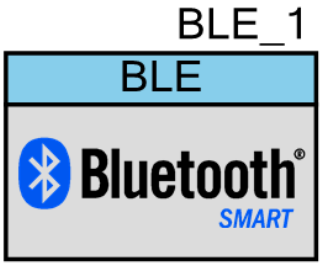
Bluetooth Low Energy (BLE)

2.30



Features

- Bluetooth v4.1 compliant protocol stack
- Generic Access Profile (GAP) Features
  - Broadcaster, Observer, Peripheral and Central roles
  - Supports role reversal between Peripheral and Central
  - User-defined advertising data
  - Bonding support for up to four devices
  - Security modes 1 and 2
- Generic Attribute Profile (GATT) Features
  - GATT Client and Server
  - 16-, 32-, and 128-bit UUIDs
- Special Interest Group (SIG) adopted GATT-based Profiles and Services, and quick prototype of new profile design through intuitive GUI Custom Profile development
- Security Manager features
  - Pairing methods: Just works, Passkey Entry, Out of Band
  - Authenticated man-in-the-middle (MITM) protection and data signing
- Logical Link Adaption Protocol (L2CAP) Connection Oriented Channel
- Link Layer (LL) Features
  - Master and Slave role
  - 128-bit AES encryption
  - Low Duty Cycle Advertising
  - LE Ping

General Description

The Bluetooth Low Energy (BLE) Component provides a comprehensive GUI-based configuration window to facilitate designing applications requiring BLE connectivity. The Component incorporates a Bluetooth Core Specification v4.1 compliant protocol stack and provides APIs to enable user applications to access the underlying hardware via the stack.

When to use the BLE Component

BLE is used in very low power Wireless Personal Area Network (WPAN) and Internet of Things (IoT) solutions aimed for low-cost battery operated devices that can quickly connect and form simple wireless links. Target applications include HID, remote controls, sports and fitness monitors, portable medical devices and smart phone accessories, among many others that are being added to a long list of BLE supporting solutions.

Bluetooth Qualification

BLE solutions provided by Cypress are listed on the Bluetooth SIG website as certified solutions. The qualification is modular, allowing greater flexibility to customers. The following is the list of Qualified Design IDs (QD ID) and Declaration IDs.

QD ID(s)	Declaration ID#	Description
63199	D025070	Profiles supported by BLE Component in PSoC Creator
73181	D026298	
61908	D024756	Host
62243	D024755	Link Layer
62245	D024754	RF-PHY for 56-QFN package
63368	D025068	RF-PHY for 68-ball WLCSP package
62887	D024757	PSoC 4 BLE and PRoC BLE end product (56-QFN package)
63683	D025069	PSoC 4 BLE and PRoC BLE end product (68-ball WLCSP package)

SIG adopted Profiles and Services

The BLE Component supports numerous SIG-adopted GATT-based Profiles and Services. Each of these can be configured for either a GATT Client or GATT Server. The Component generates all the necessary code for a particular Profile/Service operation, as configured in the component Configure dialog.

The component can also support several Profiles at a time by adding the required Services of a Profile to a base Profile. For example, you can select HID as a base Profile. Then to add a Find Me Profile, add the Immediate Alert Service to the HID Profile.

See BLE Service-Specific APIs for a list of supported Profiles and Services.

Comprehensive APIs

The BLE Component provides application-level APIs to design solutions without requiring manual stack level configuration. The BLE Component API documentation is also provided in a separate HTML-based file.

Custom Profiles

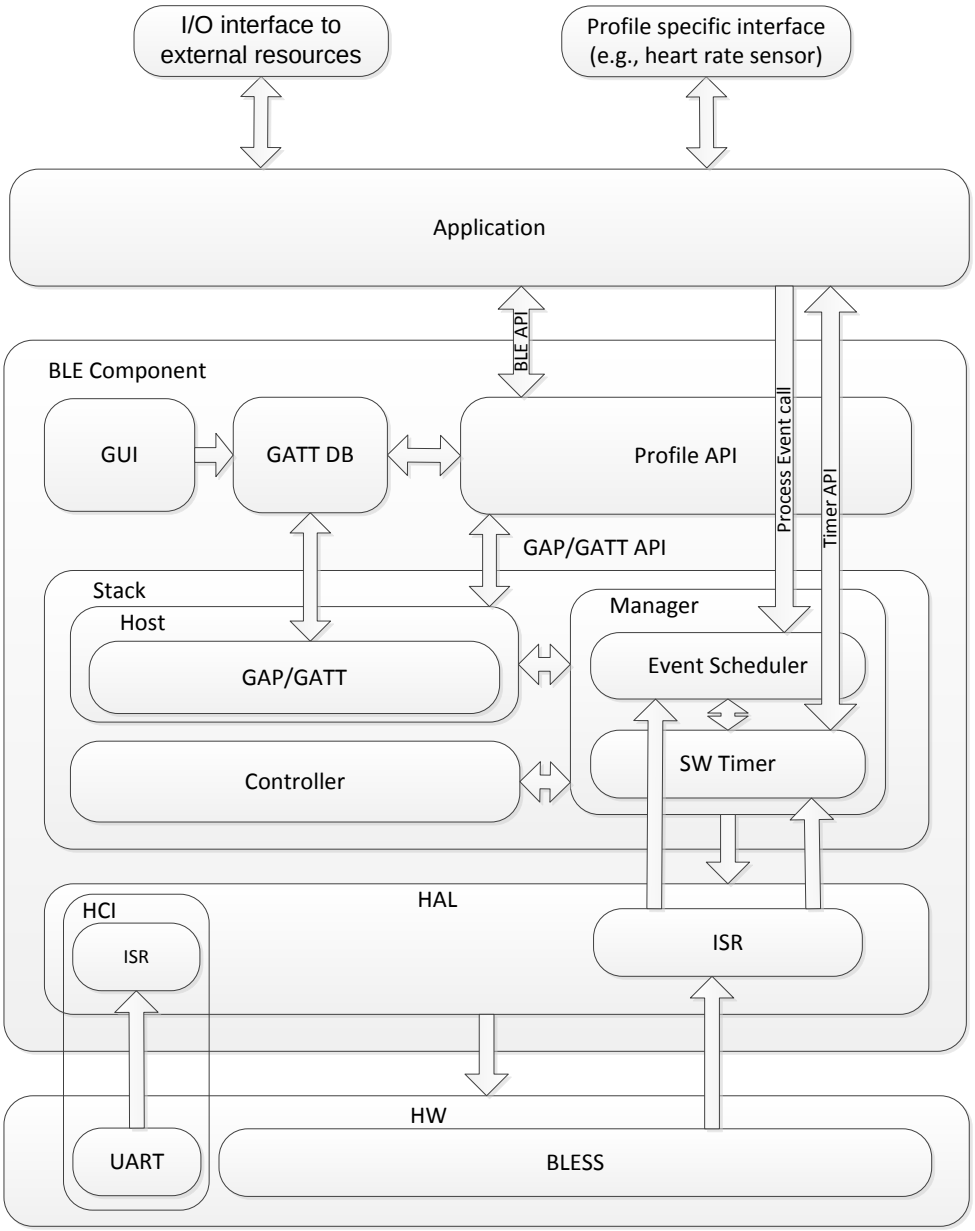
You can create custom Profiles that use existing Services, and you can create custom Services with custom Characteristics and Descriptors. There are no restrictions for GAP roles for a custom Profile.

Debug Support

For testing and debugging, the Component can be configured to HCI mode through a Component embedded UART. For over-the-air verification, Cypress CySmart verification tool can be used for generic Bluetooth host stack emulation. To launch this tool, right click on the Component to bring up the context menu, and choose to deploy the CySmart tool.

BLE Component Architecture

The BLE Component consists of the BLE Stack, BLE Profile, BLE Component Hardware Abstraction Layer (HAL), and the Link Layer. The following figure shows a high-level architecture of the BLE Component, illustrating the relationship between each of the layers and the route in which the application interacts with the Component. Note that the application is informed of the BLE events through the use of callback functions. You may build your state machine using these. Refer to the Callback Functions section for more details.

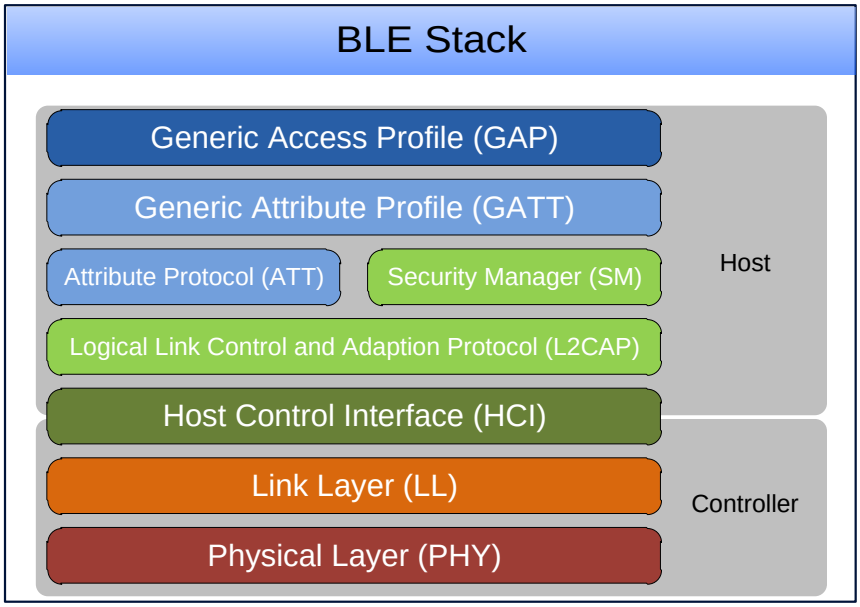


The following sub-sections give an overview of each of these layers.

BLE Stack

The BLE stack implements the core BLE functionality as defined in the Bluetooth Core Specification 4.1. The stack is included as a precompiled library and it is embedded inside the BLE Component.

The BLE stack implements all the mandatory and optional features of Low Energy Single Mode compliant to Bluetooth Core Specification 4.1. The BLE Stack implements a layered architecture of the BLE protocol stack as shown in the following figure.



Generic Access Profile (GAP)

The Generic Access Profile defines the generic procedures related to discovery of Bluetooth devices and link management aspects of connecting to Bluetooth devices. In addition, this profile includes common format requirements for parameters accessible on the user interface level.

The Generic Access Profile defines the following roles when operating over the LE physical channel:

- **Broadcaster role:** A device operating in the Broadcaster role can send advertising events. It is referred to as a Broadcaster. It has a transmitter and may have a receiver.
- **Observer role:** A device operating in the Observer role is a device that receives advertising events. It is referred to as an Observer. It has a receiver and may have a transmitter.

- **Peripheral role:** A device that accepts the establishment of an LE physical link using any of the connection establishment procedures is termed to be in a "Peripheral role." A device operating in the Peripheral role will be in the "Slave role" in the Link Layer Connection State. A device operating in the Peripheral role is referred to as a Peripheral. A Peripheral has both a transmitter and a receiver.
- **Central role:** A device that supports the Central role initiates the establishment of a physical connection. A device operating in the "Central role" will be in the "Master role" in the Link Layer Connection. A device operating in the Central role is referred to as a Central. A Central has a transmitter and a receiver.

Generic Attribute Profile (GATT)

The Generic Attribute Profile defines a generic service framework using the ATT protocol layer. This framework defines the procedures and formats of services and their Characteristics. It defines the procedures for Service, Characteristic, and Descriptor discovery, reading, writing, notifying, and indicating Characteristics, as well as configuring the broadcast of Characteristics.

GATT Roles

- GATT Client: This is the device that wants data. It initiates commands and requests towards the GATT Server. It can receive responses, indications, and notifications data sent by the GATT Server.
- GATT Server: This is the device that has the data and accepts incoming commands and requests from the GATT Client and sends responses, indications, and notifications to a GATT Client.

The BLE Stack supports both roles simultaneously for a custom profile use case.

Attribute Protocol (ATT)

The Attribute Protocol layer defines a Client/Server architecture above the BLE logical transport channel. The attribute protocol allows a device referred to as the GATT Server to expose a set of attributes and their associated values to a peer device referred to as the GATT Client. These attributes exposed by the GATT Server can be discovered, read, and written by a GATT Client, and can be indicated and notified by the GATT Server. All the transactions on attributes are atomic.

Security Manager Protocol (SMP)

Security Manager Protocol defines the procedures and behavior to manage pairing, authentication, and encryption between the devices. These include:

- Encryption and Authentication
- Pairing and Bonding
  - Pass Key and Out of band bonding
- Key Generation for a device identity resolution, data signing and encryption
- Pairing method selection based on the IO capability of the GAP central and GAP peripheral device

Logical Link Control Adaptation Protocol (L2CAP)

L2CAP provides a connectionless data channel. LE L2CAP provides the following features:

- Channel multiplexing, which manages three fixed channels. Two channels are dedicated for higher protocol layers like ATT, SMP. One channel is used for the LE-L2CAP protocol signaling channel for its own use.
- Segmentation and reassembly of packets whose size is up to the BLE Controller managed maximum packet size.
- Connection-oriented channel over a specific application registered using the PSM (protocol service multiplexer) channel. It implements credit-based flow control between two LE L2CAP entities. This feature can be used for BLE applications that require transferring large chunks of data.

Host Controller Interface (HCI)

The HCI layer implements a command, event, and data interface to allow link layer access from upper layers such as GAP, L2CAP, and SMP.

Link Layer (LL)

The LL protocol manages the physical BLE connections between devices. It supports all LL states such as Advertising, Scanning, Initiating, and Connecting (Master and Slave). It implements all the key link control procedures such as LE Encryption, LE Connection Update, LE Channel Update, and LE Ping. The Link Layer is a hardware-firmware co-implementation, where the key time critical LL functions are implemented in the LL hardware. The LL firmware maintains and controls the key LL procedure state machines. It supports all the BLE chip specific low power modes.

The BLE Stack is a pre-compiled library in the BLE Component solution. The appropriate configuration of the BLE Stack library is linked during a build process based on application. The

BLE Stack libraries are ARM Embedded Application Binary Interface (eabi) compliant and they are compiled using ARM compiler version 5.03.

The following table shows the mapping between the BLE Stack library to the user-configured Profile Role in Profile Mode or HCI Mode. Refer to the Generic Tab section for selection of stack configuration.

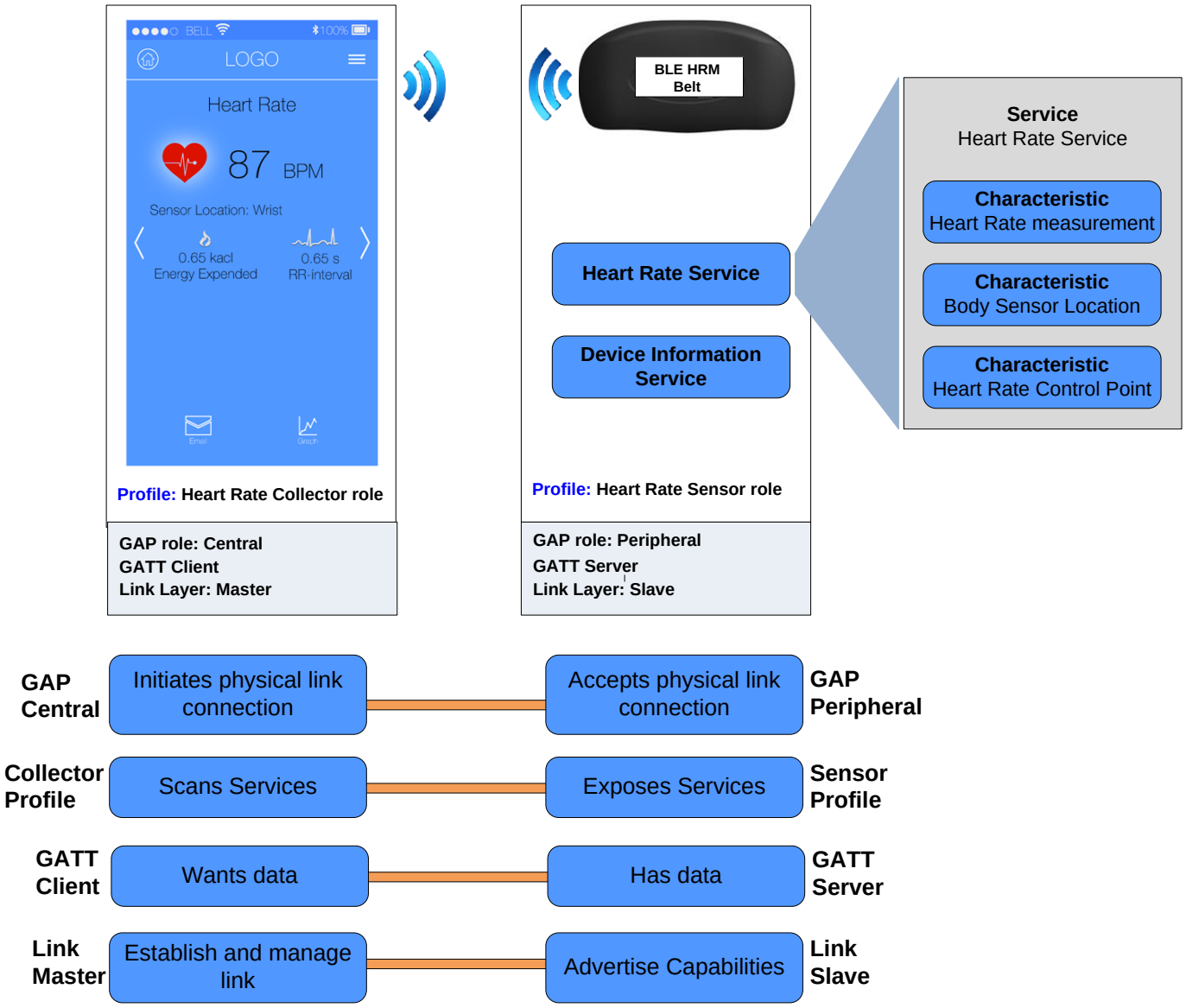
BLE Component Configuration	GAP Role	BLE Stack Library
BLE Profile	Central + Peripheral	CyBLEStack_BLE_SOC_CENTRAL_PERIPHERAL.a
BLE Profile	Central	CyBLEStack_BLE_SOC_CENTRAL.a
BLE Profile	Peripheral	CyBLEStack_BLE_SOC_PERIPHERAL.a
Broadcaster/Observer	Broadcaster	CyBLEStack_BLE_SOC_PERIPHERAL.a
Broadcaster/Observer	Observer	CyBLEStack_BLE_SOC_CENTRAL.a
HCI Mode	N/A	CyBLEStack_HCI_MODE_CENTRAL_PERIPHERAL.a

Profile Layer

In BLE, data is organized into concepts called Profiles, Services, and Characteristics.

- A **Profile** describes how devices connect to each other to find and use Services. It is a definition used by Bluetooth devices to describe the type of application and the general expected behavior of that device. See the Profile parameter for how to configure to the BLE Component.
- A **Service** is a collection of data entities called Characteristics. A Service is used to define a certain function in a Profile. A Service may also define its relationship to other Services. A Service is assigned a Universally Unique Identifier (UUID). This is 16 bits for SIG adopted Services and 128 bits for custom Services. See the Toolbar section for information about adding Services to a Profile.
- A **Characteristic** contains a Value and the Descriptor that describes a Characteristic Value. It is an attribute type for a specific piece of information within a Service. Like a Service, each Characteristic is designated with a UUID; 16 bits for SIG adopted Characteristics and 128 bits for custom Characteristics. See the Toolbar section for information about adding Characteristics and Descriptors.

The following diagram shows the relationship between Profiles, Services, and Characteristics in a sample BLE heart rate monitor application using a Heart Rate Profile.



The Heart Rate Profile contains a Heart Rate Service and a Device Information Service. Within the Heart Rate Service, there are three Characteristics, each containing different information. The device in the diagram is configured as a Sensor role, meaning that in the context of the Heart Rate Profile, the device is a GAP Peripheral and a GATT Server. These concepts are explained in the BLE Stack description.

The Profile layer is generated by PSoC Creator using the parameter configurations specified in the GUI. The Profile implements the Profile specific attribute database and APIs required for the application. You can choose to configure the standard SIG adopted Profile and generate a

design or define a Custom Profile required by an application. The GUI also allows import/export of a Profile design in XML format for Profile design reuse.

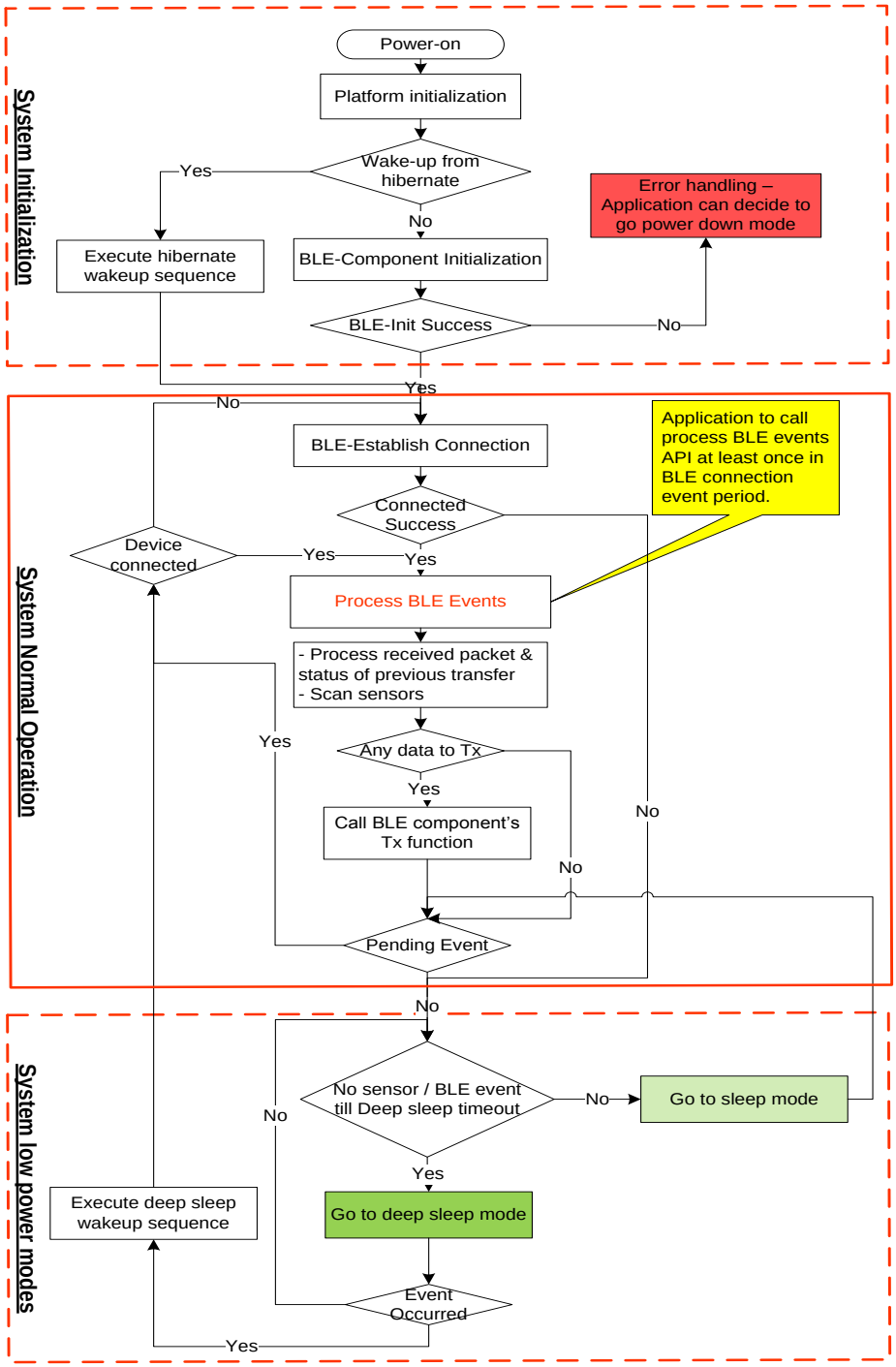
Hardware Abstraction Layer (HAL)

The HAL implements the interface between the BLE stack and the underlying hardware. This layer is meant for the stack only and is not advisable to modify it.

Functional Description

Operation Flow

A typical application code consists of three separate stages: Initialization, Normal operation, and Low power operation.



Once the Component is initialized, it enters normal operation and periodically enters various degrees of low power operation to conserve power. Hence initialization should only happen at system power-up, and the Component should operate between normal mode and low power mode afterwards.

System Initialization

The initialization stage happens at system power-up or when waking from system hibernation. This stage sets up the platform and the Component parameters. The application code should also start the Component and set up the callback functions for the event callbacks that will happen in the other modes of operation.

System Normal Operation

Upon successful initialization of the BLE Component or hibernate wakeup sequence, the Component enters normal mode. Normal operation first establishes a BLE connection if it is not already connected. It should then process all pending BLE events by checking the stack status. This is accomplished by calling CyBle_ProcessEvents(). When all events have been processed, it can transmit any data that need to be communicated and enters low power operation unless there is another pending event. In such a case, it should execute the normal operation flow again. Processing of BLE events should be performed at least once in a BLE connection event period. The BLE connection event is configured by application using the customizer.

System Low power Operation

When there are no pending interrupts in Normal operation, the Component should be placed in low power mode. It should first enter sleep mode. After a certain application defined timeout, you may place the Component in Deep Sleep Mode. If an event happens at any time in low power mode, it should re-enter normal operation.

Note The MCU and BLE Sub-System (BLESS) have separate power modes and are able to go to different power modes independent of each other. The check marks in the following table show the possible combination of power modes of MCU and BLESS.

BLESS Power Modes	PSoC 4200-BL, PRoC 4200-BL MCUs Power Modes				
	Active	Sleep	Deep Sleep	Hibernate	Off
Active (idle/Tx/Rx)	✓	✓			
Sleep	✓	✓			
Deep Sleep (ECO off)	✓	✓	✓		
Off				✓	✓

Callback Functions

The BLE Component requires that you define a callback function for handling BLE stack events. This is passed as a parameter to the CyBle_Start() API. The callback function is of type CYBLE_CALLBACK_T, as defined by:

```
void (* CYBLE_CALLBACK_T)(uint32 eventCode, void *eventParam);
```

- eventCode: The stack event code
- eventParam : Stack event parameters

The callback function should then evaluate the eventCode (and eventParam for certain events) and provide stack event-specific actions. Hence the events are used to build your application specific state machine for general events such as advertisement, scan, connection and timeout. Refer to the BLE Common Events section for the BLE stack events.

Similarly, you will need to provide a callback function for each Service that you wish to use. This function is also of type CYBLE_CALLBACK_T and is passed as a parameter to the Service-specific callback registration function. The callback function is used to evaluate the Service-specific events and to take appropriate action as defined by your application. Then a Service specific state machine can be built using these events. Refer to the BLE Service-Specific Events section for the BLE Service-specific events.

Device Bonding

The BLE Component will store the link key of a connection after pairing with the remote device. If a connection is lost and re-established, the devices will use the previously stored key for the connection.

The BLE stack will update the bonding data in RAM while the devices are connected. If the bonding data is to be retained during shutdown, the application can use CyBle_StoreBondingData() API to write the bonding data from RAM to the dedicated Flash location, as defined by the Component. Refer to the BLE_HID_Keyboard example project for usage details.

Notes

- For BLE devices with 128 K of Flash memory, the Flash write modifies the IMO of the chip to 48 MHz temporarily during the write cycle. Therefore, you should only perform the bonding data Flash storage while the BLE devices are disconnected, because the change in IMO will disrupt the communication. Likewise, you should either temporarily halt all peripherals running off of the IMO or compensate for the brief frequency change during the Flash write cycle.
- If BLE device with 128 K of Flash memory, is configured to run at 48 MHz, then the IMO does not change and does not affect other peripherals. However, the Flash write is a blocking call and may disrupt the BLE communication. Therefore, it is advisable to perform the Flash write while the devices are disconnected.

LFCLK configuration

The LFCLK configuration as set in the **Clocks** tab of the Design-Wide Resources (*<project>.cydwr*) file affects the BLE Component's ability to operate in Deep Sleep Mode. If the WCO is chosen, then the Component Deep Sleep Mode is available for use. However, if the ILO is chosen, then the Component cannot enter Deep Sleep.

Note The LFCLK is used in the BLE Component only during Deep Sleep Mode and hence the ILO inaccuracy does not affect the BLE communication.

Unsupported Features

The BLE Component stack does not support the following optional Bluetooth v4.1 protocol features, as listed in Vol 6, Part B, section 4.6 of the specification:

- Connection Parameters Request Procedure (Vol 6, Part B, section 4.6.2)
- Extended Reject Indication (Vol 6, Part B, section 4.6.3)
- Slave-initiated Features Exchange (Vol 6, Part B, section 4.6.4)

Input/Output Connections

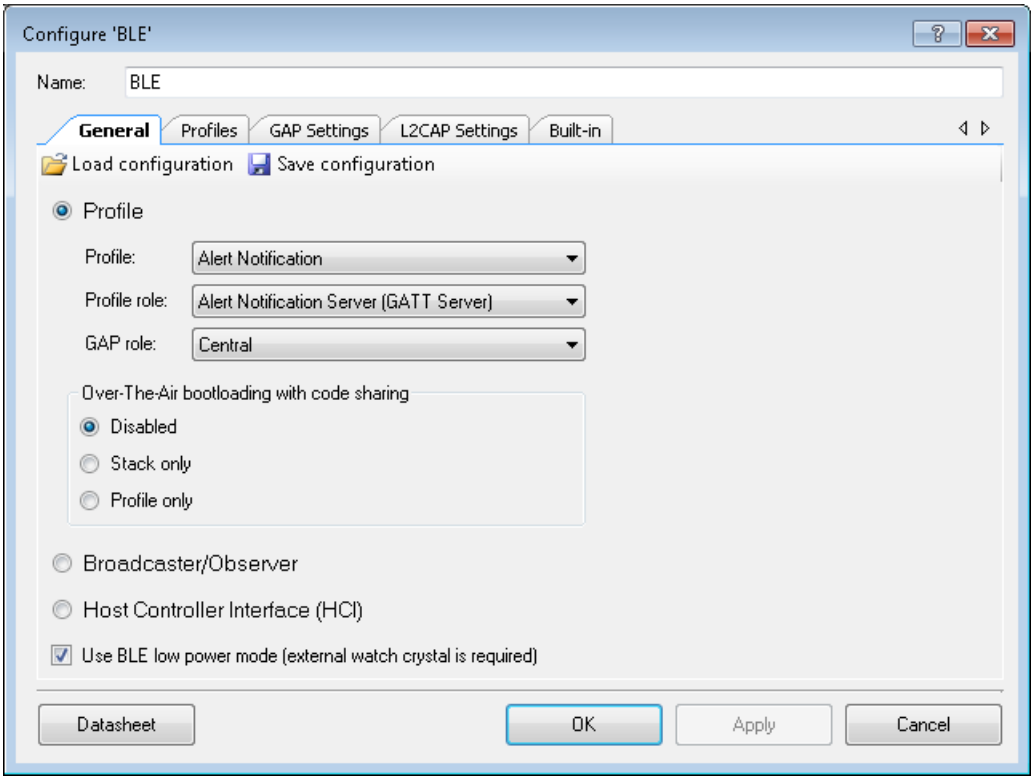
This Component does not require hardware terminals. All the hardware connections are direct and dedicated to specific pins in the underlying BLE hardware.

Component Parameters

Drag a BLE Component onto your design and double-click it to open the Configure dialog. This dialog has the following tabs with different parameters.

General Tab

The **General** tab allows general configuration of the BLE Component. This tab contains tools to load and save configurations, three main areas for the type of configuration, and an option to use low power mode.



Load Configuration/Save Configuration

Use the **Load Configuration** button to load the previously saved xml Component configuration; use the Save Configuration button to save the current configuration for use in other designs. It is possible to import and export the customizer configuration in xml format.

Mode Selection

On the main part of this tab, there are three options to select a mode:

- Profile
- Broadcaster/Observer

- Host Controller Interface

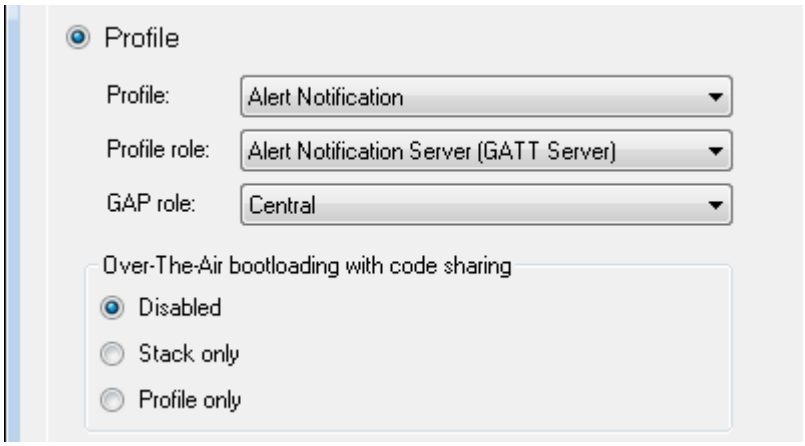
Use BLE low power mode

There is also a parameter that identifies if the low power mode support is required for the BLE component. Default: true.

When this parameter is set, WCO must be selected as the LFCLK source in the Design-Wide Resources Clock Editor. This configuration is a requirement if you intend to use the Component in the low power mode.

General Tab – Profile

The Profile mode is used to select the target Profile, Profile role, and GAP role, as well as Over-The-Air (OTA) Bootloading options.



Profile

The **Profile** option is used to choose the target Profile from a list of supported Profiles. See Profile, Service, and Characteristic. The following Profiles are available for selection:

Alert Notification

This Profile enables a GATT Client device to receive different types of alerts and event information, as well as information on the count of new alerts and unread items, which exist in the GATT Server device.

- **Alert Notification Server** Profile role – Specified as a GATT Server. Requires the following Service: **Alert Notification Service**.
  - Central GAP role
  - Peripheral and Central GAP role

- **Alert Notification Client** Profile role – Specified as a GATT Client.
  - Peripheral GAP role
  - Peripheral and Central GAP role

Blood Pressure

This Profile enables a device to connect and interact with a Blood Pressure Sensor device for use in consumer and professional health care applications.

- **Blood Pressure Sensor** Profile role – Specified as a GATT Server. Requires the following Services: **Blood Pressure Service**, **Device Information Service**.
  - Peripheral GAP role
- **Blood Pressure Collector** Profile role – Specified as a GATT Client. Requires support of the following Services: **Blood Pressure Service**. Support of **Device Information Service** is optional.
  - Central GAP role

Continuous Glucose Monitoring

This Profile enables a device to connect and interact with a Continuous Glucose Monitoring Sensor device for use in consumer healthcare applications.

- **Continuous Glucose Monitoring Sensor** Profile role – Specified as a GATT Server. Requires the following Services: **Continuous Glucose Monitoring Service**, **Device Information Service**. Optionally may include **Bond Management Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Services: **Continuous Glucose Monitoring Service**. Support of **Bond Management Service** and **Device Information Service** is optional.
  - Central GAP role

Cycling Power

This Profile enables a Collector device to connect and interact with a Cycling Power Sensor for use in sports and fitness applications.

- **Cycling Power Sensor** Profile role – Specified as a GATT Server. Requires the following Service: **Cycling Power Service**. Optionally may include **Device Information Service** and **Battery Service**.
  - Peripheral GAP role
- **Cycling Power Broadcaster** Profile role. Requires the following Service: **Cycling Power Service**.
  - Broadcaster GAP role
- **Cycling Power Observer** Profile role. Can only talk to a device with the **Cycling Power Broadcaster** role. Requires support of the following Service: **Cycling Power Service**.
  - Observer GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Service: **Cycling Power Service**. Support of **Device Information Service** and **Battery Service** is optional.
  - Central GAP role

Cycling Speed and Cadence

This Profile enables a Collector device to connect and interact with a Cycling Speed and Cadence Sensor for use in sports and fitness applications.

- **Cycling Speed and Cadence Sensor** Profile role – Specified as a GATT Server. Requires the following Service: **Cycling Speed and Cadence Service**. Optionally may include **Device Information Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Service: **Cycling Speed and Cadence Service**. Support of **Device Information Service** is optional.
  - Central GAP role

Environmental Sensing Profile

This Profile enables a Collector device to connect and interact with an Environmental Sensor for use in outdoor activity applications.

- **Environmental Sensor** Profile role – Specified as a GATT Server. Requires the following Service: **Environmental Sensing Service**. Optionally may include **Device Information Service** and **Battery Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Service: **Environmental Sensing Service**. Support of **Device Information Service** and **Battery Service** is optional.
  - Central GAP role

Find Me

The Find Me Profile defines the behavior when a button is pressed on one device to cause an alerting signal on a peer device.

- **Find Me Target** Profile role – Specified as a GATT Server. Requires the following Service: **Immediate Alert Service**.
  - Peripheral GAP role
  - Central GAP role
  - Peripheral and Central GAP roles
- **Find Me Locator** Profile role – Specified as a GATT Client. Requires support of the following Service: **Immediate Alert Service**.
  - Peripheral GAP role
  - Central GAP role
  - Peripheral and Central GAP roles

Glucose

This Profile enables a device to connect and interact with a Glucose Sensor for use in consumer healthcare applications.

- **Glucose Sensor** Profile role – Specified as a GATT Server. Requires the following Services: **Glucose Service**, **Device Information Service**.
  - Peripheral GAP role

- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Service: **Glucose Service**. Support of **Device Information Service** is optional.
  - Central GAP role

Health Thermometer

This Profile enables a Collector device to connect and interact with a Thermometer sensor for use in healthcare applications.

- **Thermometer** Profile role – Specified as a GATT Server. Requires the following Services: **Health Thermometer Service**, **Device Information Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Service: **Health Thermometer Service**. Support of **Device Information Service** is optional.
  - Central GAP role

Heart Rate

This Profile enables a Collector device to connect and interact with a Heart Rate Sensor for use in fitness applications.

- **Heart Rate Sensor** Profile role – Specified as a GATT Server. Requires the following Services: **Heart Rate Service**, **Device Information Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Service: **Heart Rate Service**. Support of **Device Information Service** is optional.
  - Central GAP role

HID over GATT

This Profile defines how a device with BLE wireless communications can support HID Services over the BLE protocol stack using the Generic Attribute Profile.

- **HID Device** Profile role – Specified as a GATT Server. Requires the following Services: **HID Service**, **Battery Service**, and **Device Information Service**. Optionally may include **Scan Parameters Service** as part of the **Scan Server** role of the **Scan Parameters**

Profile. **HID Device** supports multiple instances of **HID Service** and **Battery Service** and may include any other optional Services.

  - Peripheral GAP role

- **Boot Host** Profile role – Specified as a GATT Client. Requires support of the following Service: **HID Service**. Support of **Battery Service** and **Device Information Service** is optional.
  - Central GAP role
- **Report Host** Profile role – Specified as a GATT Client. Requires support of the following Services: **HID Service**, **Battery Service**, **Device Information Service**. Support of **Scan Client** role of the **Scan Parameters** is optional.
  - Central GAP role
- **Report and Boot Host** Profile role – Specified as a GATT Client. Requires support of the following Services: **HID Service**, **Battery Service**, **Device Information Service**. Support of **Scan Client** role of the **Scan Parameters** is optional.
  - Central GAP role

Internet Protocol Support

This Profile provides the support of exchanging IPv6 packets between devices over the Bluetooth Low Energy transport. The IPSP defines two roles – Node role and Router role. A device may support both Node role and Router role. A device supporting the Node role is likely to be a sensor or actuator. A device supporting the Router role is likely to be an Access Point (such as home router, mobile phone, or similar).

- **Node** Profile role – Specified as a GATT Server. Requires the following Service: **Internet Protocol Support Service**.
  - Peripheral GAP role
  - Peripheral and Central GAP role
- **Router** Profile role – Specified as a GATT Client. Requires support of the following Services: **Internet Protocol Support Service**.
  - Central GAP role
  - Peripheral and Central GAP role

Location and Navigation

This Profile enables devices to communicate with a Location and Navigation Sensor for use in outdoor activity applications.

- **Location and Navigation Sensor** Profile role – Specified as a GATT Server. Requires the following Service: **Location and Navigation Service**. Optionally may include **Device Information Service** and **Battery Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Services: **Location and Navigation Service**. Support of **Device Information Service** and **Battery Service** is optional.
  - Central GAP role

Phone Alert Status

This Profile enables a device to alert its user about the alert status of a phone connected to the device.

- **Phone Alert Server** Profile role – Specified as a GATT Server. Requires the following Services: **Phone Alert Status Service**.
  - Central GAP role
  - Peripheral and Central GAP role
- **Phone Alert Client** Profile role – Specified as a GATT Client. Requires support of the following Service: **Phone Alert Service**.
  - Peripheral GAP role
  - Peripheral and Central GAP role

Proximity

The Proximity Profile enables proximity monitoring between two devices.

- **Proximity Reporter** Profile role – Specified as a GATT Server. Requires the following Service: **Link Loss Service**. Optionally may include **Immediate Alert Service** and **Tx Power Service** if both are used. Using only one of the optional Services is not allowed.
  - Peripheral GAP role
  - Central GAP role

- **Proximity Monitor** Profile role – Specified as a GATT Client. Requires support of the following Services: **Link Loss Service**. Support of **Immediate Alert Service** and **Tx Power Service** is optional. Same restrictions apply as to **Proximity Reporter**.
  - Central GAP role
  - Peripheral GAP role
  - Peripheral and Central GAP role

Running Speed and Cadence

This Profile enables a Collector device to connect and interact with a Running Speed and Cadence Sensor for use in sports and fitness applications.

- **Running Speed and Cadence Sensor** Profile role – Specified as a GATT Server. Requires the following Service: **Running Speed and Cadence Service**. Optionally may include **Device Information Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client. Requires support of the following Services: **Running Speed and Cadence Service**. Support of **Device Information Service** is optional.
  - Central GAP role

Scan Parameters

This Profile defines how a Scan Client device with BLE wireless communications can write its scanning behavior to a Scan Server, and how a Scan Server can request updates of the Scan Client scanning behavior.

- **Scan Server** Profile role – Specified as a GATT Server. Requires the following Service: **Scan Parameters Service**.
  - Peripheral GAP role
- **Scan Client** Profile role – Specified as a GATT Client. Required support of the following Service: **Scan Parameters Service**.
  - Central GAP role

Time

The Time Profile enables the device to get the date, time, time zone, and DST information and control the functions related to time.

- **Time Server** Profile role – Specified as a GATT Server. Requires the following Service: **Current Time Service**. Optionally may include **Next DST Change Service** and **Reference Time Update Service**.
  - Central GAP role
  - Peripheral and Central GAP role
- **Time Client** Profile role – Specified as a GATT Client. Requires support of the following Service: **Current Time Service**. Support of **Next DST Change Service** and **Reference Time Update Service** is optional.
  - Peripheral GAP role
  - Peripheral and Central GAP role

Weight Scale

The Weight Scale Profile is used to enable a data collection device to obtain data from a Weight Scale that exposes the Weight Scale Service.

- **Weight Scale** Profile role – Specified as a GATT Server, and may be also a GATT Client.

  Requires the following Services: **Weight Scale Service** and **Device Information Service**.

  Optionally may include: **User Data Service**, **Body Composition Service**, **Battery Service** and **Current Time Service**.
  - Peripheral GAP role
- **Collector** Profile role – Specified as a GATT Client, and may be also a GATT Service.

  Required support of the following Service: **Weight Scale Service** and **Device Information Service**.

  Support of **User Data Service**, **Body Composition Service**, **Battery Service** and **Current Time Service** is optional.
  - Central GAP role

Wireless Power Transfer

The Wireless Power Transfer Profile enables communication between Power Receiver Unit and Power Transmitter Unit in the Wireless Power Transfer systems.

- **Power Receiver Unit** Profile role – Specified as a GATT Server. Requires the following Service: **Wireless Power Transfer**.
  - Peripheral GAP role
- **Power Transmitter Unit** Profile role – Specified as a GATT Client. Requires support of the following Service: **Wireless Power Transfer**.
  - Central GAP role

Custom

Used to create a custom Profile. This Profile mode allows you to add in a **Custom Service** and gives control over the Service types. Custom Services cannot be used in stand-alone mode; they need to be used in a Profile. For example, the Device Information Service is used in the Heart Rate Profile. It can be used in a custom Profile, or it can be added to any of existing Profiles.

Note The Apple Notification Center Service is not included into any Bluetooth SIG adopted Profiles, so it can be used only within custom Profile.

- **Server (GATT Server)** Profile role
  - Peripheral GAP role
  - Central GAP role
  - Peripheral and Central GAP roles
- **Client (GATT Client)** Profile role
  - Peripheral GAP role
  - Central GAP role
  - Peripheral and Central GAP roles
- **Client and Server (GATT Client and Server)** Profile role
  - Peripheral GAP role
  - Central GAP role
  - Peripheral and Central GAP roles

Bootloader Profile

The component also has support for a Bootloader Profile and Bootloader Service, which allows a Bootloader component to update the existing firmware on the Cypress BLE device. The Bootloader Service uses the Bluetooth Low Energy interface as a communication interface. It can be added to any of the profiles if the design requires updating the firmware Over-the-Air (OTA).

The Bootloader Service is designed to be used with the Cypress Bootloader/Bootloadable components and therefore it uses the characteristic structure compatible with the Bootloader component command format.

Profile Role

The **Profile role** parameter configuration depends on the chosen **Profile**, and the **Profile role** selection affects the **GAP role** parameter. These parameters affect the options available on the **Profiles** tab.

- **GATT Server –** Defines the role of the device that contains a specific data in a structured form. The device in this role is usually a sensor that gets the data. The data is structured in the GATT database. BLE Profiles can introduce their own names to identify GATT Server device (e.g. Find Me Profile uses “Find Me Target”). GATT Server devices usually utilize the GAP Peripheral role.
- **GATT Client –** Defines the role of the device that generates requests to the GATT Server device to fetch data. BLE Profiles can introduce their own names to identify GATT Client device (e.g. Find Me Profile uses “Find Me Locator”). GATT Client devices usually utilize the GAP Peripheral role.
- **Client and Server –** Defines the role of the device that concurrently can perform functionality of a GATT Client and Server Profile role. A device in this role should be configured for Peripheral and Central GAP role. For example, a peripheral device can act as a GATT Client and start discovering the iOS device's (acting as GATT Server) Services (Battery, Time and Apple Notification Central Service).

Gap Role

The **GAP role** parameter can take the following values:

- **Peripheral** – Defines a device that advertises using connectable advertising packets and so becomes a slave once connected. Peripheral devices need a Central device, as the Central device initiates connections. Through the advertisement data, a Peripheral device can broadcast the general information about a device.
- **Central** – Defines a device that initiates connections to peripherals and will therefore become a master when connected. Peripheral devices need a Central device, as the Central device initiates connections.

- **Peripheral and Central** – In this role, the application can perform role reversal between Peripheral and Central roles at run time. For example, Bluetooth Smart watch (Peripheral) can connect to a smartphone (Central device). The same sports watch can then switch to the Central device mode to obtain data from other Peripheral devices such as a heart rate monitor and a blood pressure sensor.

Over-The-Air bootloading with code sharing

This option is used in the over-the-air (OTA) implementation. It allows you to share the BLE component code between two component instances: one instance with profile-specific code and one with the stack. This parameter allows you to choose between the following options:

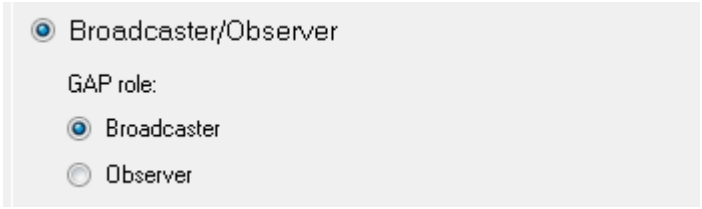
- **Disabled** – This option disables the OTA feature.
- **Stack only** – When this option is selected, the component represents only the stack portion of BLE along with a Bootloader Service. It is used to isolate the stack from the profiles. In this mode, the **Profile configuration** fields are disabled and the **Profiles** tab configuration is non-editable.

  The **Stack only** mode is used in the BLE OTA Upgradable Stack Example.

  Note This mode requires approximately 3024 additional bytes of heap memory. If there is not enough heap memory, the BLE component will not work. The Heap size property can be modified in the PSoC Creator Design-Wide Resources System Editor. See the PSoC Creator Help for more information.
- **Profile only** – This option makes the component only have the profile-specific code. Stack is excluded.
  - Stack dependency – This field allows you to associate a **Profiles only** project with the **Stack only** project. Each project configured in the **Stack only** mode during the build generates the .CYCSA file located in the *Generated_Source* project folder. This file needs to be referenced from the **Profiles only** project using this field.

General Tab – Broadcaster/Observer

The **Broadcaster/Observer** mode allows you to configure the device directly into one of the non-connectable GAP roles that does not require a Profile definition.

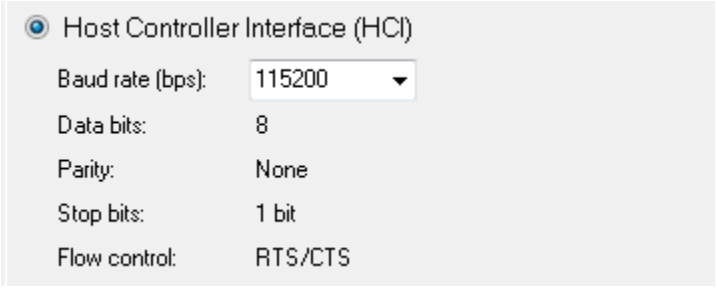


Two GAP roles are available for selection:

- **Broadcaster** – Similar to the Peripheral role, the device sends advertising data. However Broadcaster does not support connections and can only send data but not receive them.
- **Observer** – When in this role, the device scans for Broadcasters and reports the received information to an application. The Observer role does not allow transmissions.

General Tab – Host Controller Interface

Choosing this configuration places the component in HCI mode, which enables use of the device as a BLE controller. It also allows communication with a host stack using a Component embedded UART. When choosing this mode, the **Profiles** tab, **GAP Settings** tab, and **L2CAP Settings** tab become unavailable.

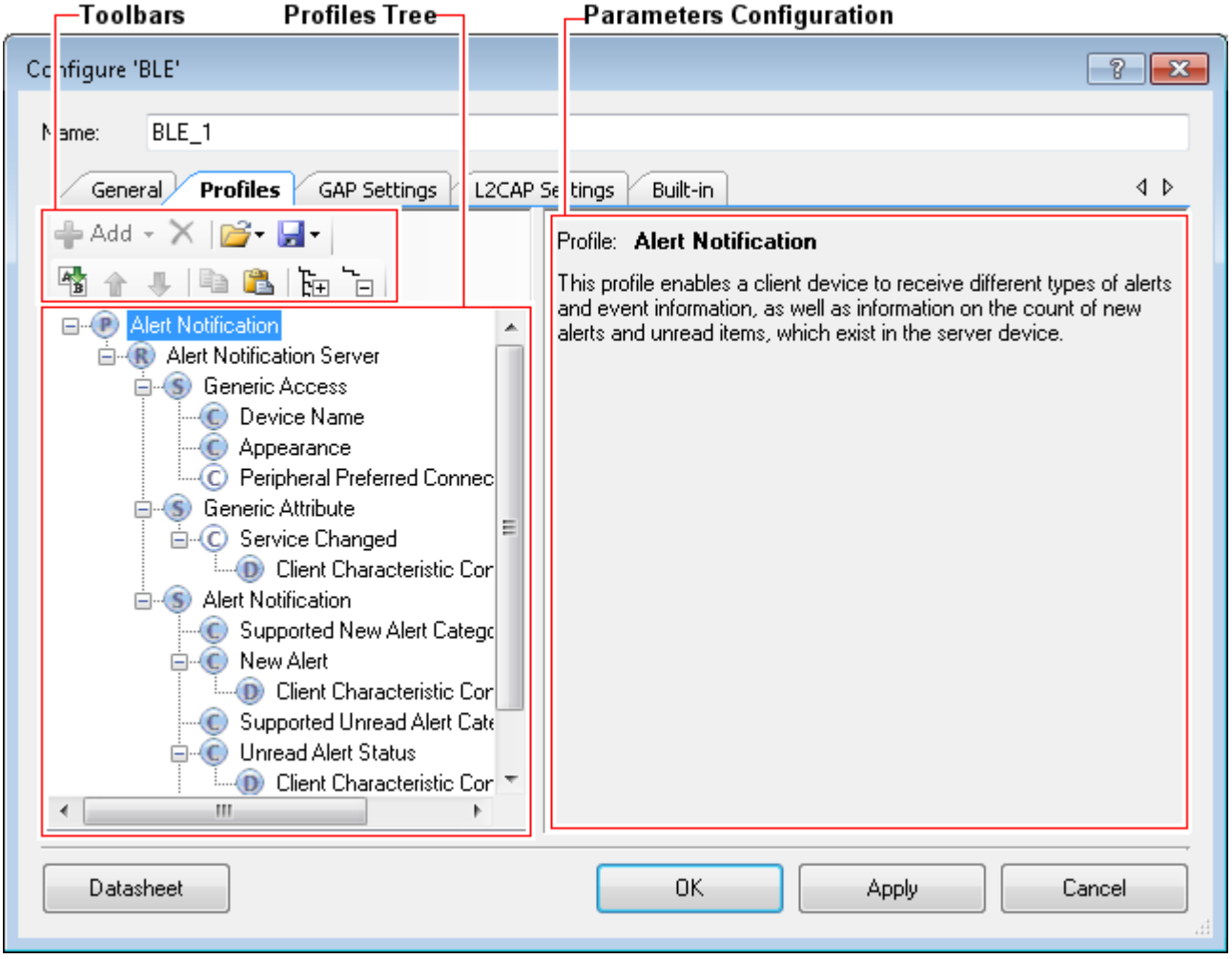


The UART is a full-duplex 8 data bit, 1 stop bit, no parity with Flow control interface. All settings except Baud rate are fixed.

- Baud rate (bps) – Configures the UART baud rate.

Profiles Tab

The **Profiles** tab is used to configure Profile-specific parameters. It is directly affected by the choice of **Profile** settings set in the **General** tab. The **Profiles** tab has 3 areas: toolbars, a Profiles tree, and a parameters configuration section.



Toolbars

The toolbars contain navigation options and a means to add or delete Services, Characteristics, and Descriptors.

- **Add Service –** This option is available when the **Profile Role** is highlighted in the Profile tree. It allows loading of Services in the selected **Profile Role**. In GATT server configuration, this option adds the selected service data to the server GATT database and enables service specific APIs. In GATT client configuration, the data structures for auto discovery of this service is created by the Component. If services that are not populated in the GUI are discovered during auto discovery, the Component ignores those service and

the application is responsible for discovering the details of such services. Refer to the Profile section for the available Services.

- **Add Characteristic –** This option is available when a Service is highlighted in the Profile tree. The Characteristic options are unique to each Service and are all loaded automatically when a Service is added to the design. The **Add Characteristic** button can be used to manually add new Characteristics to the Service. All Characteristics for the above mentioned Services plus Custom Characteristic are available for selection.
- **Add Descriptor –** This option is available when a Characteristic is highlighted in the Profile tree. Similar to the Characteristic options, Descriptor options are unique to a Characteristic and are all automatically loaded when a Characteristic is added to the design. For more information about BLE Characteristic Descriptors, refer to developer.bluetooth.org. (**Note** You should be a member of Bluetooth SIG to have full access to this site.)
- **Delete –** Deletes the selected Service, Characteristic, or Descriptor.
- **Load/Save –** Imports/Exports Profiles, Services, Characteristics, and Descriptors as shown in the tree. This functionality is independent of the **Load Configuration/Save Configuration** buttons on the **General** tab. That is, this allows you to customize this tree independent of the general settings. Each exported file type will have its own extension.

  The BLE component supports import and export of profiles in the file format of **Bluetooth Developer Studio** tool (Beta version). Use **Load BDS Profile** command to import the BDS profile and **Save Profile in BDS format** command to export the profile into the BDS file format.
- **Rename –** Renames the selected item in the Profiles tree.
- **Move Up/Down –** Moves the selected item up or down in the Profiles tree.
- **Copy/Paste –** Copies/pastes items in the Profiles tree.
- **Expand All –** Expands all items in the Profiles tree.
- **Collapse all Services –** Collapses all Services in the Profiles tree.

Profiles Tree

The Profiles tree is used to view Services, Characteristics, and Descriptors in the selected Profile. By navigating through the tree, you can quickly add, delete, or modify Services, Characteristics, and Descriptors using the toolbar buttons or the context menu. You can configure the parameters by clicking an item on the tree. These parameters will show in the Parameters Configuration section.

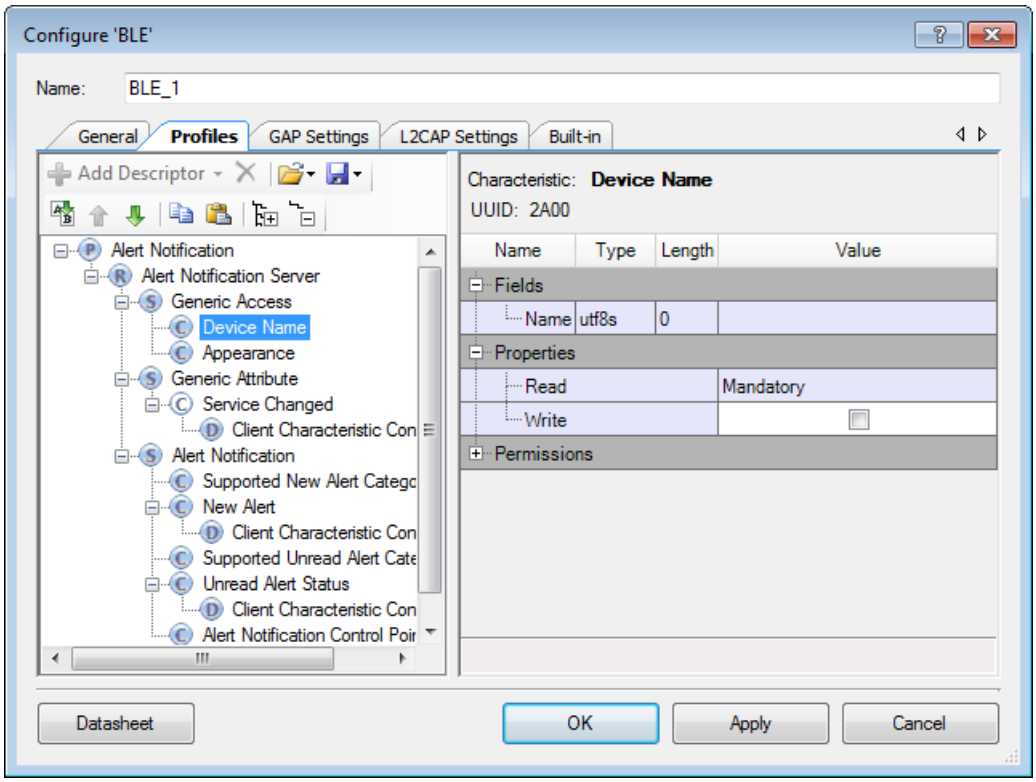
Parameters Configuration

The Parameters Configuration section allows you to configure a Service or Characteristic by selecting the type of Service or Characteristic in the tree.

Notes

- All Profiles must have a **Generic Access Service** and a **Generic Attribute Service**.
- The Service Characteristics are configurable only when the device is a GATT Server.
- The security settings located in the **GAP Settings** tab are applied globally. In addition to this, you may manually configure the security of each Characteristic/Descriptor.
- Tree node icons may have two colors: blue and white. Blue color indicates that a node is mandatory and cannot be deleted. White color indicates that a node is optional.

Generic Access Service



This Service is used to define the basic Bluetooth connection and discovery parameters. Click on the Characteristic under the **Generic Access Service** to view that particular Characteristic settings. You perform the actual Characteristics configuration in the **General** options located in the **GAP Settings** tab.

- **Device Name**: This is the name of your device. It has a read (without authentication/authorization) property associated with it by default. This parameter can be up to 248 bytes. The value comes from the **Device Name** field on the GAP Settings tab, under General.
- **Appearance**: The device's logo or appearance, which is a SIG defined 2-byte value. It has a read (without authentication/authorization) property associated with it by default. The value comes from the **Appearance** field on the GAP Settings tab, under General.
- **Peripheral Preferred Connection**: A device in the peripheral role can convey its preferred connection parameter to the peer device. This parameter is 8 bytes in total and is composed of the following sub-parameters.

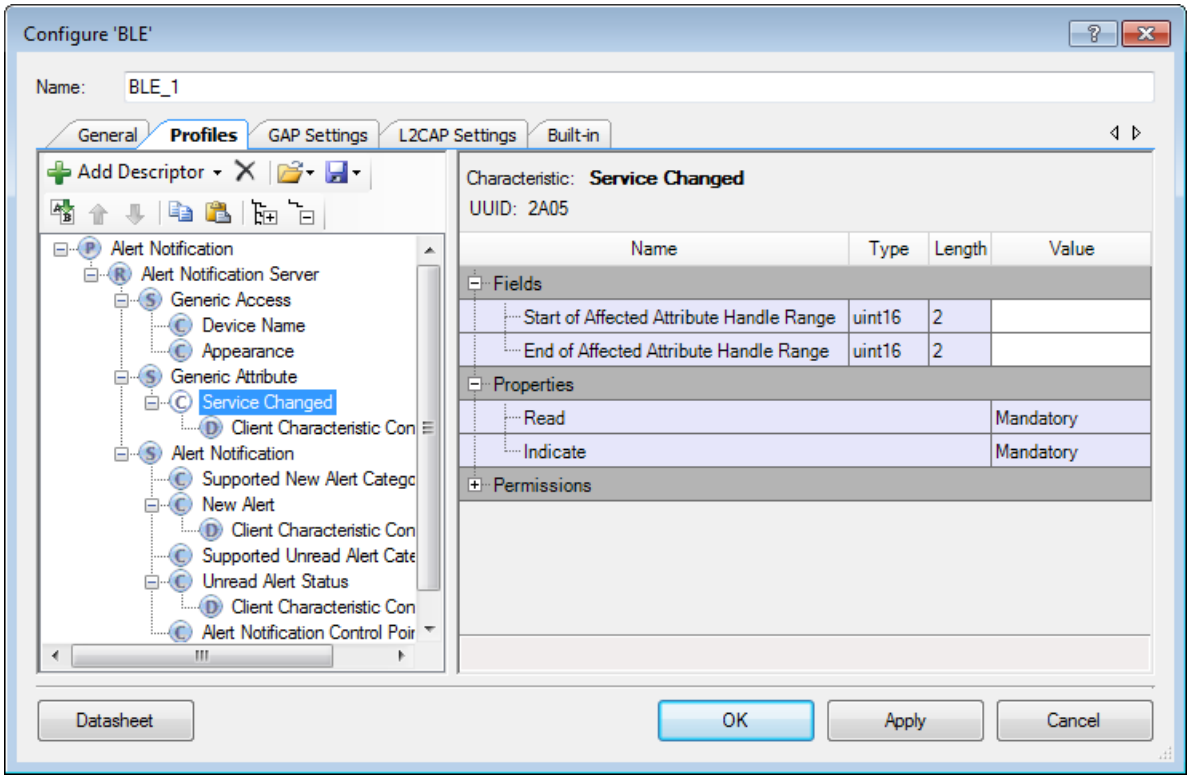
  Note This parameter is read-only and is derived from the **GAP Settings** tab, **Peripheral Preferred Connection Parameters** node. It will only be available when the device supports a Peripheral role. Refer to the GAP Settings Tab Peripheral preferred connection parameters section for more information.

  - **Minimum Connection Interval:** This is a 2-byte parameter that denotes the minimum permissible connection time.
  - **Maximum Connection Interval**: This is a 2-byte parameter that denotes the maximum permissible connection time.
  - **Slave Latency**: This is a 2-byte value and defines the latency between consecutive connection events.
  - **Connection Supervision Timeout Multiplier**: This is a 2-byte value that denotes the LE link supervision timeout interval. It defines the timeout duration for which an LE link needs to be sustained in case of no response from the peer device over the LE link.

  Note The above parameters are used for connection parameters update procedure over L2CAP if a GAP central device does not use the peripheral preferred connection parameters. For example, iOS7 ignores peripheral preferred connection parameter Characteristics and establishes a connection with a default 30 ms connection interval. The peripheral device should request a connection parameter update by sending an L2CAP connection parameter update request at an appropriate time.

  A typical peripheral implementation should initiate L2CAP connection parameter update procedure once any Characteristic is configured for periodic notification or indication.

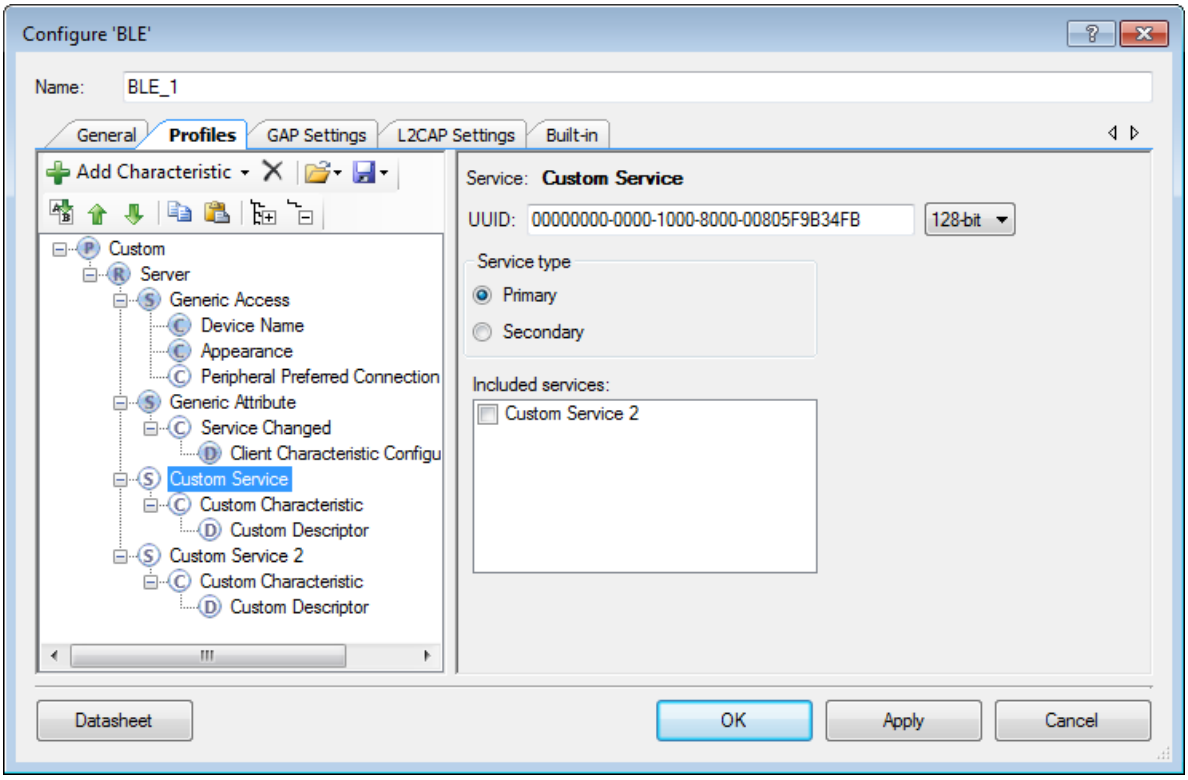
Generic Attribute Service



Click on the Characteristic under the Generic Attribute Service to configure that particular Characteristic.

- **Service Changed** - This Characteristic is used to indicate to the connected devices that a Service has changed (i.e., added, removed, or modified). It is used to indicate to GATT Clients that have a trusted relationship (i.e., bond) with the GATT Server when GATT based Services have changed when they re-connect to the GATT Server. It is mandatory for the device in the GATT Client role. For the device in the GATT Server role, the Characteristic is mandatory if the GATT Server changes the supported Services in the device.

Custom Service Configuration



UUID

A universally unique identifier of the service. This field is editable for Custom Services.

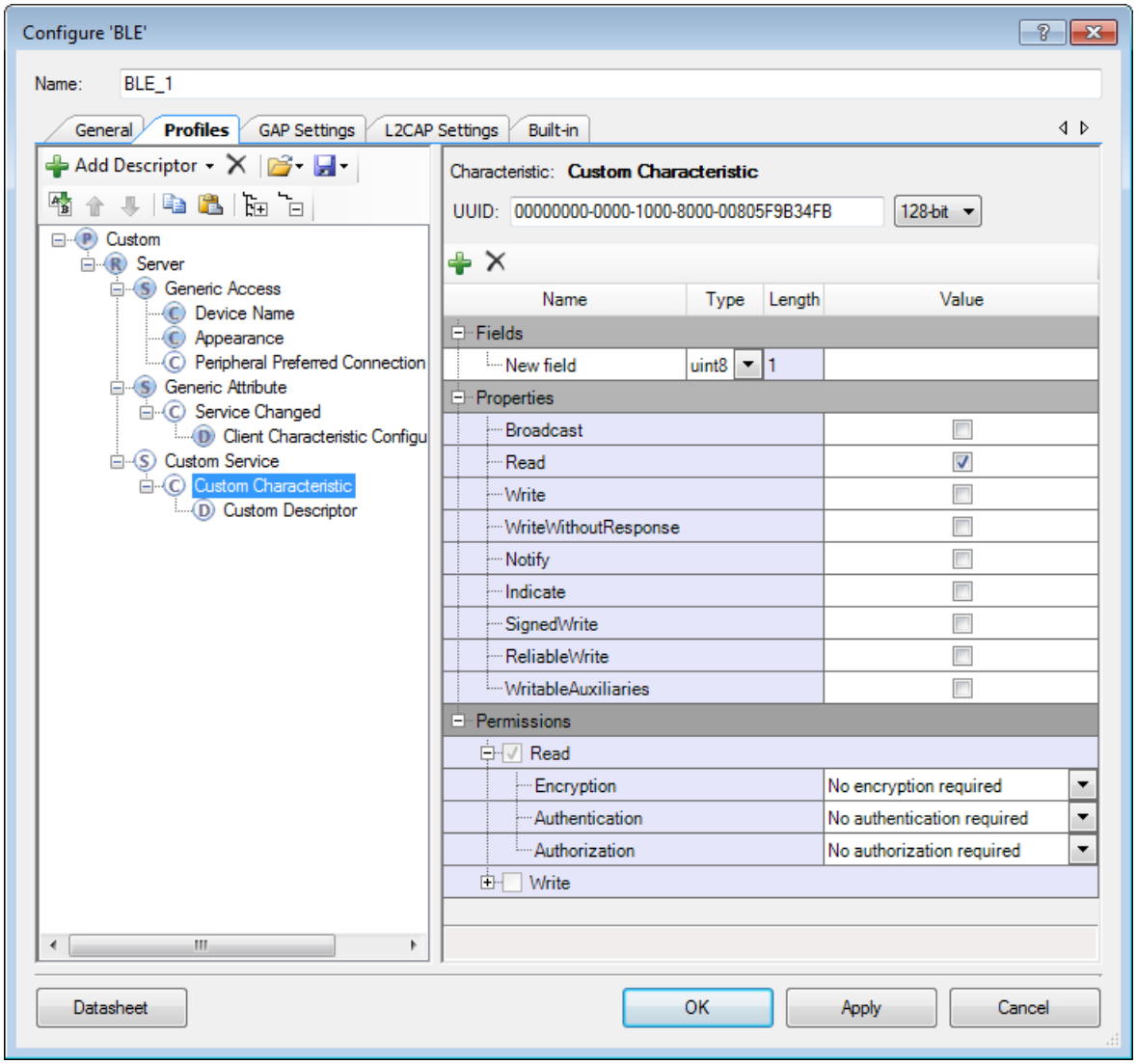
Service type

- **Primary** – Represents the primary functionality of the device.
- **Secondary** – Represents an additional functionality of the device. The secondary service must be included in another service.

Included services

- The list of the Services that can be included in the selected Service. Each Service may have one or more included Services. The included Services provide the additional functionality for the Service.

Custom Characteristic Configuration



UUID

A universally unique identifier of the Characteristic. This field is editable for Custom Characteristics.

Fields

Fields represent a Characteristic value. The default value for each field can be set in the **Value** column. In case of the Custom Characteristic, the fields are customizable.

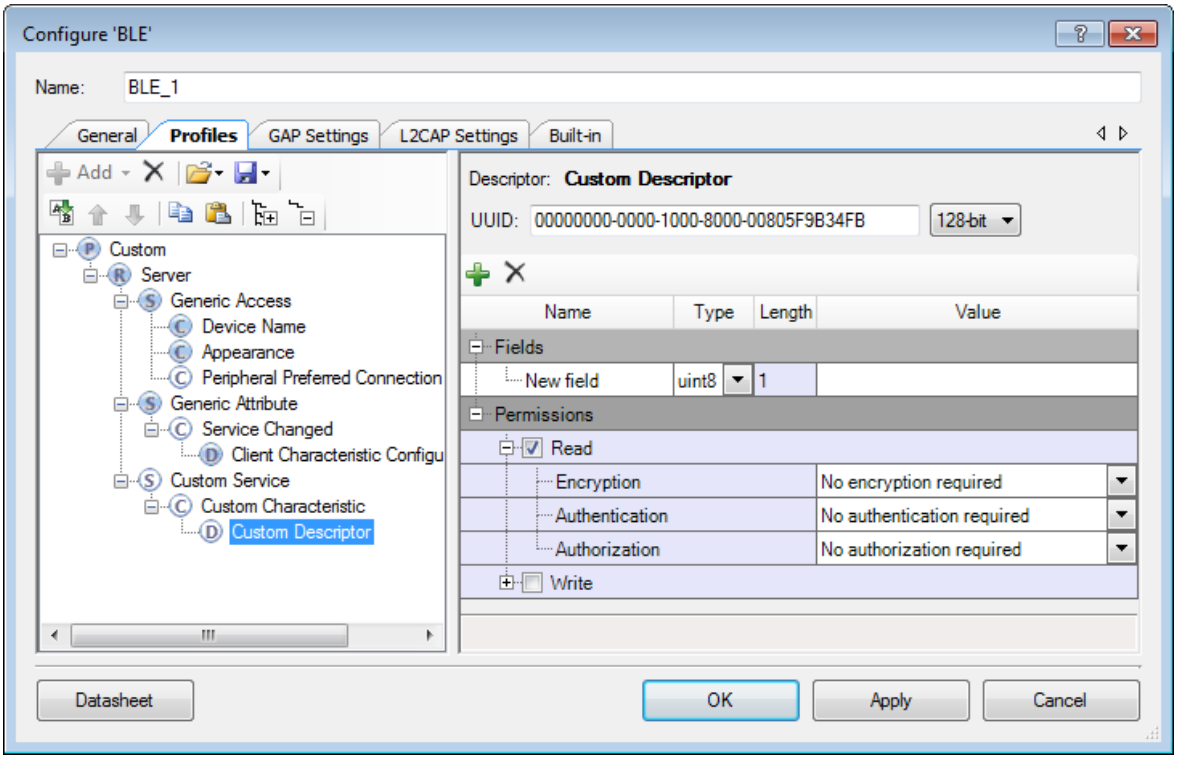
Properties

The Characteristic properties define how the Characteristic value can be used. Some properties (Broadcast, Notify, Indicate, Reliable Write, Writable Auxiliries) require the presence of a corresponding Characteristic Descriptor. For details, please see Bluetooth Core Specification Vol.3, part G (GATT), section 3.3.1.1 “Characteristic Properties”.

Permissions

Characteristic permissions define how the Characteristic Value attribute can be accessed and the security level required for this access. Access permissions are set based on the Characteristic properties. Security permissions are automatically updated for all Characteristics when the **Security Mode** or **Security Level** parameters are changed on the GAP tab.

Custom Descriptor Configuration



UUID

A universally unique identifier of the Descriptor. This field is editable for Custom Descriptors.

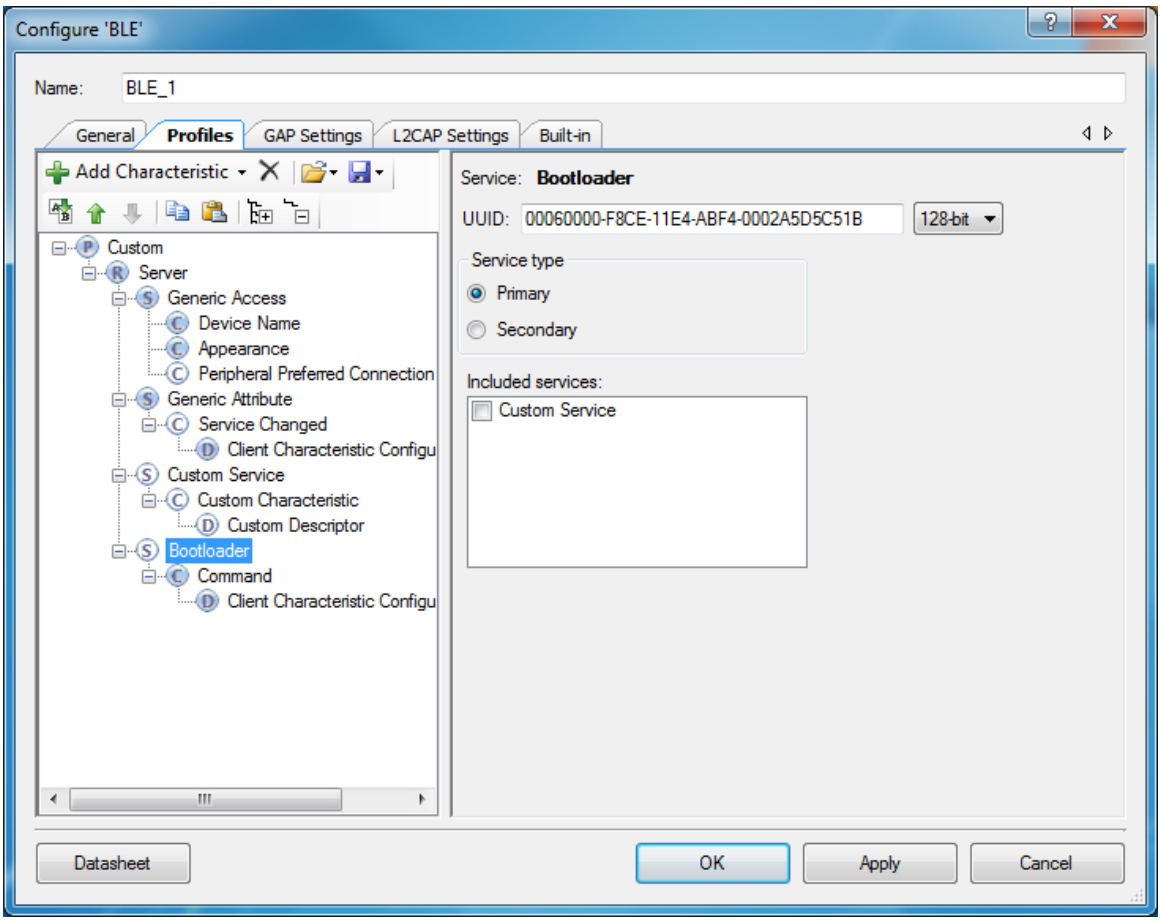
Fields

Fields represent a Descriptor value. The default value for each field can be set in the **Value** column. In case of the Custom Descriptor, the fields are customizable.

Permissions

Descriptor permissions define how the Descriptor attribute can be accessed and the security level required for this access.

Bootloader Service Configuration



UUID

A universally unique identifier of the service. The UUID is set to 00060000-F8CE-11E4-ABF4-0002A5D5C51B.

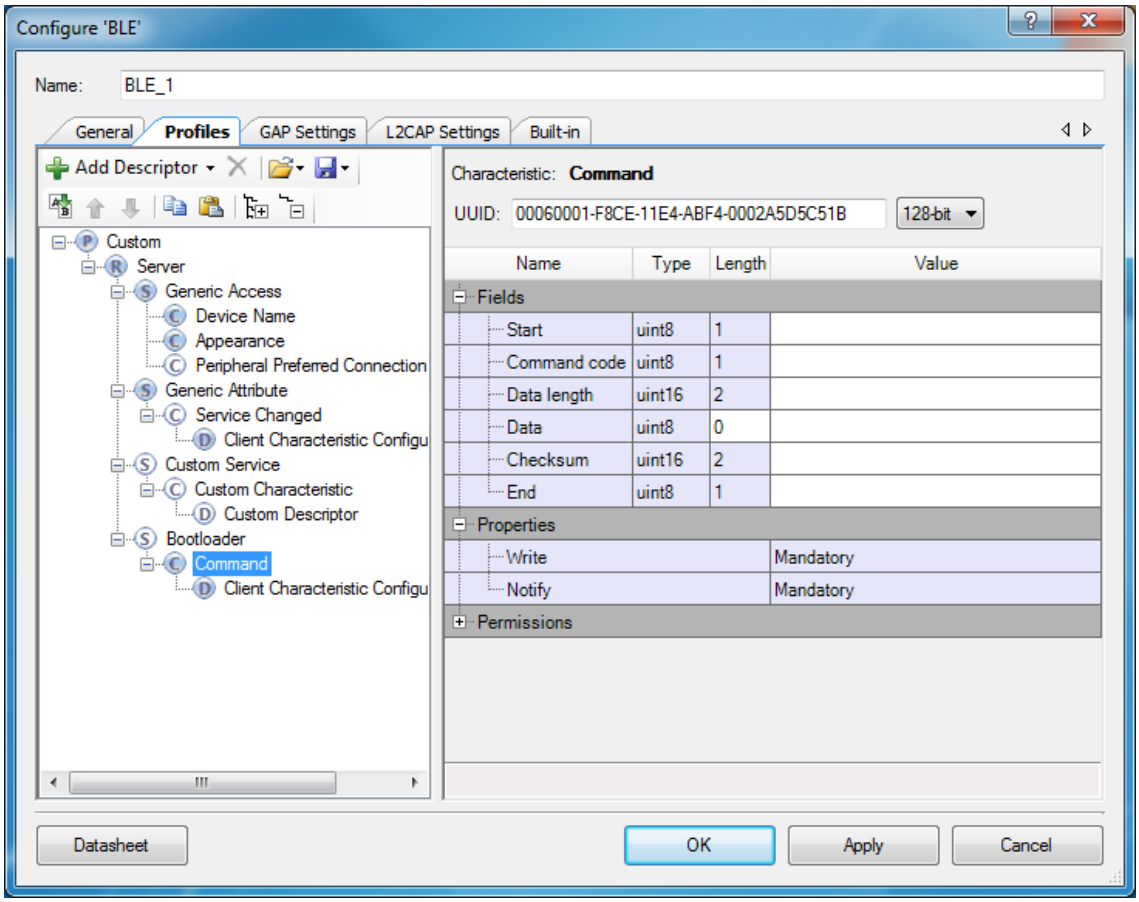
Service type

- **Primary** – Represents the primary functionality of the device.
- **Secondary** – Represents an additional functionality of the device. The secondary service must be included in another service.

Included services

- The list of the Services that can be included in the selected Service. Each Service may have one or more included Services. The included Services provide the additional functionality for the Service.

Command Characteristic Configuration



UUID

A universally unique identifier of the Characteristic. The UUID is set to 00060001-F8CE-11E4-ABF4-0002A5D5C51B.

Fields

Fields represent Command Characteristic values, such as the following.

- Start of packet – This constant defines the start of the bootloader packet.

- Command – This field defines the bootloader command. Since the bootloader commands are dependent on the revision of the Cypress Bootloader/Bootloadable component, refer to the Bootloader/ Bootloadable component datasheet for the list and description of bootloader commands.
- Status Code – This field defines the status code of the command.
- Data Length – This field defines the length of the bootloader command/response and should be set to the maximum command data length that can be used in the design. The maximum command data length should be obtained from the Bootloader component datasheet.

  Per the specifics of the BLE protocol, if the command requires a response larger than 20 bytes, the attribute MTU size should be increased. To support the responses with data length set to 56 (response for **Get Metadata** command), the attribute MTU size should be set to 66. This can be seen from the following equation:

  MTU size = Data Length + Bootloader command overhead + notification parameters overhead

  Where:

  - *Data Length* = the response data length
  - *Bootloader command overhead* = 7
  - *Notification parameters overhead* = 3

  Not following this will result in the BLE component failing to send a response to the requested command.
- Data – This field defines the bootloader command data. The length of this field is specified by the Data Length field.
- Checksum – This field defines the checksum that is computed for the entire packet with the exception of the Checksum and End of Packet fields.
- End of Packet – This constant defines the end of the bootloader packet.

Properties

The Command Characteristic can be Written or Notified.

Permissions

Characteristic permissions define how the Characteristic Value attribute can be accessed, as well as the security level required for this access. Access permissions are set based on the Characteristic properties. Security permissions are automatically updated for all Characteristics when the **Security Mode** or **Security Level** parameters are changed on the **GAP Settings** tab.

GAP Settings Tab

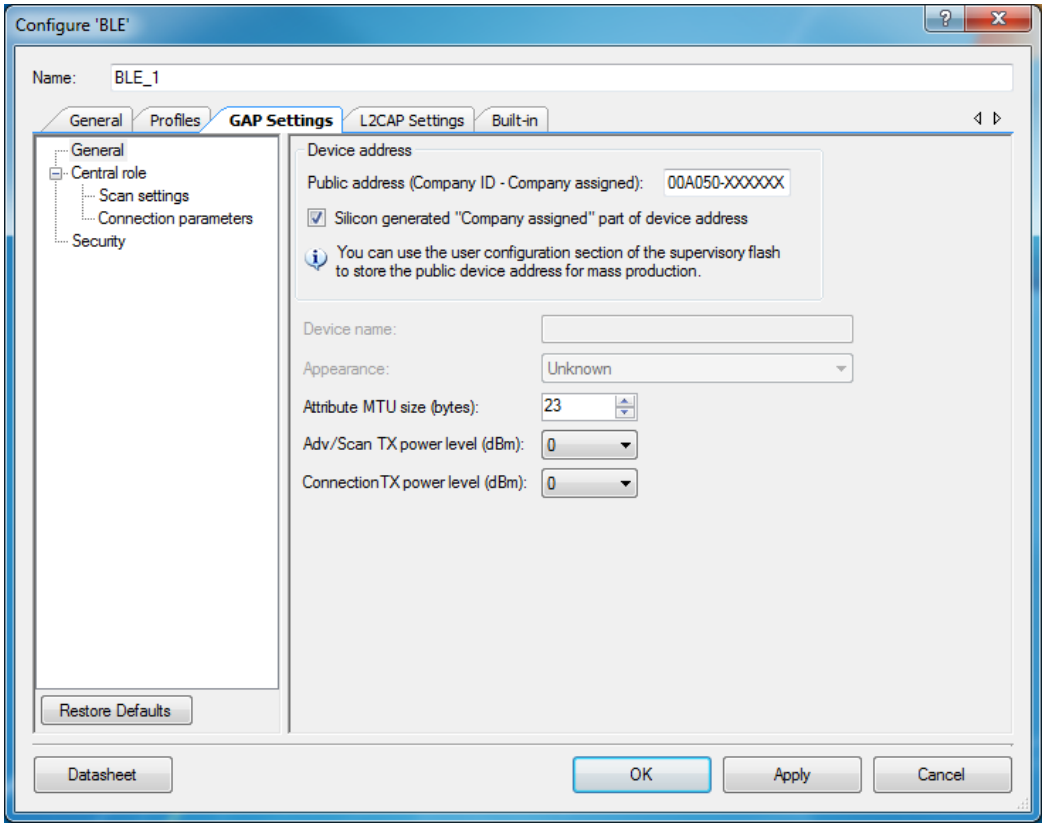
The GAP parameters define the general connection settings required when connecting Bluetooth devices. It contains various sections of parameters based on the item you select in the tree.

The **GAP Settings** tab displays the settings possible based on the GAP role selected in the **General** tab. This tab allows the default settings of the active tree item to be restored by using the **Restore Defaults** button.

The following sections show the different categories of parameters based on what item you select in the tree.

GAP Settings Tab – General

This section contains general GAP parameters:



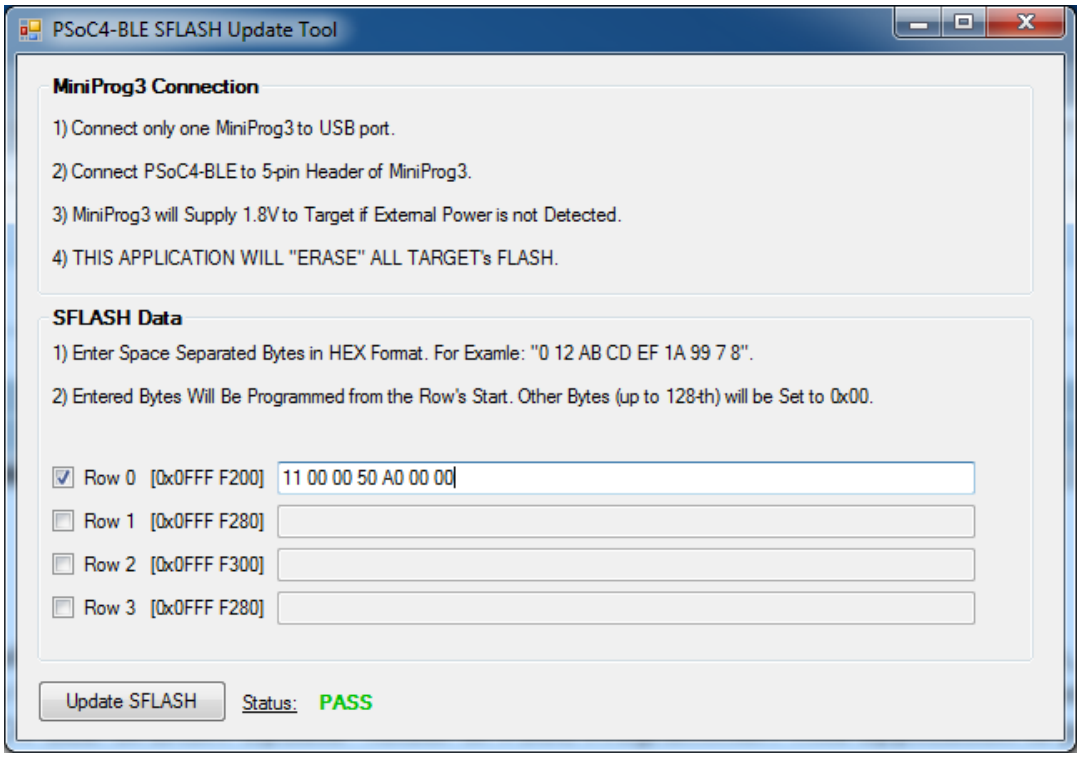
Public device address (Company ID – Company assigned)

This is a unique 48-bit Bluetooth public address that is used to identify the device. It is divided into the following two parts:

- **"Company ID"** part is contained in the 24 most significant bits. It is a 24-bit Organization Unique Identifier (OUI) address assigned by IEEE.

- **“Company assigned”** part is contained in the 24 least significant bits.

The address configured here is static and is designed to be used for development purposes only. This address is programmed into the device via the SWD interface. Normally this address must be programmed only once during mass production, and then never changed in-field. However, user flash can be reprogrammed in-field many times. During prototyping (FW design), this address can be programmed using MiniProg3. For that you can use the application installed in the “C:\Program Files (x86)\Cypress\Programmer\Example\Misc\PSoC4-BLE-SFLASH-Update\Executable” folder of PSoC Programmer. Enter device address structure of type CYBLE_GAP_BD_ADDR_T in the Row 0 line to store it in the SFLASH.



Row 1, Row 2 and Row 3 are not used by the component and available for user information storage. Note that row addresses and length (128 or 256 bytes) depend on the flash memory size of the selected device. Row 0 address is: 0x0FFF F200 for device with 128 KB Flash or 0x0FFF F400 for device with 256 KB Flash.

This application is provided in source code, and can be used as a reference example for implementation in production programmers.

Silicon generated “Company assigned” part of device address

When checked, the “Company assigned” part of the device address is generated using the wafer ID and X-Y die location on the wafer.

Device Name

The device name to be displayed on the peer side. It has a read (without authentication/authorization) property associated with it by default. This parameter can be up to 248 bytes.

Note This parameter configures the **GAP Service Device name** Characteristic located in the **Profile Tree**. It is available for modification only when the device is a GATT Server.

Appearance

The device's logo or appearance, which is a SIG defined 2-byte value. It has a read (without authentication/authorization) property associated with it by default.

Note This parameter configures the **GAP Service Appearance** Characteristic located in the **Profile Tree**, It is available for modification only when the device is a GATT Server.

Attribute MTU Size

Maximum Transmission Unit size (Bytes) of an attribute to be used in the design. Valid range is from 23 to 512 bytes. This value is used to respond to an Exchange MTU request from the GATT Client.

Adv/Scan TX power level

The initial transmitter power level (dBm) of the advertisement or scan channels upon startup. Default: 0 dBm. Possible values: -18 dBm, -12 dBm, -6 dBm, -3 dBm, -2 dBm, -1 dBm, 0 dBm, 3 dBm.

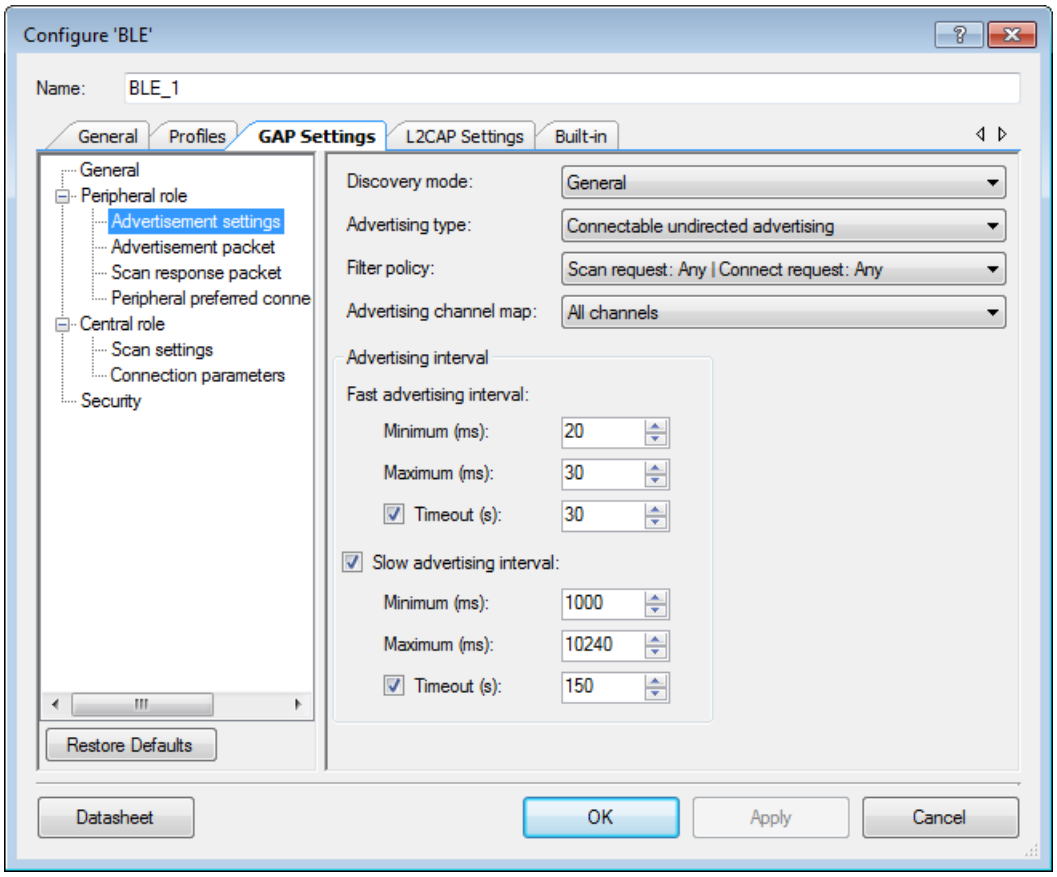
Connection TX power level

The initial transmitter power level (dBm) of the connection channels upon startup. Default: 0 dBm. Possible values: -18 dBm, -12 dBm, -6 dBm, -3 dBm, -2 dBm, -1 dBm, 0 dBm, 3 dBm.

Note Due to hardware limitations, the 3 dBm value can be set only for both Adv/Scan TX power level and Connection TX power level simultaneously.

GAP Settings Tab – Advertisement Settings

These parameters are available when the device is configured as "Peripheral," "Peripheral and Central," or "Broadcaster" **GAP role**.



Discovery mode

- **Non-discoverable** – In this mode, the device can't be discovered by a Central device.
- **Limited Discoverable** – This mode is used by devices that need to be discoverable only for a limited period of time, during temporary conditions, or for a specific event. The device which is advertising in Limited Discoverable mode are available for a connection to Central device which performs Limited Discovery procedure. The timeout duration is defined by the applicable advertising timeout parameter.
- **General Discoverable** – In this mode, the device should be used by devices that need to be discoverable continuously or for no specific condition. The device which is advertising in General Discoverable mode are available for a connection to Central device which performs General Discovery procedure. The timeout duration is defined by the applicable advertising timeout parameter.

Advertising type

This parameter defines the advertising type to be used by the LL for an appropriate **Discovery mode**.

- **Connectable undirected advertising** – This option is used for general advertising of the advertising and scan response data. It allows any other device to connect to this device.
- **Scannable undirected advertising** – This option is used to broadcast advertising data and scan response data to active scanners.
- **Non-connectable undirected advertising** – This option is used to just broadcast advertising data.

Filter policy

This parameter defines how the scan and connection requests are filtered.

- **Scan request: Any | Connect request: Any** – Process scan and connect requests from all devices.
- **Scan request: White List | Connect request: Any** – Process scan requests only from devices in the White List and connect requests from all devices.
- **Scan request: Any | Connect request: White List** – Process scan requests from all devices and connect requests only from devices in the White List.
- **Scan request: White List | Connect request: White List** – Process scan and connect requests only from devices in the White List.

Advertising channel map

This parameter is used to enable a specific advertisement channel.

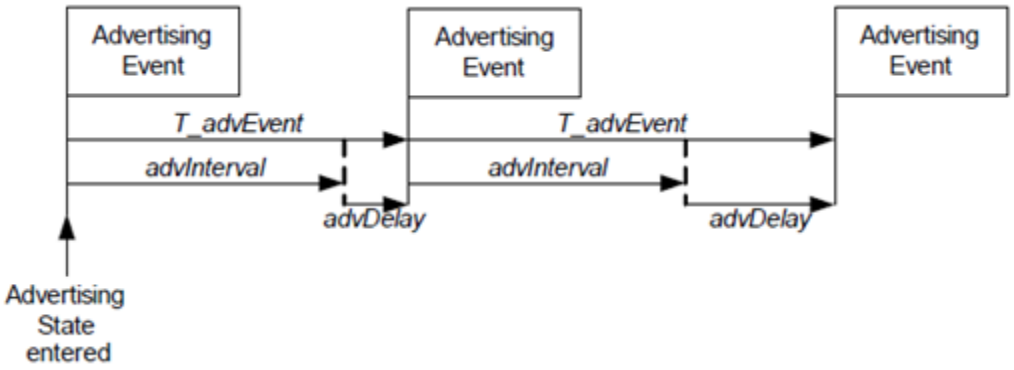
- **Channel 37** – enables advertisement channel #37
- **Channel 38** – enables advertisement channel #38
- **Channel 39** – enables advertisement channel #39
- **Channels 37 and 38** – enables advertisement channels #37 and #38
- **Channel 37 and 39** – enables advertisement channels #37 and #39
- **Channels 38 and 39** – enables advertisement channels #38 and #39
- **All channels** – enables all three advertisement channels

Advertising Interval

This parameter defines the interval between two advertising events. Set the permissible minimum and maximum values of two Advertisement interval types: **Fast advertising interval** and **Slow advertising interval**. Typically after the device initialization, a peripheral device uses the Fast advertising interval. After the **Fast advertising interval timeout** value expires, and if a connection with a Central device is not established, then the Profile switches to Slow advertising interval to save the battery life. After the **Slow advertising interval timeout** value expires, 'CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP' event is generated.

Note: The Advertising interval needs to be aligned with the selected Profile specification.

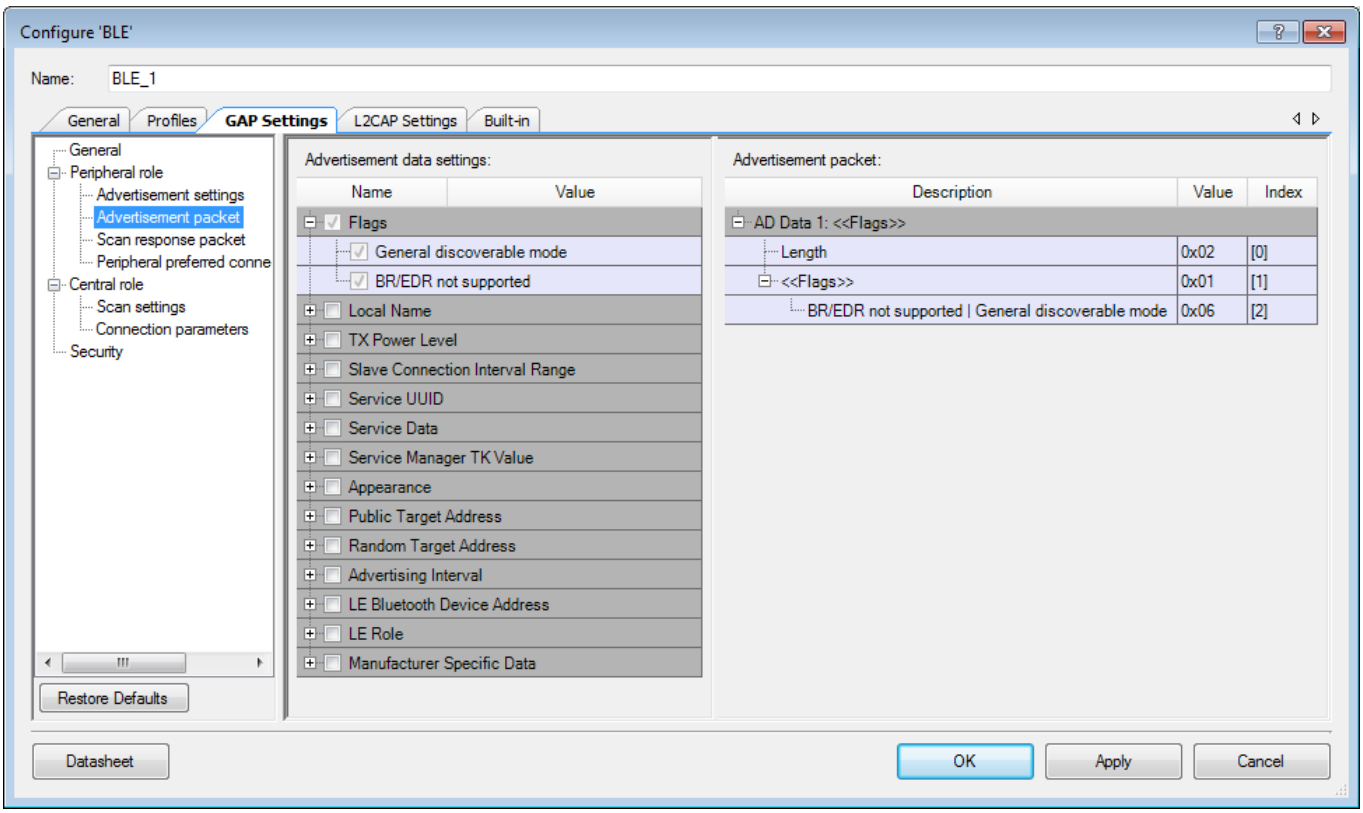
- **Fast advertising interval** – This advertisement interval results in faster LE Connection. The BLE Component uses this interval value when the connection time is between the specified minimum and maximum values of the interval.
  - Minimum: The minimum interval for advertising the data and establishing the LE Connection. The parameter is configured to increment in multiples of 0.625 ms. Valid range is from 20 ms to 10240 ms.
  - Maximum: The maximum interval for advertising the data and establishing the LE Connection. The parameter is configured to increment in multiples of 0.625 ms. Valid range is from 20 ms to 10240 ms.
  - Timeout: The timeout value of advertising with fast advertising interval parameters. When unchecked, the device is advertising continuously and slow advertising settings become unavailable. The timeout cannot occur before the advertising interval is expired, that is why if a timeout value is less than fast advertising interval minimum value, a warning is displayed.
- **Slow advertising interval** – Defines the advertising interval for slow advertising. This is an optional parameter which, if enabled, allows to implement advertising with a lower duty cycle to save battery life. The Slow advertising interval parameters are applied to the device after the internal fast advertising interval timeout occurs. The minimum and maximum values defined using this parameter allow the BLE Stack to expect the advertising to happen within these intervals.
  - Minimum: The minimum interval for advertising the data and establishing the LE Connection. The parameter is configured to increment in multiples of 0.625 ms. Valid range is from 1000 ms to 10240 ms.
  - Maximum: The maximum interval for advertising the data and establishing the LE Connection. The parameter is configured to increment in multiples of 0.625 ms. Valid range is from 1000 ms to 10240 ms.
  - Timeout: The timeout value of advertising with slow advertising interval parameters. When unchecked, the device is advertising continuously. The timeout cannot occur before the advertising interval is expired, that is why if a timeout value is less than slow advertising interval minimum value, a warning is displayed.



- AdvDelay is a pseudo random delay 0-10 mS.
- The complete advertising Event consists of one advertising PDU sent on each of used advertising channels.

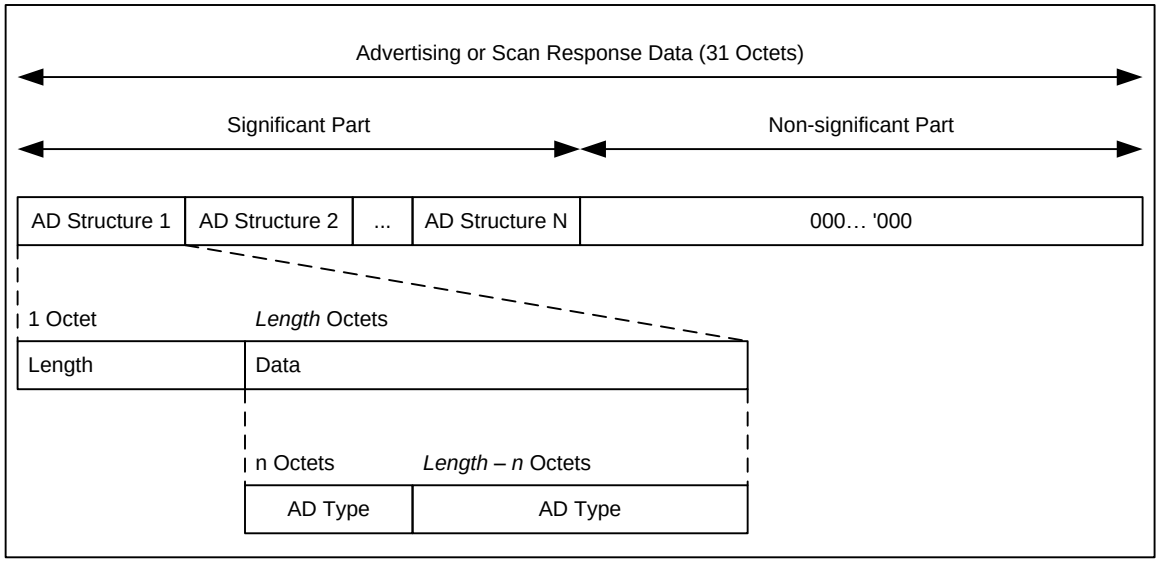
GAP Settings Tab – Advertisement packet

This section displays when the device is configured to contain "Peripheral," "Broadcaster," or "Peripheral and Central" **GAP role**. It is used to configure the **Advertisement data** to be used in device advertisements.



Advertisement / Scan response data settings

Advertisement (AD) or **Scan response data** packet is a 31 byte payload used to declare the device's BLE capability and its connection parameters. The structure of this data is shown below as specified in the Bluetooth specification.



The data packet can contain a number of AD structures. Each of these structures is composed of the following parameters.

- **AD Length**: Size of the **AD Type** and **AD Data** in bytes.
- **AD Type**: The type of advertisement within the AD structure.
- **AD Data**: Data associated with the **AD Type**.

The total length of a complete Advertising packet cannot exceed 31 bytes.

An example structure for **Advertisement data** or **Scan response data** is as follows.

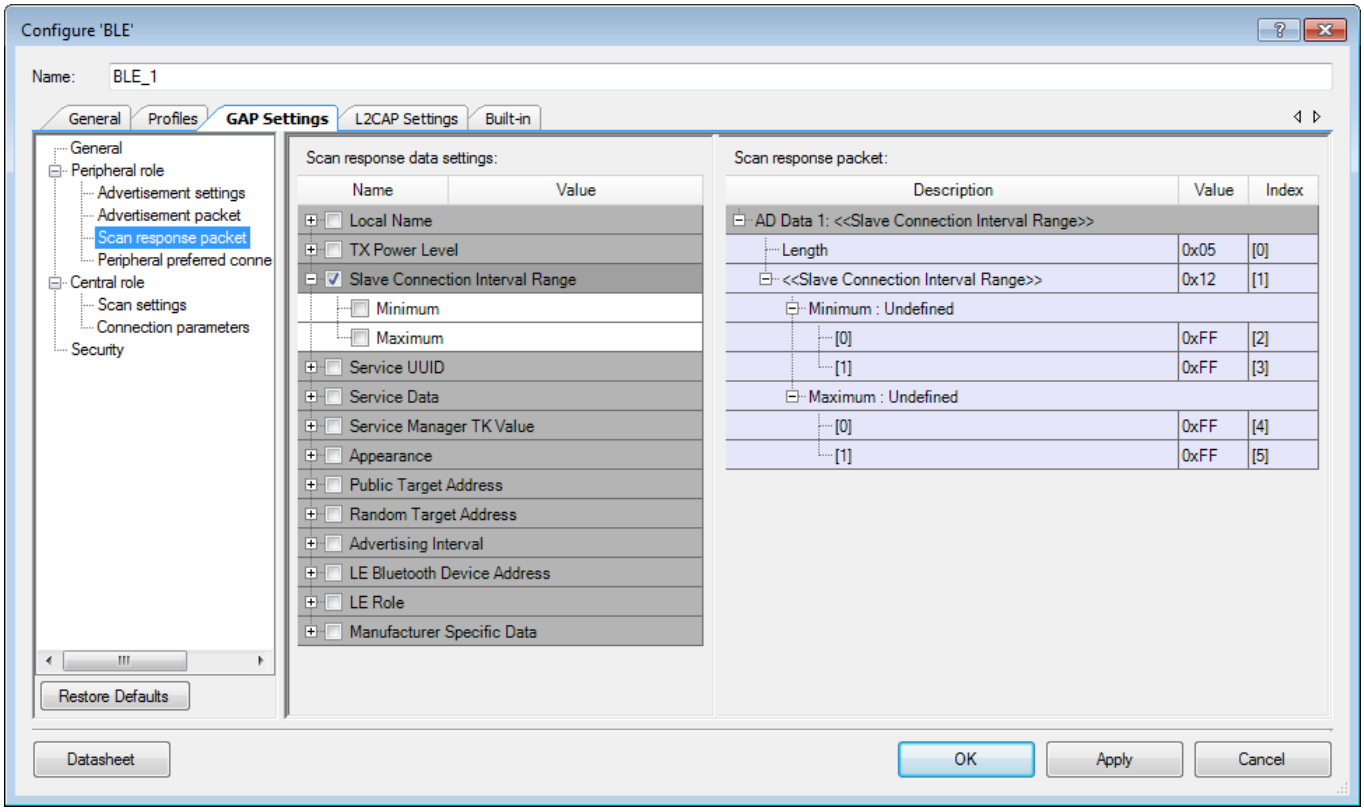
- AD Structure Element Definition:
  - **AD Length**: Size of **AD Type** and associated **AD Data** = 5 bytes
  - **AD Type** (1 byte): 0x03 (Service UUID)
  - **AD Data** (4 bytes): 0x180D, 0x180A (Heart Rate Service, Device Information Service)

The following table shows the **AD Types**.

AD Type	Description
Flags	Flags to broadcast underlying BLE transport capability such as Discoverable mode, LE only, etc.
Local Name	Device Name (complete of shortened). The device name value comes from the **Device name** field on the **GAP Settings** tab, under **General**.
Tx Power Level	Transmit Power Level. Taken from the **Adv/Scan TX power level** field on the **GAP Settings** tab, under **General.**
Slave Connection Interval Range	Preferred connection interval range for the device. Not available in **Broadcaster** GAP role.
Service UUID	List of Service UUIDs to be broadcasted that the device has implemented. There are different AD Type values to advertise 16-bit, 32-bit and 128-bit Service UUIDs. 16-bit and 32-bit Service UUIDs are used if they are assigned by the Bluetooth SIG. Not available in **Broadcaster** GAP role.
Service Solicitation	List of Service UUIDs from the central device that the peripheral device would like to use. There are different AD Type values to advertise 16-bit, 32-bit and 128-bit Service UUIDs. Not available in **Broadcaster** GAP role.
Service Data	2/4/16-byte Service UUID, followed by additional Service data. Not available in **Broadcaster** GAP role.
Security Manager TK value	Temporal key to be used at the time of pairing. Not available in **Broadcaster** GAP role.
Appearance	The external appearance of the device. The value comes from the **Appearance** field on the **GAP Settings** tab, under **General**.
Public Target Address	The public device address of intended recipients.
Random Target Address	The random device address of intended recipients.
Advertising Interval	The Advertising interval value that is calculated as an average of Fast advertising interval minimum and maximum values configured on the **GAP Settings** tab, under **Advertisement Settings**.
LE Bluetooth Device Address	The device address of the local device. The value comes from the **Public device address** field on the **GAP Settings** tab, under **General**.
LE Role	Supported LE roles. Not available in **Broadcaster** GAP role.
Manufacturer Specific Data	2 bytes company identifier followed by manufacturer specific data.

GAP Settings Tab – Scan response packet

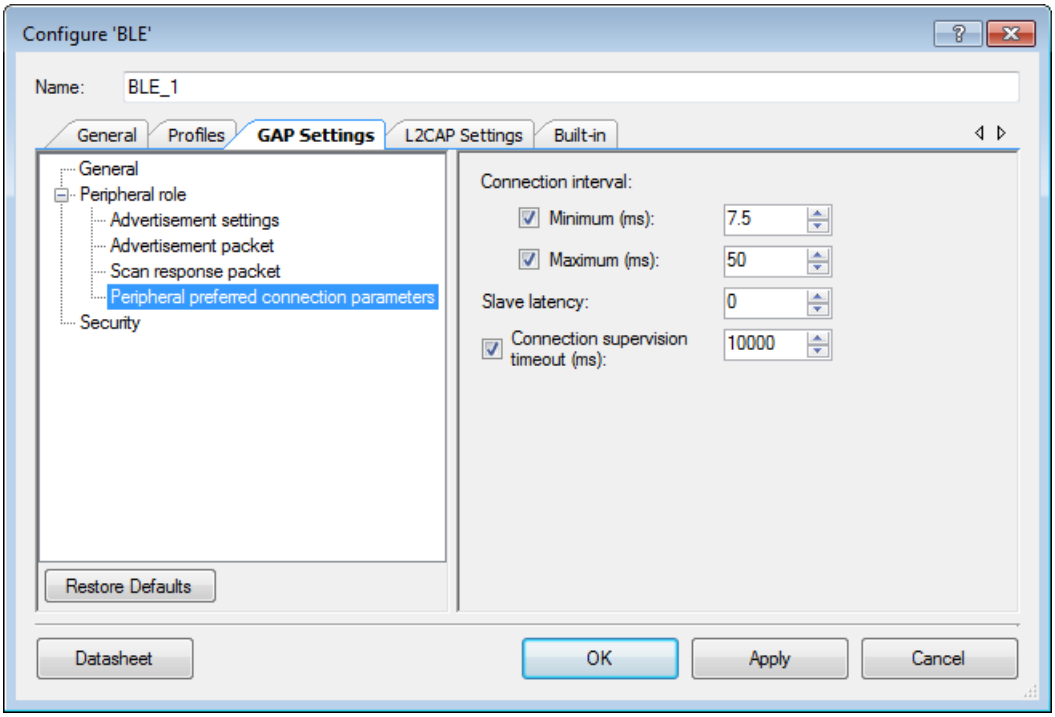
This section displays when the device is configured to contain a "Peripheral," "Broadcaster," or "Peripheral and Central" **GAP role**. It is used to configure the Scan response data packet to be used in response to device scanning performed by a GATT Client device.



The packet structure of a Scan response packet is the same as an Advertisement packet. See Advertisement / Scan response data settings for information on configuring the Scan response packet.

GAP Settings Tab –Peripheral preferred connection parameters

These parameters define the connection event timing for a Central device communicating with the Peripheral device. Consecutive connection events are separated by the defined Connection interval.



Note The scaled values of these parameters used internally by the BLE stack are also shown in the **Peripheral Preferred Connection Parameters** on the **Profiles** tab. These are the actual values sent over the air.

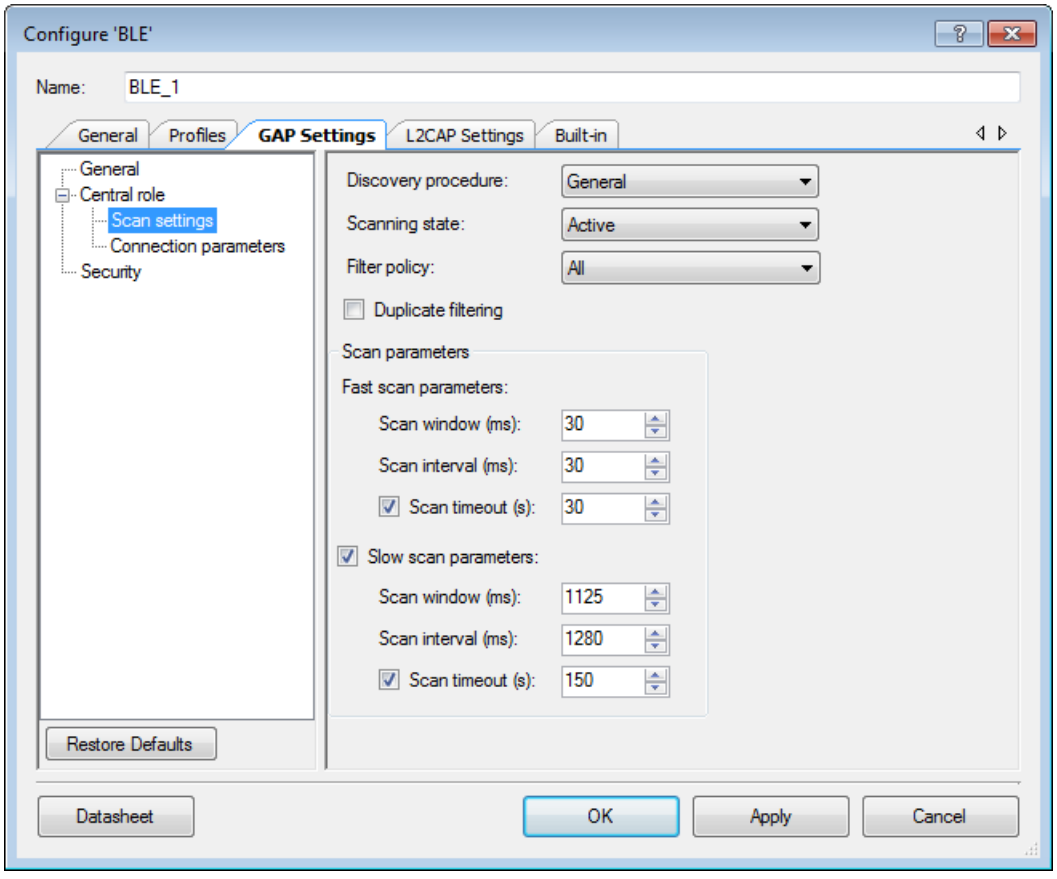
- **Connection interval –** The Central device connecting to a Peripheral device needs to define the time interval for a connection to happen.
  - Minimum (ms): This parameter is the minimum permissible connection time value to be used during a connection event. It is configured in steps of 1.25 ms. The range is from 7.5 ms to 4000 ms. Unchecked means no specific minimum.
  - Maximum (ms): This parameter is the maximum permissible connection time value to be used during a connection event. It is configured in steps of 1.25 ms. The range is from 7.5 ms to 4000 ms. Unchecked means no specific maximum.
- **Slave Latency –** Defines the latency of the slave in responding to a connection event in consecutive connection events. This is expressed in terms of multiples of connection intervals, where only one connection event is allowed per interval. The range is from 0 to 499 events.

- **Connection Supervision Timeout –** This parameter defines the LE link supervision timeout interval. It defines the timeout duration for which an LE link needs to be sustained in case of no response from peer device over the LE link. The time interval is configured in multiples of 10 ms. Unchecked means no specific value. The range is from 100 ms to 32000 ms.

  Note that for proper operation the Connection Supervision Timeout must be larger than **(1 + Slave latency) * Connection Interval * 2** (ms). Refer to Bluetooth Core Specification 4.1 Volume 4, Chapter 4.5.2 for more information on Connection Supervision Timeout.

GAP Settings Tab – Scan settings

These parameters are available when the device is configured as a "Central," "Peripheral and Central," or “Observer” **GAP role**. Typically during a device discovery, the GATT Client device initiates the scan procedure. It uses **Fast scan parameters** for a period of time, approximately 30 to 60 seconds, and then it reduces the scan frequency using the **Slow scan parameters**.



Note The scan interval needs to be aligned with the user-selected Profile specification.

Discovery procedure

- **Limited –** A device performing this procedure shall discover the device doing limited discovery mode advertising only.
- **General –** A device performing this procedure shall discover the devices doing general and limited discovery advertising.

Scanning state

- **Passive –** In this state a device can only listen to advertisement packets.
- **Active –** In this state a device may ask an advertiser for additional information.

Filter policy

This parameter defines how the advertisement packets are filtered.

- **All** – Process all advertisement packets.
- **White List Only** – Process advertisement packets only from devices in the White List.

Duplicate filtering

When enabled, this activates filtering of duplicated advertisement data. If disabled, the BLE stack will not perform filtering of advertisement data.

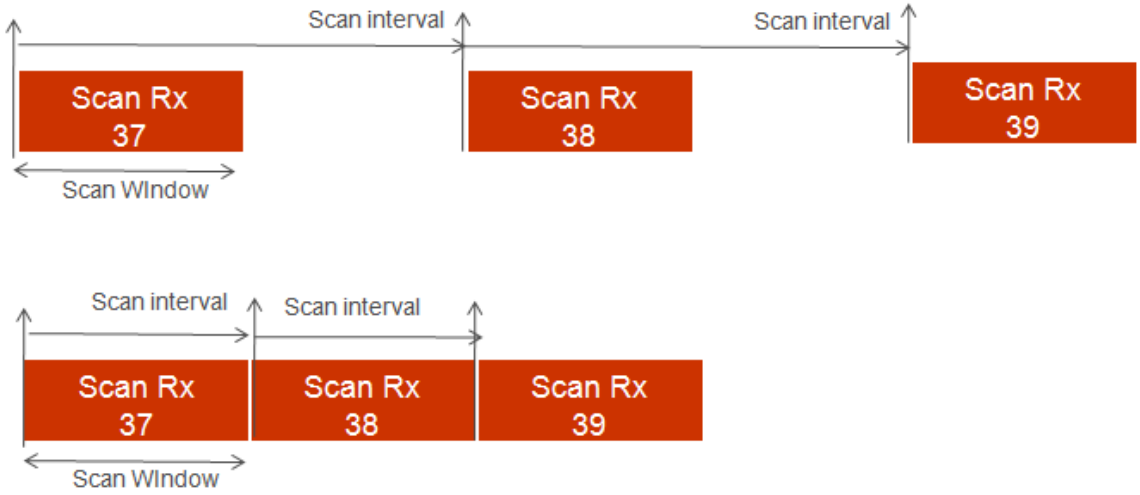
Scan parameters

These parameters define the scanning time and interval between scanning events. Two different sets of Scan parameters are used: **Fast scan parameters** and **Slow scan parameters**. Typically after the device initialization, a central device uses the Fast scan parameters. After the **Fast scan timeout** value expires, and if a connection with a Peripheral device is not established, then the Profile switches to Slow scan parameters to save the battery life. After the **Slow scan timeout** value expires, CYBLE_EVT_GAPC_SCAN_START_STOP event is generated. See API documentation.

- **Fast scan parameters** – This connection type results in a faster connection between the GATT Client and Server devices than it is possible using a normal connection.
  - **Scan Window**: This parameter defines the scan window when operating in **Fast connection**. The parameter is configured to increment in multiples of 0.625 ms. Valid range is from 2.5 ms to 10240 ms. **Scan Window** must be less than the **Scan Interval**. Default: 30 ms.
  - **Scan Interval**: This parameter defines the scan interval when operating in **Fast connection**. The parameter is configured to increment in multiples of 0.625 ms. Valid range is from 2.5 ms to 10240 ms. Default: 30 ms.

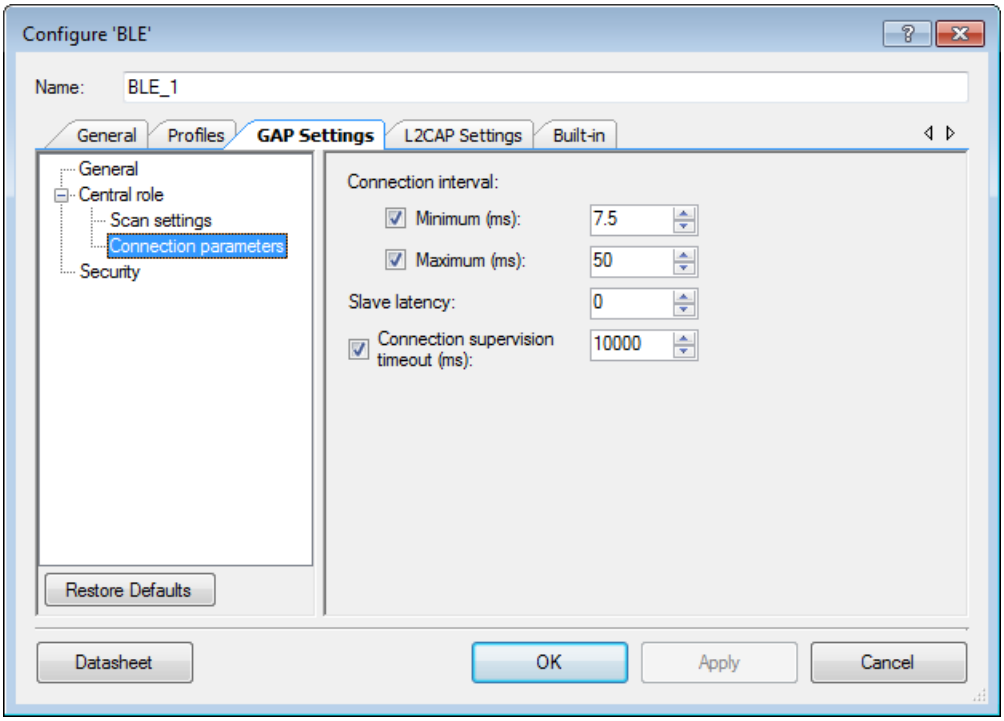
- **Scan Timeout**: The timeout value of scanning with fast scan parameters. Default: 30 s. When unchecked, the device is scanning continuously. The timeout cannot occur before the scanning interval is expired, that is why if a timeout value is less than slow scanning interval minimum value, a warning is displayed.

- **Slow scan parameters** – This connection results in a slower connection between the GATT Client and GATT Server devices than is possible using a normal connection. However this method consumes less power.
  - **Scan Window**: This parameter defines the scan window when operating in **Slow Connection**. The parameter is configured to increment in multiples of 0.625ms. Valid range is from 2.5 ms to 10240 ms. **Scan Window** must be less than the **Scan Interval**. Default: 11.25 ms.
  - **Scan Interval**: This parameter defines the scan interval when operating in **Slow Connection**. The parameter is configured to increment in multiples of 0.625 ms. Valid range is from 2.5 ms to 10240 ms. Default: 1280 ms.
  - **Scan Timeout**: The timeout value of scanning with slow scan parameters. Default: 150 s. When unchecked, the device is scanning continuously. The timeout cannot occur before the scanning interval is expired, that is why if a timeout value is less than slow scanning interval minimum value, a warning is displayed.



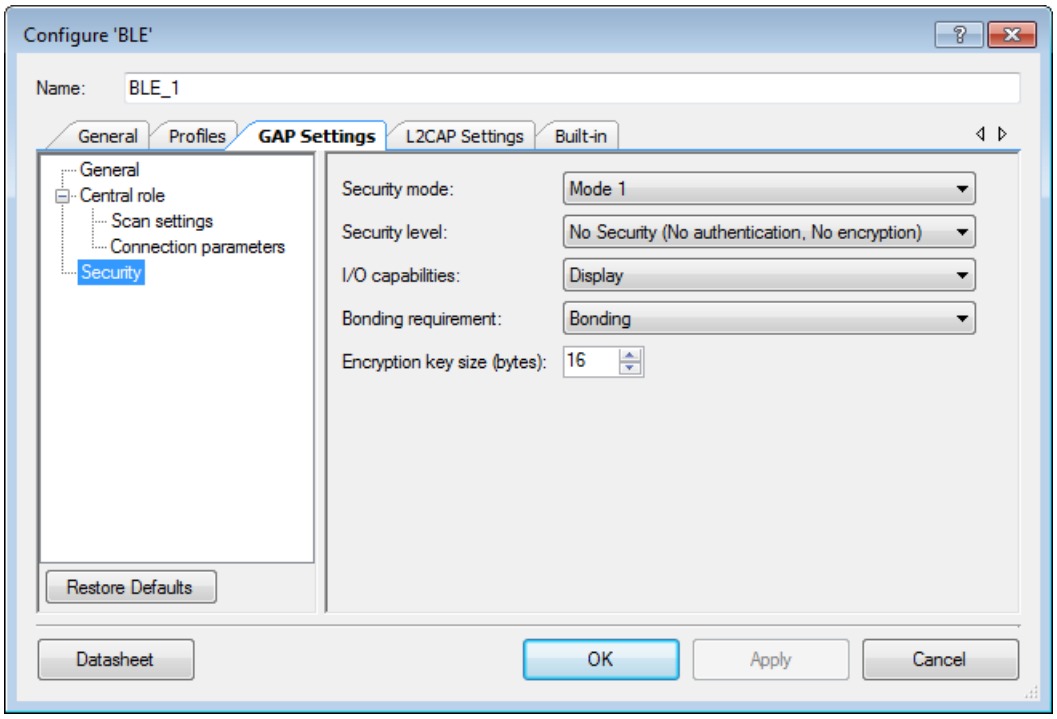
GAP Settings Tab – Connection parameters

This section is the same as Peripheral Preferred Connection Parameters for Advertisement Settings. The only difference is that Central connection parameters will not be shown on the **Peripheral Preferred Connection parameters** on the **Profile** tab.



GAP Settings Tab – Security

This section contains several parameters to configure the global security options for the Component. These parameters are configurable only in **Profile** mode. If the device is configured as a GATT Server, you can optionally set each Characteristic using its own unique security setting in the **Profile Tree**.



Security mode

Defines GAP security modes for the Component. Both available modes may support authentication.

- Mode 1 – Used in designs where data encryption is required.
- Mode 2 – Used in designs where data signing is required.

Security level

Enables different levels of security depending on the selected **Security mode**:

- If Mode1 is selected, then the following security levels are available.
  - No Security – With this level of security, the device will not use encryption or authentication.
  - Unauthenticated pairing with encryption – With this level of security, the device will send encrypted data after establishing a connection with the remote device.

  - Authenticated pairing with encryption – With this level of security, the device will send encrypted data after establishing a connection with the remote device. To establish a connection, devices should perform the authenticated paring procedure.

- If Mode 2 is selected, then the following security levels are available.
  - Unauthenticated pairing with data signing – With this level of security, the device will perform data signing prior to sending it to the remote device after they establish a connection.
  - Authenticated pairing with data signing – With this level of security, the device will perform data signing prior to sending it to the remote device after they establish a connection. To establish a connection, the devices should perform the authenticated paring procedure.

I/O capabilities

This parameter refers to the device's input and output capability that can enable or restrict a particular pairing method or security level.

- No Input No Output – Used in devices that don't have any capability to enter and display the authentication key data. Used in mouse-like devices. No GAP authentication is required.
- Display Only – Used in devices with display capability and may display authentication key data. GAP authentication is required.
- Keyboard Only – Used in devices with numeric keypad. GAP authentication is required.
- Display Yes/No – Used in devices with display and at least two input keys for Yes/No action. GAP authentication is required.
- Keyboard and Display – Used in devices like PCs and tablets. GAP authentication is required.

Bonding Requirement:

This parameter is used to configure the bonding requirements. The purpose of bonding is to create a relation between two Bluetooth devices based on a common link key (a bond). The link key is created and exchanged (pairing) during the bonding procedure and is expected to be stored by both Bluetooth devices, to be used for future authentication. The maximum number of remote devices that can be bonded is four.

- **Bonding:** The device will store the link key of a connection after paring with the remote device in the flash memory and if a connection will be lost and re-established, the devices will use the previously stored key for the connection.

  Note Bonding information is stored in RAM and should be written to Flash if it needs to be retained during shutdown. Refer to the Functional Description section for details on bonding and Flash write usage.

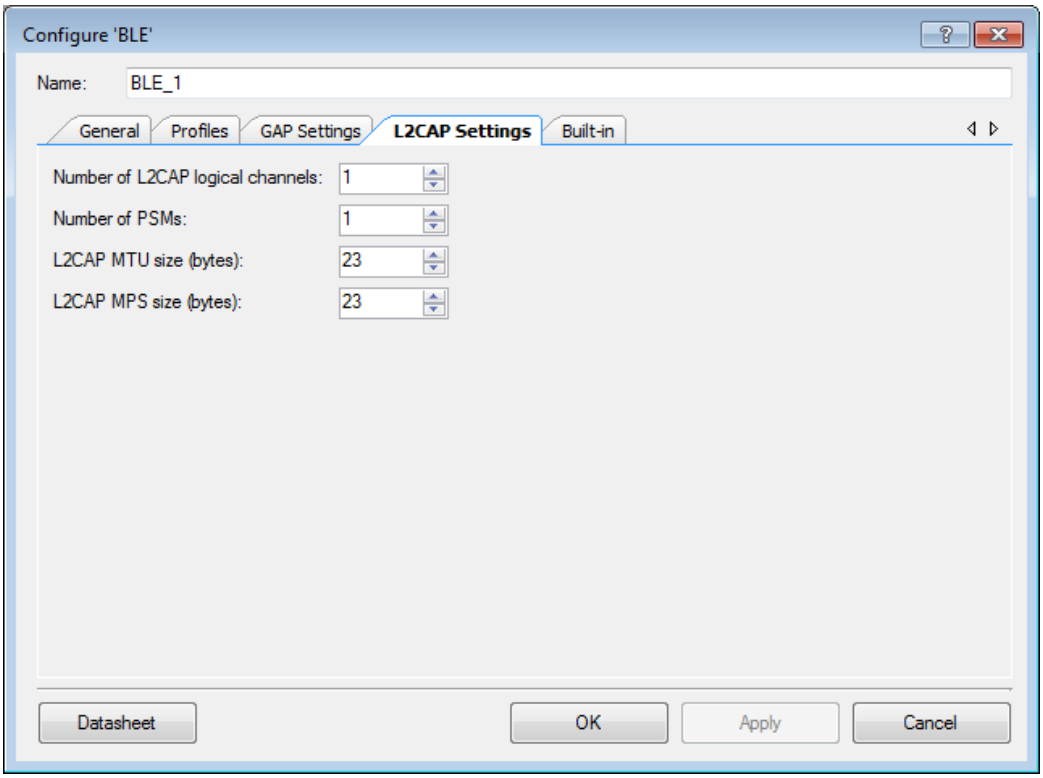
- **No Bonding:** The pairing process will be performed on each connection establishment.

Encryption Key Size

This parameter defines the encryption key size based on the Profile requirement. The valid values of encryption key size are 7 to 16 bytes.

L2CAP Settings Tab

The L2CAP parameters define parameters for L2CAP connection oriented channel configuration.



Number of L2CAP logical channels

This parameter defines the number of LE L2CAP connection oriented logical channels required by the application. Valid range is from 1 to 255. Default: 1.

Number of PSMs

This parameter defines the number of PSMs required by the application. Valid range is from 1 to 255. Default: 1.

L2CAP MTU size

This parameter defines the maximum SDU size of an L2CAP packet. Valid range is from 23 to 65488 bytes. Default: 1280 bytes when **Internet Protocol Support Service** is supported and 23 bytes otherwise.

L2CAP MPS size

This parameter defines the maximum size of payload data that the L2CAP layer is capable of accepting. **L2CAP MPS size** should be less than or equal to the **L2CAP MTU size** parameter. Valid range is from 23 to 65488 bytes. Default: 23 bytes.

BLE Component APIs

The BLE Component contains a comprehensive API list to allow you to configure the BLE stack, the underlying chip hardware and the BLE service specific configuration using software. You may access the GAP, GATT and L2CAP layers of the stack using these.

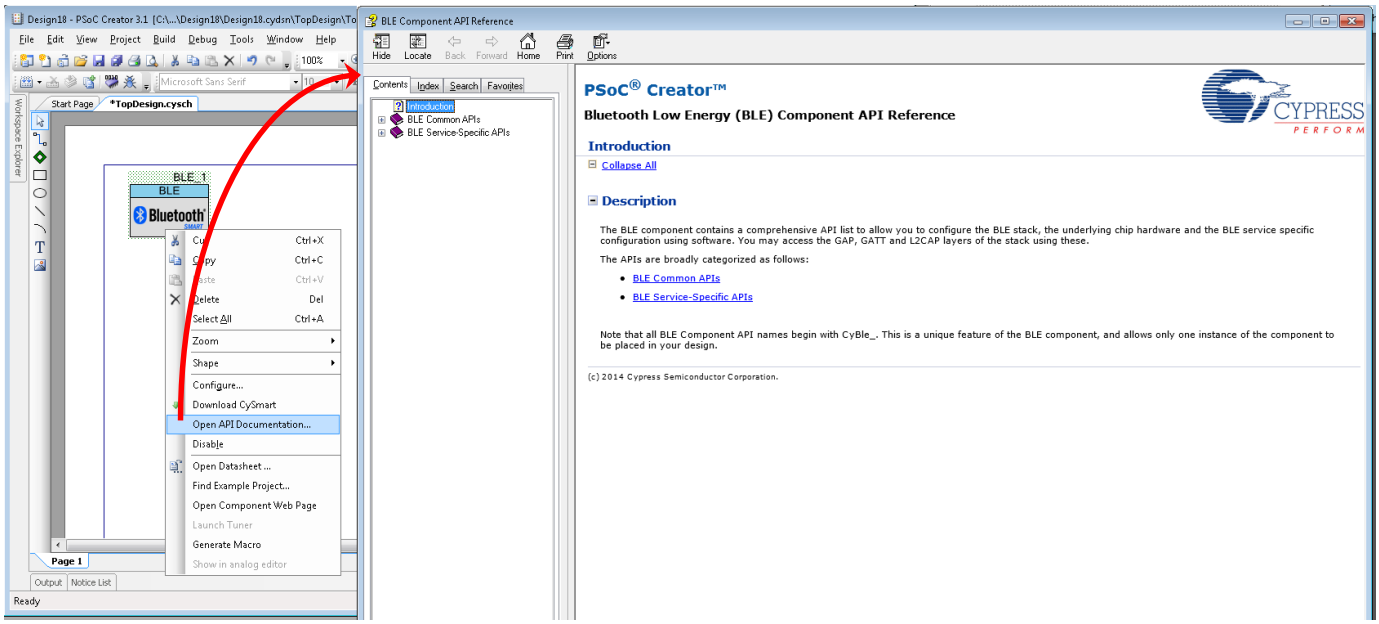
The APIs are broadly categorized as follows:

- BLE Common APIs
- BLE Service-Specific APIs

Note: All BLE Component API names begin with CyBle_. This is a unique feature of the BLE Component, and allows only one instance of the Component to be placed in your design.

HTML-Based API Document

Because the BLE Component has numerous APIs, Cypress has also provided a separate HTML-based API reference document (CHM file). To open this file, right-click on the BLE Component on the design canvas, and select **Open API Documentation…**



Code snippets

PSoC Creator provides code snippets for the BLE component. These are located on the **Edit** menu.

- For the CyBle_Start API function: CyBle_Start(CyBle_AppCallback);
- For an application callback: void CyBle_AppCallback(uint32 eventCode, void *eventParam){<all general events>}
- For each CyBle_<service>RegisterAttrCallback API function: CyBle_<service>RegisterAttrCallback(CyBle_<service>CallBack);
- For each service callback: void CyBle_<service>CallBack(uint32 eventCode, void *eventParam) {<all service-specific events>}

Sample Firmware Source Code

PSoC Creator provides numerous example projects that include schematics and example code in the Find Example Project dialog. For Component-specific examples, open the dialog from the Component Catalog or an instance of the Component in a schematic. For general examples, open the dialog from the Start Page or **File** menu. As needed, use the **Filter Options** in the dialog to narrow the list of projects available to select.

Refer to the "Find Example Project" topic in the PSoC Creator Help for more information.

MISRA Compliance

This section describes the MISRA-C:2004 compliance and deviations for the Component. There are three types of deviations defined:

- project deviations – deviations that are applicable for all PSoC Creator Components
- Component specific deviations – deviations that are applicable only for the common part of this Component
- Profile specific deviations – deviations that are applicable only for a specific Profile of the Component

This section provides information on Component-specific deviations. Project deviations are described in the MISRA Compliance section of the *System Reference Guide* along with information on the MISRA compliance verification environment.

The BLE Component has the following specific deviations.

MISRA-C:2004 Rule	Rule Class (Required/ Advisory)	Rule Description	Description of Deviation(s)
9.3	R	In an enumerator list, the '=' construct shall not be used to explicitly initialize members other than the first, unless all items are explicitly initialized.	Violated when a specific value needs to be assigned to an enumerator item.
10.1	R	The value of an expression of integer type shall not be implicitly converted to a different underlying type under some circumstances.	An operand of essentially enum type is being converted to unsigned type as a result of an arithmetic or conditional operation. The conversion does not have any unintended effect.
11.4	A	A cast should not be performed between a pointer to object type and a different pointer to object type.	A cast involving pointers is conducted with caution that the pointers are correctly aligned for the type of object being pointed to.
13.7	R	Boolean operations whose results are invariant shall not be permitted.	A Boolean operator can yields a result that can be proven to be always "true" or always "false" in some specific configurations because of generalized implementation approach.
17.4	R	Array indexing shall be the only allowed form of pointer arithmetic.	An array subscript operator is being used to subscript an expression which is not of array type. This is perfectly legitimate in the C language providing the pointer addresses an array element.
18.4	R	Unions shall not be used.	Deviated for constructing an efficient implementation.
19.7	A	A function should be used in preference to a function-like macro.	Deviated for more efficient code.

This Component has the following embedded Components: cy_isr, SCB. Refer to the corresponding Component datasheets for information on their MISRA compliance and specific deviations.

API Memory Usage

The Component memory usage varies significantly, depending on the compiler, device, number of APIs used and Component configuration. The following table provides the memory usage for all APIs available in the given Component configuration.

The measurements are done with the associated compiler configured in Release mode with optimization set for Size. For a specific design, the map file generated by the compiler can be analyzed to determine the memory usage.

The Component's BLE Stack is implemented in four libraries and therefore the Component memory usage is directly dependent on the library used. The libraries are:

- HCI Library (used in HCI mode)
- Peripheral (used when the Component is configured for GAP Peripheral or GAP Broadcaster role)
- Central (used when the Component is configured for GAP Central or GAP Observer role)
- Peripheral and Central (used when the Component is configured for GAP Peripheral and Central roles)

HCI Mode

Configuration	PSoC 4200 BLE (GCC)		
	Flash Bytes	SRAM Bytes	Stack Bytes
HCI Mode	36562	2631	2048

Peripheral and Central Profile Mode

Configuration	PSoC 4200 BLE (GCC)		
	Flash Bytes	SRAM Bytes	Stack Bytes
Alert Notification Profile (Server)	82814	7471	2048
Find Me Profile (Find Me Target role)	82334	7401	2048
Internet Protocol Support	82000	10599	2048
Phone Alert Status	82706	7451	2048
Time	83370	7502	2048

Central Profile Mode

Configuration	PSoC 4200 BLE (GCC)		
	Flash Bytes	SRAM Bytes	Stack Bytes
Alert Notification Profile (Server)	75962	7300	2048
Find Me Profile (Find Me Target role)	75354	7219	2048
HID over GATT Profile (Host)	80894	7416	2048
Phone Alert Status	75826	7260	2048
Proximity Profile (Proximity Reporter)	76130	7245	2048
Time	76482	7315	2048

Peripheral Profile Mode

Configuration	PSoC 4200 BLE (GCC)		
	Flash Bytes	SRAM Bytes	Stack Bytes
Blood Pressure	74542	7414	2048
Bootloader	73880	7288	2048
Continuous Glucose Monitoring	75756	7513	2048
Cycling Power	74980	7358	2048
Cycling Speed and Cadence	74680	7394	2048
Custom	73438	7286	2048
Environmental Sensing	78918	9017	2048
Find Me Profile (Find Me Target role)	73528	7240	2048
Glucose Profile (Glucose Sensor)	74796	7417	2048
Health Thermometer Profile (Server)	74888	7420	2048
Heart Rate Profile (Heart Rate Sensor)	74438	7358	2048
HID Over GATT Profile (HID Device)	76382	7530	2048
Internet Protocol Support	73330	10438	2048
Location and Navigation	74378	7337	2048
Proximity Profile (Proximity Reporter)	74324	7278	2048
Running Speed and Cadence	74700	7398	2048
Scan Parameters Profile (Scan Server)	73894	7262	2048
Weight Scale	79478	7912	2048
Wireless Power Transfer	74538	7412	2048

BLE Common APIs

Description

The common APIs act as a general interface between the BLE application and the BLE Stack module. The application may use these APIs to control the underlying hardware such as radio power, data encryption and device bonding via the stack. It may also access the GAP, GATT and L2CAP layers of the stack. These are divided into the following categories:

- BLE Common Core Functions
- GAP Functions
- GATT Functions
- L2CAP Functions

These APIs also use API specific definitions and data structures. Many of the APIs also rely on BLE Stack events. These are classified in the following subsets:

- BLE Common Events
- BLE Common Definitions and Data Structures

Modules

- BLE Common Core Functions

  The common core APIs are used for general BLE component configuration. These include initialization, power management, and utilities.
- GAP Functions

  The GAP APIs allow access to the Generic Access Profile (GAP) layer of the BLE stack. Depending on the chosen GAP role in the GUI, you may use a subset of the supported APIs.
- GATT Functions

  The GATT APIs allow access to the Generic Attribute Profile (GATT) layer of the BLE stack. Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.
- L2CAP Functions

  The L2CAP APIs allow access to the Logical link control and adaptation protocol (L2CAP) layer of the BLE stack.
- BLE Common Events

  The BLE stack generates events to notify the application on various status alerts concerning the stack. These can be generic stack events or can be specific to GAP, GATT or L2CAP layers. The service specific events are handled separately in BLE Service-Specific Events.
- BLE Common Definitions and Data Structures

  Contains definitions and structures that are common to all BLE common APIs. Note that some of these are also used in Service-specific APIs.

BLE Common Core Functions

Description

The common core APIs are used for general BLE component configuration. These include initialization, power management, and utilities.

Functions

- CYBLE_API_RESULT_T CyBle_Start (CYBLE_CALLBACK_TcallbackFunc)

- void CyBle_Stop(void)
- CYBLE_API_RESULT_T CyBle_StoreBondingData(uint8 isForceWrite)
- CYBLE_API_RESULT_T CyBle_SoftReset(void)
- CYBLE_LP_MODE_T CyBle_EnterLPM (CYBLE_LP_MODE_TpwrMode)
- CYBLE_LP_MODE_T CyBle_ExitLPM(void)
- void CyBle_ProcessEvents(void)
- CYBLE_API_RESULT_T CyBle_SetDeviceAddress (CYBLE_GAP_BD_ADDR_T*bdAddr)
- CYBLE_API_RESULT_T CyBle_GetDeviceAddress (CYBLE_GAP_BD_ADDR_T*bdAddr)
- int8 CyBle_GetRssi(void)
- CYBLE_API_RESULT_T CyBle_GetTxPowerLevel (CYBLE_BLESS_PWR_IN_DB_T*bleSsPwrLvl)
- CYBLE_API_RESULT_T CyBle_SetTxPowerLevel (CYBLE_BLESS_PWR_IN_DB_T*bleSsPwrLvl)
- CYBLE_API_RESULT_T CyBle_GetBleClockCfgParam (CYBLE_BLESS_CLK_CFG_PARAMS_T*bleSsClockConfig)
- CYBLE_API_RESULT_T CyBle_SetBleClockCfgParam (CYBLE_BLESS_CLK_CFG_PARAMS_T*bleSsClockConfig)
- CYBLE_API_RESULT_T CyBle_GenerateRandomNumber(uint8 *randomNumber)
- CYBLE_API_RESULT_T CyBle_AesEncrypt(uint8 *plainData, uint8 *aesKey, uint8 *encryptedData)
- CYBLE_API_RESULT_T CyBle_SetCeLengthParam(uint8 bdHandle, uint8 mdBit, uint16 ceLength)
- CYBLE_API_RESULT_T CyBle_WriteAuthPayloadTimeout(uint8 bdHandle, uint16 authPayloadTimeout)
- CYBLE_API_RESULT_T CyBle_ReadAuthPayloadTimeout(uint8 bdHandle, uint16 *authPayloadTimeout)
- CYBLE_API_RESULT_T CyBle_GetStackLibraryVersion (CYBLE_STACK_LIB_VERSION_T*stackVersion)
- CYBLE_BLESS_STATE_T CyBle_GetBleSsState(void)
- void CyBle_AesCcmInit(void)
- CYBLE_API_RESULT_T CyBle_AesCcmEncrypt(uint8 *key, uint8 *nonce, uint8 *in_data, uint8 length, uint8 *out_data, uint8 *out_mic)
- CYBLE_API_RESULT_T CyBle_AesCcmDecrypt(uint8 *key, uint8 *nonce, uint8 *in_data, uint8 length, uint8 *out_data, uint8 *in_mic)
- void CyBle_SetTxGainMode(uint8 bleSsGainMode)
- void CyBle_SetRxGainMode(uint8 bleSsGainMode)
- CYBLE_API_RESULT_T CyBle_StoreStackData(uint8 isForceWrite)
- CYBLE_API_RESULT_T CyBle_StoreAppData(uint8 *srcBuff, const uint8 destAddr[], uint32 buffLen, uint8 isForceWrite)

Function Documentation

CYBLE_API_RESULT_TCyBle_Start (CYBLE_CALLBACK_T *callbackFunc*)

This function initializes the BLE Stack, which consists of the BLE Stack Manager, BLE Controller, and BLE Host modules. It takes care of initializing the Profile layer, schedulers, Timer and other platform related resources required for the BLE component. It also registers the callback function for BLE events that will be registered in the BLE stack.

Note that this function does not reset the BLE Stack.

For HCI-Mode of operation, this function will not initialize the BLE Host module.

Calling this function results in the generation of CYBLE_EVT_STACK_ON event on successful initialization of the BLE Stack.

Parameters:

callbackFunc	Event callback function to receive events from BLE stack. CYBLE_CALLBACK_T is a function pointer type.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On passing a NULL pointer to the function when the BLE stack is not built in HCI mode. CYBLE_ERROR_INVALID_PARAMETER is never returned in HCI mode.
CYBLE_ERROR_REPEATED_ATTEMPTS	On invoking this function more than once without calling CyBle_Shutdown() function between calls to this function.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	There is insufficient memory available.

Global Variables

The CyBle_initVar variable is used to indicate initial configuration of this component. The variable is initialized to zero (0u) and set to one (1u) the first time CyBle_Start() is called. This allows for component initialization without re-initialization in all subsequent calls to the CyBle_Start() routine.

void CyBle_Stop (void)

This function stops any ongoing operation in the BLE Stack and forces the BLE Stack to shut down. The only function that can be called after calling this function is CyBle_Start().

Returns:

None

CYBLE_API_RESULT_T CyBle_StoreBondingData (uint8 *isForceWrite*)

This function writes the new bonding data from RAM to the dedicated Flash location as defined by the component. It performs data comparing between RAM and Flash before writing to Flash. If there is no change between RAM and Flash data, then no write is performed. It writes only one flash row in one call. Application should keep calling this function till API return CYBLE_ERROR_OK. This function is available only when Bonding requirement is selected in Security settings.

Parameters:

isForceWrite	If value is set to 0, then stack will check if flash write is permissible.

Returns:

Return value is of type CYBLE_API_RESULT_T.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_FLASH_WRITE_NOT_PERMITED	Flash Write is not complete

Side Effects

For BLE devices with 128K of Flash memory this API will automatically modify the clock settings for the device. Writing to flash requires changes to be done to the IMO (set to 48 MHz) and HFCLK (source set to IMO) settings. The configuration is restored before returning. This will impact the operation of most of the hardware in the device.

Global Variables

The BLE_pendingFlashWrite variable is used to detect status of pending write to flash operation for stack data and CCCD. This API automatically clears pending bits after write operation complete.

CYBLE_API_RESULT_T CyBle_SoftReset (void)

This function resets the BLE Stack, including BLE sub-system hardware registers. BLE Stack transitions to idle mode. This function can be used to reset the BLE Stack if the BLE Stack turns unresponsive due to incomplete transfers with the peer BLE device.

This is a blocking function. No event is generated on calling this function.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_OPERATION	This error occurs if this function is invoked before invoking CyBle_StackInit function.

CYBLE_LP_MODE_T CyBle_EnterLPM (CYBLE_LP_MODE_T *pwrMode*)

This function requests the underlying BLE modules such as BLE Controller, BLE Host Stack and BLE Stack manger to enter into one of the supported low power modes. Application should use this function to put Bluetooth Low Energy Sub-System (BLESS) to Low Power Mode (LPM).

BLE Stack enters and exits low power modes based on its current state and hence the application should consider the BLE Stack LPM state before putting the CPU or the overall device into LPM. This function attempts to set the requested low power mode and if that is not possible, it tries to set the next higher low-power-mode. This behavior is due to the requirement that the application will always try to use the lowest power mode when there is nothing that it needs to process. Note that the CPU will not be able to access the BLESS registers when BLESS is in deep sleep mode.

BLE Stack has the following power modes:

1. Active
2. Sleep (Low Power Mode)
3. DeepSleep with ECO Off (Low Power Mode)
4. Hibernate (Low Power Mode)

Note that certain conditions may prevent BLE sub system from entering a particular low power mode.

Active Mode

Bluetooth Low Energy Sub System (BLESS) has three sub-modes in Active mode:

1. Idle
2. Transmit Mode, and
3. Receive Mode

These modes draw full current from the device and the CPU has full access to its registers.

Sleep Mode

The clock to the link layer engine and digital modem is gated and the (External Crystal Oscillator) ECO continues to run to maintain the link layer timing. The application cannot enter sleep mode if a Transmit or Receive is in progress.

Deep Sleep with ECO Off Mode

The ECO is stopped and Watch Crystal Oscillator (WCO) is used to maintain link layer timing. All the regulators in the Radio Frequency (RF) transceiver are turned off to reduce leakage current and BLESS logic is kept powered ON from the System Resources Sub System (SRSS) deep-sleep regulator for retention of current BLESS state information. This mode can be entered from either Idle (Active) or Sleep mode. It should be entered when the next scheduled activity instant in time domain is greater than the Deep Sleep total wakeup time (typically 2ms).

Hibernate mode

The application layer should invoke this function with the Hibernate Mode option to put the BLE Stack in to hibernate mode. If this mode is set, the micro-controller can be put in to Hibernate Mode by the application layer. This mode ensures that BLE Sub-system is completely idle and no procedures such ADV, SCAN and CONNECTION are active.

The following table indicates the allowed sleep modes for the complete system (BLE Sub-system and the micro-controller). Modes marked In 'X' are the allowed combinations. The application layer should make sure that the invalid modes are not entered in to:

BLE Stack LPM / PSoC4A-BLE LPM	Active	Sleep	DeepSleep	Hibernate
Active	X			
Sleep	X	X		
DeepSleep (ECO OFF)	X	X	X	
Hibernate				X

The application layer is responsible for putting the BLE Sub-system and the micro-controller in to the desired sleep modes. Upon entering the requested sleep mode combination, the BLE Sub-system and the micro-controller are woken up by an interrupt every advertisement interval(in case of a GAP Peripheral) or connection interval (in case of GAP Central). On wakeup, if the application needs to transmit some data, appropriate function(s) including the Stack functions need to be invoked. This needs to be followed by a call to the function CyBle_ProcessEvents, which handles all pending transmit and receive operations. The application can now put the complete system back in to one of the sleep modes. The application should ensure that the above invalid states are never encountered.

Application shall also ensure that BLE Sub-system's low power entry and low power exit interrupts are processed in realtime and not blocked. It is recommended that BLE Sub-system interrupt should be of higher priority. If BLE Sub-system interrupts are blocked for longer time (> 200us), BLE Sub-system can violate Bluetooth specification timing for wakeup where ECO is required to perform BLE radio operation. It can also result in race condition where BLE Stack waits for interrupt as ECO is not started correctly and BLE Sub system enters in unknown state, BLE Stack gets stuck in busy loop.

This is a blocking function. In process of entering in BLESS Deep Sleep Mode, BLE Stack puts CPU in Sleep Mode to save power while polling for entry indication to BLESS DSM. No event is generated on calling this function. Based on the return code from this function, the application layer should decide on the sleep mode for the complete system. For example, if the return code is CYBLE_BLESS_DEEPSLEEP, the application can choose to call system wide DeepSleep mode function.

Parameters:

pwrMode	The power mode that the component is intended to enter. The allowed values are, • CYBLE_BLESS_SLEEP • CYBLE_BLESS_DEEPSLEEP

Returns:

CYBLE_LP_MODE_T: The actual power mode that BLE stack is now set to.

CYBLE_LP_MODE_TCyBle_ExitLPM (void)

Application can asynchronously wake up the BLE Stack from low power using this function. The wake up is not performed for the entire chip. This is a blocking call and returns when BLE Stack has come out of LPM, and in process of waking up from BLESS Deep Sleep Mode, BLE Stack puts CPU in Sleep Mode to save power while polling for wakeup indication from BLESS.No event is generated on calling this function. It has no effect if it is invoked when the BLE Stack is already in active mode.

Returns:

CYBLE_LP_MODE_T: The actual power mode that BLE stack is now set to. Expected return value is CYBLE_BLESS_ACTIVE.

void CyBle_ProcessEvents (void)

This function checks the internal task queue in the BLE Stack, and pending operation of the BLE Stack, if any. This needs to be called at least once every interval 't' where:

1. 't' is equal to connection interval or scan interval, whichever is smaller, if the device is in GAP Central mode of operation, or
2. 't' is equal to connection interval or advertisement interval, whichever is smaller, if the device is in GAP Peripheral mode of operation.

On calling every interval 't', all pending operations of the BLE Stack are processed. This is a blocking function and returns only after processing all pending events of the BLE Stack Care should be taken to prevent this call from any kind of starvation; on starvation, events may be dropped by the stack. All the events generated will be propagated to higher layers of the BLE Stack and to the Application layer only after making a call to this function.

Call to this function can wakeup BLESS from Low Power Mode, and in process of waking up from BLESS Deep Sleep Mode, BLE Stack puts CPU in Sleep Mode to save power while polling for wakeup indication from BLESS. This can occur if the caller function has pending data or control transactions to be performed in BLE Stack that need to be programmed to BLESS in CyBle_ProcessEvents() context and BLESS is in Low Power Mode.

Returns:

None

CYBLE_API_RESULT_TCyBle_SetDeviceAddress (CYBLE_GAP_BD_ADDR_T* *bdAddr*)

This function sets the Bluetooth device address into BLE Controller's memory. This address shall be used for BLE procedures unless explicitly indicated by BLE Host through HCI commands. The application layer needs to call this function every time an address change is required. Bluetooth 4.1 Core specification [3.12] specifies that the Bluetooth device can change its private address periodically, with the period being decided by the application; there are no limits specified on this period. The application layer should maintain its own timers in order to do this.

This is a blocking function. No event is generated on calling this function.

Parameters:

bdAddr	Bluetooth Device address retrieved from the BLE stack gets stored to a variable pointed to by this pointer. The variable is of type CYBLE_GAP_BD_ADDR_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

CYBLE_API_RESULT_T CyBle_GetDeviceAddress (CYBLE_GAP_BD_ADDR_T* *bdAddr*)

This API reads the BD device address from BLE Controller's memory. This address shall be used for BLE procedures unless explicitly indicated by BLE Host through HCI commands. This is a blocking function and it returns immediately with the required value.

Parameters:

bdAddr	Pointer to the CYBLE_GAP_BD_ADDR_T structure variable. It has two fields where, • bdAddr.addr: Bluetooth Device address buffer that is populated with the device address data from BLE stack. • bdAddr.type: Caller function should fill the "address type" to retrieve appropriate address. Caller function should use bdAddr.type = 0x00 to get the "Public Device Address" which is currently set. Caller function use bdAddr.type = 0x01 to get the "Random Device Address" which is currently set.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

int8 CyBle_GetRssi (void)

This function reads the recorded Received Signal Strength Indicator (RSSI) value for the last successfully received packet from the BLE radio sub-system. This is a blocking function. No event is generated on calling this function.

Returns:

int8: The RSSI value of the responding device.

Information	Description
Range	-85 <= N <= 5
Note	The value is in dBm.

CYBLE_API_RESULT_TCyBle_GetTxPowerLevel (CYBLE_BLESS_PWR_IN_DB_T* *bleSsPwrLvl*)

This function reads the transmit power of the BLE radio for the given BLE sub-system channel group. This is a blocking function. No event is generated on calling this function.

Parameters:

bleSsPwrLvl	Pointer to a variable of type CYBLE_BLESS_PWR_IN_DB_T where, • bleSsPwrLvl -> blePwrLevelInDbm indicates Output Power level in dBm returned by the function. • bleSsPwrLvl -> bleSsChId indicates Channel group for which power level is to be read. This needs to be set before calling the function. The value can be advertisement channels (CYBLE_LL_ADV_CH_TYPE) or data channels (CYBLE_LL_CONN_CH_TYPE). • If bleSsPwrLvl->blePwrLevelInDbm is greater than 0dBm, then the power level is applicable to both advertisement and connection channel.

Returns:

CYBLE_API_RESULT_T: Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter

CYBLE_API_RESULT_TCyBle_SetTxPowerLevel (CYBLE_BLESS_PWR_IN_DB_T* *bleSsPwrLvl*)

This function sets the transmit power of the BLE radio for given BLE sub-system channel group. This is a blocking function. No event is generated on calling this function.

Parameters:

bleSsPwrLvl	Pointer to a variable of type 'CYBLE_BLESS_PWR_IN_DB_T' where, • bleSsPwrLvl -> blePwrLevelInDbm indicates Output Power level in dBm to be set by the function. • bleSsPwrLvl -> bleSsChId indicates Channel group for which power level is to be set. The value can be advertisement channels (CYBLE_LL_ADV_CH_TYPE) or data channels (CYBLE_LL_CONN_CH_TYPE). • If bleSsPwrLvl->blePwrLevelInDbm is greater than 0dBm, then the power level is applicable to both advertisement and connection channel.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.

Errors codes	Description
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

CYBLE_API_RESULT_TCyBle_GetBleClockCfgParam (CYBLE_BLESS_CLK_CFG_PARAMS_T* *bleSsClockConfig*)

This function reads the clock configuration parameter of BLE sub-system. This is a blocking function. No event is generated on calling this function. The following parameters related to the BLE sub-system clock are set by this function:

Sleep Clock accuracy

Sleep clock accuracy (SCA) in PPM. This parameter indicates the sleep clock accuracy in PPM as described in the following table. It is set in the BLE Stack and is used for BLE Connection operation while creating LE connection with the peer device.

Sleep Clock Accuracy Enum Field	PPM Range Translation (PPM)
CYBLE_LL_SCA_251_TO_500_PPM	251 - 500
CYBLE_LL_SCA_151_TO_250_PPM	151 - 250
CYBLE_LL_SCA_101_TO_150_PPM	101 - 150
CYBLE_LL_SCA_076_TO_100_PPM	76 - 100
CYBLE_LL_SCA_051_TO_075_PPM	51 - 75
CYBLE_LL_SCA_031_TO_050_PPM	31 - 50
CYBLE_LL_SCA_021_TO_030_PPM	21 - 30
CYBLE_LL_SCA_000_TO_020_PPM	0 - 20

Refer to Bluetooth Core Specification 4.1 Volume 6, Chapter 4.5.7 for more details on how the SCA is used.

Link Layer clock divider

This input decides the frequency of the clock to the link layer. A lower clock frequency results in lower power consumption. Default clock frequency for the operation is 24 MHz. BLESS supports 24 MHz, 12 MHz and 8 MHz clock configurations. Based on the end application requirement (how frequent the communication is expected to be), this parameter needs to be set.

ecoXtalStartUpTime ECO startup time specifies the value in the unit of 62.5 us (16 KHz clock cycles). This value is programmed in BLESS WAKE_UP config register, to configure the wakeup time required by ECO. Max value for ECO startup time field can be 79u units = (79 * 62.5) us

Parameters:

bleSsClockConfig	Pointer to a variable of type CYBLE_BLESS_CLK_CFG_PARAMS_T to which the existing clock configuration is stored.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

CYBLE_API_RESULT_TCyBle_SetBleClockCfgParam (CYBLE_BLESS_CLK_CFG_PARAMS_T* *bleSsClockConfig*)

This function sets the clock configuration parameter of BLE sub-system. This is a blocking function. No event is generated on calling this function. The following parameters related to the BLE sub-system clock are set by this function:

Sleep Clock accuracy

Sleep clock accuracy (SCA) in PPM. This parameter indicates the sleep clock accuracy in PPM as described in the following table. It is set in the BLE Stack and is used for BLE Connection operation while creating LE connection with the peer device.

Sleep Clock Accuracy Enum Field	PPM Range Translation (PPM)
CYBLE_LL_SCA_251_TO_500_PPM	251 - 500
CYBLE_LL_SCA_151_TO_250_PPM	151 - 250
CYBLE_LL_SCA_101_TO_150_PPM	101 - 150
CYBLE_LL_SCA_076_TO_100_PPM	76 - 100
CYBLE_LL_SCA_051_TO_075_PPM	51 - 75
CYBLE_LL_SCA_031_TO_050_PPM	31 - 50
CYBLE_LL_SCA_021_TO_030_PPM	21 - 30
CYBLE_LL_SCA_000_TO_020_PPM	0 - 20

Refer to Bluetooth Core Specification 4.1 Volume 6, Chapter 4.5.7 for more details on how the SCA is used.

Link Layer clock divider

This input decides the frequency of the clock to the link layer. A lower clock frequency results in lower power consumption. Default clock frequency for the operation is 24MHz. BLESS supports 24MHz, 12MHz and 8MHz clock configurations. Based on the end application requirement (how frequent the communication is expected to be), this parameter needs to be set.

ecoXtalStartUpTime ECO startup time specifies the value in the unit of 62.5us (16KHz clock cycles). This value is programmed in BLESS WAKE_UP config register, to configure the wakeup time required by ECO. Max value for ECO startup time field can be 79u units = (79 * 62.5) us

Parameters:

bleSsClockConfig	Pointer to a variable of type CYBLE_BLESS_CLK_CFG_PARAMS_T from which the existing clock configuration is taken.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

CYBLE_API_RESULT_TCyBle_GenerateRandomNumber (uint8 * *randomNumber*)

This function generates 8-byte random number which complies with pseudo random number generation in accordance with [FIPS PUB 140-2]. Random number generation function is used during security procedure documented in Bluetooth 4.1 core specification, Volume 3, Part H.

This is a blocking function. No event is generated on calling this function.

Parameters:

randomNumber	Pointer to a buffer of size 8 bytes in which the generated random number gets stored.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

CYBLE_API_RESULT_T CyBle_AesEncrypt (uint8 * *plainData*, uint8 * *aesKey*, uint8 * *encryptedData*)

This function uses BLE sub-system AES engine to encrypt 128-bit of plain text using the given AES key. The output of AES processing is copied to encryptedData buffer. Refer Bluetooth 4.1 core specification, Volume 3, Part H, section 2.2 for more details on usage of AES key.

This is a blocking function. No event is generated on calling this function.

Parameters:

plainData	Pointer to the data containing plain text (128-bit) that is to be encrypted.
aesKey	Pointer to the AES Key (128-bit) that is to be used for AES encryption.
encryptedData	Pointer to the encrypted data (128-bit) that is output of AES module for given plainData and aesKey.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter

CYBLE_API_RESULT_T CyBle_SetCeLengthParam (uint8 *bdHandle*, uint8 *mdBit*, uint16 *ceLength*)

This function sets the connection event duration related parameters that can result in extension or truncation of LE connection event based on more data (mdBit) bit status and 'ceLength' duration. Refer Bluetooth 4.1 core specification, Volume 6, Part B, section 4.5 for more details on connection states of BLE Link Layer.

This is a blocking function. No event is generated on calling this function.

BLE Stack uses the BLESS hardware (AES module) to encrypt/decrypt the data. BLESS must be initialized before using this function. This function can safely be used by the application in "single thread/task system" which is the case with the current implementation of the BLE Stack. For multitasking systems, this function must be used within the BLE task to ensure atomic operation.

Parameters:

bdHandle	Peer device bdHandle.
mdBit	'More Data' bit to select more number of data packets in BLE Stack buffer. A value of 0x01 indicates extension and a value of 0x00 indicates truncation.

ceLength	CE length of connection event that can extend the connection event. Details on this parameter are as given below: • Value Range = 0x0000 to 0xFFFF • Time Calculation = N x 0.625 ms • Time Range = 0 ms to 40.959 ms

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	One of the input parameters is invalid
CYBLE_ERROR_NO_CONNECTION	Connection does not exist

CYBLE_API_RESULT_TCyBle_WriteAuthPayloadTimeout (uint8 *bdHandle*, uint16 *authPayloadTimeout*)

This function sets the Authentication Payload timeout in BLE Controller for LE_PING feature. Refer Bluetooth 4.1 core specification, Volume 6, Part B, section 4.6.5 for LE Ping operation.

This is a blocking function. No event is generated on calling this function.

Parameters:

bdHandle	Peer device handle.
authPayload Timeout	Variable containing authentication timeout value to be written to BLE Controller. Details on this parameter are as given below: • Value Range = 0x0001 to 0xFFFF • Default Value (N) = 3000 (30 seconds) • Time Calculation = N x 10 ms • Time Range = 10 ms to 655,350 ms

Returns:

CYBLE_API_RESULT_T: Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	One of the input parameters is invalid
CYBLE_ERROR_INVALID_OPERATION	Operation is not permitted
CYBLE_ERROR_NO_CONNECTION	Connection does not exist

CYBLE_API_RESULT_TCyBle_ReadAuthPayloadTimeout (uint8 *bdHandle*, uint16 * *authPayloadTimeout*)

This function reads the Authentication Payload timeout set in BLE Controller for LE_PING feature Refer Bluetooth 4.1 core specification, Volume 6, Part B, section 4.6.5 for LE Ping operation.

This is a blocking function. No event is generated on calling this function.

Parameters:

bdHandle	Peer device handle
authPayload Timeout	Pointer to a variable to which authentication timeout value, read from BLE Controller, is written.

Returns:

CYBLE_API_RESULT_T: Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	One of the input parameters is invalid.
CYBLE_ERROR_INVALID_OPERATION	Operation is not permitted.
CYBLE_ERROR_NO_CONNECTION	Connection does not exist.

CYBLE_API_RESULT_T CyBle_GetStackLibraryVersion (CYBLE_STACK_LIB_VERSION_T* *stackVersion*)

This function retrieves the version information of the BLE Stack library. This is a blocking function. No event is generated on calling this function.

Parameters:

stackVersion	Pointer to a variable of type CYBLE_STACK_LIB_VERSION_T containing the version information of the CYBLE Stack library.

Returns:

CYBLE_API_RESULT_T: Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	stackVersion is NULL.

CYBLE_BLESS_STATE_T CyBle_GetBleSsState (void)

This function gets the BLE Subsystem's current operational mode. This state can be used to manage system level power modes based on return value.

Returns:

CYBLE_BLESS_STATE_T bleStackMode: CYBLE_BLESS_STATE_T has one of the following modes

BLE Stack Mode	Description
CYBLE_BLESS_STATE_ACTIVE	BLE Sub System is in active mode, CPU can be in active mode or sleep mode.
CYBLE_BLESS_STATE_EVENT_CLOSE	BLE Sub System radio and Link Layer hardware finishes Tx/Rx. After this state application can try putting BLE to Deep Sleep State to save power in rest of the BLE transmission event.

BLE Stack Mode	Description
CYBLE_BLESS_STATE_SLEEP	BLE Sub System is in sleep mode, CPU can be in sleep mode.
CYBLE_BLESS_STATE_ECO_ON	BLE Sub System is in process of wakeup from Deep Sleep Mode and ECO(XTAL) is turned on. CPU can be put in Deep Sleep Mode.
CYBLE_BLESS_STATE_ECO_STABLE	BLE Sub System is in process of wakeup from Deep Sleep Mode and ECO(XTAL) is stable. CPU can be put in sleep mode.
CYBLE_BLESS_STATE_DEEPSLEEP	BLE Sub System is in Deep Sleep Mode. CPU can be put in Deep Sleep Mode.
CYBLE_BLESS_STATE_HIBERNATE	BLE Sub System is in Hibernate Mode. CPU can be put in Deep Sleep Mode.

void CyBle_AesCcmInit (void)

This function initializes the clocks and registers needed to used AEC CCM encryption / decryption functionality without initializing the complete BLE Stack. This function must be called before calling CyBle_AesCcmEncrypt and/or CyBle_AesCcmDecrypt function. This is a blocking function. No event is generated on calling this function.

Returns:

None

CYBLE_API_RESULT_TCyBle_AesCcmEncrypt (uint8 * ***key*****, uint8 *** ***nonce*****, uint8 *** ***in_data*****, uint8** ***length*****, uint8 *** ***out_data*****, uint8 *** ***out_mic*****)**

This function encrypts the given data. This function can only be invoked after invoking 'CyBle_AesCcmInit' function. This is a blocking function. No event is generated on calling this function.

Parameters:

key	Pointer to an array of bytes holding the key. The array length to be allocated by the application should be 16 bytes.
nonce	Pointer to an array of bytes. The array length to be allocated by the application is 13 Bytes.
in_data	Pointer to an array of bytes to be encrypted. Size of the array should be equal to the value of 'length' parameter.
length	Length of the data to be encrypted, in Bytes. Valid value range is 1 to 27.
out_data	Pointer to an array of size 'length' where the encrypted data is stored.
out_mic	Pointer to an array of bytes (4 Bytes) to store the MIC value generated during encryption.

Returns:

CYBLE_API_RESULT_T: Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	One of the inputs is a null pointer or the 'length' value is invalid

CYBLE_API_RESULT_TCyBle_AesCcmDecrypt (uint8 * *key*, uint8 * *nonce*, uint8 * *in_data*, uint8 *length*, uint8 * *out_data*, uint8 * *in_mic*)

This function decrypts the given data. This function can only be invoked after invoking 'CyBle_AesCcmInit' function. This is a blocking function. No event is generated on calling this function.

Parameters:

key	Pointer to an array of bytes holding the key. The array length to be allocated by the application should be 16 bytes.
nonce	Pointer to an array of bytes. The array length to be allocated by the application is 13 Bytes.
in_data	Pointer to an array of bytes to be decrypted. Size of the array should be equal to the value of 'length' parameter.
length	Length of the data to be decrypted, in Bytes. Valid value range is 1 to 27.
out_data	Pointer to an array of size 'length' where the decrypted data is stored.
in_mic	Pointer to an array of bytes (4 Bytes) to provide the MIC value generated during encryption.

Returns:

CYBLE_API_RESULT_T: Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	One of the inputs is a null pointer or the 'length' value is invalid
CYBLE_ERROR_MIC_AUTH_FAILED	Data decryption has been done successfully but MIC based authorization check has failed. This error can be ignored if MIC based authorization was not intended.

void CyBle_SetTxGainMode (uint8 *bleSsGainMode*)

This function configures the Tx gain mode for BLESS radio for Tx operation.

Parameters:

bleSsGainMode	Gain mode setting for the output power

BLESS RD Gain Mode	Description
CYBLE_BLESS_NORMAL_GAIN_MODE	0x00u - BLESS Normal Gain Mode Tx Pwr Range -18dBm to 0 dBm Normal Rx Sensitivity
CYBLE_BLESS_HIGH_GAIN_MODE	0x01u - BLESS High Gain Mode Tx Pwr Range -18dBm to 3 dBm 3 dBm Additional Rx Sensitivity

Returns:

none

void CyBle_SetRxGainMode (uint8 *bleSsGainMode*)

This function configures the Rx gain mode for BLESS radio for Rx operation.

Parameters:

bleSsGainMode	Gain mode setting for the output power

BLESS RD Gain Mode	Description
CYBLE_BLESS_NORMAL_GAIN_MODE	0x00u - BLESS Normal Gain Mode Tx Pwr Range -18dBm to 0 dBm Normal Rx Sensitivity
CYBLE_BLESS_HIGH_GAIN_MODE	0x01u - BLESS High Gain Mode Tx Pwr Range -18dBm to 3 dBm 3 dBm Additional Rx Sensitivity

Returns:

none

CYBLE_API_RESULT_T CyBle_StoreStackData (uint8 *isForceWrite*)

This function instructs Stack to backup Stack internal RAM data into flash. This API must be called by application to backup stack data. If this API is not called appropriately, stack internal data structure will not be available on power cycle.

Parameters:

isForceWrite	If value is set to 0, then stack will check if flash write is permissible. If value is set to 1, application should exit low power mode by calling CyBle_ExitLPM().

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_FLASH_WRITE_NOT_PERMITED	Flash Write is not permitted or not completely written

CYBLE_API_RESULT_T CyBle_StoreAppData (uint8 * *srcBuff*, const uint8 *destAddr*[], uint32 *buffLen*, uint8 *isForceWrite*)

This function instructs the Stack to backup application specific data into flash. This API must be called by application to backup application specific data. If this API is not called appropriately, data will not be available on power cycle.

Parameters:

srcBuff	Source buffer
destAddr	Destination address
buffLen	Length of srcData
isForceWrite	If value is set to 0, then stack will check if flash write is permissible. If value is set to 1, application should exit low power mode by calling CyBle_ExitLPM()

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_FLASH_WRITE_NOT_PERMITED	Flash Write is not permitted

GAP Functions

Description

The GAP APIs allow access to the Generic Access Profile (GAP) layer of the BLE stack. Depending on the chosen GAP role in the GUI, you may use a subset of the supported APIs.

The GAP API names begin with CyBle_Gap. In addition to this, the APIs also append the GAP role initial letter in the API name.

Modules

- GAP Central and Peripheral Functions
  These are APIs common to both GAP Central role and GAP Peripheral role. You may use them in either roles.
- GAP Central Functions
  APIs unique to designs configured as a GAP Central role.
- GAP Peripheral Functions
  APIs unique to designs configured as a GAP Peripheral role.
- GAP Definitions and Data Structures
  Contains the GAP specific definitions and data structures used in the GAP APIs.

GAP Central and Peripheral Functions

Description

These are APIs common to both GAP Central role and GAP Peripheral role. You may use them in either roles.

No letter is appended to the API name: CyBle_Gap

Functions

- CYBLE_API_RESULT_T CyBle_GapSetLocalName(const char8 name[])
- CYBLE_API_RESULT_T CyBle_GapGetLocalName(char8 name[])
- CYBLE_API_RESULT_T CyBle_GapSetIoCap (CYBLE_GAP_IOCAP_TioCap)
- CYBLE_API_RESULT_T CyBle_GapSetOobData(uint8 bdHandle, uint8 oobFlag, uint8 *key, uint8 *oobData, uint8 *oobDataLen)
- CYBLE_API_RESULT_T CyBle_GapGetPeerBdAddr(uint8 bdHandle, CYBLE_GAP_BD_ADDR_T*peerBdAddr)
- CYBLE_API_RESULT_T CyBle_GapGetPeerBdHandle(uint8 *bdHandle, CYBLE_GAP_BD_ADDR_T*peerBdAddr)
- CYBLE_API_RESULT_T CyBle_GapGetPeerDevSecurity(uint8 bdHandle, CYBLE_GAP_AUTH_INFO_T*security)

- CYBLE_API_RESULT_T CyBle_GapDisconnect(uint8 bdHandle)
- CYBLE_API_RESULT_T CyBle_GapGetPeerDevSecurityKeyInfo(uint8 bdHandle, uint8 *keysFlag, CYBLE_GAP_SMP_KEY_DIST_T*keyInfo)
- CYBLE_API_RESULT_T CyBle_GapGenerateDeviceAddress (CYBLE_GAP_BD_ADDR_T*bdAddr, CYBLE_GAP_ADDR_TYPE_TaddrType, uint8 *irk)
- CYBLE_API_RESULT_T CyBle_GapSetSecurityKeys(uint8 keysFlag, CYBLE_GAP_SMP_KEY_DIST_T*keyInfo)
- CYBLE_API_RESULT_T CyBle_GapGenerateKeys(uint8 keysFlag, CYBLE_GAP_SMP_KEY_DIST_T*keyInfo)
- CYBLE_API_RESULT_T CyBle_GapAuthReq(uint8 bdHandle, CYBLE_GAP_AUTH_INFO_T*authInfo)
- CYBLE_API_RESULT_T CyBle_GapAuthPassKeyReply(uint8 bdHandle, uint32 passkey, uint8 accept)
- CYBLE_API_RESULT_T CyBle_GapRemoveDeviceFromWhiteList (CYBLE_GAP_BD_ADDR_T*bdAddr)
- CYBLE_API_RESULT_T CyBle_GapAddDeviceToWhiteList (CYBLE_GAP_BD_ADDR_T*bdAddr)
- CYBLE_API_RESULT_T CyBle_GapGetBondedDevicesList (CYBLE_GAP_BONDED_DEV_ADDR_LIST_T*bondedDevList)
- CYBLE_API_RESULT_T CyBle_GapRemoveOldestDeviceFromBondedList(void)
- CYBLE_API_RESULT_T CyBle_GapGetDevSecurityKeyInfo(uint8 *keyFlags, CYBLE_GAP_SMP_KEY_DIST_T*keys)
- CYBLE_API_RESULT_T CyBle_GapGetDevicesFromWhiteList(uint8 *count, CYBLE_GAP_BD_ADDR_T*addr)

Function Documentation

CYBLE_API_RESULT_TCyBle_GapSetLocalName (const char8 *name*[])

This API is used to set the local device name - a Characteristic of the GAP Service. If the characteristic length entered in the component customizer is shorter than the string specified by the "name" parameter, the local device name will be cut to the length specified in the customizer.

Parameters:

name	The local device name string. The name string to be written as the local device name. It represents a UTF-8 encoded User Friendly Descriptive Name for the device. The length of the local device string is entered into the component customizer and it can be set to a value from 0 to 248 bytes. If the name contained in the parameter is shorter than the length from the customizer, the end of the name is indicated by a NULL octet (0x00).

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	Function completed successfully.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter

CYBLE_API_RESULT_TCyBle_GapGetLocalName (char8 *name*[])

This API is used to read the local device name - a Characteristic of the GAP Service.

Parameters:

name	The local device name string. Used to read the local name to the given string array. It represents a UTF-8 encoded User Friendly Descriptive Name for the device. The length of the local device string is entered into the component customizer and it can be set to a value from 0 to 248 bytes. If the name contained in the parameter is shorter than the length from the customizer, the end of the name is indicated by a NULL octet (0x00).

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	Function completed successfully.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter

CYBLE_API_RESULT_TCyBle_GapSetIoCap (CYBLE_GAP_IOCAP_T *ioCap*)

This function sets the input and output capability of the BLE Device that is used during authentication procedure. This is a blocking function. No event is generated on calling this function. The input capabilities are described in the following table:

Capability	Description
No input	Device does not have the ability to indicate "yes" or "no"
Yes/No	Device has at least two buttons that can be easily mapped to "yes" and "no" or the device has a mechanism whereby the user can indicate either "yes" or "no".
Keyboard	Device has a numeric keyboard that can input the numbers "0" through "9" and a confirmation. Device also has at least two buttons that can be easily mapped to "yes" and "no" or the device has a mechanism whereby the user can indicate either "yes" or "no".

The output capabilities are described in the following table:

Capability	Description
No output	Device does not have the ability to display or communicate a 6 digit decimal number.
Numeric output	Device has the ability to display or communicate a 6 digit decimal number.

Combined capability is defined in the following table:

Input Capability	No Output	Numeric Output
No input	NoInputNoOutput	DisplayOnly

Input Capability	No Output	Numeric Output
Yes/No	NoInputNoOutput	DisplayYesNo
Keyboard	KeyboardOnly	KeyboardDisplay

Refer Bluetooth 4.1 core specification, Volume 3, Part C, section 5.2.2.4 for more details on the IO capabilities. IO capabilities of the BLE devices are used to determine the pairing method. Please refer Bluetooth 4.1 core specification, Volume 3, Part H, section 2.3.5.1 for more details on the impact of IO capabilities on the pairing method chosen.

Parameters:

io_cap	IO Capability of type CYBLE_GAP_IOCAP_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	On specifying invalid input parameter

CYBLE_API_RESULT_T CyBle_GapSetOobData (uint8 *bdHandle*, uint8 *oobFlag*, uint8 * *key*, uint8 * *oobData*, uint8 * *oobDataLen*)

This function sets OOB presence flag and data. This function should be used by the application layer if it wants to enable OOB bonding procedure for any specific device identified by "bdHandle". This function should be called before initiating authentication or before responding to authentication request to set OOB flag and data. For more details on OOB, please refer Bluetooth 4.1 core specification, Volume 1, Part A, section 5.2.4.3. This is a blocking function. No event is generated on calling this function.

Parameters:

bdHandle	Peer device for which the Out Of Band signaling (OOB) configuration is to be used.
oobFlag	OOB data presence flag. Allowed value are, • CYBLE_GAP_OOB_DISABLE • CYBLE_GAP_OOB_ENABLE
key	16 Octet Temporary Key, to be used for OOB authentication.
oobData	Pointer to OOB data.
oobDataLen	Pointer to a variable to store OOB data length.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter
CYBLE_ERROR_NO_DEVICE_ENTI	'bdHandle' does not represent known device

Errors codes	Description
TY	entity

CYBLE_API_RESULT_TCyBle_GapGetPeerBdAddr (uint8 *bdHandle*, CYBLE_GAP_BD_ADDR_T* *peerBdAddr*)

This function reads the peer Bluetooth device address which has already been fetched by the BLE Stack. 'peerBdAddr' stores the peer's Bluetooth device address identified with 'bdHandle'. This is a blocking function. No event is generated on calling this function.

Parameters:

bdHandle	Peer device handle.
peerBdAddr	Empty buffer where the Bluetooth device address gets stored.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'peerBdAddr'.
CYBLE_ERROR_NO_DEVICE_ENTITY	Specified device handle does not map to any device handle entry in BLE stack.

CYBLE_API_RESULT_TCyBle_GapGetPeerBdHandle (uint8 * *bdHandle*, CYBLE_GAP_BD_ADDR_T* *peerBdAddr*)

This function reads the device handle of the remote Bluetooth device using 'peerBdAddr', which has already been fetched by the BLE Stack. 'bdHandle' stores the peer device handle. This is a blocking function. No event is generated on calling this function.

Parameters:

bdHandle	Pointer to a variable to store peer device handle
peerBdAddr	Pointer to Bluetooth device address of peer device of type CYBLE_GAP_BD_ADDR_T, to be provided to this function as an input

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'peerBdAddr' or 'bdHandle'.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.
CYBLE_ERROR_NO_DEVICE_ENTITY	Specified device handle does not map to any device handle entry in BLE stack.

CYBLE_API_RESULT_T CyBle_GapGetPeerDevSecurity (uint8 *bdHandle*, CYBLE_GAP_AUTH_INFO_T* *security*)

This function enables the application to get the device security of the peer device, which has already been fetched by the BLE Stack, identified using 'bdHandle' when the peer device is in the trusted list. This is a blocking function. No event is generated on calling this function.

Parameters:

bdHandle	Peer device handle
security	Pointer to a buffer into which security information will be written. security level of the peer device is provided in CYBLE_GAP_AUTH_INFO_T->security. It ignores LE Security mode. Security should be interpreted as MITM and no MITM as encryption is always supported if pairing is performed between two devices.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'security'.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.
CYBLE_ERROR_NO_DEVICE_ENTITY	Specified device handle does not map to any device handle entry in BLE stack.

CYBLE_API_RESULT_T CyBle_GapDisconnect (uint8 *bdHandle*)

This function disconnects the peer device. It is to be used by the device in GAP Central mode and may be used by a GAP Peripheral device to send a disconnect request. This is a non-blocking function. On disconnection, the following events are generated, in order.

- CYBLE_EVT_GATT_DISCONNECT_IND
- CYBLE_EVT_GAP_DEVICE_DISCONNECTED

Parameters:

bdHandle	Peer device handle

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	No device to be disconnected. The specified device handle does not map to any device entry in the BLE Stack.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.

CYBLE_API_RESULT_TCyBle_GapGetPeerDevSecurityKeyInfo (uint8 *bdHandle*, uint8 * *keysFlag*, CYBLE_GAP_SMP_KEY_DIST_T* *keyInfo*)

This function enables the application to know the keys shared by a given peer device upon completion of the security sequence (already fetched by the BLE Stack). The keys are shared by the peer device on initiation of authentication which is performed using the CyBle_GapAuthReq() or CyBle_GappAuthReqReply() function.

This is a blocking function. No event is generated on calling this function.

Parameters:

bdHandle	Peer device handle.
keysFlag	Indicates the keys to be retrieved from peer device. The following bit fields indicate the presence or absence of the keys distributed. **Negotiated Local/Peer Key distribution** • Bit 0. Encryption information (LTK and MID Information) • Bit 1. Identity information • Bit 2. Signature Key • Bit 3-7. Reserved
key_info	Pointer to variable of type CYBLE_GAP_SMP_KEY_DIST_T to copy the stored keys of the peer device identified by 'bdHandle'

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'keyInfo'.
CYBLE_ERROR_INVALID_OPERATION	An error occurred in BLE stack.

CYBLE_API_RESULT_TCyBle_GapGenerateDeviceAddress (CYBLE_GAP_BD_ADDR_T* *bdAddr*, CYBLE_GAP_ADDR_TYPE_T *addrType*, uint8 * *irk*)

This function generates either public or random address based on 'type' field of CYBLE_GAP_BD_ADDR_T structure. It uses BLE Controller's random number generator to generate the random part of the Bluetooth device address.

The parameter 'addrType' specifies further sub-classification within the public and random address types.

This is a blocking function. No event is generated on calling this function.

Parameters:

bdAddr	Bluetooth device address is generated and populated in the structure pointed to by this pointer. The structure is of type CYBLE_GAP_BD_ADDR_T.
addrType	Specifies the type of address. This can take one of the values from the enumerated data type CYBLE_GAP_ADDR_TYPE_T.
irk	Pointer to buffer containing 128-bit 'IRK' data. This parameter is only used when CYBLE_GAP_RANDOM_PRIV_RESOLVABLE_ADDR is the value set to 'addrType'. For other values of 'addrType', this parameter is not used.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

CYBLE_API_RESULT_T CyBle_GapSetSecurityKeys (uint8 *keysFlag*, CYBLE_GAP_SMP_KEY_DIST_T* *keyInfo*)

This function sets the security keys that are to be exchanged with peer device during key exchange stage of authentication procedure and sets it in the BLE Stack. This is a blocking function. No event is generated on calling this function.

Parameters:

keysFlag	This parameter indicates which keys get exchanged with peer device. The following is the bit field mapping for the keys. **First 4 bits. Initiator's Key distribution** • Bit 0. Encryption information (LTK and MID Information) • Bit 1. Identity information • Bit 2. Signature Key • Bit 3. Reserved **Next 4 bits. Responder's Key distribution** • Bit 4. Encryption information (LTK and MID Information) • Bit 5. Identity information • Bit 6. Signature Key • Bit 7. Reserved
keyInfo	Pointer to a variable containing the keys to be set, of type 'CYBLE_GAP_SMP_KEY_DIST_T'. idAddrInfo param of 'CYBLE_GAP_SMP_KEY_DIST_T' will be ignored. 'CyBle_SetDeviceAddress' api needs to be used to set bd address.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'keyInfo'

CYBLE_API_RESULT_T CyBle_GapGenerateKeys (uint8 *keysFlag*, CYBLE_GAP_SMP_KEY_DIST_T* *keyInfo*)

This function generates the security keys that are to be exchanged with peer device during key exchange stage of authentication procedure and sets it in the BLE Stack. This is a blocking function. No event is generated on calling this function.

Parameters:

keysFlag	This parameter indicates which keys get exchanged with peer device. The following is the bit field mapping for the keys. **First 4 bits. Initiator's Key distribution** • Bit 0. Encryption information (LTK and MID Information) • Bit 1. Identity information • Bit 2. Signature Key • Bit 3. Reserved **Next 4 bits. Responder's Key distribution** • Bit 4. Encryption information (LTK and MID Information) • Bit 5. Identity information • Bit 6. Signature Key • Bit 7. Reserved
keyInfo	Pointer to a variable containing the returned keys, of type 'CYBLE_GAP_SMP_KEY_DIST_T'

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'keyInfo'

CYBLE_API_RESULT_T CyBle_GapAuthReq (uint8 *bdHandle*, CYBLE_GAP_AUTH_INFO_T* *authInfo*)

This function starts authentication/pairing procedure with the peer device. It is a non-blocking function.

If the local device is a GAP Central, the pairing request is sent to the GAP Peripheral device. On receiving CYBLE_EVT_GAP_AUTH_REQ event, the GAP Peripheral is expected to respond by invoking the CyBle_GappAuthReqReply() function.

If the local device is GAP Peripheral, a Security Request is sent to GAP Central device. On receiving CYBLE_EVT_GAP_AUTH_REQ event, the GAP Central device is expected to respond by invoking 'CyBle_GapAuthReq ()' function.

Parameters:

bdHandle	Peer device handle
authInfo	Pointer to security information of the device of type CYBLE_GAP_AUTH_INFO_T. The 'authErr' parameter in CYBLE_GAP_AUTH_INFO_T should be ignored as it is not used in this function.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying null pointer for 'advInfo' or if any of the element of this structure has an invalid value.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_ERROR_NO_DEVICE_ENTITY	Device identified using 'bdHandle' does not exist.
CYBLE_ERROR_INSUFFICIENT_RESOURCES	On bonded device is full and application tries to initiate pairing with bonding enable.

CYBLE_API_RESULT_T CyBle_GapAuthPassKeyReply (uint8 *bdHandle*, uint32 *passkey*, uint8 *accept*)

This function sends passkey for authentication. It is a non-blocking function.

It should be invoked in reply to the authentication request event CYBLE_EVT_GAP_PASSKEY_ENTRY_REQUEST received by the BLE Stack. This function is used to accept the passkey request and send the passkey or reject the passkey request.

- If the authentication operation succeeds, CYBLE_EVT_GAP_AUTH_COMPLETE is generated. If the authentication process times out, CYBLE_EVT_TIMEOUT event is generated.
- If the authentication fails, CYBLE_EVT_GAP_AUTH_FAILED event is generated.

Parameters:

bdHandle	Peer device handle
passkey	6-digit decimal number (authentication passkey)
accept	Accept or reject passkey entry request. Allowed values are, • CYBLE_GAP_REJECT_PASSKEY_REQ • CYBLE_GAP_ACCEPT_PASSKEY_REQ

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	Invalid parameter.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.
CYBLE_ERROR_NO_DEVICE_ENTITY	Device identified using 'bdHandle' does not exist.

CYBLE_API_RESULT_T CyBle_GapRemoveDeviceFromWhiteList (CYBLE_GAP_BD_ADDR_T* *bdAddr*)

This function marks the device specified by the handle as untrusted. It removes the bonding information of the device and removes it from the white list. More details on 'bonding' and 'trusted devices' is available in Bluetooth 4.1 core specification, Volume 3, Part C, section 9.4.4.

This is a blocking function. No event is generated on calling this function.

Parameters:

bdAddr	Pointer to peer device address, of type CYBLE_GAP_BD_ADDR_T. If device address is set to 0, then all devices shall be removed from trusted list and white list.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'bdAddr'.
CYBLE_ERROR_INVALID_OPERATION	Whitelist is already in use.
CYBLE_ERROR_NO_DEVICE_ENTITY	Device does not exist in the whitelist.

CYBLE_API_RESULT_T CyBle_GapAddDeviceToWhiteList (CYBLE_GAP_BD_ADDR_T* *bdAddr*)

This function adds the device to the whitelist. Maximum number of devices that can be added to the whitelist is eight including CYBLE_GAP_MAX_BONDED_DEVICE. Refer to Bluetooth 4.1 core specification, Volume 3, Part C, section 9.3.5 for more details on whitelist.

This is a blocking function. No event is generated on calling this function.

Parameters:

bdAddr	Peer device address, of type CYBLE_GAP_BD_ADDR_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'bdAddr' or 'bdAddr->type' has an invalid value
CYBLE_ERROR_INVALID_OPERATION	Whitelist is already in use
CYBLE_ERROR_INSUFFICIENT_RESOURCES	WhitelistMemory is full
CYBLE_ERROR_DEVICE_ALREADY_EXISTS	Matching device already exists in the whitelist

CYBLE_API_RESULT_TCyBle_GapGetBondedDevicesList (CYBLE_GAP_BONDED_DEV_ADDR_LIST_T* *bondedDevList*)

This function returns the count and Bluetooth device address of the devices in the bonded device list. This is a blocking function. No event is generated on calling this function.

Application invoking this function should allocate sufficient memory for the structure CYBLE_GAP_BONDED_DEV_ADDR_LIST_T, where the complete list of bonded devices along with count can be written. Maximum devices bonded are specified by CYBLE_GAP_MAX_BONDED_DEVICE, which is a pre processing time parameter for the BLE Stack. Hence, the bonded device count will be less than or equal to CYBLE_GAP_MAX_BONDED_DEVICE.

Refer Bluetooth 4.1 core specification, Volume 3, Part C, section 9.4.4 for details on bonded devices.

Parameters:

bondedDevList	Buffer to which list of bonded device list will be stored of type CYBLE_GAP_BONDED_DEV_ADDR_LIST_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter.

CYBLE_API_RESULT_TCyBle_GapRemoveOldestDeviceFromBondedList (void)

This function removes the oldest device from the bonded and while lists. This api should not be called while in connected state. If device is connected to the oldest device, and this API is called, it will remove the device which is oldest and not connected.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded (0x0000) or failed. Following are the possible error codes returned -

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_MAX	On failure operation.

CYBLE_API_RESULT_TCyBle_GapGetDevSecurityKeyInfo (uint8 * *keyFlags*, CYBLE_GAP_SMP_KEY_DIST_T* *keys*)

This function gets the local device's Keys and key flags. The IRK received from this function should be used as the input IRK for the function 'CyBle_GapGenerateDeviceAddress' to generate Random Private Resolvable address. This is a blocking function. No event is generated on calling this function.

Parameters:

keyFlags	Pointer to a byte where the key flags are stored. Based on the flag bits, the calling application can determine if the returned value is valid (1) or not (0). Key distribution flag • Bit 0: Local Encryption information • Bit 1: Local Identity information • Bit 2: Local Signature Key

	• Bit 3 - Bit 7: Reserved
keys	Pointer to a structure of type CYBLE_GAP_SMP_KEY_DIST_T where the keys get stored

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameters

CYBLE_API_RESULT_TCyBle_GapGetDevicesFromWhiteList (uint8 * ***count*****, CYBLE_GAP_BD_ADDR_T*** ***addr*****)**

This function extracts the list of devices added to the white list. This is a blocking function. No events are generated on calling this function. There is no HCI command defined for this operation as the application is expected to keep track of the devices added to the white list. This function has been provided to facilitate testing of the Cypress BLE Hardware using CySmart tool. The prototype of this function has been specified in CyBle_UtilityFunctions.h. This file should not be used by the BLE Component team.

Parameters:

count	Pointer to a variable to hold the number of enabled addresses in the white list. This is an output parameter.
addr	Pointer to a variable of type 'CYBLE_GAP_BD_ADDR_T' which holds Address type and Address of the device.

The function invoking this should allocate memory for the variables pointed to by the above pointers. 'addr' should point to an array of type CYBLE_GAP_BD_ADDR_T and size equal to the maximum number of white list devices supported by the BLE Stack (CYBLE_MAX_WHITELIST_ENTRIES).

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter(s)

GAP Central Functions

Description

APIs unique to designs configured as a GAP Central role.

A letter 'c' is appended to the API name: CyBle_Gapc

Functions

- CYBLE_API_RESULT_T CyBle_GapcStartScan(uint8 scanningIntervalType)

- void CyBle_GapcStopScan(void)
- CYBLE_API_RESULT_T CyBle_GapcConnectDevice(const CYBLE_GAP_BD_ADDR_T*address)
- CYBLE_API_RESULT_T CyBle_GapcCancelDeviceConnection(void)
- CYBLE_API_RESULT_T CyBle_GapcStartDiscovery (CYBLE_GAPC_DISC_INFO_T*scanInfo)
- void CyBle_GapcStopDiscovery(void)
- CYBLE_API_RESULT_T CyBle_GapcInitConnection (CYBLE_GAPC_CONN_PARAM_T*connParam)
- CYBLE_API_RESULT_T CyBle_GapcCancelConnection(void)
- CYBLE_API_RESULT_T CyBle_GapcResolveDevice(const uint8 *bdAddr, const uint8 *irk)
- CYBLE_API_RESULT_T CyBle_GapcConnectionParamUpdateRequest(uint8 bdHandle, CYBLE_GAP_CONN_UPDATE_PARAM_T*connParam)
- CYBLE_API_RESULT_T CyBle_GapcSetHostChannelClassification(uint8 *channelMap)
- CYBLE_API_RESULT_T CyBle_GapcSetRemoteAddr(uint8 bdHandle, CYBLE_GAP_BD_ADDR_TremoteAddr)

Function Documentation

CYBLE_API_RESULT_TCyBle_GapcStartScan (uint8 *scanningIntervalType*)

This function is used for discovering GAP peripheral devices that are available for connection. It performs the scanning routine using the parameters entered in the component's customizer.

As soon as the discovery operation starts, CYBLE_EVT_GAPC_SCAN_START_STOP event is generated. The CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT event is generated when a GAP peripheral device is located. There are three discovery procedures can be selected in the customizer's GUI:

- Observation procedure: A device performing the observer role receives only advertisement data from devices irrespective of their discoverable mode settings. Advertisement data received is provided by the event, CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT. This procedure requires the scanType sub parameter to be passive scanning.
- Limited Discovery procedure: A device performing the limited discovery procedure receives advertisement data and scan# response data from devices in the limited discoverable mode only. Received data is provided by the event, CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT. This procedure requires the scanType sub-parameter to be active scanning.
- General Discovery procedure: A device performing the general discovery procedure receives the advertisement data and scan response data from devices in both limited discoverable mode and the general discoverable mode. Received data is provided by the event, CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT. This procedure requires the scanType sub-parameter to be active scanning.

Every Advertisement / Scan response packet received results in a new event, CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT. If 'scanTo' sub-parameter is a non-zero value, then upon commencement of discovery procedure and elapsed time = 'scanTo', CYBLE_EVT_TIMEOUT event is generated with the event parameter indicating CYBLE_GAP_SCAN_TO. Possible generated events are:

- CYBLE_EVT_GAPC_SCAN_START_STOP: If a device started or stopped scanning. Use CyBle_GetState() to determine the state. Sequential scanning could be started when CYBLE_STATE_DISCONNECTED state is returned.
- CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT
- CYBLE_EVT_TIMEOUT (CYBLE_GAP_SCAN_TO)

Parameters:

scanningIntervalType	Fast or slow scanning interval with timings entered in Scan settings section of the customizer.

	• CYBLE_SCANNING_FAST 0x00u • CYBLE_SCANNING_SLOW 0x01u • CYBLE_SCANNING_CUSTOM 0x02u

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_STACK_INTERNAL	An error occurred in the BLE stack.
CYBLE_ERROR_INVALID_PARAMETER	On passing an invalid parameter.

void CyBle_GapcStopScan (void)

This function used to stop the discovery of devices. On stopping discovery operation, CYBLE_EVT_GAPC_SCAN_START_STOP event is generated. Application layer needs to keep track of the function call made before receiving this event to associate this event with either the start or stop discovery function.

Possible events generated are:

- CYBLE_EVT_GAPC_SCAN_START_STOP

Returns:

None

CYBLE_API_RESULT_TCyBle_GapcConnectDevice (const CYBLE_GAP_BD_ADDR_T* *address*)

This function is used to send a connection request to the remote device with the connection parameters set in the component customizer. This function needs to be called only once after the target device is discovered by CyBle_GapcStartScan() and further scanning has stopped. Scanning is successfully stopped on invoking CyBle_GapcStopScan() and then receiving the event CYBLE_EVT_GAPC_SCAN_START_STOP with sub-parameter 'success' = 0x01u.

On successful connection, the following events are generated at the GAP Central device (as well as the GAP Peripheral device), in the following order.

- CYBLE_EVT_GATT_CONNECT_IND
- CYBLE_EVT_GAP_DEVICE_CONNECTED

A procedure is considered to have timed out if a connection response packet is not received within time set by cyBle_connectingTimeout global variable (30 seconds by default). CYBLE_EVT_TIMEOUT event with CYBLE_GENERIC_TO parameter will indicate about connection procedure timeout. Connection will automatically be canceled and state will be changed to CYBLE_STATE_DISCONNECTED.

Parameters:

address	The device address of the remote device to connect to.
timeout	Timeout for which timer to be started in seconds.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_STACK_INTERNAL	On error occurred in the BLE stack.
CYBLE_ERROR_INVALID_PARAMETER	On passing an invalid parameter.
CYBLE_ERROR_INVALID_STATE	On calling this API not in Disconnected state.

CYBLE_API_RESULT_T CyBle_GapcCancelDeviceConnection (void)

This function cancels a previously initiated connection with the remote device. It is a blocking function. No event is generated on calling this function. If the devices are already connected then this function should not be used. If you intend to disconnect from an existing connection, the function CyBle_GapDisconnect() should be used.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_STACK_INTERNAL	An error occurred in the BLE stack.
CYBLE_ERROR_INVALID_OPERATION	Device is already connected.

CYBLE_API_RESULT_T CyBle_GapcStartDiscovery (CYBLE_GAPC_DISC_INFO_T* *scanInfo*)

This function starts the discovery of devices which are advertising. This is a non-blocking function. As soon as the discovery operation starts, CYBLE_EVT_GAPC_SCAN_START_STOP event is generated.

Every Advertisement / Scan response packet received results in a new event, CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT. If 'scanInfo->scanTo' is a non-zero value, upon commencement of discovery procedure and elapsed time = 'scanInfo->scanTo', CYBLE_EVT_TIMEOUT event is generated with the event parameter indicating CYBLE_GAP_SCAN_TO.

If 'scanInfo->scanTo' is equal to zero, the scanning operation is performed until the CyBle_GapcStopDiscovery() function is invoked.

There are three discovery procedures that can be specified as a parameter to this function.

Observation procedure

A device performing the observer role receives only advertisement data from devices irrespective of their discoverable mode settings. Advertisement data received is provided by the event,

CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT

'scanInfo->scanType' should be set as passive scanning (0x00).

Limited Discovery procedure

A device performing the limited discovery procedure receives advertisement data and scan response data from devices in the limited discoverable mode only. Received data is provided by the event,

CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT

'scanInfo->scanType' should be set as active scanning (0x01).

General Discovery procedure

A device performing the general discovery procedure receives the advertisement data and scan response data from devices in both limited discoverable mode and the general discoverable mode. Received data is provided by the event,

CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT

'scanInfo->scanType' should be set as active scanning (0x01).

Parameters:

scanInfo	Pointer to a variable of type CYBLE_GAPC_DISC_INFO_T

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'scanInfo' or if any element within ' scanInfo' has an invalid value.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.

void CyBle_GapcStopDiscovery (void)

This function stops the discovery of devices. This is a non-blocking function. On stopping discovery operation, CYBLE_EVT_GAPC_SCAN_START_STOP event is generated. Application layer needs to keep track of the function call made before receiving this event to associate this event with either the start or stop discovery function.

Returns:

None

CYBLE_API_RESULT_TCyBle_GapcInitConnection (CYBLE_GAPC_CONN_PARAM_T* *connParam*)

This function instructs BLE Stack to initiate connection request to the remote device with required connection parameters. Connection request from application is acknowledged by BLE Controller as 'CYBLE_EVT_GAP_DEVICE_CONNECTED'. That means, request is correct, permitted and all parameters as part of the request are correct. If the parameter validation or request is not permitted, then BLE controller throws 'CYBLE_EVT_HCI_STATUS' event with error code instead of CYBLE_EVT_GAP_DEVICE_CONNECTED. For positive condition, controller can issue connect request to peer. Once connection is done, no more event is required but if fails to establish connection, 'CYBLE_EVT_GAP_DEVICE_DISCONNECTED' is passed to application.

This is a non-blocking function. This function needs to be called after successfully stopping scanning. Scanning is successfully stopped on invoking the CyBle_GapcStopDiscovery() function and receiving the event CYBLE_EVT_GAPC_SCAN_START_STOP with the event data of '0x01', indicating success.

For details related to connection modes and procedures, refer to Bluetooth 4.1 Core Specification, Volume 3, Part C, Section 9.3.

Parameters:

connParam	Structure of type 'CYBLE_GAPC_CONN_PARAM_T' which contains the connection parameters. **Note** Any parameter of structure type CYBLE_GAPC_CONN_PARAM_T, if not required by a specific Bluetooth Low Energy profile, may be ignored.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'connParam' or if any element within 'connParam' has an invalid value.
CYBLE_ERROR_INVALID_OPERATION	Device already connected.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.

CYBLE_API_RESULT_T CyBle_GapcCancelConnection (void)

Description: This function cancels a previously initiated connection with the peer device. This is a blocking function. No event is generated on calling this function.

If the devices are already connected, then this function should not be used. To disconnect from an existing connection, use the function CyBle_GapDisconnect().

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_OPERATION	Device already connected.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.

CYBLE_API_RESULT_T CyBle_GapcResolveDevice (const uint8 * *bdAddr*, const uint8 * *irk*)

This function enables the application to start resolution procedure for a device that is connected using resolvable private address. This is a blocking function. Application should use this function when in GAP Central mode.

Refer to Bluetooth 4.1 Core specification, Volume 3, Part C, section 10.8.2.3 Resolvable Private Address Resolution Procedure to understand the usage of Private addresses.

Parameters:

bdAddr	Pointer to peer Bluetooth device address of length 6 bytes, not NULL terminated.
irk	Pointer to 128-bit IRK to be used for resolving the peer's private resolvable address.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'bdAddr' or 'irk'.
CYBLE_ERROR_INVALID_OPERATI	No device to be resolved. The specified device

Error codes	Description
ON	handle does not map to any device entry in the BLE Stack.

CYBLE_API_RESULT_TCyBle_GapcConnectionParamUpdateRequest (uint8 *bdHandle*, CYBLE_GAP_CONN_UPDATE_PARAM_T* *connParam*)

This function sends the connection parameter update command to local controller. This function can only be used from device connected in GAP Central role. Note: Connection parameter update procedure, defined as part of Bluetooth spec 4.1, is not supported. This function will allow GAP Central application to update connection parameter for local controller and local controller will follow the procedure as defined in Bluetooth Core specification 4.0.

Parameters:

bdHandle	Peer device handle
connParam	Pointer to a structure of type CYBLE_GAP_CONN_UPDATE_PARAM_T containing connection parameter updates

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation 'connParam' is NULL
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GapcSetHostChannelClassification (uint8 * *channelMap*)

This function sets channel classification for data channels. This classification persists until it is overwritten by a subsequent call to this function or the controller is reset. If this command is used, updates should be sent within 10 seconds of the BLE Host knowing that the channel classification has changed. The interval between two successive commands sent will be at least one second. This command will only be used when the local device supports the Master role.

For details, refer to Bluetooth core specification 4.1, Volume 2, part E, section 7.8.19.

This is a non blocking function. Application should look for 'CYBLE_EVT_HCI_STATUS' for any error condition.

Parameters:

channelMap	This parameter contains five octet byte stream (Least Significant Byte having the bit fields 0 to 7, most significant byte having the bit fields 32 to 36). The nth such field (in the range 0 to 36) contains the value for the link layer channel index n. Allowed values and their interpretation are, • Channel 'n' is disabled = 0x00u • Channel 'n' is enabled = 0x01u The most significant bits (37 to 39) are reserved and will be set to 0. At least one channel will be marked as unknown.

For example- expected pattern = XX XX XX XX 1F not expected = XX XX XX XX 10, XX XX XX XX 2f MSB 3 bits should be not set. (1f is most significant bytes in this case)

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying NULL as input parameter for 'channelMap'.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed.

CYBLE_API_RESULT_TCyBle_GapcSetRemoteAddr (uint8 *bdHandle*, CYBLE_GAP_BD_ADDR_T *remoteAddr*)

This function allows application to set the new address of remote device identified by bdHandle. This API should be used when:

1. If peer device is previously bonded with public address and changes its bd address to resolvable private address. Application should resolve the device by calling 'CyBle_GapcResolveDevice()' api and set the new address if successfully resolved.
2. If device is previously bonded with random, application should call this api to set the new address (public/random).

Parameters:

bdHandle	Peer device handle
remoteAddr	Peer device address, of type CYBLE_GAP_BD_ADDR_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On invalid bdHandle

GAP Peripheral Functions

Description

APIs unique to designs configured as a GAP Peripheral role.

A letter 'p' is appended to the API name: CyBle_Gapp

Functions

- CYBLE_API_RESULT_T CyBle_GappStartAdvertisement(uint8 advertisingIntervalType)
- void CyBle_GappStopAdvertisement(void)
- void CyBle_ChangeAdDeviceAddress(const CYBLE_GAP_BD_ADDR_T*bdAddr, uint8 dest)
- CYBLE_API_RESULT_T CyBle_GappEnterDiscoveryMode (CYBLE_GAPP_DISC_MODE_INFO_T*advInfo)
- void CyBle_GappExitDiscoveryMode(void)
- CYBLE_API_RESULT_T CyBle_GappAuthReqReply(uint8 bdHandle, CYBLE_GAP_AUTH_INFO_T*authInfo)

- CYBLE_API_RESULT_T CyBle_GapUpdateAdvData (CYBLE_GAPP_DISC_DATA_T*advDiscData, CYBLE_GAPP_SCAN_RSP_DATA_T*advScanRespData)

Function Documentation

CYBLE_API_RESULT_T CyBle_GappStartAdvertisement (uint8 *advertisingIntervalType*)

This function is used to start the advertisement using the advertisement data set in the component customizer's GUI. After invoking this API, the device will be available for connection by the devices configured for GAP central role. It is only included if the device is configured for GAP Peripheral or GAP Peripheral + Central role.

On start of advertisement, GAP Peripheral receives the CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP event. The following events are possible on invoking this function:

- CYBLE_EVT_GAP_DEVICE_CONNECTED: If the device connects to remote GAP Central device
- CYBLE_EVT_TIMEOUT: If no device in GAP Central mode connects to this device within the specified timeout limit. Stack automatically initiate stop advertising when Slow advertising was initiated, or starts Slow advertising after Fast advertising timeout occur.
- CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP: If device started or stopped advertising. Use CyBle_GetState() to determine the state. Sequential advertising could be started when CYBLE_STATE_DISCONNECTED state is returned.

Parameters:

advertisingIntervalType	Fast or slow advertising interval with timings entered in Advertising settings section of the customizer. • CYBLE_ADVERTISING_FAST 0x00u • CYBLE_ADVERTISING_SLOW 0x01u • CYBLE_ADVERTISING_CUSTOM 0x02u

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On passing an invalid parameter.
CYBLE_ERROR_INVALID_STATE	On calling this API not in Disconnected state.

void CyBle_GappStopAdvertisement (void)

This function can be used to exit from discovery mode. After the execution of this function, there will no longer be any advertisements. On stopping advertising, GAP Peripheral receives CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP event. It is expected that the application layer tracks the function call performed before occurrence of this event as this event can occur on making a call to Cy_BleGappStartAdvertisement(), CyBle_GappEnterDiscoveryMode(), or CyBle_GappStartAdvertisement() functions as well.

The following event occurs on invoking this function:

- CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP

Returns:

None

void CyBle_ChangeAdDeviceAddress (const CYBLE_GAP_BD_ADDR_T* *bdAddr*, uint8 *dest*)

This API is used to set the Bluetooth device address into the advertisement or scan response data structure.

Parameters:

bdAddr	Bluetooth Device address. The variable is of type CYBLE_GAP_BD_ADDR_T
dest	0 - selects advertisement structure, not zero value selects scan response structure.

Returns:

None

CYBLE_API_RESULT_TCyBle_GappEnterDiscoveryMode (CYBLE_GAPP_DISC_MODE_INFO_T* *advInfo*)

This function sets the device into discoverable mode. In the discoverable mode, based on the parameters passed to this function, the BLE Device starts advertisement and can respond to scan requests. This is a non-blocking function. It is to be used by the device in 'GAP Peripheral' mode of operation to set parameters essential for starting advertisement procedure.

On start of advertisement, the GAP Peripheral receives CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP event. The following two events can occur on invoking this function.

- CYBLE_EVT_GAP_DEVICE_CONNECTED - If the device connects to a GAP Central.
- CYBLE_EVT_TIMEOUT - If no device in 'GAP Central' mode connects to this device within the specified timeout limit. This event can occur if 'advInfo ->discMode' is equal to CYBLE_GAPP_LTD_DISC_MODE or CYBLE_GAPP_GEN_DISC_MODE. 'advInfo-> advTo' specifies the timeout duration. Set the 'advInfo-> advTo' to 0 when 'advInfo -> discMode' is set to CYBLE_GAPP_GEN_DISC_MODE so that the timeout event does not occur and the advertisement continues until the CyBle_GappExitDiscoveryMode() function is invoked.

Parameters:

advInfo	Structure of type CYBLE_GAPP_DISC_MODE_INFO_T, which contains the advertisement parameters

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying null pointer for 'advInfo' or if any of the elements of this structure have invalid values.

void CyBle_GappExitDiscoveryMode (void)

This function is used to exit from discoverable mode. This is a non-blocking function. After the execution of this function, the device stops advertising.

On stopping advertising, GAP Peripheral receives CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP event. It is expected that the application layer keeps track of the function call performed before occurrence of this event, as this event can occur on making a call to the CyBle_GappEnterDiscoveryMode () function as well.

Returns:

None

CYBLE_API_RESULT_TCyBle_GappAuthReqReply (uint8 *bdHandle*, CYBLE_GAP_AUTH_INFO_T* *authInfo*)

This function is used to pass security information for authentication in reply to an authentication request from the master device. It should be invoked on receiving CYBLE_EVT_GAP_AUTH_REQ event. Events shown in the following table may be received by the application based on the authentication result.

Event Parameter	Description
CYBLE_EVT_TIMEOUT	With error code CYBLE_GAP_PAIRING_PROCESS_TO on invoking CyBle_GappAuthReqReply() or CyBle_GapAuthReq() if there is no response from the peer device
CYBLE_EVT_GAP_AUTH_COMPLETE	Pointer to structure of type 'CYBLE_GAP_AUTH_INFO_T' is returned as parameter to both the peer devices on successful authentication.
CYBLE_EVT_GAP_AUTH_FAILED	Received by both GAP Central and Peripheral devices (peers) on authentication failure. Data is of type CYBLE_GAP_AUTH_FAILED_REASON_T.
CYBLE_ERROR_INSUFFICIENT_RESOURCES	On bonded device is full and application tries to initiate pairing with bonding enable.

Parameters:

bdHandle	Peer device handle.
authInfo	Pointer to a variable containing security information of the device of type CYBLE_GAP_AUTH_INFO_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On specifying null pointer for 'advInfo' or if any of the element of this structure has an invalid value.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_ERROR_NO_DEVICE_ENTITY	Device identified using 'bdHandle' does not exist.
CYBLE_ERROR_INSUFFICIENT_RESOURCES	On bonded device is full and application tries to initiate pairing with bonding enable.

CYBLE_API_RESULT_T CyBle_GapUpdateAdvData (CYBLE_GAPP_DISC_DATA_T* *advDiscData*, CYBLE_GAPP_SCAN_RSP_DATA_T* *advScanRespData*)

This function allows setting the ADV data and SCAN response data while advertising is ongoing. Application shall preserve Bluetooth Spec 4.1 mandated AD flags fields corresponding to the type of discovery mode the device is in and only change the rest of the data. This API must be called when API CyBle_GetBleSsState() returns CYBLE_BLESS_STATE_EVENT_CLOSE state. If API is called in any of the BLESS Low Power Modes, it will force exit BLESS from Low Power Mode state to update ADV Data.

Parameters:

advData	Pointer to a structure of CYBLE_GAPP_DISC_DATA_T. It has two fields advData field representing the data and advDataLen indicating the length of present data. Application can pass length as 0 if the ADV data doesn't need to be changed.
scanRespData	Pointer to a structure of type CYBLE_GAPP_SCAN_RSP_DATA_T. It has two fields scanRspData field representing the data and scanRspDataLen indicating the length of present data. Application can pass length as 0 if the SCAN RESP data doesn't need to be changed.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On NULL pointer, Data length in input parameter exceeds 31 bytes.
CYBLE_ERROR_INVALID_OPERATION	ADV Event is not closed, BLESS is active or ADV is not enabled.

GAP Definitions and Data Structures

Description

Contains the GAP specific definitions and data structures used in the GAP APIs.

Data Structures

- struct CYBLE_GAPC_T
- struct CYBLE_GAP_BD_ADDR_T
- struct CYBLE_GAP_AUTH_INFO_T
- struct CYBLE_GAP_BONDED_DEV_ADDR_LIST_T
- struct CYBLE_GAP_SMP_KEY_DIST_T
- struct CYBLE_GAPP_DISC_PARAM_T
- struct CYBLE_GAPP_DISC_DATA_T
- struct CYBLE_GAPP_SCAN_RSP_DATA_T
- struct CYBLE_GAPP_DISC_MODE_INFO_T
- struct CYBLE_GAPC_DISC_INFO_T
- struct CYBLE_GAPC_CONN_PARAM_T
- struct CYBLE_GAPC_ADV_REPORT_T

- struct CYBLE_GAP_PASSKEY_DISP_INFO_T
- struct CYBLE_GAP_CONN_UPDATE_PARAM_T
- struct CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T

Enumerations

- enum CYBLE_GAP_ADV_ASSIGN_NUMBERS{ CYBLE_GAP_ADV_FLAGS= 0x01u, CYBLE_GAP_ADV_INCOMPL_16UUID, CYBLE_GAP_ADV_COMPL_16UUID, CYBLE_GAP_ADV_INCOMPL_32_UUID, CYBLE_GAP_ADV_COMPL_32_UUID, CYBLE_GAP_ADV_INCOMPL_128_UUID, CYBLE_GAP_ADV_COMPL_128_UUID, CYBLE_GAP_ADV_SHORT_NAME, CYBLE_GAP_ADV_COMPL_NAME, CYBLE_GAP_ADV_TX_PWR_LVL, CYBLE_GAP_ADV_CLASS_OF_DEVICE= 0x0Du, CYBLE_GAP_ADV_SMPL_PAIR_HASH_C, CYBLE_GAP_ADV_SMPL_PAIR_RANDOM_R, CYBLE_GAP_ADV_DEVICE_ID, CYBLE_GAP_ADV_SCRT_MNGR_TK_VAL= 0x10u, CYBLE_GAP_ADV_SCRT_MNGR_OOB_FLAGS, CYBLE_GAP_ADV_SLAVE_CONN_INTRV_RANGE, CYBLE_GAP_ADV_SOLICIT_16UUID= 0x14u, CYBLE_GAP_ADV_SOLICIT_128UUID, CYBLE_GAP_ADV_SRVC_DATA_16UUID, CYBLE_GAP_ADV_PUBLIC_TARGET_ADDR, CYBLE_GAP_ADV_RANDOM_TARGET_ADDR, CYBLE_GAP_ADV_APPEARANCE, CYBLE_GAP_ADV_ADVERT_INTERVAL, CYBLE_GAP_ADV_LE_BT_DEVICE_ADDR, CYBLE_GAP_ADV_LE_ROLE, CYBLE_GAP_ADV_SMPL_PAIR_HASH_C256, CYBLE_GAP_ADV_SMPL_PAIR_RANDOM_R256, CYBLE_GAP_ADV_SOLICIT_32UUID, CYBLE_GAP_ADV_SRVC_DATA_32UUID, CYBLE_GAP_ADV_SRVC_DATA_128UUID, CYBLE_GAP_ADV_3D_INFO_DATA= 0x3D}
- enum CYBLE_GAPP_ADV_T{ CYBLE_GAPP_CONNECTABLE_UNDIRECTED_ADV= 0x00u, CYBLE_GAPP_CONNECTABLE_HIGH_DC_DIRECTED_ADV, CYBLE_GAPP_SCANNABLE_UNDIRECTED_ADV, CYBLE_GAPP_NON_CONNECTABLE_UNDIRECTED_ADV, CYBLE_GAPP_CONNECTABLE_LOW_DC_DIRECTED_ADV}
- enum CYBLE_GAPC_ADV_EVENT_T{ CYBLE_GAPC_CONN_UNDIRECTED_ADV= 0x00u, CYBLE_GAPC_CONN_DIRECTED_ADV, CYBLE_GAPC_SCAN_UNDIRECTED_ADV, CYBLE_GAPC_NON_CONN_UNDIRECTED_ADV, CYBLE_GAPC_SCAN_RSP}
- enum CYBLE_GAP_SEC_LEVEL_T{ CYBLE_GAP_SEC_LEVEL_1= 0x00u, CYBLE_GAP_SEC_LEVEL_2, CYBLE_GAP_SEC_LEVEL_3, CYBLE_GAP_SEC_LEVEL_MASK=0x0Fu}
- enum CYBLE_GAP_IOCAP_T{ CYBLE_GAP_IOCAP_DISPLAY_ONLY=0x00u, CYBLE_GAP_IOCAP_DISPLAY_YESNO, CYBLE_GAP_IOCAP_KEYBOARD_ONLY, CYBLE_GAP_IOCAP_NOINPUT_NOOUTPUT, CYBLE_GAP_IOCAP_KEYBOARD_DISPLAY}
- enum CYBLE_GAP_AUTH_FAILED_REASON_T{ CYBLE_GAP_AUTH_ERROR_NONE= 0x00u, CYBLE_GAP_AUTH_ERROR_PASSKEY_ENTRY_FAILED, CYBLE_GAP_AUTH_ERROR_OOB_DATA_NOT_AVAILABLE, CYBLE_GAP_AUTH_ERROR_AUTHENTICATION_REQ_NOT_MET, CYBLE_GAP_AUTH_ERROR_CONFIRM_VALUE_NOT_MATCH, CYBLE_GAP_AUTH_ERROR_PAIRING_NOT_SUPPORTED, CYBLE_GAP_AUTH_ERROR_INSUFFICIENT_ENCRYPTION_KEY_SIZE, CYBLE_GAP_AUTH_ERROR_COMMAND_NOT_SUPPORTED, CYBLE_GAP_AUTH_ERROR_UNSPECIFIED_REASON, CYBLE_GAP_AUTH_ERROR_REPEATED_ATTEMPTS, CYBLE_GAP_AUTH_ERROR_INVALID_PARAMETERS= 0x0Au, CYBLE_GAP_AUTH_ERROR_AUTHENTICATION_TIMEOUT= 0x15u, CYBLE_GAP_AUTH_ERROR_LINK_DISCONNECTED= 0x18u}
- enum CYBLE_GAP_ADDR_TYPE_T{ CYBLE_GAP_RANDOM_PRIV_NON_RESOLVABLE_ADDR= 0x00u, CYBLE_GAP_RANDOM_PRIV_RESOLVABLE_ADDR= 0x01u, CYBLE_GAP_PUBLIC_ADDR= 0x02u, CYBLE_GAP_RANDOM_STATIC_ADDR= 0x03u}

Enumeration Type Documentation

enum CYBLE_GAP_ADV_ASSIGN_NUMBERS

Stack mode defines Advertisement SIG assigned numbers

Enumerator

CYBLE_GAP_ADV_FLAGS Flags

CYBLE_GAP_ADV_INCOMPL_16UUID Incomplete List of 16-bit Service Class UUIDs

CYBLE_GAP_ADV_COMPL_16UUID Complete List of 16-bit Service Class UUIDs

CYBLE_GAP_ADV_INCOMPL_32_UUID Incomplete List of 32-bit Service Class UUIDs

CYBLE_GAP_ADV_COMPL_32_UUID Complete List of 32-bit Service Class UUIDs

CYBLE_GAP_ADV_INCOMPL_128_UUID Incomplete List of 128-bit Service Class UUIDs

CYBLE_GAP_ADV_COMPL_128_UUID Complete List of 128-bit Service Class UUIDs

CYBLE_GAP_ADV_SHORT_NAME Shortened Local Name

CYBLE_GAP_ADV_COMPL_NAME Complete Local Name

CYBLE_GAP_ADV_TX_PWR_LVL Tx Power Level

CYBLE_GAP_ADV_CLASS_OF_DEVICE Class of Device

CYBLE_GAP_ADV_SMPL_PAIR_HASH_C Simple Pairing Hash C

CYBLE_GAP_ADV_SMPL_PAIR_RANDOM_R Simple Pairing Randomizer R

CYBLE_GAP_ADV_DEVICE_ID Device ID

CYBLE_GAP_ADV_SCRT_MNGR_TK_VAL Security Manager TK Value

CYBLE_GAP_ADV_SCRT_MNGR_OOB_FLAGS Security Manager Out of Band Flags

CYBLE_GAP_ADV_SLAVE_CONN_INTRV_RANGE Slave Connection Interval Range

CYBLE_GAP_ADV_SOLICIT_16UUID List of 16-bit Service Solicitation UUIDs

CYBLE_GAP_ADV_SOLICIT_128UUID List of 128-bit Service Solicitation UUIDs

CYBLE_GAP_ADV_SRVC_DATA_16UUID Service Data - 16-bit UUID

CYBLE_GAP_ADV_PUBLIC_TARGET_ADDR Public Target Address

CYBLE_GAP_ADV_RANDOM_TARGET_ADDR Random Target Address

CYBLE_GAP_ADV_APPEARANCE Appearance

CYBLE_GAP_ADV_ADVERT_INTERVAL Advertising Interval

CYBLE_GAP_ADV_LE_BT_DEVICE_ADDR LE Bluetooth Device Address

CYBLE_GAP_ADV_LE_ROLE LE Role

CYBLE_GAP_ADV_SMPL_PAIR_HASH_C256 Simple Pairing Hash C-256

CYBLE_GAP_ADV_SMPL_PAIR_RANDOM_R256 Simple Pairing Randomizer R-256

CYBLE_GAP_ADV_SOLICIT_32UUID List of 32-bit Service Solicitation UUIDs

CYBLE_GAP_ADV_SRVC_DATA_32UUID Service Data - 32-bit UUID

CYBLE_GAP_ADV_SRVC_DATA_128UUID Service Data - 128-bit UUID

CYBLE_GAP_ADV_3D_INFO_DATA 3D Information Data

enum CYBLE_GAPP_ADV_T

Advertisement type

Enumerator

CYBLE_GAPP_CONNECTABLE_UNDIRECTED_ADV Connectable undirected advertising

CYBLE_GAPP_CONNECTABLE_HIGH_DC_DIRECTED_ADV Connectable high duty cycle directed advertising

CYBLE_GAPP_SCANNABLE_UNDIRECTED_ADV Scannable undirected advertising

CYBLE_GAPP_NON_CONNECTABLE_UNDIRECTED_ADV Non connectable undirected advertising

CYBLE_GAPP_CONNECTABLE_LOW_DC_DIRECTED_ADV Connectable low duty cycle directed advertising

enum CYBLE_GAPC_ADV_EVENT_T

Advertisement event type

Enumerator

CYBLE_GAPC_CONN_UNDIRECTED_ADV Connectable undirected advertising

CYBLE_GAPC_CONN_DIRECTED_ADV Connectable directed advertising

CYBLE_GAPC_SCAN_UNDIRECTED_ADV Scannable undirected advertising

CYBLE_GAPC_NON_CONN_UNDIRECTED_ADV Non connectable undirected advertising

CYBLE_GAPC_SCAN_RSP Scan Response

enum CYBLE_GAP_SEC_LEVEL_T

Security Levels

Enumerator

CYBLE_GAP_SEC_LEVEL_1 Level 1 Mode 1 - No Security (No Authentication & No Encryption) Mode 2 - N/A

CYBLE_GAP_SEC_LEVEL_2 Level 2 Mode 1 - Unauthenticated pairing with encryption (No MITM) Mode 2 - Unauthenticated pairing with data signing (No MITM)

CYBLE_GAP_SEC_LEVEL_3 Level 3 Mode 1 - Authenticated pairing with encryption (With MITM) Mode 2 - Authenticated pairing with data signing (With MITM)

CYBLE_GAP_SEC_LEVEL_MASK LE Security Level Mask

enum CYBLE_GAP_IOCAP_T

IO capability

Enumerator

CYBLE_GAP_IOCAP_DISPLAY_ONLY Platform supports only a mechanism to display or convey only 6 digit number to user.

CYBLE_GAP_IOCAP_DISPLAY_YESNO The device has a mechanism whereby the user can indicate 'yes' or 'no'.

CYBLE_GAP_IOCAP_KEYBOARD_ONLY Platform supports a numeric keyboard that can input the numbers '0' through '9' and a confirmation key(s) for 'yes' and 'no'.

CYBLE_GAP_IOCAP_NOINPUT_NOOUTPUT Platform does not have the ability to display or communicate a 6 digit decimal number.

CYBLE_GAP_IOCAP_KEYBOARD_DISPLAY Platform supports a mechanism through which 6 digit numeric value can be displayed and numeric keyboard that can input the numbers '0' through '9'.

enum CYBLE_GAP_AUTH_FAILED_REASON_T

Authentication Failed Error Codes

Enumerator

CYBLE_GAP_AUTH_ERROR_NONE No Error

CYBLE_GAP_AUTH_ERROR_PASSKEY_ENTRY_FAILED User input of passkey failed, for example, the user cancelled the operation

CYBLE_GAP_AUTH_ERROR_OOB_DATA_NOT_AVAILABLE Out Of Band data is not available, applicable if NFC is supported

CYBLE_GAP_AUTH_ERROR_AUTHENTICATION_REQ_NOT_MET Pairing procedure cannot be performed as authentication requirements cannot be met due to IO capabilities of one or both devices.

CYBLE_GAP_AUTH_ERROR_CONFIRM_VALUE_NOT_MATCH Confirm value does not match the calculated compare value

CYBLE_GAP_AUTH_ERROR_PAIRING_NOT_SUPPORTED Pairing is not supported by the device

CYBLE_GAP_AUTH_ERROR_INSUFFICIENT_ENCRYPTION_KEY_SIZE Insufficient key size for the security requirements of this device

CYBLE_GAP_AUTH_ERROR_COMMAND_NOT_SUPPORTED command received is not supported

CYBLE_GAP_AUTH_ERROR_UNSPECIFIED_REASON Pairing failed due to an unspecified reason

CYBLE_GAP_AUTH_ERROR_REPEATED_ATTEMPTS Pairing or authentication procedure is disallowed because too little time has elapsed since last pairing request or security request.

CYBLE_GAP_AUTH_ERROR_INVALID_PARAMETERS Invalid Parameters in Request - Invalid Command length and Parameter value outside range

CYBLE_GAP_AUTH_ERROR_AUTHENTICATION_TIMEOUT Authentication process timeout, if pairing timeout happens for first time, application can choose to re-initiate the pairing procedure. If timeout occurs again, app may choose to disconnect peer device.

CYBLE_GAP_AUTH_ERROR_LINK_DISCONNECTED Link disconnected

enum CYBLE_GAP_ADDR_TYPE_T

GAP address type

Enumerator

CYBLE_GAP_RANDOM_PRIV_NON_RESOLVABLE_ADDR Random private non-resolvable address

CYBLE_GAP_RANDOM_PRIV_RESOLVABLE_ADDR Random private resolvable address

CYBLE_GAP_PUBLIC_ADDR Public address

CYBLE_GAP_RANDOM_STATIC_ADDR Random static address

GATT Functions

Description

The GATT APIs allow access to the Generic Attribute Profile (GATT) layer of the BLE stack. Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The GATT API names begin with CyBle_Gatt. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- GATT Client and Server Functions
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- GATT Client Functions
  APIs unique to designs configured as a GATT Client role.
- GATT Server Functions
  APIs unique to designs configured as a GATT Server role.
- GATT Definitions and Data Structures
  Contains the GATT specific definitions and data structures used in the GATT APIs.

GATT Client and Server Functions

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Gatt

Functions

- CYBLE_API_RESULT_T CyBle_GattGetMtuSize(uint16 *mtu)

Function Documentation

CYBLE_API_RESULT_TCyBle_GattGetMtuSize (uint16 * *mtu*)

This function provides the correct GATT MTU used by BLE stack. If function is called after GATT MTU configuration procedure, it will provide the final negotiated GATT MTU else default MTU (23 Bytes).

Parameters:

mtu	buffer where Size of GATT MTU will be stored.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If invalid parameter passed

GATT Client Functions

Description

APIs unique to designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Gattc

Functions

- CYBLE_API_RESULT_T CyBle_GattcStartDiscovery (CYBLE_CONN_HANDLE_TconnHandle)
- void CyBle_GattcStopCmd(void)
- CYBLE_API_RESULT_T CyBle_GattcExchangeMtuReq (CYBLE_CONN_HANDLE_TconnHandle, uint16 mtu)
- CYBLE_API_RESULT_T CyBle_GattcDiscoverAllPrimaryServices (CYBLE_CONN_HANDLE_TconnHandle)
- CYBLE_API_RESULT_T CyBle_GattcDiscoverPrimaryServiceByUuid (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATT_VALUE_Tvalue)
- CYBLE_API_RESULT_T CyBle_GattcFindIncludedServices (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATT_ATTR_HANDLE_RANGE_T*range)
- CYBLE_API_RESULT_T CyBle_GattcDiscoverAllCharacteristics (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATT_ATTR_HANDLE_RANGE_Trange)
- CYBLE_API_RESULT_T CyBle_GattcDiscoverCharacteristicByUuid (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_BY_TYPE_REQ_T*readByTypeReqParam)

- CYBLE_API_RESULT_T CyBle_GattcDiscoverAllCharacteristicDescriptors (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_FIND_INFO_REQ_T*findInfoReqParam)
- CYBLE_API_RESULT_T CyBle_GattcReadCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_REQ_TreadReqParam)
- CYBLE_API_RESULT_T CyBle_GattcReadUsingCharacteristicUuid (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_BY_TYPE_REQ_T*readByTypeReqParam)
- CYBLE_API_RESULT_T CyBle_GattcReadLongCharacteristicValues (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_BLOB_REQ_T*readBlobReqParam)
- CYBLE_API_RESULT_T CyBle_GattcReadMultipleCharacteristicValues (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_MULT_REQ_T*readMultiReqParam)
- CYBLE_API_RESULT_T CyBle_GattcWriteWithoutResponse (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_WRITE_CMD_REQ_T*writeCmdReqParam)
- CYBLE_API_RESULT_T CyBle_GattcSignedWriteWithoutRsp (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_SIGNED_WRITE_CMD_REQ_T*signedWriteWithoutRspParam)
- CYBLE_API_RESULT_T CyBle_GattcWriteCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_WRITE_REQ_T*writeReqParam)
- CYBLE_API_RESULT_T CyBle_GattcWriteLongCharacteristicValues (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_PREP_WRITE_REQ_T*writePrepReqParam)
- CYBLE_API_RESULT_T CyBle_GattcReliableWrites (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_PREP_WRITE_REQ_T*writePrepReqParam, uint8 numOfRequests)
- CYBLE_API_RESULT_T CyBle_GattcConfirmation (CYBLE_CONN_HANDLE_TconnHandle)
- CYBLE_API_RESULT_T CyBle_GattcReadCharacteristicDescriptors (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_REQ_TreadReqParam)
- CYBLE_API_RESULT_T CyBle_GattcReadLongCharacteristicDescriptors (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_BLOB_REQ_T*readBlobReqParam)
- CYBLE_API_RESULT_T CyBle_GattcWriteCharacteristicDescriptors (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_WRITE_REQ_T*writeReqParam)
- CYBLE_API_RESULT_T CyBle_GattcWriteLongCharacteristicDescriptors (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_PREP_WRITE_REQ_T*writePrepReqParam)
- CYBLE_API_RESULT_T CyBle_GattcReadByTypeReq (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTC_READ_BY_TYPE_REQ_T*readByTypeReqParam)
- CYBLE_API_RESULT_T CyBle_GattcSendExecuteWriteReq (CYBLE_CONN_HANDLE_TconnHandle, uint8 flag)

Function Documentation

CYBLE_API_RESULT_TCyBle_GattcStartDiscovery (CYBLE_CONN_HANDLE_T *connHandle*)

Starts the automatic server discovery process. Two events may be generated after calling this function - CYBLE_EVT_GATTC_DISCOVERY_COMPLETE or CYBLE_EVT_GATTC_ERROR_RSP. The CYBLE_EVT_GATTC_DISCOVERY_COMPLETE event is generated when the remote device was successfully discovered. The CYBLE_EVT_GATTC_ERROR_RSP is generated if the device discovery is failed.

Parameters:

connHandle	The handle which consists of the device ID and ATT connection ID.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry.
CYBLE_ERROR_INVALID_OPERATION	The operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_ERROR_INVALID_STATE	If the function is called in any state except connected or discovered

void CyBle_GattcStopCmd (void)

This function is used by the GATT Client to stop any of the following ongoing GATT procedures:

1. CyBle_GattcDiscoverAllPrimaryServices()
2. CyBle_GattcDiscoverPrimaryServiceByUuid()
3. CyBle_GattcFindIncludedServices()
4. CyBle_GattcDiscoverAllCharacteristics()
5. CyBle_GattcDiscoverCharacteristicByUuid()
6. CyBle_GattcDiscoverAllCharacteristicDescriptors()
7. CyBle_GattcReadLongCharacteristicValues()
8. CyBle_GattcWriteLongCharacteristicValues()
9. CyBle_GattcReliableWrites()
10. CyBle_GattcReadLongCharacteristicDescriptors()
11. CyBle_GattcWriteLongCharacteristicDescriptors()

If none of the above procedures is ongoing, then this command will be ignored. This function has no effect on ATT procedures other than those listed above.

If the user intends to start a new GATT procedure including those listed above and there is an ongoing GATT procedure (any one from the above list), the user needs to call this function to stop the ongoing GATT procedure and then invoke the desired GATT procedure. This is a blocking function. No event is generated on calling this function.

Returns:

None

CYBLE_API_RESULT_T CyBle_GattcExchangeMtuReq (CYBLE_CONN_HANDLE_T *connHandle*, uint16 *mtu*)

This function is used by the GATT Client to send Maximum Transmitted Unit (GATT MTU) supported by the GATT Client. This is a non-blocking function.

Default GATT MTU size as per Bluetooth 4.1 core specification is 23 bytes. If the GATT Client supports a size greater than the default, it has to invoke this function with the desired GATT MTU size. This function should only be initiated once during a connection.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.3.1 for more details on GATT MTU exchange operation.

This function call results in CYBLE_EVT_GATTS_XCNHG_MTU_REQ event at the GATT Server's end in response to which the GATT Server is expected to send its GATT MTU size.

The CYBLE_EVT_GATTC_XCHNG_MTU_RSP event is generated at the GATT Client's end on receiving GATT MTU response from the GATT Server.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
mtu	Size of GATT MTU. Max GATT MTU supported by BLE stack is 256 Bytes.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack or, 'mtu' has a value which is greater than that set on calling CyBle_StackInit function
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcDiscoverAllPrimaryServices (CYBLE_CONN_HANDLE_T *connHandle*)

This function is used by the GATT Client to discover all the primary services on a GATT Server to which it is connected. This is a non-blocking function.

Internally, this function initiates multiple Read By Group Type Requests to the peer device in response to which it receives Read By Group Type Responses. Each Read By Group Type Response results in CYBLE_EVT_GATTC_READ_BY_GROUP_TYPE_RSP event, which is propagated to the application layer for handling.

Primary service discovery is complete when Error Response (CYBLE_EVT_GATTC_ERROR_RSP) is received and the Error Code is set to Attribute Not Found or when the End Group Handle in the Read by Group Type Response is 0xFFFF. Completion of this operation is notified to the upper layer(s) using CYBLE_EVT_GATTC_ERROR_RSP with error code updated appropriately.

It is permitted to end the above stated sequence of operations early if the desired primary service is found prior to discovering all the primary services on the GATT Server. This can be achieved by calling the CyBle_GattcStopCmd() function.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.4.1 for more details on this sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack

Errors codes	Description
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcDiscoverPrimaryServiceByUuid (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATT_VALUE_T *value*)

This function is used by the GATT Client to discover a specific primary service on a GATT Server, to which it is connected, when only the Service UUID is known. This is a non-blocking function.

Internally, this function initiates multiple Find By Type Value Requests with the Attribute Type parameter set to the UUID for Primary Service and the Attribute Value set to the 16-bit Bluetooth UUID or 128-bit UUID for the specific primary service. Each Find By Type Value Response received from the peer device is passed to the application as CYBLE_EVT_GATTC_FIND_BY_TYPE_VALUE_RSP event.

The sequence of operations is complete when the Error Response is received and the Error Code is set to Attribute Not Found or when the End Group Handle in the Find By Type Value Response is 0xFFFF. Completion of this function is notified to upper layer using CYBLE_EVT_GATTC_ERROR_RSP event with the error code updated appropriately.

It is permitted to end the function early by calling the CyBle_GattcStopCmd() function if a desired primary service is found prior to discovery of all the primary services of the specified service UUID supported on the GATT Server.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.4.2 for more details on this sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
value	Parameter is of type CYBLE_GATT_VALUE_T, where, 1. 'value.val' should point to uint8 array containing the UUID to look for. UUID can be 16 or 128 bit. 2. 'value.len' should be set to 2 if the 16 bit UUID is to be found. The length should be set to 16 if 128 bit UUID is to be found. 3. 'value.actualLen' is an unused parameter and should be ignored as it is unused.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted

CYBLE_API_RESULT_TCyBle_GattcFindIncludedServices (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATT_ATTR_HANDLE_RANGE_T* *range*)

This function is used by the GATT Client to find Included Service declarations within a GATT Service to which it is connected. This is a non-blocking function.

Internally, multiple Read By Type Requests are sent to the peer device in response to which Read By Type Responses are received (CYBLE_EVT_GATTC_READ_BY_TYPE_RSP) and passed to the application layer.

When Read By Type Response data does not contain the service UUID, indicating the service UUID is a 128-bit UUID, the application layer can choose to get the service UUID by performing the following steps:

1. Stop ongoing GATT operation by invoking CyBle_GattcStopCmd()
2. Send Read Request by invoking the function CyBle_GattcReadCharacteristicValue() with the read request handle set to the attribute handle of the included service. Handle associated events.
3. Re-initiate CyBle_GattcFindIncludedServices function, setting the start handle to the attribute handle which is placed next to the one used in the above step.

It is permitted to end the function early if a desired included service is found prior to discovering all the included services of the specified service supported on the server by calling the CyBle_GattcStopCmd() function. If the CyBle_GattcStopCmd() function is not invoked, completion of this function is notified to the upper layer using CYBLE_EVT_GATTC_ERROR_RSP.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.5.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
range	Pointer to the handle range of type CYBLE_GATT_ATTR_HANDLE_RANGE_T for which relationship discovery has to be performed

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcDiscoverAllCharacteristics (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATT_ATTR_HANDLE_RANGE_T *range*)

This function is used by the GATT Client to find all characteristic declarations within a service definition on a GATT Server connect to it when only the service handle range is known. This is a non-blocking function.

Internally, multiple Read By Type Requests are sent to the GATT Server in response to which Read By Type Responses are received. Each response results in the event CYBLE_EVT_GATTC_READ_BY_TYPE_RSP, which is passed to the application layer for handling.

It is permitted to end the function early by calling the CyBle_GattcStopCmd() function if a desired characteristic is found prior to discovering all the characteristics of the specified service supported on the GATT Server. Completion of this function is notified to upper layer using CYBLE_EVT_GATTC_ERROR_RSP event.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.6.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
range	Parameter is of type CYBLE_GATT_ATTR_HANDLE_RANGE_T where: 1. 'range.startHandle' can be set to the start handle of the desired primary service. 2. 'range.endHandle' can be set to the end handle of the desired primary service.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcDiscoverCharacteristicByUuid (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_BY_TYPE_REQ_T* *readByTypeReqParam*)

This function is used by the GATT Client to discover service characteristics on a GATT Server when only the service handle ranges are known and the characteristic UUID is known. This is a non-blocking function.

Internally, multiple Read By Type Requests are sent to the peer device in response to which Read By Type Responses are received. Each of these responses results in the event CYBLE_EVT_GATTC_READ_BY_TYPE_RSP, which is passed to the application layer for further processing.

It is permitted to end the function early by calling the CyBle_GattcStopCmd() function if a desired characteristic is found prior to discovering all the characteristics for the specified service supported on the GATT Server. Completion of this function is notified to upper layer using CYBLE_EVT_GATTC_ERROR_RSP event.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.6.2 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
readByType ReqParam	Pointer to a variable of type CYBLE_GATTC_READ_BY_TYPE_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcDiscoverAllCharacteristicDescriptors (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_FIND_INFO_REQ_T* *findInfoReqParam*)

This function is used by the GATT Client to find all the characteristic descriptors. This is a non-blocking function.

Internally, multiple Find Information Requests are sent to the peer device in response to which Find Information Responses are received by the GATT Client. Each of these responses generate CYBLE_EVT_GATTC_FIND_INFO_RSP event at the GATT Client end which is propagated to the application layer for further processing.

It is permitted to end the function early by calling the CyBle_GattcStopCmd() function if desired Characteristic Descriptor is found prior to discovering all the characteristic descriptors of the specified characteristic. Completion of this function is notified to upper layer using CYBLE_EVT_GATTC_ERROR_RSP event.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.7.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
findInfoReqParam	Pointer to a variable of type CYBLE_GATTC_FIND_INFO_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcReadCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_REQ_T *readReqParam*)

This function reads a Characteristic Value from a GATT Server when the GATT Client knows the Characteristic Value Handle. This is a non-blocking function.

Internally, Read Request is sent to the peer device in response to which Read Response is received. This response results in CYBLE_EVT_GATTC_READ_RSP event which is propagated to the application for handling the event data. An Error Response (CYBLE_EVT_GATTC_ERROR_RSP event at the GATT Client's end) is sent by the GATT Server in response to the Read Request on insufficient authentication or insufficient authorization or insufficient encryption key size is caused by the GATT Client, or if a read operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.8.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
readReqParam	Pointer to a variable of type CYBLE_GATTC_READ_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcReadUsingCharacteristicUuid (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_BY_TYPE_REQ_T* *readByTypeReqParam*)

This function reads a Characteristic Value from the GATT Server when the GATT Client only knows the characteristic UUID and does not know the handle of the characteristic. This is a non-blocking function.

Internally, Read By Type Request is sent to the peer device in response to which Read By Type Response is received by the GATT Client. This results in CYBLE_EVT_GATTC_READ_BY_TYPE_RSP event, which is propagated to the application layer for further handling.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.8.2 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
readByTypeReqParam	Parameter is of type CYBLE_GATTC_READ_BY_TYPE_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAME	'connHandle' value does not represent any

Errors codes	Description
TER	existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcReadLongCharacteristicValues (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_BLOB_REQ_T* *readBlobReqParam*)

This function reads a Characteristic Value from the GATT Server when the GATT Client knows the Characteristic Value Handle and the length of the Characteristic Value is longer than can be sent in a single Read Response Attribute Protocol message. This is a non-blocking function.

Internally multiple Read Blob Requests are sent to the peer device in response to which Read Blob Responses are received. For each Read Blob Request, a Read Blob Response event is received (CYBLE_EVT_GATTC_READ_BLOB_RSP) with a portion of the Characteristic Value contained in the Part Attribute Value parameter. These events are propagated to the application layer for further processing. Each read blob response will return up to (GATT MTU-1) bytes of data. If the size of characteristic value field is an integral multiple of (GATT MTU-1) then the operation terminates with an error response event, where the error code is CYBLE_GATT_ERR_INVALID_OFFSET. If the size of the characteristic value field is not an integral multiple of (GATT MTU-1), the last read blob response will return data bytes which are less than (GATT MTU-1). The application needs to monitor these two conditions before proceeding with the initiation of any other GATT operation.

An Error Response event (CYBLE_EVT_GATTC_ERROR_RSP) is sent by the GATT Server in response to the Read Blob Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a read operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

If the Characteristic Value is not longer than (GATT MTU - 1), an Error Response with the Error Code set to Attribute Not Long is received by the GATT Client on the first Read Blob Request.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.8.3 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
readblobReqParam	Pointer to a variable of type CYBLE_GATTC_READ_BLOB_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcReadMultipleCharacteristicValues (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_MULT_REQ_T* *readMultiReqParam*)

This function reads multiple Characteristic Values from a GATT Server when the GATT Client knows the Characteristic Value Handles. This is a non-blocking function.

Internally, Read Multiple Request is sent to the peer device in response to which Read Multiple Response is received. This results in C YBLE_EVT_GATTC_READ_MULTI_RSP event, which is propagated to the application layer.

An Error Response event is sent by the server (CYBLE_EVT_GATTC_ERROR_RSP) in response to the Read Multiple Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a read operation is not permitted on any of the Characteristic Values. The Error Code parameter is set as specified in the Attribute Protocol.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.8.4 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
readMultiReqParam	Pointer to a variable of type CYBLE_GATTC_READ_MULT_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcWriteWithoutResponse (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_WRITE_CMD_REQ_T* *writeCmdReqParam*)

This function writes a Characteristic Value to a GATT Server when the GATT Client knows the Characteristic Value Handle and the client does not need an acknowledgement that the write was successfully performed. This is a blocking function. No event is generated on calling this function.

Internally, Write Command is sent to the GATT Server and nothing is received in response from the GATT Server.

Refer Bluetooth 4.1 core specification, Volume 3, Part G, section 4.9.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
writeCmdReqParam	Pointer to a variable of type CYBLE_GATTC_WRITE_CMD_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcSignedWriteWithoutRsp (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_SIGNED_WRITE_CMD_REQ_T* *signedWriteWithoutRspParam*)

This function writes a Characteristic Value to a server when the client knows the Characteristic Value Handle and the ATT Bearer is not encrypted. This procedure shall only be used if the Characteristic Properties authenticated bit is enabled and the client and server device share a bond as defined in Bluetooth Spec4.1 [Vol. 3] Part C, Generic Access Profile.

This function only writes the first (ATT_MTU - 15) octets of an Attribute Value. This function cannot be used to write a long Attribute.

Internally, Signed Write Command is used. Refer Bluetooth Spec4.1 Security Manager [Vol. 3] Part H, Section 2.4.5.

If the authenticated Characteristic Value that is written is the wrong size, has an invalid value as defined by the profile, or the signed value does not authenticate the client, then the write shall not succeed and no error shall be generated by the server.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
signedWriteWithoutRspParam	Pointer to a variable of type CYBLE_GATTC_SIGNED_WRITE_CMD_REQ_T

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_INSUFFICIENT_RESOURCES	BLE stack out of resource

CYBLE_API_RESULT_TCyBle_GattcWriteCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_WRITE_REQ_T* *writeReqParam*)

This function writes a Characteristic Value to a GATT Server when the GATT Client knows the Characteristic Value Handle. This is a non-blocking function.

Internally, Write Request is sent to the GATT Server in response to which Write Response is received. This results in the event CYBLE_EVT_GATTC_WRITE_RSP, which indicates that the write operation succeeded.

An Error Response event (CYBLE_EVT_GATTC_ERROR_RSP) is sent by the server in response to the Write Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a write operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.9.3 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
writeReqParam	Pointer to a variable of type CYBLE_GATTC_WRITE_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcWriteLongCharacteristicValues (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_PREP_WRITE_REQ_T* *writePrepReqParam*)

This function writes a Characteristic Value to a GATT Server when the GATT Client knows the Characteristic Value Handle but the length of the Characteristic Value is longer than GATT MTU size and cannot be sent in a single Write Request Attribute Protocol message. This is a non-blocking function.

Internally, multiple Prepare Write Requests are sent to the GATT Server in response to which Prepare Write Responses are received. No events are generated by the BLE Stack during these operations.

Prepare Write Requests are repeated until the complete Characteristic Value has been transferred to the GATT Server, after which an Execute Write Request is sent to the GATT Server to write the initially transferred value at the GATT Server's end. This generates CYBLE_EVT_GATTS_EXEC_WRITE_REQ at the GATT Server's end.

Once the GATT Server responds, CYBLE_EVT_GATTC_EXEC_WRITE_RSP event is generated at the GATT Client's end. The value associated with this event has to be checked by the application layer to confirm that the long write operation succeeded.

An Error Response event CYBLE_EVT_GATTC_ERROR_RSP is received by the GATT Client in response to the Prepare Write Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a write operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.9.4 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
writePrepReqParam	Pointer to a variable of type CYBLE_GATTC_PREP_WRITE_REQ_T, where 'writePrepReqParam->value.val' points to the actual data to be written. 'writePrepReqParam' and all associated variables need to be retained in memory by the calling application until the GATT Write Long Characteristic Value operation is completed successfully.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcReliableWrites (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_PREP_WRITE_REQ_T* *writePrepReqParam*, uint8 *numOfRequests*)

This function writes a Characteristic Value to a GATT Server when the GATT Client knows the Characteristic Value Handle, and assurance is required that the correct Characteristic Value is going to be written by transferring the Characteristic Value to be written in both directions before the write is performed. This is a non-blocking function.

Internally, multiple Prepare Write Requests are sent to the GATT Server in response to which Prepare Write Responses are received. No events are generated by the BLE Stack during these operations.

Prepare Write Requests are repeated until the complete Characteristic Value has been transferred to the GATT Server, after which an Execute Write Request is sent to the GATT Server to write the initially transferred value at the GATT Server's end. This generates CYBLE_EVT_GATTS_EXEC_WRITE_REQ at the GATT Server's end.

Once the GATT Server responds, a CYBLE_EVT_GATTC_EXEC_WRITE_RSP event is generated at the GATT Client's end. The value associated with this event has to be checked by the application layer to confirm that the long write operation succeeded. An Error Response event CYBLE_EVT_GATTC_ERROR_RSP is received by the GATT Client in response to the Prepare Write Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a write operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.9.5 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
writePrepReqParam	Pointer to a variable of type CYBLE_GATTC_PREP_WRITE_REQ_T. Since more than one writes are performed as part of this function, the

	first array element of the array of type CYBLE_GATTC_PREP_WRITE_REQ_T, which contains the values to be written, has to be specified. 'writePrepReqParam' and all associated variables need to be retained in memory by the calling application until the GATT Reliable Write operation is completed successfully.
numOfRequests	Number of requests. That is, the count of array of structures of type CYBLE_GATTC_PREP_WRITE_REQ_T. Each array element represents a value and the attribute to which the value has to be written.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcConfirmation (CYBLE_CONN_HANDLE_T *connHandle*)

This function sends confirmation to the GATT Server on receiving Handle Value Indication event CYBLE_EVT_GATTC_HANDLE_VALUE_IND at the GATT Client's end. This is a non-blocking function.

This function call results in CYBLE_EVT_GATTS_HANDLE_VALUE_CNF event at the GATT Server's end.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.11.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcReadCharacteristicDescriptors (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_REQ_T *readReqParam*)

This function reads a characteristic descriptor from a GATT Server when the GATT Client knows the Attribute handle from the characteristic descriptor declaration. This is a non-blocking function.

Internally, Read Request is sent to the peer device in response to which Read Response is received. This response results in CYBLE_EVT_GATTC_READ_RSP event, which is propagated to the application for handling the event data.

An Error Response (CYBLE_EVT_GATTC_ERROR_RSP event at the GATT Client's end) is sent by the GATT Server in response to the Read Request on insufficient authentication or insufficient authorization or insufficient encryption key size is caused by the GATT Client, or if a read operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.12.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
readReqParam	Pointer to a variable of type CYBLE_GATTC_READ_REQ_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcReadLongCharacteristicDescriptors (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_BLOB_REQ_T* *readBlobReqParam*)

This function reads a characteristic descriptor from a GATT Server when the GATT Client knows the Attribute handle from the characteristic descriptor declaration and the length of the characteristic descriptor declaration is longer than what can be sent in a single Read Response Attribute Protocol message. This is a non-blocking function.

Internally multiple Read Blob Requests are sent to the peer device in response to which Read Blob Responses are received. For each Read Blob Request, a Read Blob Response event is received (CYBLE_EVT_GATTC_READ_BLOB_RSP) with a portion of the Characteristic Value contained in the Part Attribute Value parameter. These events are propagated to the application layer for further processing. Each read blob response will return up to (GATT MTU-1) bytes of data. If the size of characteristic descriptor field is an integral multiple of (GATT MTU-1) then the operation terminates with an error response event, where the error code is CYBLE_GATT_ERR_INVALID_OFFSET. If the size of the characteristic descriptor field is not an integral multiple of (GATT MTU-1), the last read blob response will return data bytes which are less than (GATT MTU-1). The application needs to monitor these two conditions before proceeding with the initiation of any other GATT operation.

An Error Response event (CYBLE_EVT_GATTC_ERROR_RSP) is sent by the GATT Server in response to the Read Blob Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a read operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol. If the Characteristic Value is not longer than (GATT MTU - 1) an Error Response with the Error Code set to Attribute Not Long is received by the GATT Client on the first Read Blob Request.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.12.2 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
readBlonReqParam	Pointer to a variable of type CYBLE_GATTC_READ_BLOB_REQ_T

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcWriteCharacteristicDescriptors (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_WRITE_REQ_T* *writeReqParam*)

This function writes a characteristic descriptor value to a GATT Server when the GATT Client knows the characteristic descriptor handle. This is a non-blocking function.

Internally, Write Request is sent to the GATT Server in response to which Write Response is received. This results in the event CYBLE_EVT_GATTC_WRITE_RSP, which indicates that the write operation succeeded.

An Error Response event (CYBLE_EVT_GATTC_ERROR_RSP) is sent by the server in response to the Write Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a write operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.12.3 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
writeReqParam	Pointer to a variable of type CYBLE_GATTC_WRITE_REQ_T

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattcWriteLongCharacteristicDescriptors (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_PREP_WRITE_REQ_T* *writePrepReqParam*)

This function writes a characteristic descriptor value to a GATT Server when the GATT Client knows the characteristic descriptor handle but the length of the characteristic descriptor value is longer than what can be sent in a single Write Request Attribute Protocol message. This is a non-blocking function.

Internally, multiple Prepare Write Requests are sent to the GATT Server in response to which Prepare Write Responses are received. No events are generated by the BLE Stack during these operations.

Prepare Write Requests are repeated until the complete Characteristic Descriptor Value has been transferred to the GATT Server, after which an Execute Write Request is sent to the GATT Server to write the initially transferred value at the GATT Server's end. This generates CYBLE_EVT_GATTS_EXEC_WRITE_REQ at the GATT Server's end.

Once the GATT Server responds, CYBLE_EVT_GATTC_EXEC_WRITE_RSP' event is generated at the GATT Client's end. The value associated with this event has to be checked by the application layer to confirm that the long write operation succeeded.

An Error Response event CYBLE_EVT_GATTC_ERROR_RSP is received by the GATT Client in response to the Prepare Write Request if insufficient authentication, insufficient authorization, insufficient encryption key size is used by the client, or if a write operation is not permitted on the Characteristic Value. The Error Code parameter is set as specified in the Attribute Protocol.

Refer Bluetooth 4.1 core specification, Volume 3, Part G, section 4.12.4 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
writePrepReqParam	Pointer to a variable of type CYBLE_GATTC_PREP_WRITE_REQ_T, where 'writePrepReqParam->value.val' points to the actual data to be written. 'writePrepReqParam' and all associated variables need to be retained in memory by the calling application until the GATT Write Long Characteristic Descriptor operation is completed successfully.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted

Errors codes	Description
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcReadByTypeReq (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTC_READ_BY_TYPE_REQ_T* *readByTypeReqParam*)

This function allows the user to send Read by type request to peer server

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.5.1 for more details on the sequence of operations.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T. readByTypeReqParam : Pointer to a variable of type CYBLE_GATTC_READ_BY_TYPE_REQ_T, Where, the following needs to be set: readByTypeReqParam->range.startHandle readByTypeReqParam->range.endHandle readByTypeReqParam->uuidFormat (CYBLE_GATT_16_BIT_UUID_FORMAT or CYBLE_GATT_128_BIT_UUID_FORMAT) readByTypeReqParam->uuid.uuid16 or readByTypeReqParam->uuid.uuid128 based on the uuidFormat

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattcSendExecuteWriteReq (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *flag*)

This function allows the user to send execute write request to remote server. This function should be called if client has previously initiated long/reliable write operation and remote has send error response. Based on error response application may choose to execute all pending requests or cancel the request.

Parameters:

connHandle	Connection handle to identify the peer GATT entity of type CYBLE_CONN_HANDLE_T.
flag	Indicates whether Queued Write is to be executed (0x01) or canceled (0x00)

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

GATT Server Functions

Description

APIs unique to designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Gatts

Functions

- CYBLE_API_RESULT_T CyBle_GattsReInitGattDb(void)
- CYBLE_API_RESULT_T CyBle_GattsDbRegister(const CYBLE_GATTS_DB_T*gattDbPtr, uint16 gattDbTotalEntries, uint16 gattDbMaxValue)
- CYBLE_GATT_ERR_CODE_T CyBle_GattsWriteAttributeValue (CYBLE_GATT_HANDLE_VALUE_PAIR_T*handleValuePair, uint16 offset, CYBLE_CONN_HANDLE_T*connHandle, uint8 flags)
- CYBLE_GATT_ERR_CODE_T CyBle_GattsReadAttributeValue (CYBLE_GATT_HANDLE_VALUE_PAIR_T*handleValuePair, CYBLE_CONN_HANDLE_T*connHandle, uint8 flags)
- CYBLE_GATT_ERR_CODE_T CyBle_GattsEnableAttribute (CYBLE_GATT_DB_ATTR_HANDLE_TattrHandle)
- CYBLE_GATT_ERR_CODE_T CyBle_GattsDisableAttribute (CYBLE_GATT_DB_ATTR_HANDLE_TattrHandle)
- CYBLE_GATT_ERR_CODE_T CyBle_GattsDbAuthorize(uint8 yesNo)
- CYBLE_API_RESULT_T CyBle_GattsNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTS_HANDLE_VALUE_NTF_T*ntfParam)
- CYBLE_API_RESULT_T CyBle_GattsIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTS_HANDLE_VALUE_IND_T*indParam)
- CYBLE_API_RESULT_T CyBle_GattsErrorRsp (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GATTS_ERR_PARAM_T*errRspParam)
- CYBLE_API_RESULT_T CyBle_GattsExchangeMtuRsp (CYBLE_CONN_HANDLE_TconnHandle, uint16 mtu)
- void CyBle_GattsPrepWriteReqSupport(uint8 prepWriteSupport)
- CYBLE_API_RESULT_T CyBle_GattsWriteRsp (CYBLE_CONN_HANDLE_TconnHandle)

Function Documentation

CYBLE_API_RESULT_TCyBle_GattsReInitGattDb (void)

Reinitializes the GATT database.

Returns:

CYBLE_API_RESULT_T: An API result states if the API succeeded or failed with error codes:

- CYBLE_ERROR_OK: GATT database was reinitialized successfully
- CYBLE_ERROR_INVALID_STATE: If the function is called in any state except CYBLE_STATE_DISCONNECTED.
- Any of the CyBle_GattsDbRegister() stack API function return values.

CYBLE_API_RESULT_T CyBle_GattsDbRegister (const CYBLE_GATTS_DB_T* *gattDbPtr*, uint16 *gattDbTotalEntries*, uint16 *gattDbMaxValue*)

This function registers the GATT database for the GATT Server. The GATT database stores all the attributes used by the GATT server, along with their permissions. This is a blocking function. No event is generated on calling this function.

Parameters:

gattDbPtr	Pointer to the GATT database of type CYBLE_GATTS_DB_T.
gattDbTotalEntries	Total number of entries in the GATT database.
gattDbMaxValue	Maximum characteristic value length

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If the Database has zero entries or is a NULL pointer

CYBLE_GATT_ERR_CODE_T CyBle_GattsWriteAttributeValue (CYBLE_GATT_HANDLE_VALUE_PAIR_T* *handleValuePair*, uint16 *offset*, CYBLE_CONN_HANDLE_T* *connHandle*, uint8 *flags*)

This function is used to write to the value field of the specified attribute in the GATT database of a GATT Server. This is a blocking function. No event is generated on calling this function.

If a peer device connected to the GATT Server initiates a write operation, this function is executed on the GATT Server. During such a call, the function checks for the attribute permissions (flags) before executing the write operation.

Parameters:

handleValuePair	Pointer to handle value pair of type CYBLE_GATT_HANDLE_VALUE_PAIR_T. • 'handleValuePair.attrHandle' is an input for which value has to be written. • 'handleValuePair.value.len' is an input parameter for the length to be written. • 'handleValuePair.value.val' is an input parameter for data buffer. • 'handleValuePair.actualLen' has to be ignored as it is unused in this function.
offset	Offset at which the data (length in number of bytes) is written.
connHandle	Pointer to the attribute instance handle, of type

	CYBLE_CONN_HANDLE_T.
falgs	Attribute permissions. Allowed values are, • CYBLE_GATT_DB_LOCALLY_INITIATED • CYBLE_GATT_DB_PEER_INITIATED

Returns:

CYBLE_GATT_ERR_CODE_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_GATT_ERR_NONE	On successful operation
CYBLE_GATT_ERR_INVALID_HANDLE	'handleValuePair.attrHandle' is not valid
CYBLE_GATT_ERR_WRITE_NOT_PERMITTED	Write operation is not permitted on this attribute
CYBLE_GATT_ERR_INVALID_OFFSET	Offset value is invalid
CYBLE_GATT_ERR_UNLIKELY_ERROR	Some other error occurred

CYBLE_GATT_ERR_CODE_TCyBle_GattsReadAttributeValue (CYBLE_GATT_HANDLE_VALUE_PAIR_T* *handleValuePair*, CYBLE_CONN_HANDLE_T* *connHandle*, uint8 *flags*)

This function is used to read the value field of the specified attribute from the GATT database in a GATT Server. This is a blocking function. No event is generated on calling this function.

Peer initiated call to this function results in the function checking for attribute permissions before performing this operation.

Parameters:

handleValuePair	Pointer to handle value pair of type CYBLE_GATT_HANDLE_VALUE_PAIR_T. • 'handleValuePair.attrHandle' is an input for which value has to be read. • 'handleValuePair.value.len' is an input parameter, the characteristic value is read based on length. • 'handleValuePair.value.val' is an output parameter for data buffer. • 'handleValuePair.actualLen' has to be ignored as it is unused in this function.
connHandle	Pointer to the attribute instance handle, of type CYBLE_CONN_HANDLE_T. connHandle can be NULL if flags field is set to CYBLE_GATT_DB_LOCALLY_INITIATED.
flags	Attribute permissions. Allowed values are, • CYBLE_GATT_DB_LOCALLY_INITIATED • CYBLE_GATT_DB_PEER_INITIATED

Returns:

CYBLE_GATT_ERR_CODE_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_GATT_ERR_NONE	On successful operation
CYBLE_GATT_ERR_INVALID_HANDLE	'handleValuePair.attrHandle' is not valid
CYBLE_GATT_ERR_READ_NOT_PERMITTED	Read operation is not permitted on this attribute
CYBLE_GATT_ERR_UNLIKELY_ERROR	Invalid arguments passed

CYBLE_GATT_ERR_CODE_T CyBle_GattsEnableAttribute (CYBLE_GATT_DB_ATTR_HANDLE_T *attrHandle*)

This function enables the attribute entry for service or characteristic logical group in the GATT database registered in BLE Stack. This is a blocking function. No event is generated on calling this function.

This function returns an error if the attribute does not belong to any service or characteristic logical group. If the attribute entry is already enabled, then this function returns status CYBLE_GATT_ERR_NONE.

Parameters:

attrHandle	Attribute handle of the registered GATT Database to enable particular attribute entry, of type CYBLE_GATT_DB_ATTR_HANDLE_T.

Returns:

CYBLE_GATT_ERR_CODE_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_GATT_ERR_NONE	On successful operation
CYBLE_GATT_ERR_INVALID_HANDLE	'attrHandle' is not valid

CYBLE_GATT_ERR_CODE_T CyBle_GattsDisableAttribute (CYBLE_GATT_DB_ATTR_HANDLE_T *attrHandle*)

This function disables the attribute entry for service or characteristic logical group in the GATT database registered in the BLE Stack. This is a blocking function. No event is generated on calling this function.

This function returns error if the attribute does not belong to a service or a characteristic logical group. If attribute entry is already disabled then it returns CYBLE_GATT_ERR_NONE as status. All the attribute entries are enabled in GATT database during stack initialization.

Parameters:

attrHandle	Attribute handle of the registered GATT Database to disable particular attribute entry, of type 'CYBLE_GATT_DB_ATTR_HANDLE_T'

Returns:

CYBLE_GATT_ERR_CODE_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_GATT_ERR_NONE	On successful operation

Errors codes	Description
CYBLE_GATT_ERR_INVALID_HANDLE	'attrHandle' is not valid

CYBLE_GATT_ERR_CODE_T CyBle_GattsDbAuthorize (uint8 *yesNo*)

This Function sets or clears authorization permission for the GATT database

Parameters:

yesNo	: Setting this to '0' turns off authorization on the entire GATT database and all attributes marked as authorize will return authorization error. Setting this to any non-zero value will authorize the entire GATT database and all attributes marked as authorize can be read / written based on other allowed permissions.

Returns:

CYBLE_GATT_ERR_CODE_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_GATT_ERR_NONE	On successful operation

CYBLE_API_RESULT_T CyBle_GattsNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTS_HANDLE_VALUE_NTF_T* *ntfParam*)

This function sends a notification to the peer device when the GATT Server is configured to notify a Characteristic Value to the GATT Client without expecting any Attribute Protocol layer acknowledgment that the notification was successfully received. This is a non-blocking function.

On enabling notification successfully for a specific attribute, if the GATT server has an updated value to be notified to the GATT Client, it sends out a 'Handle Value Notification' which results in CYBLE_EVT_GATTC_HANDLE_VALUE_NTF event at the GATT Client's end.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.10 for more details on notifications.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
ntfParam	Pointer to structure of type CYBLE_GATTS_HANDLE_VALUE_NTF_T which is same as CYBLE_GATT_HANDLE_VALUE_PAIR_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted as BLE Stack is busy processing previous requests.
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattsIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTS_HANDLE_VALUE_IND_T* *indParam*)

This function sends an indication to the peer device when the GATT Server is configured to indicate a Characteristic Value to the GATT Client and expects an Attribute Protocol layer acknowledgement that the indication was successfully received. This is a non-blocking function.

On enabling indication successfully, if the GATT server has an updated value to be indicated to the GATT Client, it sends out a 'Handle Value Indication' which results in CYBLE_EVT_GATTC_HANDLE_VALUE_IND event at the GATT Client's end.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.11 for more details on Indications.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
indParam	Pointer to structure of type CYBLE_GATTS_HANDLE_VALUE_IND_T which is same as CYBLE_GATT_HANDLE_VALUE_PAIR_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_TCyBle_GattsErrorRsp (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GATTS_ERR_PARAM_T* *errRspParam*)

This function sends an error response to the peer device. The Error Response is used to state that a given request cannot be performed, and to provide the reason as defined in 'CYBLE_GATT_ERR_CODE_T'. This is a non-blocking function.

Note that the 'Write Command' initiated by GATT Client does not generate an 'Error Response' from the GATT Server's end. The GATT Client gets CYBLE_EVT_GATTC_ERROR_RSP event on receiving error response.

Refer Bluetooth 4.1 core specification, Volume 3, Part F, section 3.4.1.1 for more details on Error Response operation.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
errRspParam	Pointer to structure of type CYBLE_GATTS_ERR_PARAM_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation

Errors codes	Description
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

CYBLE_API_RESULT_T CyBle_GattsExchangeMtuRsp (CYBLE_CONN_HANDLE_T *connHandle*, uint16 *mtu*)

This function sends the GATT Server's GATT MTU size to the GATT Client. This function has to be invoked in response to an Exchange GATT MTU Request received from the GATT Client. The GATT Server's GATT MTU size should be greater than or equal to the default GATT MTU size (23 bytes). This is a non-blocking function.

The peer GATT Client receives CYBLE_EVT_GATTC_XCHNG_MTU_RSP event on executing this function on the GATT Server.

Refer to Bluetooth 4.1 core specification, Volume 3, Part G, section 4.3.1 for more details on exchange of GATT MTU.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.
mtu	Size of GATT MTU, of type uint16

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If 'l2capPsm' is 0
CYBLE_ERROR_INSUFFICIENT_RESOURCES	Cannot register more than one PSM
CYBLE_ERROR_L2CAP_PSM_WRONG_ENCODING	PSM value must be an odd number and the Most Significant Byte must have Least Significant Bit value set to '0'. If PSM does not follow this guideline, this return code is generated.
CYBLE_ERROR_L2CAP_PSM_ALREADY_REGISTERED	PSM already Registered

void CyBle_GattsPrepWriteReqSupport (uint8 *prepWriteSupport*)

This API needs to be called after getting CYBLE_EVT_GATTS_PREP_WRITE_REQ event from the BLE Stack to support prepare write request operation. This API should be called only once during one Long/reliable write session. This needs to be called from the same event call back context. This is a non-blocking function.

On receiving CYBLE_EVT_GATTS_PREP_WRITE_REQ, returning from the event handler without calling this function will result in prepare write response being sent to the peer device rejecting the prepare write operation. CYBLE_GATT_ERR_REQUEST_NOT_SUPPORTED error code will be sent to client.

Parameters:

prepWriteSupport	If prepare write operation is supported by the application then the application layer should set this variable to CYBLE_GATTS_PREP_WRITE_SUPPORT. Any other value will result in the device rejecting the prepare write operation. Allowed values for this parameter • CYBLE_GATTS_PREP_WRITE_SUPPORT • CYBLE_GATTS_PREP_WRITE_NOT_SUPPORT

Returns:

None

CYBLE_API_RESULT_T CyBle_GattsWriteRsp (CYBLE_CONN_HANDLE_T *connHandle*)

This function sends a Write Response from a GATT Server to the GATT Client. This is a non-blocking function. This function has to be invoked in response to a valid Write Request event from the GATT Client (CYBLE_EVT_GATTS_WRITE_REQ) to acknowledge that the attribute has been successfully written.

The Write Response has to be sent after the attribute value is written or saved by the GATT Server. Write Response results in CYBLE_EVT_GATTC_WRITE_RSP event at the GATT Client's end.

Parameters:

connHandle	Connection handle to identify the peer GATT entity, of type CYBLE_CONN_HANDLE_T.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	'connHandle' value does not represent any existing entry in the Stack
CYBLE_ERROR_INVALID_OPERATION	This operation is not permitted
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed

GATT Definitions and Data Structures

Description

Contains the GATT specific definitions and data structures used in the GATT APIs.

Data Structures

- struct CYBLE_DISC_SRVC_INFO_T
- struct CYBLE_DISC_SRVC128_INFO_T
- struct CYBLE_DISC_INCL_INFO_T
- struct CYBLE_DISC_CHAR_INFO_T
- struct CYBLE_SRVR_CHAR_INFO_T

- struct CYBLE_DISC_DESCR_INFO_T
- struct CYBLE_GATTS_T
- struct CYBLE_GATTC_T
- struct CY_BLE_FLASH_STORAGE
- struct CYBLE_GATT_VALUE_T
- struct CYBLE_GATT_HANDLE_VALUE_PAIR_T
- struct CYBLE_GATT_ATTR_HANDLE_RANGE_T
- struct CYBLE_GATT_XCHG_MTU_PARAM_T
- struct CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T
- struct CYBLE_GATTC_ERR_RSP_PARAM_T
- struct CYBLE_GATTC_READ_BY_TYPE_REQ_T
- struct CYBLE_GATTC_READ_BLOB_REQ_T
- struct CYBLE_GATTC_HANDLE_LIST_T
- struct CYBLE_GATTC_READ_RSP_PARAM_T
- struct CYBLE_GATTC_HANDLE_VALUE_NTF_PARAM_T
- struct CYBLE_GATTC_GRP_ATTR_DATA_LIST_T
- struct CYBLE_GATTC_READ_BY_GRP_RSP_PARAM_T
- struct CYBLE_GATTC_FIND_BY_TYPE_RSP_PARAM_T
- struct CYBLE_GATTC_HANDLE_UUID_LIST_PARAM_T
- struct CYBLE_GATTC_FIND_INFO_RSP_PARAM_T
- struct CYBLE_GATTC_FIND_BY_TYPE_VALUE_REQ_T
- struct CYBLE_GATTC_EXEC_WRITE_RSP_T
- struct CYBLE_GATTS_ATT_GEN_VAL_LEN_T
- struct CYBLE_GATTS_ATT_PACK_VAL_LEN_T
- union CYBLE_GATTS_ATT_VALUE_T
- struct CYBLE_GATTS_DB_T
- struct CYBLE_GATTS_ERR_PARAM_T
- struct CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T
- struct CYBLE_GATTS_EXEC_WRITE_REQ_T
- struct CYBLE_GATTS_WRITE_REQ_PARAM_T
- struct CYBLE_GATTS_CHAR_VAL_READ_REQ_T

Typedefs

- typedef uint16 CYBLE_GATT_DB_ATTR_HANDLE_T
- typedef CYBLE_GATT_ATTR_HANDLE_RANGE_T CYBLE_GATTC_FIND_INFO_REQ_T
- typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTC_SIGNED_WRITE_CMD_REQ_T
- typedef CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_GATTC_READ_REQ_T
- typedef CYBLE_GATTC_HANDLE_LIST_T CYBLE_GATTC_READ_MULT_REQ_T
- typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTC_WRITE_CMD_REQ_T
- typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTC_WRITE_REQ_T
- typedef CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T CYBLE_GATTC_PREP_WRITE_REQ_T

- typedef CYBLE_GATTC_HANDLE_VALUE_NTF_PARAM_T CYBLE_GATTC_HANDLE_VALUE_IND_PARAM_T
- typedef CYBLE_GATTC_READ_BY_GRP_RSP_PARAM_T CYBLE_GATTC_READ_BY_TYPE_RSP_PARAM_T
- typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTS_HANDLE_VALUE_NTF_T
- typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTS_HANDLE_VALUE_IND_T
- typedef CYBLE_GATT_VALUE_T CYBLE_GATTS_READ_RSP_PARAM_T
- typedef CYBLE_GATTS_WRITE_REQ_PARAM_T CYBLE_GATTS_WRITE_CMD_REQ_PARAM_T
- typedef CYBLE_GATTS_WRITE_REQ_PARAM_T CYBLE_GATTS_SIGNED_WRITE_CMD_REQ_PARAM_T
- typedef CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T CYBLE_GATTS_PREP_WRITE_RSP_PARAM_T

Enumerations

- enum CYBLE_GATT_PDU_T{ CYBLE_GATT_ERROR_RSP= 0x01u, CYBLE_GATT_XCNHG_MTU_REQ, CYBLE_GATT_XCHNG_MTU_RSP, CYBLE_GATT_FIND_INFO_REQ, CYBLE_GATT_FIND_INFO_RSP, CYBLE_GATT_FIND_BY_TYPE_VALUE_REQ, CYBLE_GATT_FIND_BY_TYPE_VALUE_RSP, CYBLE_GATT_READ_BY_TYPE_REQ, CYBLE_GATT_READ_BY_TYPE_RSP, CYBLE_GATT_READ_REQ, CYBLE_GATT_READ_RSP, CYBLE_GATT_READ_BLOB_REQ, CYBLE_GATT_READ_BLOB_RSP, CYBLE_GATT_READ_MULTIPLE_REQ, CYBLE_GATT_READ_MULTIPLE_RSP, CYBLE_GATT_READ_BY_GROUP_REQ, CYBLE_GATT_READ_BY_GROUP_RSP, CYBLE_GATT_WRITE_REQ, CYBLE_GATT_WRITE_RSP, CYBLE_GATT_WRITE_CMD= 0x52u, CYBLE_GATT_PREPARE_WRITE_REQ= 0x16u, CYBLE_GATT_PREPARE_WRITE_RSP, CYBLE_GATT_EXECUTE_WRITE_REQ, CYBLE_GATT_EXECUTE_WRITE_RSP, CYBLE_GATT_HANDLE_VALUE_NTF= 0x1Bu, CYBLE_GATT_HANDLE_VALUE_IND= 0x1Du, CYBLE_GATT_HANDLE_VALUE_CNF= 0x1Eu, CYBLE_GATT_SIGNED_WRITE_CMD= 0xD2, CYBLE_GATT_UNKNOWN_PDU_IND= 0xFFu}
- enum CYBLE_GATT_ERR_CODE_T{ CYBLE_GATT_ERR_NONE= 0x00u, CYBLE_GATT_ERR_INVALID_HANDLE, CYBLE_GATT_ERR_READ_NOT_PERMITTED, CYBLE_GATT_ERR_WRITE_NOT_PERMITTED, CYBLE_GATT_ERR_INVALID_PDU, CYBLE_GATT_ERR_INSUFFICIENT_AUTHENTICATION, CYBLE_GATT_ERR_REQUEST_NOT_SUPPORTED, CYBLE_GATT_ERR_INVALID_OFFSET, CYBLE_GATT_ERR_INSUFFICIENT_AUTHORIZATION, CYBLE_GATT_ERR_PREPARE_WRITE_QUEUE_FULL, CYBLE_GATT_ERR_ATTRIBUTE_NOT_FOUND, CYBLE_GATT_ERR_ATTRIBUTE_NOT_LONG, CYBLE_GATT_ERR_INSUFFICIENT_ENC_KEY_SIZE, CYBLE_GATT_ERR_INVALID_ATTRIBUTE_LEN, CYBLE_GATT_ERR_UNLIKELY_ERROR, CYBLE_GATT_ERR_INSUFFICIENT_ENCRYPTION, CYBLE_GATT_ERR_UNSUPPORTED_GROUP_TYPE, CYBLE_GATT_ERR_INSUFFICIENT_RESOURCE= 0x11, CYBLE_GATT_ERR_HEART_RATE_CONTROL_POINT_NOT_SUPPORTED= 0x80u, CYBLE_GATT_ERR_USER_DATA_ACCESS_NOT_PERMITTED= 0x80u, CYBLE_GATT_ERR_CPS_INAPPROPRIATE_CONNECTION_PARAMETERS= 0x80u, CYBLE_GATT_ERR_HTS_OUT_OF_RANGE= 0x80u, CYBLE_GATTS_ERR_PROCEDURE_ALREADY_IN_PROGRESS= 0x80u, CYBLE_GATT_ERR_OP_CODE_NOT_SUPPORTED= 0x80u, CYBLE_GATT_ERR_MISSING_CRC= 0x80u, CYBLE_GATTS_ERR_CCCD_IMPROPERLY_CONFIGURED= 0x81u, CYBLE_GATTS_ERR_OPERATION_FAILED= 0x81u, CYBLE_GATT_ERR_INVALID_CRC= 0x81u, CYBLE_GATT_ERR_ANS_COMMAND_NOT_SUPPORTED= 0xA0u, CYBLE_GATT_ERR_ANCS_UNKNOWN_COMMAND= 0xA0u, CYBLE_GATT_ERR_ANCS_INVALID_COMMAND= 0xA1u, CYBLE_GATT_ERR_ANCS_INVALID_PARAMETER= 0xA2u, CYBLE_GATT_ERR_ANCS_ACTION_FAILED= 0xA3u, CYBLE_GATT_ERR_CCCD_IMPROPERLY_CONFIGURED= 0xFDu,

CYBLE_GATT_ERR_PROCEDURE_ALREADY_IN_PROGRESS= 0xFEu,
CYBLE_GATT_ERR_OUT_OF_RANGE= 0xFFu}

Typedef Documentation

typedef uint16 CYBLE_GATT_DB_ATTR_HANDLE_T

GATT BD Attribute Handle Type

typedef CYBLE_GATT_ATTR_HANDLE_RANGE_T CYBLE_GATTC_FIND_INFO_REQ_T

GATT find info request to be sent to Server

typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTC_SIGNED_WRITE_CMD_REQ_T

Signed Write command request to be sent to Server

typedef CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_GATTC_READ_REQ_T

Read request to be sent to Server

typedef CYBLE_GATTC_HANDLE_LIST_T CYBLE_GATTC_READ_MULT_REQ_T

Read multiple request to be sent to Server

typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTC_WRITE_CMD_REQ_T

Write command request to be sent to Server

typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTC_WRITE_REQ_T

Write request to be sent to Server

typedef CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T CYBLE_GATTC_PREP_WRITE_REQ_T

Prepare write request to be sent to Server

typedef CYBLE_GATTC_HANDLE_VALUE_NTF_PARAM_T CYBLE_GATTC_HANDLE_VALUE_IND_PARAM_T

GATT handle value indication parameter received from server type

typedef CYBLE_GATTC_READ_BY_GRP_RSP_PARAM_T CYBLE_GATTC_READ_BY_TYPE_RSP_PARAM_T

GATT read by type response received from server

typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTS_HANDLE_VALUE_NTF_T

Handle value notification data to be sent to Client

typedef CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTS_HANDLE_VALUE_IND_T

GATT handle value indication parameter type

typedef CYBLE_GATT_VALUE_T CYBLE_GATTS_READ_RSP_PARAM_T

Read response parameter to be sent to Client

typedef CYBLE_GATTS_WRITE_REQ_PARAM_T CYBLE_GATTS_WRITE_CMD_REQ_PARAM_T

Write command request parameter received from Client

typedef CYBLE_GATTS_WRITE_REQ_PARAM_T CYBLE_GATTS_SIGNED_WRITE_CMD_REQ_PARAM_T

Signed Write command request parameter received from Client

typedef CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T CYBLE_GATTS_PREP_WRITE_RSP_PARAM_T

Prepare write response parameter to be sent to Client

Enumeration Type Documentation

enum CYBLE_GATT_PDU_T

Opcode which has resulted in error

Enumerator

CYBLE_GATT_ERROR_RSP Error Response PDU

CYBLE_GATT_XCNHG_MTU_REQ Exchange GATT MTU Request PDU

CYBLE_GATT_XCHNG_MTU_RSP Exchange GATT MTU Response PDU

CYBLE_GATT_FIND_INFO_REQ Find Information Request PDU

CYBLE_GATT_FIND_INFO_RSP Find Information Response PDU

CYBLE_GATT_FIND_BY_TYPE_VALUE_REQ Find By Type Value Request PDU

CYBLE_GATT_FIND_BY_TYPE_VALUE_RSP Find By Type Value Response PDU

CYBLE_GATT_READ_BY_TYPE_REQ Read By Type Request PDU

CYBLE_GATT_READ_BY_TYPE_RSP Read By Type Response PDU

CYBLE_GATT_READ_REQ Read Request PDU

CYBLE_GATT_READ_RSP Read Response PDU

CYBLE_GATT_READ_BLOB_REQ Read Blob Request PDU

CYBLE_GATT_READ_BLOB_RSP Read Blob Response PDU

CYBLE_GATT_READ_MULTIPLE_REQ Read Multiple Request PDU

CYBLE_GATT_READ_MULTIPLE_RSP Read Multiple Response PDU

CYBLE_GATT_READ_BY_GROUP_REQ Read Group Type Request PDU

CYBLE_GATT_READ_BY_GROUP_RSP Read Group Type Response PDU

CYBLE_GATT_WRITE_REQ Write Request PDU

CYBLE_GATT_WRITE_RSP Write Response PDU

CYBLE_GATT_WRITE_CMD Write Command PDU

CYBLE_GATT_PREPARE_WRITE_REQ Prepare Write Request PDU

CYBLE_GATT_PREPARE_WRITE_RSP Prepare Write Response PDU

CYBLE_GATT_EXECUTE_WRITE_REQ Execute Write Request PDU

CYBLE_GATT_EXECUTE_WRITE_RSP Execute Write Response PDU

CYBLE_GATT_HANDLE_VALUE_NTF Handle Value Notification PDU

CYBLE_GATT_HANDLE_VALUE_IND Handle Value Indication PDU

CYBLE_GATT_HANDLE_VALUE_CNF Handle Value Confirmation PDU

CYBLE_GATT_SIGNED_WRITE_CMD Signed Write Command PDU

CYBLE_GATT_UNKNOWN_PDU_IND Unknown or Unhandled PDU

enum CYBLE_GATT_ERR_CODE_T

GATT profile error codes

Enumerator

CYBLE_GATT_ERR_NONE No Error

CYBLE_GATT_ERR_INVALID_HANDLE Invalid Handle error code is used in the case when the ATT handle in the ATT request PDU is invalid.

CYBLE_GATT_ERR_READ_NOT_PERMITTED Read Not Permitted error code is used in the case when the permission to read the value of an ATT handle is not permitted on the ATT server.

CYBLE_GATT_ERR_WRITE_NOT_PERMITTED Write Not Permitted error code is used in the case when the permission to write the value of an ATT handle is not permitted on the ATT server.

CYBLE_GATT_ERR_INVALID_PDU Invalid PDU error code is used in the case when the format of the PDU sent from the ATT Client is incorrect.

CYBLE_GATT_ERR_INSUFFICIENT_AUTHENTICATION Insufficient Authentication error code is used in the case when an access to a handle is attempted on a un-authenticated link but the attribute requires that the link be authenticated before any client can access it.

CYBLE_GATT_ERR_REQUEST_NOT_SUPPORTED Request not supported error code is used in the case when the server does not support the processing of an ATT request sent from the client.

CYBLE_GATT_ERR_INVALID_OFFSET Invalid Offset error code is used in the case when the offset sent by the client in the Read blob/Prepare Write Request is invalid with respect to the length of the value in the server.

CYBLE_GATT_ERR_INSUFFICIENT_AUTHORIZATION Insufficient Authorization error code is used in the case when the ATT server does not Authorize the client and hence prohibiting the client from reading the handle value.

CYBLE_GATT_ERR_PREPARE_WRITE_QUEUE_FULL Write queue full error code is used when there is no more space left in the prepare write queue on the server to entertain any more prepare writes from a client.

CYBLE_GATT_ERR_ATTRIBUTE_NOT_FOUND Attribute not found error is used when the ATT server cannot find any handles that belong to the Attribute type in the given range of handles that the client specified in its request. This error code can be sent to the client in response to the following request PDUs - Find Information, Find by Type Value, Read by Type, Read by Group Type requests.

CYBLE_GATT_ERR_ATTRIBUTE_NOT_LONG Attribute Not Long error code is used when the client tries to read or write a Attribute handle's value which cannot be read or written through Read Blob or multiple prepare write requests.

CYBLE_GATT_ERR_INSUFFICIENT_ENC_KEY_SIZE Insufficient encryption key size error code is used when the client tries to access an Attribute Handle's Value for which the link need to be encrypted with a key of certain minimum key size and the current link is encrypted with a key of lesser size than the minimum required.

CYBLE_GATT_ERR_INVALID_ATTRIBUTE_LEN Invalid Attribute length error code is used when the Attribute value's length is not correct to process the request containing the value.

CYBLE_GATT_ERR_UNLIKELY_ERROR Unlikely error is used when the processing of the Attribute request has encountered an error that is not covered by any other error code.

CYBLE_GATT_ERR_INSUFFICIENT_ENCRYPTION Insufficient encryption error code is used when the client tries to read or write an Attribute handle which requires the link to be encrypted and the link is currently not encrypted.

CYBLE_GATT_ERR_UNSUPPORTED_GROUP_TYPE Unsupported Group Type error code is used when the Attribute type requested in the Read by Group Type request is not a valid grouping attribute on the server.

CYBLE_GATT_ERR_INSUFFICIENT_RESOURCE Insufficient Resources error code is used when the ATT server does not have enough resources such as memory etc. to process the request from the client.

CYBLE_GATT_ERR_HEART_RATE_CONTROL_POINT_NOT_SUPPORTED Other Error Groups for ATT - GATT Reserved: GATT-ATT Error codes 0x12 to 0x7F are reserved for Application Specific Error Code Range: 0x80 to 0x9F Reserved: 0xA0 to 0xDF Common Profile & Service Error Code : 0xE0 to 0xFF

Heart Rate Control Point Not Supported error code is used when a unsupported code is written into Heart Rate service Control Point characteristic.

CYBLE_GATT_ERR_USER_DATA_ACCESS_NOT_PERMITTED The user data access is not permitted (i.e. the user has not given consent in order to access these data).

CYBLE_GATT_ERR_CPS_INAPPROPRIATE_CONNECTION_PARAMETERS The notifications of the Cycling Power Vector characteristic cannot be sent due to inappropriate connection parameters.

CYBLE_GATT_ERR_HTS_OUT_OF_RANGE The value is considered invalid and outside of the range allowed by the characteristic.

CYBLE_GATTS_ERR_PROCEDURE_ALREADY_IN_PROGRESS Procedure Already in Progress error code is used when a profile or service request cannot be serviced because an operation that has been previously triggered is still in progress.

CYBLE_GATT_ERR_OP_CODE_NOT_SUPPORTED The Op Code Not Supported error code is used when a unsupported Op Code is written into Control Point characteristic.

CYBLE_GATT_ERR_MISSING_CRC The Missing CRC error code is used when the CRC is missed in the incoming characteristic value.

CYBLE_GATTS_ERR_CCCD_IMPROPERLY_CONFIGURED Client Characteristic Configuration Descriptor Improperly Configured error code is used when a Client Characteristic Configuration descriptor is not configured according to the requirements of the profile or service.

CYBLE_GATTS_ERR_OPERATION_FAILED The Operation Failed error code is used when the device is unable to complete a procedure for any reason.

CYBLE_GATT_ERR_INVALID_CRC The Invalid CRC error code is used when the CRC is invalid in the incoming characteristic value.

CYBLE_GATT_ERR_ANS_COMMAND_NOT_SUPPORTED Command Not Supported used by the Alert Notification Server when the Client sends incorrect value of the Command ID or Category ID of to the Alert Notification Control Point Characteristic.

CYBLE_GATT_ERR_ANCS_UNKNOWN_COMMAND Unknown command error code used by the Apple Notification Center Server when the Client sends unknown command value of the Apple Notification Center Service Control Point Characteristic.

CYBLE_GATT_ERR_ANCS_INVALID_COMMAND Invalid command error code used by the Apple Notification Center Server when the Client sends invalid command value of the Apple Notification Center Service Control Point Characteristic.

CYBLE_GATT_ERR_ANCS_INVALID_PARAMETER Invalid parameter error code used by the Apple Notification Center Server when the Client sends invalid parameter value of the Apple Notification Center Service Control Point Characteristic.

CYBLE_GATT_ERR_ANCS_ACTION_FAILED Action failed error code used by the Apple Notification Center Server when some Apple Notification Center Service Control Point Characteristic command processing goes wrong

CYBLE_GATT_ERR_CCCD_IMPROPERLY_CONFIGURED Client Characteristic Configuration Descriptor Improperly Configured error code is used when a Client Characteristic Configuration descriptor is not configured according to the requirements of the profile or service.

CYBLE_GATT_ERR_PROCEDURE_ALREADY_IN_PROGRESS The Procedure Already in Progress error code is used when a profile or service request cannot be serviced because an operation that has been previously triggered is still in progress.

CYBLE_GATT_ERR_OUT_OF_RANGE Out of Range error code is used when an attribute value is out of range as defined by a profile or service specification.

L2CAP Functions

Description

The L2CAP APIs allow access to the Logical link control and adaptation protocol (L2CAP) layer of the BLE stack. The L2CAP API names begin with CyBle_L2cap.

Modules

- L2CAP Definitions and Data Structures
  Contains the L2CAP specific definitions and data structures used in the L2CAP APIs.

Functions

- CYBLE_API_RESULT_T CyBle_L2capCbfcRegisterPsm(uint16 l2capPsm, uint16 creditLwm)
- CYBLE_API_RESULT_T CyBle_L2capCbfcUnregisterPsm(uint16 l2capPsm)
- CYBLE_API_RESULT_T CyBle_L2capCbfcConnectReq(uint8 bdHandle, uint16 remotePsm, uint16 localPsm, CYBLE_L2CAP_CBFC_CONNECT_PARAM_T*param)
- CYBLE_API_RESULT_T CyBle_L2capCbfcConnectRsp(uint16 localCid, uint16 response, CYBLE_L2CAP_CBFC_CONNECT_PARAM_T*param)
- CYBLE_API_RESULT_T CyBle_L2capCbfcSendFlowControlCredit(uint16 localCid, uint16 credit)
- CYBLE_API_RESULT_T CyBle_L2capChannelDataWrite(uint8 bdHandle, uint16 localCid, uint8 *buffer, uint16 bufferLen)
- CYBLE_API_RESULT_T CyBle_L2capDisconnectReq(uint16 localCid)
- CYBLE_API_RESULT_T CyBle_L2capLeConnectionParamUpdateRequest(uint8 bdHandle, CYBLE_GAP_CONN_UPDATE_PARAM_T*connParam)
- CYBLE_API_RESULT_T CyBle_L2capLeConnectionParamUpdateResponse(uint8 bdHandle, uint16 result)

Function Documentation

CYBLE_API_RESULT_T CyBle_L2capCbfcRegisterPsm (uint16 *l2capPsm*, uint16 *creditLwm*)

This function registers a new upper layer protocol or PSM to L2CAP, along with the set of callbacks for the L2CAP Credit Based Flow Control mode. This is a blocking function. No event is generated on calling this function.

Refer Bluetooth 4.1 core specification, Volume 3, Part A, section 3.4 for more details about credit based flow control mode of operation.

Parameters:

l2capPsm	PSM value of the higher-level protocol
creditLwm	Upper Layer defined Receive Credit Low Mark

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Error codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If 'l2capPsm' is 0
CYBLE_ERROR_INSUFFICIENT_RESOURCES	Cannot register more than one PSM

Error codes	Description
CYBLE_ERROR_L2CAP_PSM_WRONG_ENCODING	PSM value must be an odd number and the Most Significant Byte must have Least Significant Bit value set to '0'. If PSM does not follow this guideline, this return code is generated.
CYBLE_ERROR_L2CAP_PSM_ALREADY_REGISTERED	PSM already Registered

CYBLE_API_RESULT_T CyBle_L2capCbfcUnregisterPsm (uint16 *l2capPsm*)

This function de-registers an upper layer protocol or LE_PSM from L2CAP for the L2CAP Credit Based Flow Control mode. This is a blocking function. No event is generated on calling this function.

Parameters:

l2capPsm	PSM value of the higher-level protocol

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_ERROR_L2CAP_PSM_WRONG_ENCODING	L2CAP PSM value specified is incorrect or does not exist

CYBLE_API_RESULT_T CyBle_L2capCbfcConnectReq (uint8 *bdHandle*, uint16 *remotePsm*, uint16 *localPsm*, CYBLE_L2CAP_CBFC_CONNECT_PARAM_T* *param*)

This L2CAP function initiates L2CAP channel establishment procedure in Credit Based Flow Control (CBFC) mode. Connection establishment is initiated to the specified remote Bluetooth device, for the specified PSM representing an upper layer protocol above L2CAP. This is a non-blocking function.

At the receiver's end, CYBLE_EVT_L2CAP_CBFC_CONN_IND event is generated. In response to this call, CYBLE_EVT_L2CAP_CBFC_CONN_CNF event is generated at the sender's end.

Refer to Bluetooth 4.1 core specification, Volume 3, Part A, section 4.22 for more details about this operation.

Parameters:

bdHandle	Peer device handle.
remotePsm	Remote PSM, representing the upper layer protocol above L2CAP.
localPsm	Local PSM, representing the upper layer protocol above L2CAP.
param	This parameter must be a pointer to the CYBLE_L2CAP_CBFC_CONNECT_PARAM_T variable containing the connection parameters for the L2CAP channel.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If "param" is NULL
CYBLE_ERROR_INSUFFICIENT_RESOURCES	Insufficient resources
CYBLE_L2CAP_PSM_NOT_REGISTERED	PSM not Registered

CYBLE_API_RESULT_TCyBle_L2capCbfcConnectRsp (uint16 *localCid*, uint16 *response*, CYBLE_L2CAP_CBFC_CONNECT_PARAM_T* *param*)

This L2CAP function enables an upper layer protocol to respond to L2CAP connection request for LE Credit Based Flow Control mode of the specified PSM from the specified remote Bluetooth device. This is a non-blocking function. It is mandatory that the upper layer PSM always responds back by calling this function upon receiving CBFC Connection Request (CYBLE_EVT_L2CAP_CBFC_CONN_IND) event.

The channel is established (opened) only when the PSM concerned responds back with an event indicating success (CYBLE_EVT_L2CAP_CBFC_CONN_CNF, at the peer device's end). Otherwise, the channel establishment request from the peer will be rejected by L2CAP with appropriate result and status as received from the upper layer PSM.

Refer to Bluetooth 4.1 core specification, Volume 3, Part A, section 4.23 for more details about this operation.

Parameters:

localCid	This parameter specifies the local L2CAP channel end-point for this new L2CAP channel. On receipt of L2CAP Connect Request command from the peer, local L2CAP will temporarily create a channel. This parameter identifies the new channel. If the upper layer PSM chooses to reject this connection, this temporary channel will be closed.
response	This parameter specifies the response of the upper layer for the new L2CAP channel establishment request from the peer. It must be set to a value as specified in L2CAP Connect Result Codes. Refer to Bluetooth 4.1 core specification, Volume 3, Part A, section 4.23 for more details.
param	This parameter must be a pointer to the CYBLE_L2CAP_CBFC_CONNECT_PARAM_T variable containing the connection parameters for the L2CAP channel.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If "param" is NULL
CYBLE_ERROR_L2CAP_CONNECTION_ENTITY_NOT_FOUND	Connection entity is not found

CYBLE_API_RESULT_T CyBle_L2capCbfcSendFlowControlCredit (uint16 *localCid*, uint16 *credit*)

This L2CAP function enables an upper layer protocol to send LE Flow Control Credit packet to peer Bluetooth device, when it is capable of receiving additional LE-frames. This is a non-blocking function.

This function is invoked when the device is expecting more data from the peer device and it gets an event indicating that the peer device is low on credits CYBLE_EVT_L2CAP_CBFC_RX_CREDIT_IND for which it needs to respond by sending credits by invoking this function. Once the peer device receives these credits, it gets CYBLE_EVT_L2CAP_CBFC_TX_CREDIT_IND event indicating the same. It is the responsibility of the application layer of the device sending the credit to keep track of the total number of credits and making sure that it does not exceed 65535.

Refer to Bluetooth 4.1 core specification, Volume 3, Part A, section 4.24 for more details about this operation.

Parameters:

localCid	This parameter specifies the local channel end-point for the L2CAP channel. For the initiator of L2CAP channel establishment, this must be set to the value indicated by the CYBLE_EVT_L2CAP_CBFC_CONN_CNF event. For the responder, the upper layer protocol obtains this value when it receives the event CYBLE_EVT_L2CAP_CBFC_CONN_IND.
credit	The credit value field represents number of credits the receiving device can increment. The credit value field is a number between 1 and 65535.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_L2CAP_CONNECTION_ENTITY_NOT_FOUND	L2CAP connection instance is not present

CYBLE_API_RESULT_T CyBle_L2capChannelDataWrite (uint8 *bdHandle*, uint16 *localCid*, uint8 * *buffer*, uint16 *bufferLen*)

This function sends a data packet on the L2CAP CBFC channel. This is a blocking function.

This API generates 'CYBLE_EVT_L2CAP_CBFC_DATA_WRITE_IND' event which is kept for backward compatibility and the user should handle CYBLE_API_RESULT_T to determine whether the last data packet was sent out properly.

Refer to Bluetooth 4.1 core specification, Volume 3, Part A, section 3.4 for more details about this operation.

Parameters:

bdHandle	Peer device handle.
localCid	This parameter specifies the local channel end-point for the L2CAP channel. For the initiator of L2CAP channel establishment, this must be set to the value indicated by the CYBLE_EVT_L2CAP_CBFC_CONN_CNF event. For the responder, the upper layer protocol obtains this value when it receives the event CYBLE_EVT_L2CAP_CBFC_CONN_IND.
buffer	Buffer containing packet to be sent.

bufferLen	L2CAP Data Packet length. It shall be of lesser than the size of both local L2CAP MTU & peer L2CAP MTU size.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If "buffer" is NULL
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_ERROR_NO_CONNECTION	No Link Layer connection is present
CYBLE_L2CAP_CHANNEL_NOT_FOUND	No L2ACP channel found corresponding to CID
CYBLE_L2CAP_NOT_ENOUGH_CREDITS	Not Enough Credits to transfer data

CYBLE_API_RESULT_T CyBle_L2capDisconnectReq (uint16 *localCid*)

This function initiates sending of an L2CAP Disconnect Request (CYBLE_EVT_L2CAP_CBFC_DISCONN_IND event received by the peer device) command to the remote L2CAP entity to initiate disconnection of the referred L2CAP channel. This is a non-blocking function.

Disconnection of the L2CAP channel always succeeds - either by reception of the L2CAP Disconnect Response from the peer, or by timeout. In any case, L2CAP will confirm disconnection of the channel, by calling the CYBLE_EVT_L2CAP_CBFC_DISCONN_CNF event.

Refer to Bluetooth 4.1 core specification, Volume 3, Part A, section 4.6 for more details about this operation.

Parameters:

localCid	This parameter specifies the local channel end-point for the L2CAP channel. • For initiator of L2CAP channel establishment, this must be set to the value indicated by the event CYBLE_EVT_L2CAP_CBFC_CONN_CNF. • For the responder, the upper layer protocol obtains this value when it receives the event CYBLE_EVT_L2CAP_CBFC_CONN_IND.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_OPERATION	No Link Layer connection is present
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_L2CAP_CONNECTION_ENT	No connection entity found which can be

Errors codes	Description
ITY_NOT_FOUND	disconnected

CYBLE_API_RESULT_TCyBle_L2capLeConnectionParamUpdateRequest (uint8 *bdHandle*, CYBLE_GAP_CONN_UPDATE_PARAM_T* *connParam*)

This function sends the connection parameter update request to the Master of the link. This is a non-blocking function. This function can only be used from device connected in LE slave role.

To send connection parameter update request from the master to the slave, use CyBle_GapcConnectionParamUpdateRequest() function. This function results in CYBLE_EVT_L2CAP_CONN_PARAM_UPDATE_REQ event at the Master's end.

Refer to Bluetooth 4.1 core specification, Volume 3, Part A, section 4.20 for more details about this operation.

Parameters:

bdHandle	Peer device handle
connParam	Pointer to a variable of type CYBLE_GAP_CONN_UPDATE_PARAM_T which indicates the response to the Connection Parameter Update Request

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If "connParam" is NULL
CYBLE_ERROR_INVALID_OPERATION	Connection Parameter Update Request is not allowed
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_ERROR_NO_CONNECTION	No Link Layer connection is present

CYBLE_API_RESULT_TCyBle_L2capLeConnectionParamUpdateResponse (uint8 *bdHandle*, uint16 *result*)

This API sends the connection parameter update response to slave. This API can only be used from device connected in LE master role.

Parameters:

bdHandle	Peer device handle
result	This field indicates the response to the Connection Parameter Update Request

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation
CYBLE_ERROR_INVALID_PARAMETER	If 'result' is invalid (greater than connection parameter reject code i.e., 0x0001)

Errors codes	Description
CYBLE_ERROR_MEMORY_ALLOCATION_FAILED	Memory allocation failed
CYBLE_ERROR_NO_CONNECTION	No Link Layer connection is present

L2CAP Definitions and Data Structures

Description

Contains the L2CAP specific definitions and data structures used in the L2CAP APIs.

Data Structures

- struct CYBLE_L2CAP_CBFC_CONNECT_PARAM_T
- struct CYBLE_L2CAP_CBFC_CONN_IND_PARAM_T
- struct CYBLE_L2CAP_CBFC_CONN_CNF_PARAM_T
- struct CYBLE_L2CAP_CBFC_DISCONN_CNF_PARAM_T
- struct CYBLE_L2CAP_CBFC_RX_PARAM_T
- struct CYBLE_L2CAP_CBFC_LOW_RX_CREDIT_PARAM_T
- struct CYBLE_L2CAP_CBFC_LOW_TX_CREDIT_PARAM_T
- struct CYBLE_L2CAP_CBFC_DATA_WRITE_PARAM_T

Enumerations

- enum CYBLE_L2CAP_COMMAND_REJ_REASON_T{ CYBLE_L2CAP_COMMAND_NOT_UNDERSTOOD= 0x0000u, CYBLE_L2CAP_SIGNALLING_MTU_EXCEEDED, CYBLE_L2CAP_INVALID_CID_IN_REQUEST}
- enum CYBLE_L2CAP_RESULT_PARAM_T{ CYBLE_L2CAP_RESULT_SUCCESS= 0x0000u,
  CYBLE_L2CAP_RESULT_COMMAND_TIMEOUT= 0x2318u,
  CYBLE_L2CAP_RESULT_INCORRECT_SDU_LENGTH= 0x2347u,
  CYBLE_L2CAP_RESULT_NOT_ENOUGH_CREDITS= 0x2371u,
  CYBLE_L2CAP_RESULT_CREDIT_OVERFLOW= 0x2373u,
  CYBLE_L2CAP_RESULT_UNACCEPTABLE_CREDIT_VALUE= 0x2374u}

Enumeration Type Documentation

enum CYBLE_L2CAP_COMMAND_REJ_REASON_T

Reason for command reject event - CYBLE_EVT_L2CAP_COMMAND_REJ

Enumerator

CYBLE_L2CAP_COMMAND_NOT_UNDERSTOOD Command Not Understood

CYBLE_L2CAP_SIGNALLING_MTU_EXCEEDED Signaling L2CAP MTU exceeded

CYBLE_L2CAP_INVALID_CID_IN_REQUEST Invalid Connection Identifier in request

enum CYBLE_L2CAP_RESULT_PARAM_T

The result code of call back structures for L2CAP

Enumerator

CYBLE_L2CAP_RESULT_SUCCESS Operation Successful

CYBLE_L2CAP_RESULT_COMMAND_TIMEOUT Command timeout, if l2cap signaling channel timeout occurs, app should disconnect.

CYBLE_L2CAP_RESULT_INCORRECT_SDU_LENGTH Invalid sdu length

CYBLE_L2CAP_RESULT_NOT_ENOUGH_CREDITS Not enough credit to perform this operation

CYBLE_L2CAP_RESULT_CREDIT_OVERFLOW Credit overflow. Total credit exceeded 65535 (maximum)

CYBLE_L2CAP_RESULT_UNACCEPTABLE_CREDIT_VALUE Invalid credit value, receive credit is Zero

BLE Common Events

Description

The BLE stack generates events to notify the application on various status alerts concerning the stack. These can be generic stack events or can be specific to GAP, GATT or L2CAP layers. The service specific events are handled separately in BLE Service-Specific Events.

Enumerations

- enum CYBLE_EVENT_T{ CYBLE_EVT_HOST_INVALID= 0x00u, CYBLE_EVT_STACK_ON= 0x01u, CYBLE_EVT_TIMEOUT, CYBLE_EVT_HARDWARE_ERROR, CYBLE_EVT_HCI_STATUS, CYBLE_EVT_STACK_BUSY_STATUS, CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT= 0x20u, CYBLE_EVT_GAP_AUTH_REQ, CYBLE_EVT_GAP_PASSKEY_ENTRY_REQUEST, CYBLE_EVT_GAP_PASSKEY_DISPLAY_REQUEST, CYBLE_EVT_GAP_AUTH_COMPLETE, CYBLE_EVT_GAP_AUTH_FAILED, CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP, CYBLE_EVT_GAP_DEVICE_CONNECTED, CYBLE_EVT_GAP_DEVICE_DISCONNECTED, CYBLE_EVT_GAP_ENCRYPT_CHANGE, CYBLE_EVT_GAP_CONNECTION_UPDATE_COMPLETE, CYBLE_EVT_GAPC_SCAN_START_STOP, CYBLE_EVT_GAP_KEYINFO_EXCHNGE_CMPLT, CYBLE_EVT_GATTC_ERROR_RSP= 0x40u, CYBLE_EVT_GATT_CONNECT_IND, CYBLE_EVT_GATT_DISCONNECT_IND, CYBLE_EVT_GATTS_XCNHG_MTU_REQ, CYBLE_EVT_GATTC_XCHNG_MTU_RSP, CYBLE_EVT_GATTC_READ_BY_GROUP_TYPE_RSP, CYBLE_EVT_GATTC_READ_BY_TYPE_RSP, CYBLE_EVT_GATTC_FIND_INFO_RSP, CYBLE_EVT_GATTC_FIND_BY_TYPE_VALUE_RSP, CYBLE_EVT_GATTC_READ_RSP, CYBLE_EVT_GATTC_READ_BLOB_RSP, CYBLE_EVT_GATTC_READ_MULTI_RSP, CYBLE_EVT_GATTS_WRITE_REQ, CYBLE_EVT_GATTC_WRITE_RSP, CYBLE_EVT_GATTS_WRITE_CMD_REQ, CYBLE_EVT_GATTS_PREP_WRITE_REQ, CYBLE_EVT_GATTS_EXEC_WRITE_REQ, CYBLE_EVT_GATTC_EXEC_WRITE_RSP, CYBLE_EVT_GATTC_HANDLE_VALUE_NTF, CYBLE_EVT_GATTC_HANDLE_VALUE_IND, CYBLE_EVT_GATTS_HANDLE_VALUE_CNF, CYBLE_EVT_GATTS_DATA_SIGNED_CMD_REQ, CYBLE_EVT_GATTC_STOP_CMD_COMPLETE, CYBLE_EVT_GATTS_READ_CHAR_VAL_ACCESS_REQ, CYBLE_EVT_L2CAP_CONN_PARAM_UPDATE_REQ= 0x70u, CYBLE_EVT_L2CAP_CONN_PARAM_UPDATE_RSP, CYBLE_EVT_L2CAP_COMMAND_REJ, CYBLE_EVT_L2CAP_CBFC_CONN_IND, CYBLE_EVT_L2CAP_CBFC_CONN_CNF, CYBLE_EVT_L2CAP_CBFC_DISCONN_IND, CYBLE_EVT_L2CAP_CBFC_DISCONN_CNF, CYBLE_EVT_L2CAP_CBFC_DATA_READ, CYBLE_EVT_L2CAP_CBFC_RX_CREDIT_IND, CYBLE_EVT_L2CAP_CBFC_TX_CREDIT_IND, CYBLE_EVT_L2CAP_CBFC_DATA_WRITE_IND, CYBLE_EVT_PENDING_FLASH_WRITE= 0xFA, CYBLE_EVT_LE_PING_AUTH_TIMEOUT= 0xFB, CYBLE_EVT_MAX= 0xFF}

Enumeration Type Documentation

enum CYBLE_EVENT_T

Host stack events. Generic events: 0x01 to 0x1F GAP events: 0x20 to 0x3F GATT events: 0x40 to 0x6F L2CAP events: 0x70 to 0x7F Future use: 0x80 to 0xFF

Enumerator

CYBLE_EVT_HOST_INVALID This event is triggered by BLE stack when stack is in a bad state, Restarting stack is the only way to get out of the state

CYBLE_EVT_STACK_ON This event is received when BLE stack is initialized and turned ON by invoking CyBle_StackInit () function.

CYBLE_EVT_TIMEOUT This event is received when there is a timeout and application needs to handle the event. Timeout reason is defined by CYBLE_TO_REASON_CODE_T.

CYBLE_EVT_HARDWARE_ERROR This event indicates that some internal hardware error has occurred. Reset of the hardware may be required.

CYBLE_EVT_HCI_STATUS This event is triggered by 'Host Stack' if 'Controller' responds with an error code for any HCI command. Event parameter returned will be an HCI error code as defined in Bluetooth 4.1 core specification, Volume 2, Part D, section 1.3. This event will be received only if there is an error.

CYBLE_EVT_STACK_BUSY_STATUS This event is triggered by host stack if BLE stack is busy or not. Event Parameter corresponding to this event will indicate the state of BLE stack's internal protocol buffers for the application to safely initiate data transactions (GATT, GAP Security, and L2CAP transactions) with the peer BLE device.

CYBLE_STACK_STATE_BUSY (0x01) = CYBLE_STACK_STATE_BUSY indicates application that BLE stack's internal buffers are about to be filled, and the remaining buffers are required to respond peer BLE device After this event, application shall not initiate (GATT, GAP Security and L2CAP data transactions). However application shall respond to peer initiated transactions to prevent BLE protocol timeouts to occur. Application initiated data transactions can be resumed after CYBLE_EVT_STACK_BUSY_STATUS event with parameter 'CYBLE_STACK_STATE_FREE' is received.

CYBLE_STACK_STATE_FREE (0x00) = CYBLE_STACK_STATE_FREE indicates application that pending transactions are completed and sufficient buffers are available to process application initiated transactions. The 'CYBLE_EVT_STACK_BUSY_STATUS' event with 'CYBLE_STACK_STATE_FREE' is indicated to application if BLE Stack's internal buffer state has transitioned from 'CYBLE_STACK_STATE_BUSY' to 'CYBLE_STACK_STATE_FREE'.

CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT This event is triggered every time a device is discovered; pointer to structure of type CYBLE_GAPC_ADV_REPORT_T is returned as the event parameter.

CYBLE_EVT_GAP_AUTH_REQ This event is received by Peripheral and Central devices. When it is received by Peripheral, peripheral needs to Call CyBle_GappAuthReqReply() to reply to authentication request from Central.

When this event is received by Central, that means the slave has requested Central to initiate authentication procedure. Central needs to call CyBle_GappAuthReq() to initiate authentication procedure. Pointer to structure of type CYBLE_GAP_AUTH_INFO_T is returned as the event parameter.

CYBLE_EVT_GAP_PASSKEY_ENTRY_REQUEST This event indicates that the device has to send passkey to be used during the pairing procedure. CyBle_GapAuthPassKeyReply() is required to be called with valid parameters on receiving this event.

Refer to Bluetooth Core Spec. 4.1, Part H, Section 2.3.5.1 Selecting STK Generation Method.

Nothing is returned as part of the event parameter.

CYBLE_EVT_GAP_PASSKEY_DISPLAY_REQUEST This event indicates that the device needs to display passkey during the pairing procedure.

Refer to Bluetooth Core Spec. 4.1, Part H, Section 2.3.5.1 Selecting STK Generation Method.

Pointer to data of type 'uint32' is returned as part of the event parameter. Passkey can be any 6-decimal-digit value.

CYBLE_EVT_GAP_AUTH_COMPLETE This event indicates that the authentication procedure has been completed.

The event parameter contains the security information as defined by CYBLE_GAP_AUTH_INFO_T. This event is generated at the end of the following three operations: Authentication is initiated with a newly connected device Encryption is initiated with a connected device that is already bonded Re-Encryption is

initiated with a connected device with link already encrypted During encryption/re-encryption, the Encryption Information exchanged during the pairing process is used to encrypt/re-encrypt the link. As this does not modify any of the authentication parameters with which the devices were paired, this event is generated with NULL event data and the result of the encryption operation.

CYBLE_EVT_GAP_AUTH_FAILED Authentication process failed between two devices. The return value of type CYBLE_GAP_AUTH_FAILED_REASON_T indicates the reason for failure.

CYBLE_EVT_GAPP_ADVERTISEMENT_START_STOP Peripheral device has started/stopped advertising. This event is generated after making a call to CyBle_GappEnterDiscoveryMode and CyBle_GappExitDiscoveryMode functions. The event parameter contains the status which is of type 'uint8'.

If the data is '0x00', it indicates 'success'; Anything else indicates 'failure'.

CYBLE_EVT_GAP_DEVICE_CONNECTED This event is generated at the GAP Peripheral end after connection is completed with peer Central device. For GAP Central device, this event is generated as in acknowledgment of receiving this event successfully by BLE Controller. Once connection is done, no more event is required but if fails to establish connection, 'CYBLE_EVT_GAP_DEVICE_DISCONNECTED' is passed to application. Event parameter is a pointer to a structure of type CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T.

CYBLE_EVT_GAP_DEVICE_DISCONNECTED Disconnected from remote device or failed to establish connection. Parameter returned with the event contains pointer to the reason for disconnection, which is of type uint8. For details refer core spec 4.2, vol2, part D

CYBLE_EVT_GAP_ENCRYPT_CHANGE Encryption change event for active connection. 'evParam' can be decoded as evParam[0] = 0x00 -> Encryption OFF evParam[0] = 0x01 -> Encryption ON Any other value of evParam[0] -> Error

This is an informative event for application when there is a change in encryption. Application may choose to ignore it.

CYBLE_EVT_GAP_CONNECTION_UPDATE_COMPLETE This event is generated at the GAP Central and the Peripheral end after connection parameter update is requested from the host to the controller. Event parameter is a pointer to a structure of type CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T.

CYBLE_EVT_GAPC_SCAN_START_STOP Central device has started/stopped scanning. This event is generated after making a call to CyBle_GapcStartDiscovery and CyBle_GapcStopDiscovery APIs. The event parameter contains the status, which is of type 'uint8'.

If the data is '0x00', it indicates 'success'; Anything else indicates 'failure'.

CYBLE_EVT_GAP_KEYINFO_EXCHNGE_CMPLT Indication that the SMP keys exchange with peer device is complete, the event handler is expected to store the peer device keys, especially IRK which is used to resolve the peer device after the connection establishment.

Event parameter returns data of type CYBLE_GAP_SMP_KEY_DIST_T containing the peer device keys.

CYBLE_EVT_GATTC_ERROR_RSP The event is received by the Client when the Server cannot perform the requested operation and sends out an error response. Event parameter is a pointer to a structure of type CYBLE_GATTC_ERR_RSP_PARAM_T.

CYBLE_EVT_GATT_CONNECT_IND This event is generated at the GAP Peripheral end after connection is completed with peer Central device. For GAP Central device, this event is generated as in acknowledgment of receiving this event successfully by BLE Controller. Once connection is done, no more event is required but if fails to establish connection, 'CYBLE_EVT_GATT_DISCONNECT_IND' is passed to application. Event parameter is a pointer to a structure of type CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T.

CYBLE_EVT_GATT_DISCONNECT_IND GATT is disconnected. Nothing is returned as part of the event parameter.

CYBLE_EVT_GATTS_XCNHG_MTU_REQ 'MTU Exchange Request' received from GATT client device. Event parameter contains the MTU size of type CYBLE_GATT_XCHG_MTU_PARAM_T.

CYBLE_EVT_GATTC_XCHNG_MTU_RSP 'MTU Exchange Response' received from server device. Event parameter is a pointer to a structure of type CYBLE_GATT_XCHG_MTU_PARAM_T.

CYBLE_EVT_GATTC_READ_BY_GROUP_TYPE_RSP 'Read by Group Type Response' received from server device. Event parameter is a pointer to a structure of type CYBLE_GATTC_READ_BY_GRP_RSP_PARAM_T.

CYBLE_EVT_GATTC_READ_BY_TYPE_RSP 'Read by Type Response' received from server device. Event parameter is a pointer to a structure of type CYBLE_GATTC_READ_BY_TYPE_RSP_PARAM_T.

CYBLE_EVT_GATTC_FIND_INFO_RSP 'Find Information Response' received from server device. Event parameter is a pointer to a structure of type 'CYBLE_GATTC_FIND_INFO_RSP_PARAM_T.

CYBLE_EVT_GATTC_FIND_BY_TYPE_VALUE_RSP 'Find by Type Value Response' received from server device. Event parameter is a pointer to a structure of type CYBLE_GATTC_FIND_BY_TYPE_RSP_PARAM_T.

CYBLE_EVT_GATTC_READ_RSP 'Read Response' from server device. Event parameter is a pointer to a structure of type CYBLE_GATTC_READ_RSP_PARAM_T.

CYBLE_EVT_GATTC_READ_BLOB_RSP 'Read Blob Response' from server. Event parameter is a pointer to a structure of type CYBLE_GATTC_READ_RSP_PARAM_T.

CYBLE_EVT_GATTC_READ_MULTI_RSP 'Read Multiple Responses' from server. Event parameter is a pointer to a structure of type CYBLE_GATTC_READ_RSP_PARAM_T. The 'actualLen' field should be ignored as it is unused in this event response.

CYBLE_EVT_GATTS_WRITE_REQ 'Write Request' from client device. Event parameter is a pointer to a structure of type CYBLE_GATTS_WRITE_REQ_PARAM_T .

CYBLE_EVT_GATTC_WRITE_RSP 'Write Response' from server device. Event parameter is a pointer to a structure of type CYBLE_CONN_HANDLE_T.

CYBLE_EVT_GATTS_WRITE_CMD_REQ 'Write Command' Request from client device. Event parameter is a pointer to a structure of type CYBLE_GATTS_WRITE_CMD_REQ_PARAM_T.

CYBLE_EVT_GATTS_PREP_WRITE_REQ 'Prepare Write' Request from client device. Event parameter is a pointer to a structure of type CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T.

CYBLE_EVT_GATTS_EXEC_WRITE_REQ 'Execute Write' request from client device. Event parameter is a pointer to a structure of type 'CYBLE_GATTS_EXEC_WRITE_REQ_T' This event will be triggered before GATT DB is modified. GATT Db will be updated only if there is no error condition provided by application. Incase of error condition triggered during stack validation, partial write will occur. Write will be cancelled from that handle where error has occurred and error response corresponding to that handle will be sent to remote. If at any point of time 'CYBLE_GATT_EXECUTE_WRITE_CANCEL_FLAG' is received in execWriteFlag fields of 'CYBLE_GATTS_EXEC_WRITE_REQ_T' structure, then all previous writes are cancelled. For execute cancel scenario, all elements of 'CYBLE_GATTS_EXEC_WRITE_REQ_T' should be ignored except execWriteFlag and connHandle.

CYBLE_EVT_GATTC_EXEC_WRITE_RSP 'Execute Write' response from server device. Event parameter is a pointer to a structure of type CYBLE_GATTC_EXEC_WRITE_RSP_T.

CYBLE_EVT_GATTC_HANDLE_VALUE_NTF Notification data received from server device. Event parameter is a pointer to a structure of type CYBLE_GATTC_HANDLE_VALUE_NTF_PARAM_T.

CYBLE_EVT_GATTC_HANDLE_VALUE_IND Indication data received from server device. Event parameter is a pointer to a structure of type CYBLE_GATTC_HANDLE_VALUE_IND_PARAM_T.

CYBLE_EVT_GATTS_HANDLE_VALUE_CNF Confirmation to indication response from client device. Event parameter is a pointer to a structure of type CYBLE_CONN_HANDLE_T.

CYBLE_EVT_GATTS_DATA_SIGNED_CMD_REQ Confirmation to indication response from client device. Event parameter is a pointer to a structure of type CYBLE_GATTS_SIGNED_WRITE_CMD_REQ_PARAM_T. if value.val parameter is set to Zero, then signature is not matched and ignored by stack

CYBLE_EVT_GATTC_STOP_CMD_COMPLETE Event indicating that GATT group procedure has stopped or completed, this event occurs only if application has called CyBle_GattcStopCmd API. Event parameters shall be ignored

CYBLE_EVT_GATTS_READ_CHAR_VAL_ACCESS_REQ Event parameters for characteristic read value access event generated by BLE Stack upon an access of Characteristic value read for the characteristic definition which has CYBLE_GATT_DB_ATTR_CHAR_VAL_RD_EVENT property set.

CYBLE_EVT_L2CAP_CONN_PARAM_UPDATE_REQ This event indicates the connection parameter update received from the remote device. The application is expected to reply to L2CAP using the CyBle_L2capLeConnectionParamUpdateResponse() function to respond to the remote device, whether parameters are accepted or rejected.

Event Parameter pointer points to data of type 'CYBLE_GAP_CONN_UPDATE_PARAM_T'

CYBLE_EVT_L2CAP_CONN_PARAM_UPDATE_RSP This event indicates the connection parameter update response received from the master. Event Parameter pointer points to data with two possible values: Accepted = 0x0000 Rejected = 0x0001

Data is of type unit16.

CYBLE_EVT_L2CAP_COMMAND_REJ This event indicates that the request send over l2cap signaling has been rejected. Event parameter is a pointer to a structure of type CYBLE_L2CAP_COMMAND_REJ_REASON_T.

CYBLE_EVT_L2CAP_CBFC_CONN_IND This event is used to inform application of the incoming L2CAP CBFC Connection Request. Event parameter is a pointer to a structure of type CYBLE_L2CAP_CBFC_CONN_IND_PARAM_T is returned.

CYBLE_EVT_L2CAP_CBFC_CONN_CNF This event is used to inform application of the L2CAP CBFC Connection Response/Confirmation. Event parameter is a pointer to a structure of type CYBLE_L2CAP_CBFC_CONN_CNF_PARAM_T is returned.

CYBLE_EVT_L2CAP_CBFC_DISCONN_IND This event is used to inform application of the L2CAP CBFC Disconnection Request received from the Peer device. Event parameter is a pointer to Local CID of type unit16.

CYBLE_EVT_L2CAP_CBFC_DISCONN_CNF This event is used to inform application of the L2CAP CBFC Disconnection confirmation/Response received from the Peer device. Event parameter is a pointer to a structure of type CYBLE_L2CAP_CBFC_DISCONN_CNF_PARAM_T.

CYBLE_EVT_L2CAP_CBFC_DATA_READ This event is used to inform application of data received over L2CAP CBFC channel. Event parameter is a pointer to a structure of type CYBLE_L2CAP_CBFC_RX_PARAM_T.

CYBLE_EVT_L2CAP_CBFC_RX_CREDIT_IND This event is used to inform the application of receive credits reached low mark. After receiving L2CAP data/payload from peer device for a specification Channel, the available credits are calculated.

If the credit count goes below the low mark, this event is called to inform the application of the condition, so that if the application wants it can send more credits to the peer device.

Event parameter is a pointer to a structure of type CYBLE_L2CAP_CBFC_LOW_RX_CREDIT_PARAM_T.

CYBLE_EVT_L2CAP_CBFC_TX_CREDIT_IND This event is used to inform application of having received transmit credits. This event is called on receiving LE Flow Control Credit from peer device.

Event parameter is a pointer to a structure of type CYBLE_L2CAP_CBFC_LOW_TX_CREDIT_PARAM_T.

If the 'result' field of the received data is non-zero, this indicates an error. If the sum of 'credit' field value and the previously available credit at the peer device receiving credit information exceeds 65535, it indicates a 'credit overflow' error.

In case of error, the peer device receiving this event should initiate disconnection of the L2CAP channel by invoking CyBle_L2capDisconnectReq () function.

CYBLE_EVT_L2CAP_CBFC_DATA_WRITE_IND This event is used to inform application of data transmission completion over L2CAP CBFC channel. Event parameter is of type

'CYBLE_L2CAP_CBFC_DATA_WRITE_PARAM_T' This event will be deprecated in future. It is only kept for backward compatibility. It is not recommended to be used by new design

CYBLE_EVT_PENDING_FLASH_WRITE This event is used to inform application that flash write is pending Stack internal data structures are modified and require backup .

CYBLE_EVT_LE_PING_AUTH_TIMEOUT LE PING Authentication Timeout Event to indicate that peer device has not responded with the valid MIC packet within the application configured ping authentication time.

CYBLE_EVT_MAX Maximum value of CYBLE_EVENT_T type

BLE Common Definitions and Data Structures

Description

Contains definitions and structures that are common to all BLE common APIs. Note that some of these are also used in Service-specific APIs.

Data Structures

- struct CYBLE_BLESS_PWR_IN_DB_T
- struct CYBLE_BLESS_CLK_CFG_PARAMS_T
- struct CYBLE_STACK_LIB_VERSION_T
- struct CYBLE_STK_APP_DATA_BUFF_T
- struct CYBLE_UUID128_T
- union CYBLE_UUID_T
- struct CYBLE_CONN_HANDLE_T

Typedefs

- typedef void(* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam)
- typedef void(* CYBLE_APP_CB_T) (uint8 event, void *evParam)
- typedef uint16 CYBLE_UUID16

Enumerations

- enum CYBLE_CLIENT_STATE_T{ CYBLE_CLIENT_STATE_CONNECTED, CYBLE_CLIENT_STATE_SRVC_DISCOVERING, CYBLE_CLIENT_STATE_INCL_DISCOVERING, CYBLE_CLIENT_STATE_CHAR_DISCOVERING, CYBLE_CLIENT_STATE_DESCR_DISCOVERING, CYBLE_CLIENT_STATE_DISCOVERED, CYBLE_CLIENT_STATE_DISCONNECTING, CYBLE_CLIENT_STATE_DISCONNECTED_DISCOVERED, CYBLE_CLIENT_STATE_DISCONNECTED}
- enum CYBLE_API_RESULT_T{ CYBLE_ERROR_OK= 0x00u, CYBLE_ERROR_INVALID_PARAMETER, CYBLE_ERROR_INVALID_OPERATION, CYBLE_ERROR_MEMORY_ALLOCATION_FAILED, CYBLE_ERROR_INSUFFICIENT_RESOURCES, CYBLE_ERROR_OOB_NOT_AVAILABLE, CYBLE_ERROR_NO_CONNECTION, CYBLE_ERROR_NO_DEVICE_ENTITY, CYBLE_ERROR_REPEATED_ATTEMPTS, CYBLE_ERROR_GAP_ROLE, CYBLE_ERROR_TX_POWER_READ, CYBLE_ERROR_BT_ON_NOT_COMPLETED, CYBLE_ERROR_SEC_FAILED, CYBLE_ERROR_L2CAP_PSM_WRONG_ENCODING= 0x0Du, CYBLE_ERROR_L2CAP_PSM_ALREADY_REGISTERED, CYBLE_ERROR_L2CAP_PSM_NOT_REGISTERED, CYBLE_ERROR_L2CAP_CONNECTION_ENTITY_NOT_FOUND, CYBLE_ERROR_L2CAP_CHANNEL_NOT_FOUND, CYBLE_ERROR_L2CAP_PSM_NOT_IN_RANGE, CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE, CYBLE_ERROR_DEVICE_ALREADY_EXISTS= 0x27u, CYBLE_ERROR_FLASH_WRITE_NOT_PERMITED= 0x28u, CYBLE_ERROR_MIC_AUTH_FAILED=

0x29u, CYBLE_ERROR_MAX= 0xFFu, CYBLE_ERROR_NTF_DISABLED, CYBLE_ERROR_IND_DISABLED, CYBLE_ERROR_INVALID_STATE}

- enum CYBLE_LP_MODE_T{ CYBLE_BLESS_ACTIVE= 0x01u, CYBLE_BLESS_SLEEP, CYBLE_BLESS_DEEPSLEEP, CYBLE_BLESS_HIBERNATE, CYBLE_BLESS_INVALID= 0xFFu}
- enum CYBLE_BLESS_STATE_T{ **CYBLE_BLESS_STATE_ACTIVE** = 0x01, **CYBLE_BLESS_STATE_EVENT_CLOSE**, **CYBLE_BLESS_STATE_SLEEP**, **CYBLE_BLESS_STATE_ECO_ON**, **CYBLE_BLESS_STATE_ECO_STABLE**, **CYBLE_BLESS_STATE_DEEPSLEEP**, **CYBLE_BLESS_STATE_HIBERNATE**, **CYBLE_BLESS_STATE_INVALID** = 0xFFu}
- enum CYBLE_BLESS_PWR_LVL_T{ CYBLE_LL_PWR_LVL_NEG_18_DBM= 0x01u, CYBLE_LL_PWR_LVL_NEG_12_DBM, CYBLE_LL_PWR_LVL_NEG_6_DBM, CYBLE_LL_PWR_LVL_NEG_3_DBM, CYBLE_LL_PWR_LVL_NEG_2_DBM, CYBLE_LL_PWR_LVL_NEG_1_DBM, CYBLE_LL_PWR_LVL_0_DBM, CYBLE_LL_PWR_LVL_3_DBM, CYBLE_LL_PWR_LVL_MAX}
- enum CYBLE_BLESS_PHY_CH_GRP_ID_T{ CYBLE_LL_ADV_CH_TYPE= 0x00u, CYBLE_LL_CONN_CH_TYPE, CYBLE_LL_MAX_CH_TYPE}
- enum CYBLE_BLESS_WCO_SCA_CFG_T{ **CYBLE_LL_SCA_251_TO_500_PPM** = 0x00u, **CYBLE_LL_SCA_151_TO_250_PPM**, **CYBLE_LL_SCA_101_TO_150_PPM**, **CYBLE_LL_SCA_076_TO_100_PPM**, **CYBLE_LL_SCA_051_TO_075_PPM**, **CYBLE_LL_SCA_031_TO_050_PPM**, **CYBLE_LL_SCA_021_TO_030_PPM**, **CYBLE_LL_SCA_000_TO_020_PPM**, **CYBLE_LL_SCA_IN_PPM_INVALID**}
- enum CYBLE_BLESS_ECO_CLK_DIV_T{ CYBLE_LL_ECO_CLK_DIV_1= 0x00u, CYBLE_LL_ECO_CLK_DIV_2, CYBLE_LL_ECO_CLK_DIV_4, CYBLE_LL_ECO_CLK_DIV_8, CYBLE_LL_ECO_CLK_DIV_INVALID}
- enum CYBLE_TO_REASON_CODE_T{ CYBLE_GAP_ADV_MODE_TO= 0x01u, CYBLE_GAP_SCAN_TO, CYBLE_GATT_RSP_TO, CYBLE_GENERIC_TO}

Typedef Documentation

typedef void(* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam)

Event callback function prototype to receive events from BLE component

typedef void(* CYBLE_APP_CB_T) (uint8 event, void *evParam)

event callback function prototype to receive events from stack

typedef uint16 CYBLE_UUID16

GATT 16 Bit UUID

Enumeration Type Documentation

enum CYBLE_CLIENT_STATE_T

Client State type

Enumerator

CYBLE_CLIENT_STATE_CONNECTED Server device is connected

CYBLE_CLIENT_STATE_SRVC_DISCOVERING Server services are being discovered

CYBLE_CLIENT_STATE_INCL_DISCOVERING Server included services are being discovered

CYBLE_CLIENT_STATE_CHAR_DISCOVERING Server characteristics are being discovered

CYBLE_CLIENT_STATE_DESCR_DISCOVERING Server char. descriptors are being discovered

CYBLE_CLIENT_STATE_DISCOVERED Server is discovered

CYBLE_CLIENT_STATE_DISCONNECTING Server is disconnecting

CYBLE_CLIENT_STATE_DISCONNECTED_DISCOVERED Server is disconnected but discovered

CYBLE_CLIENT_STATE_DISCONNECTED Essentially initial client state

enum CYBLE_API_RESULT_T

Common error codes received as API result

Enumerator

CYBLE_ERROR_OK No Error occurred

CYBLE_ERROR_INVALID_PARAMETER At least one of the input parameters is invalid

CYBLE_ERROR_INVALID_OPERATION Operation is not permitted

CYBLE_ERROR_MEMORY_ALLOCATION_FAILED An internal error occurred in the stack

CYBLE_ERROR_INSUFFICIENT_RESOURCES Insufficient resources to perform requested operation

CYBLE_ERROR_OOB_NOT_AVAILABLE OOB data not available

CYBLE_ERROR_NO_CONNECTION Connection is required to perform requested operation. Connection not present

CYBLE_ERROR_NO_DEVICE_ENTITY No device entity to perform requested operation

CYBLE_ERROR_REPEATED_ATTEMPTS Attempted repeat operation is not allowed

CYBLE_ERROR_GAP_ROLE GAP role is incorrect

CYBLE_ERROR_TX_POWER_READ Error reading TC power

CYBLE_ERROR_BT_ON_NOT_COMPLETED BLE Initialization failed

CYBLE_ERROR_SEC_FAILED Security operation failed

CYBLE_ERROR_L2CAP_PSM_WRONG_ENCODING L2CAP error codes L2CAP PSM encoding is incorrect

CYBLE_ERROR_L2CAP_PSM_ALREADY_REGISTERED L2CAP PSM has already been registered

CYBLE_ERROR_L2CAP_PSM_NOT_REGISTERED L2CAP PSM has not been registered

CYBLE_ERROR_L2CAP_CONNECTION_ENTITY_NOT_FOUND L2CAPconnection entity not found

CYBLE_ERROR_L2CAP_CHANNEL_NOT_FOUND L2CAP channel not found

CYBLE_ERROR_L2CAP_PSM_NOT_IN_RANGE Specified PSM is out of range

CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE GATT DB error codes Invalid attribute handle

CYBLE_ERROR_DEVICE_ALREADY_EXISTS Device cannot be added to whitelist as it has already been added

CYBLE_ERROR_FLASH_WRITE_NOT_PERMITED Write to flash is not permitted

CYBLE_ERROR_MIC_AUTH_FAILED MIC Authentication failure

CYBLE_ERROR_MAX All other errors not covered in the above list map to this error code

CYBLE_ERROR_NTF_DISABLED Characteristic notifications disabled

CYBLE_ERROR_IND_DISABLED Characteristic indications disabled

CYBLE_ERROR_INVALID_STATE The state is not valid for current operation

enum CYBLE_LP_MODE_T

BLE power modes

Enumerator

CYBLE_BLESS_ACTIVE Link Layer engine and Digital modem clocked from ECO. The CPU can access the BLE Sub-System (BLESS) registers. This mode collectively denotes Tx Mode, Rx Mode, and Idle mode of BLESS.

CYBLE_BLESS_SLEEP The clock to the link layer engine and digital modem is gated. The ECO continues to run to maintain the link layer timing.

CYBLE_BLESS_DEEPSLEEP The ECO is stopped and WCO is used to maintain link layer timing. RF transceiver is turned off completely to reduce leakage current. BLESS logic is kept powered ON from the SRSS deep sleep regulator for retention.

CYBLE_BLESS_HIBERNATE External power is available but all internal LDOs are turned off.

CYBLE_BLESS_INVALID Invalid mode

enum CYBLE_BLESS_STATE_T

BLESS Power enum reflecting power states supported by BLESS radio

enum CYBLE_BLESS_PWR_LVL_T

BLESS Power enum reflecting power level values supported by BLESS radio

Enumerator

CYBLE_LL_PWR_LVL_NEG_18_DBM ABS PWR = -18dBm, PA_Gain = 0x01

CYBLE_LL_PWR_LVL_NEG_12_DBM ABS PWR = -12dBm, PA_Gain = 0x02

CYBLE_LL_PWR_LVL_NEG_6_DBM ABS PWR = -6dBm, PA_Gain = 0x03

CYBLE_LL_PWR_LVL_NEG_3_DBM ABS PWR = -3dBm, PA_Gain = 0x04

CYBLE_LL_PWR_LVL_NEG_2_DBM ABS PWR = -2dBm, PA_Gain = 0x05

CYBLE_LL_PWR_LVL_NEG_1_DBM ABS PWR = -1dBm, PA_Gain = 0x06

CYBLE_LL_PWR_LVL_0_DBM ABS PWR = 0dBm, PA_Gain = 0x07

CYBLE_LL_PWR_LVL_3_DBM ABS PWR = 3dBm, PA_Gain = 0x07, PWR_GAIN level is same as 0 dBm, but the ABS_PWR is amplified and applied for both Connection and Advertising channel.

CYBLE_LL_PWR_LVL_MAX ABS PWR = 3dBm, PA_Gain = 0x07

enum CYBLE_BLESS_PHY_CH_GRP_ID_T

BLE channel group ID

Enumerator

CYBLE_LL_ADV_CH_TYPE Advertisement channel type

CYBLE_LL_CONN_CH_TYPE Connection channel type

CYBLE_LL_MAX_CH_TYPE Maximum value of CYBLE_BLESS_PHY_CH_GRP_ID_T type

enum CYBLE_BLESS_WCO_SCA_CFG_T

BLE WCO sleep clock accuracy configuration

enum CYBLE_BLESS_ECO_CLK_DIV_T

BLE ECO clock divider

Enumerator

CYBLE_LL_ECO_CLK_DIV_1 Link Layer clock divider = 1

CYBLE_LL_ECO_CLK_DIV_2 Link Layer clock divider = 2

CYBLE_LL_ECO_CLK_DIV_4 Link Layer clock divider = 4

CYBLE_LL_ECO_CLK_DIV_8 Link Layer clock divider = 8

CYBLE_LL_ECO_CLK_DIV_INVALID Invalid Link Layer clock divider

enum CYBLE_TO_REASON_CODE_T

Enumerator

CYBLE_GAP_ADV_MODE_TO Advertisement time set by application has expired
CYBLE_GAP_SCAN_TO Scan time set by application has expired
CYBLE_GATT_RSP_TO GATT procedure timeout
CYBLE_GENERIC_TO Generic timeout

BLE Service-Specific APIs

Description

This section describes BLE Service-specific APIs. The Service APIs are only included in the design if the Service is added to the selected Profile in the component GUI. These are interfaces for the BLE application to use during BLE connectivity. The service specific APIs internally use the BLE Stack APIs to achieve the Service use case.

Refer to the Special Interest Group Web Site for links to the latest specifications and other documentation.

Many of the APIs will generate Service-specific events. The events are also used in the Service-specific callback functions. These are documented in:

- BLE Service-Specific Events

Modules

- BLE Service-Specific Events

  The BLE stack generates service-specific events to notify the application that a service specific status change needs attention. For general stack events, refer to BLE Common Events.
- Apple Notification Center Service (ANCS)

  The Apple Notification Center Service provides iOS notifications from Apple devices for accessories.
- Alert Notification Service (ANS)

  The Alert Notification Service exposes alert information in a device.
- Battery Service BAS

  The Battery Service exposes the battery level of a single battery or set of batteries in a device.
- Body Composition Service (BCS)

  The Environmental Sensing Service exposes data related to body composition from a body composition analyzer (Server) intended for consumer healthcare as well as sports/fitness applications.
- Blood Pressure Service (BLS)

  The Blood Pressure Service exposes blood pressure and other data related to a non-invasive blood pressure monitor for consumer and professional healthcare applications.
- Bond Management Service (BMS)

  The Bond Management Service defines how a peer Bluetooth device can manage the storage of bond information, especially the deletion of it, on the Bluetooth device supporting this service.
- Continuous Glucose Monitoring Service (CGMS)

  The Continuous Glucose Monitoring Service exposes glucose measurement and other data related to a personal CGM sensor for healthcare applications.
- Cycling Power Service (CPS)

  The Cycling Power Service (CPS) exposes power- and force-related data and optionally speed- and cadence-related data from a Cycling Power sensor (GATT Server) intended for sports and fitness applications.
- Cycling Speed and Cadence Service (CSCS)

  The Cycling Speed and Cadence (CSC) Service exposes speed-related data and/or cadence-related data while using the Cycling Speed and Cadence sensor (Server).
- Current Time Service (CTS)

Current Time Service defines how a Bluetooth device can expose time information to other Bluetooth devices.

- Device Information Service (DIS)

  The Device Information Service exposes manufacturer and/or vendor information about a device.
- Environmental Sensing Service (ESS)

  The Environmental Sensing Service exposes measurement data from an environmental sensor intended for sports and fitness applications.
- Glucose Service (GLS)

  The Glucose Service exposes glucose and other data related to a personal glucose sensor for consumer healthcare applications and is not designed for clinical use.
- HID Service (HIDS)

  The HID Service exposes data and associated formatting for HID Devices and HID Hosts.
- Heart Rate Service (HRS)

  The Heart Rate Service exposes heart rate and other data related to a heart rate sensor intended for fitness applications.
- Health Thermometer Service (HTS)

  The Health Thermometer Service exposes temperature and other data related to a thermometer used for healthcare applications.
- Immediate Alert Service (IAS)

  The Immediate Alert Service exposes a control point to allow a peer device to cause the device to immediately alert.
- Link Loss Service (LLS)

  The Link Loss Service uses the Alert Level Characteristic to cause an alert in the device when the link is lost.
- Location and Navigation Service (LNS)

  The Location and Navigation Service exposes location and navigation-related data from a Location and Navigation sensor (Server) intended for outdoor activity applications.
- Next DST Change Service (NDCS)

  This Service enables a BLE device that has knowledge about the next occurrence of a DST change to expose this information to another Bluetooth device. The Service uses the "Time with DST" Characteristic and the functions exposed in this Service are used to interact with that Characteristic.
- Phone Alert Status Service (PASS)

  The Phone Alert Status Service uses the Alert Status Characteristic and Ringer Setting Characteristic to expose the phone alert status and uses the Ringer Control Point Characteristic to control the phone's ringer into mute or enable.
- Running Speed and Cadence Service (RSCS)

  The Running Speed and Cadence (RSC) Service exposes speed, cadence and other data related to fitness applications such as the stride length and the total distance the user has travelled while using the Running Speed and Cadence sensor (Server).
- Reference Time Update Service (RTUS)

  This Service enables a Bluetooth device that can update the system time using the reference time such as a GPS receiver to expose a control point and expose the accuracy (drift) of the local system time compared to the reference time source.
- Scan Parameters Service (ScPS)

  The Scan Parameters Service enables a Server device to expose a Characteristic for the GATT Client to write its scan interval and scan window on the Server device, and enables a Server to request a refresh of the GATT Client scan interval and scan window.
- TX Power Service (TPS)

The Tx Power Service uses the Tx Power Level Characteristic to expose the current transmit power level of a device when in a connection.

- User Data Service (UDS)

  The User Data Service exposes user-related data in the sports and fitness environment. This allows remote access and update of user data by a Client as well as the synchronization of user data between a Server and a Client.

- Wireless Power Transfer Service (WPTS)

  The Wireless Power Transfer Service enables communication between Power Receiver Unit and Power Transmitter Unit in the Wireless Power Transfer systems.

- Weight Scale Service (WSS)

  The Weight Scale Service exposes weight and related data from a weight scale (Server) intended for consumer healthcare as well as sports/fitness applications.

- Custom Service

  This section contains the CYBLE_CUSTOMS_INFO_T and CYBLE_CUSTOMS_T structs used for Custom Services.

BLE Service-Specific Events

Description

The BLE stack generates service-specific events to notify the application that a service specific status change needs attention. For general stack events, refer to BLE Common Events.

Enumerations

- enum CYBLE_EVT_T{ CYBLE_EVT_GATTS_INDICATION_ENABLED, CYBLE_EVT_GATTS_INDICATION_DISABLED, CYBLE_EVT_GATTC_INDICATION, CYBLE_EVT_GATTC_SRVC_DISCOVERY_FAILED, CYBLE_EVT_GATTC_INCL_DISCOVERY_FAILED, CYBLE_EVT_GATTC_CHAR_DISCOVERY_FAILED, CYBLE_EVT_GATTC_DESCR_DISCOVERY_FAILED, CYBLE_EVT_GATTC_SRVC_DUPLICATION, CYBLE_EVT_GATTC_CHAR_DUPLICATION, CYBLE_EVT_GATTC_DESCR_DUPLICATION, CYBLE_EVT_GATTC_SRVC_DISCOVERY_COMPLETE, CYBLE_EVT_GATTC_INCL_DISCOVERY_COMPLETE, CYBLE_EVT_GATTC_CHAR_DISCOVERY_COMPLETE, CYBLE_EVT_GATTC_DISCOVERY_COMPLETE, CYBLE_EVT_ANCSS_NOTIFICATION_ENABLED, CYBLE_EVT_ANCSS_NOTIFICATION_DISABLED, CYBLE_EVT_ANCSS_WRITE_CHAR, CYBLE_EVT_ANCSC_NOTIFICATION, CYBLE_EVT_ANCSC_READ_CHAR_RESPONSE, CYBLE_EVT_ANCSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_ANCSC_READ_DESCR_RESPONSE, CYBLE_EVT_ANCSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_ANCSC_ERROR_RESPONSE, CYBLE_EVT_ANSS_NOTIFICATION_ENABLED, CYBLE_EVT_ANSS_NOTIFICATION_DISABLED, CYBLE_EVT_ANSS_CHAR_WRITE, CYBLE_EVT_ANSC_NOTIFICATION, CYBLE_EVT_ANSC_READ_CHAR_RESPONSE, CYBLE_EVT_ANSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_ANSC_READ_DESCR_RESPONSE, CYBLE_EVT_ANSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_BASS_NOTIFICATION_ENABLED, CYBLE_EVT_BASS_NOTIFICATION_DISABLED, CYBLE_EVT_BASC_NOTIFICATION, CYBLE_EVT_BASC_READ_CHAR_RESPONSE, CYBLE_EVT_BASC_READ_DESCR_RESPONSE, CYBLE_EVT_BASC_WRITE_DESCR_RESPONSE, CYBLE_EVT_BCSS_INDICATION_ENABLED, CYBLE_EVT_BCSS_INDICATION_DISABLED, CYBLE_EVT_BCSS_INDICATION_CONFIRMED, CYBLE_EVT_BCSC_INDICATION, CYBLE_EVT_BCSC_READ_CHAR_RESPONSE, CYBLE_EVT_BCSC_READ_DESCR_RESPONSE, CYBLE_EVT_BCSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_BLSS_INDICATION_ENABLED, CYBLE_EVT_BLSS_INDICATION_DISABLED, CYBLE_EVT_BLSS_INDICATION_CONFIRMED, CYBLE_EVT_BLSS_NOTIFICATION_ENABLED, CYBLE_EVT_BLSS_NOTIFICATION_DISABLED, CYBLE_EVT_BLSC_INDICATION, CYBLE_EVT_BLSC_NOTIFICATION, CYBLE_EVT_BLSC_READ_CHAR_RESPONSE,

CYBLE_EVT_BLSC_READ_DESCR_RESPONSE, CYBLE_EVT_BLSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_BMSS_WRITE_CHAR, CYBLE_EVT_BMSC_READ_CHAR_RESPONSE, CYBLE_EVT_BMSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_BMSC_READ_DESCR_RESPONSE, CYBLE_EVT_CGMSS_INDICATION_ENABLED, CYBLE_EVT_CGMSS_INDICATION_DISABLED, CYBLE_EVT_CGMSS_INDICATION_CONFIRMED, CYBLE_EVT_CGMSS_NOTIFICATION_ENABLED, CYBLE_EVT_CGMSS_NOTIFICATION_DISABLED, CYBLE_EVT_CGMSS_WRITE_CHAR, CYBLE_EVT_CGMSC_INDICATION, CYBLE_EVT_CGMSC_NOTIFICATION, CYBLE_EVT_CGMSC_READ_CHAR_RESPONSE, CYBLE_EVT_CGMSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_CGMSC_READ_DESCR_RESPONSE, CYBLE_EVT_CGMSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_CPSS_NOTIFICATION_ENABLED, CYBLE_EVT_CPSS_NOTIFICATION_DISABLED, CYBLE_EVT_CPSS_INDICATION_ENABLED, CYBLE_EVT_CPSS_INDICATION_DISABLED, CYBLE_EVT_CPSS_INDICATION_CONFIRMED, CYBLE_EVT_CPSS_BROADCAST_ENABLED, CYBLE_EVT_CPSS_BROADCAST_DISABLED, CYBLE_EVT_CPSS_CHAR_WRITE, CYBLE_EVT_CPSC_NOTIFICATION, CYBLE_EVT_CPSC_INDICATION, CYBLE_EVT_CPSC_READ_CHAR_RESPONSE, CYBLE_EVT_CPSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_CPSC_READ_DESCR_RESPONSE, CYBLE_EVT_CPSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_CPSC_SCAN_PROGRESS_RESULT, CYBLE_EVT_CSCSS_NOTIFICATION_ENABLED, CYBLE_EVT_CSCSS_NOTIFICATION_DISABLED, CYBLE_EVT_CSCSS_INDICATION_ENABLED, CYBLE_EVT_CSCSS_INDICATION_DISABLED, CYBLE_EVT_CSCSS_INDICATION_CONFIRMATION, CYBLE_EVT_CSCSS_CHAR_WRITE, CYBLE_EVT_CSCSC_NOTIFICATION, CYBLE_EVT_CSCSC_INDICATION, CYBLE_EVT_CSCSC_READ_CHAR_RESPONSE, CYBLE_EVT_CSCSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_CSCSC_READ_DESCR_RESPONSE, CYBLE_EVT_CSCSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_CTSS_NOTIFICATION_ENABLED, CYBLE_EVT_CTSS_NOTIFICATION_DISABLED, CYBLE_EVT_CTSS_CHAR_WRITE, CYBLE_EVT_CTSC_NOTIFICATION, CYBLE_EVT_CTSC_READ_CHAR_RESPONSE, CYBLE_EVT_CTSC_READ_DESCR_RESPONSE, CYBLE_EVT_CTSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_CTSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_DISC_READ_CHAR_RESPONSE, CYBLE_EVT_ESSS_NOTIFICATION_ENABLED, CYBLE_EVT_ESSS_NOTIFICATION_DISABLED, CYBLE_EVT_ESSS_INDICATION_ENABLED, CYBLE_EVT_ESSS_INDICATION_DISABLED, CYBLE_EVT_ESSS_INDICATION_CONFIRMATION, CYBLE_EVT_ESSS_CHAR_WRITE, CYBLE_EVT_ESSS_EXEC_WRITE_REQ, CYBLE_EVT_ESSS_DESCR_WRITE, CYBLE_EVT_ESSC_NOTIFICATION, CYBLE_EVT_ESSC_INDICATION, CYBLE_EVT_ESSC_READ_CHAR_RESPONSE, CYBLE_EVT_ESSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_ESSC_READ_DESCR_RESPONSE, CYBLE_EVT_ESSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_GLSS_INDICATION_ENABLED, CYBLE_EVT_GLSS_INDICATION_DISABLED, CYBLE_EVT_GLSS_INDICATION_CONFIRMED, CYBLE_EVT_GLSS_NOTIFICATION_ENABLED, CYBLE_EVT_GLSS_NOTIFICATION_DISABLED, CYBLE_EVT_GLSS_WRITE_CHAR, CYBLE_EVT_GLSC_INDICATION, CYBLE_EVT_GLSC_NOTIFICATION, CYBLE_EVT_GLSC_READ_CHAR_RESPONSE, CYBLE_EVT_GLSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_GLSC_READ_DESCR_RESPONSE, CYBLE_EVT_GLSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_HIDSS_NOTIFICATION_ENABLED, CYBLE_EVT_HIDSS_NOTIFICATION_DISABLED, CYBLE_EVT_HIDSS_BOOT_MODE_ENTER, CYBLE_EVT_HIDSS_REPORT_MODE_ENTER, CYBLE_EVT_HIDSS_SUSPEND, CYBLE_EVT_HIDSS_EXIT_SUSPEND, CYBLE_EVT_HIDSS_REPORT_CHAR_WRITE, CYBLE_EVT_HIDSC_NOTIFICATION, CYBLE_EVT_HIDSC_READ_CHAR_RESPONSE, CYBLE_EVT_HIDSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_HIDSC_READ_DESCR_RESPONSE, CYBLE_EVT_HIDSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_HRSS_ENERGY_EXPENDED_RESET, CYBLE_EVT_HRSS_NOTIFICATION_ENABLED, CYBLE_EVT_HRSS_NOTIFICATION_DISABLED, CYBLE_EVT_HRSC_NOTIFICATION, CYBLE_EVT_HRSC_READ_CHAR_RESPONSE, CYBLE_EVT_HRSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_HRSC_READ_DESCR_RESPONSE, CYBLE_EVT_HRSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_HTSS_NOTIFICATION_ENABLED, CYBLE_EVT_HTSS_NOTIFICATION_DISABLED, CYBLE_EVT_HTSS_INDICATION_ENABLED, CYBLE_EVT_HTSS_INDICATION_DISABLED, CYBLE_EVT_HTSS_INDICATION_CONFIRMED, CYBLE_EVT_HTSS_CHAR_WRITE, CYBLE_EVT_HTSC_NOTIFICATION, CYBLE_EVT_HTSC_INDICATION,

CYBLE_EVT_HTSC_READ_CHAR_RESPONSE, CYBLE_EVT_HTSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_HTSC_READ_DESCR_RESPONSE, CYBLE_EVT_HTSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_IASS_WRITE_CHAR_CMD, CYBLE_EVT_LLSS_WRITE_CHAR_REQ, CYBLE_EVT_LLSC_READ_CHAR_RESPONSE, CYBLE_EVT_LLSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_LNSS_INDICATION_ENABLED, CYBLE_EVT_LNSS_INDICATION_DISABLED, CYBLE_EVT_LNSS_INDICATION_CONFIRMED, CYBLE_EVT_LNSS_NOTIFICATION_ENABLED, CYBLE_EVT_LNSS_NOTIFICATION_DISABLED, CYBLE_EVT_LNSS_WRITE_CHAR, CYBLE_EVT_LNSC_INDICATION, CYBLE_EVT_LNSC_NOTIFICATION, CYBLE_EVT_LNSC_READ_CHAR_RESPONSE, CYBLE_EVT_LNSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_LNSC_READ_DESCR_RESPONSE, CYBLE_EVT_LNSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_NDCSC_READ_CHAR_RESPONSE, CYBLE_EVT_PASSS_NOTIFICATION_ENABLED, CYBLE_EVT_PASSS_NOTIFICATION_DISABLED, CYBLE_EVT_PASSS_WRITE_CHAR, CYBLE_EVT_PASSC_NOTIFICATION, CYBLE_EVT_PASSC_READ_CHAR_RESPONSE, CYBLE_EVT_PASSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_PASSC_READ_DESCR_RESPONSE, CYBLE_EVT_PASSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_RSCSS_NOTIFICATION_ENABLED, CYBLE_EVT_RSCSS_NOTIFICATION_DISABLED, CYBLE_EVT_RSCSS_INDICATION_ENABLED, CYBLE_EVT_RSCSS_INDICATION_DISABLED, CYBLE_EVT_RSCSS_INDICATION_CONFIRMATION, CYBLE_EVT_RSCSS_CHAR_WRITE, CYBLE_EVT_RSCSC_NOTIFICATION, CYBLE_EVT_RSCSC_INDICATION, CYBLE_EVT_RSCSC_READ_CHAR_RESPONSE, CYBLE_EVT_RSCSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_RSCSC_READ_DESCR_RESPONSE, CYBLE_EVT_RSCSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_RTUSS_WRITE_CHAR_CMD, CYBLE_EVT_RTUSC_READ_CHAR_RESPONSE, CYBLE_EVT_SCPSS_NOTIFICATION_ENABLED, CYBLE_EVT_SCPSS_NOTIFICATION_DISABLED, CYBLE_EVT_SCPSS_SCAN_INT_WIN_CHAR_WRITE, CYBLE_EVT_SCPSC_NOTIFICATION, CYBLE_EVT_SCPSC_READ_DESCR_RESPONSE, CYBLE_EVT_SCPSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_TPSS_NOTIFICATION_ENABLED, CYBLE_EVT_TPSS_NOTIFICATION_DISABLED, CYBLE_EVT_TPSC_NOTIFICATION, CYBLE_EVT_TPSC_READ_CHAR_RESPONSE, CYBLE_EVT_TPSC_READ_DESCR_RESPONSE, CYBLE_EVT_TPSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_UDSS_INDICATION_ENABLED, CYBLE_EVT_UDSS_INDICATION_DISABLED, CYBLE_EVT_UDSS_INDICATION_CONFIRMED, CYBLE_EVT_UDSS_NOTIFICATION_ENABLED, CYBLE_EVT_UDSS_NOTIFICATION_DISABLED, CYBLE_EVT_UDSS_READ_CHAR, CYBLE_EVT_UDSS_WRITE_CHAR, CYBLE_EVT_UDSC_INDICATION, CYBLE_EVT_UDSC_NOTIFICATION, CYBLE_EVT_UDSC_READ_CHAR_RESPONSE, CYBLE_EVT_UDSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_UDSC_READ_DESCR_RESPONSE, CYBLE_EVT_UDSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_UDSC_ERROR_RESPONSE, CYBLE_EVT_WPTSS_NOTIFICATION_ENABLED, CYBLE_EVT_WPTSS_NOTIFICATION_DISABLED, CYBLE_EVT_WPTSS_INDICATION_ENABLED, CYBLE_EVT_WPTSS_INDICATION_DISABLED, CYBLE_EVT_WPTSS_INDICATION_CONFIRMED, CYBLE_EVT_WPTSS_WRITE_CHAR, CYBLE_EVT_WPTSC_NOTIFICATION, CYBLE_EVT_WPTSC_INDICATION, CYBLE_EVT_WPTSC_WRITE_CHAR_RESPONSE, CYBLE_EVT_WPTSC_READ_CHAR_RESPONSE, CYBLE_EVT_WPTSC_READ_DESCR_RESPONSE, CYBLE_EVT_WPTSC_WRITE_DESCR_RESPONSE, CYBLE_EVT_WSSS_INDICATION_ENABLED, CYBLE_EVT_WSSS_INDICATION_DISABLED, CYBLE_EVT_WSSS_INDICATION_CONFIRMED, CYBLE_EVT_WSSC_INDICATION, CYBLE_EVT_WSSC_READ_CHAR_RESPONSE, CYBLE_EVT_WSSC_READ_DESCR_RESPONSE, CYBLE_EVT_WSSC_WRITE_DESCR_RESPONSE, **CYBLE_DEBUG_EVT_BLESS_INT** = 0xE000u}

Enumeration Type Documentation

enum CYBLE_EVT_T

Service specific events

Enumerator

CYBLE_EVT_GATTS_INDICATION_ENABLED GATT Server - Notifications for GATT Service's "Service Changed" Characteristic were enabled. The parameter of this event is a structure of CYBLE_GATTS_WRITE_REQ_PARAM_T type.

CYBLE_EVT_GATTS_INDICATION_DISABLED GATT Server - Notifications for GATT Service's "Service Changed" Characteristic were disabled. The parameter of this event is a structure of CYBLE_GATTS_WRITE_REQ_PARAM_T type.

CYBLE_EVT_GATTC_INDICATION GATT Client - GATT Service's "Service Changed" Characteristic Indications were received. The parameter of this event is a structure of CYBLE_GATTC_HANDLE_VALUE_IND_PARAM_T type.

CYBLE_EVT_GATTC_SRVC_DISCOVERY_FAILED GATT Client - Service discovery procedure failed. This event may be generated on calling CyBle_GattcDiscoverAllPrimaryServices(). No parameters passed for this event.

CYBLE_EVT_GATTC_INCL_DISCOVERY_FAILED GATT Client - Discovery of included services failed. This event may be generated on calling CyBle_GattcFindIncludedServices(). No parameters passed for this event.

CYBLE_EVT_GATTC_CHAR_DISCOVERY_FAILED GATT Client - Discovery of service's characteristics failed. This event may be generated on calling CyBle_GattcDiscoverAllCharacteristics() or CyBle_GattcReadUsingCharacteristicUuid(). No parameters passed for this event.

CYBLE_EVT_GATTC_DESCR_DISCOVERY_FAILED GATT Client - Discovery of service's characteristics failed. This event may be generated on calling CyBle_GattcDiscoverAllCharacteristicDescriptors(). No parameters passed for this event.

CYBLE_EVT_GATTC_SRVC_DUPLICATION GATT Client - Duplicate service record was found during server device discovery. The parameter of this event is a structure of uint16 (UUID16) type.

CYBLE_EVT_GATTC_CHAR_DUPLICATION GATT Client - Duplicate service's characteristic record was found during server device discovery. The parameter of this event is a structure of uint16 (UUID16) type.

CYBLE_EVT_GATTC_DESCR_DUPLICATION GATT Client - Duplicate service's characteristic descriptor record was found during server device discovery. The parameter of this event is a structure of uint16 (UUID16) type.

CYBLE_EVT_GATTC_SRVC_DISCOVERY_COMPLETE GATT Client - Service discovery procedure completed successfully. This event may be generated on calling CyBle_GattcDiscoverAllPrimaryServices(). No parameters passed for this event.

CYBLE_EVT_GATTC_INCL_DISCOVERY_COMPLETE GATT Client - Included services discovery is completed successfully. This event may be generated on calling CyBle_GattcFindIncludedServices(). No parameters passed for this event.

CYBLE_EVT_GATTC_CHAR_DISCOVERY_COMPLETE GATT Client - Discovery of service's characteristics discovery is completed successfully. This event may be generated on calling CyBle_GattcDiscoverAllCharacteristics() or CyBle_GattcReadUsingCharacteristicUuid(). No parameters passed for this event.

CYBLE_EVT_GATTC_DISCOVERY_COMPLETE GATT Client - Discovery of remote device completed successfully. No parameters passed for this event.

CYBLE_EVT_ANCSS_NOTIFICATION_ENABLED ANCS Server - Notifications for Apple Notification Center Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_ANCS_CHAR_VALUE_T type.

CYBLE_EVT_ANCSS_NOTIFICATION_DISABLED ANCS Server - Notifications for Apple Notification Center Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_ANCS_CHAR_VALUE_T type.

CYBLE_EVT_ANCSS_WRITE_CHAR ANCS Server - Write Request for Apple Notification Center Service Characteristic was received. The parameter of this event is a structure of CYBLE_ANCS_CHAR_VALUE_T type.

CYBLE_EVT_ANCSC_NOTIFICATION ANCS Client - Apple Notification Center Characteristic Service Notification was received. The parameter of this event is a structure of CYBLE_ANCS_CHAR_VALUE_T type.

CYBLE_EVT_ANCSC_READ_CHAR_RESPONSE ANCS Client - Read Response for Apple Notification Center Service Characteristic Value. The parameter of this event is a structure of CYBLE_ANCS_CHAR_VALUE_T type.

CYBLE_EVT_ANCSC_WRITE_CHAR_RESPONSE ANCS Client - Write Response for Write Request for Apple Notification Center Service Characteristic Value. The parameter of this event is a structure of CYBLE_ANCS_CHAR_VALUE_T type.

CYBLE_EVT_ANCSC_READ_DESCR_RESPONSE ANCS Client - Read Response for Read Request for Apple Notification Center Service Characteristic Descriptor Read Request. The parameter of this event is a structure of CYBLE_ANCS_DESCR_VALUE_T type.

CYBLE_EVT_ANCSC_WRITE_DESCR_RESPONSE ANCS Client - Write Response for Write Request for Apple Notification Center Service Client Characteristic Configuration Descriptor Value. The parameter of this event is a structure of CYBLE_ANCS_DESCR_VALUE_T type.

CYBLE_EVT_ANCSC_ERROR_RESPONSE ANCS Client - Error Response for Write Request for Apple Notification Center Service Characteristic Value. The parameter of this event is a structure of CYBLE_ANCS_CHAR_VALUE_T type.

CYBLE_EVT_ANSS_NOTIFICATION_ENABLED ANS Server - Notifications for Alert Notification Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_ANS_CHAR_VALUE_T type.

CYBLE_EVT_ANSS_NOTIFICATION_DISABLED ANS Server - Notifications for Alert Notification Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_ANS_CHAR_VALUE_T type.

CYBLE_EVT_ANSS_CHAR_WRITE ANS Server - Write Request for Alert Notification Service Characteristic was received. The parameter of this event is a structure of CYBLE_ANS_CHAR_VALUE_T type.

CYBLE_EVT_ANSC_NOTIFICATION ANS Client - Alert Notification Characteristic Service Notification was received. The parameter of this event is a structure of CYBLE_ANS_CHAR_VALUE_T type.

CYBLE_EVT_ANSC_READ_CHAR_RESPONSE ANS Client - Read Response for Alert Notification Service Characteristic Value. The parameter of this event is a structure of CYBLE_ANS_CHAR_VALUE_T type.

CYBLE_EVT_ANSC_WRITE_CHAR_RESPONSE ANS Client - Write Response for Write Request for Alert Notification Service Characteristic Value. The parameter of this event is a structure of CYBLE_ANS_CHAR_VALUE_T type.

CYBLE_EVT_ANSC_READ_DESCR_RESPONSE ANS Client - Read Response for Read Request for Alert Notification Service Characteristic Descriptor Read Request. The parameter of this event is a structure of CYBLE_ANS_DESCR_VALUE_T type.

CYBLE_EVT_ANSC_WRITE_DESCR_RESPONSE ANS Client - Write Response for Write Request for Alert Notification Service Client Characteristic Configuration Descriptor Value. The parameter of this event is a structure of CYBLE_ANS_DESCR_VALUE_T type.

CYBLE_EVT_BASS_NOTIFICATION_ENABLED BAS Server - Notifications for Battery Level Characteristic were enabled. The parameter of this event is a structure of CYBLE_BAS_CHAR_VALUE_T type.

CYBLE_EVT_BASS_NOTIFICATION_DISABLED BAS Server - Notifications for Battery Level Characteristic were disabled. The parameter of this event is a structure of CYBLE_BAS_CHAR_VALUE_T type.

CYBLE_EVT_BASC_NOTIFICATION BAS Client - Battery Level Characteristic Notification was received. The parameter of this event is a structure of CYBLE_BAS_CHAR_VALUE_T type.

CYBLE_EVT_BASC_READ_CHAR_RESPONSE BAS Client - Read Response for Battery Level Characteristic Value. The parameter of this event is a structure of CYBLE_BAS_CHAR_VALUE_T type.

CYBLE_EVT_BASC_READ_DESCR_RESPONSE BAS Client - Read Response for Battery Level Characteristic Descriptor Read Request. The parameter of this event is a structure of CYBLE_BAS_DESCR_VALUE_T type.

CYBLE_EVT_BASC_WRITE_DESCR_RESPONSE BAS Client - Write Response for Battery Level Client Characteristic Configuration Descriptor Value. The parameter of this event is a structure of CYBLE_BAS_DESCR_VALUE_T type.

CYBLE_EVT_BCSS_INDICATION_ENABLED BCS Server - Indication for Body Composition Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_BCS_CHAR_VALUE_T type.

CYBLE_EVT_BCSS_INDICATION_DISABLED BCS Server - Indication for Body Composition Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_BCS_CHAR_VALUE_T type.

CYBLE_EVT_BCSS_INDICATION_CONFIRMED BCS Server - Body Composition Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_BCS_CHAR_VALUE_T type.

CYBLE_EVT_BCSC_INDICATION BCS Client - Body Composition Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_BCS_CHAR_VALUE_T type.

CYBLE_EVT_BCSC_READ_CHAR_RESPONSE BCS Client - Read Response for Read Request of Body Composition Service Characteristic value. The parameter of this event is a structure of CYBLE_BCS_CHAR_VALUE_T type.

CYBLE_EVT_BCSC_READ_DESCR_RESPONSE BCS Client - Read Response for Read Request of Body Composition Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_BCS_DESCR_VALUE_T type.

CYBLE_EVT_BCSC_WRITE_DESCR_RESPONSE BCS Client - Write Response for Write Request of Body Composition Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_BCS_DESCR_VALUE_T type.

CYBLE_EVT_BLSS_INDICATION_ENABLED BLS Server - Indication for Blood Pressure Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type

CYBLE_EVT_BLSS_INDICATION_DISABLED BLS Server - Indication for Blood Pressure Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type

CYBLE_EVT_BLSS_INDICATION_CONFIRMED BLS Server - Blood Pressure Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type

CYBLE_EVT_BLSS_NOTIFICATION_ENABLED BLS Server - Notifications for Blood Pressure Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type.

CYBLE_EVT_BLSS_NOTIFICATION_DISABLED BLS Server - Notifications for Blood Pressure Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type

CYBLE_EVT_BLSC_INDICATION BLS Client - Blood Pressure Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type

CYBLE_EVT_BLSC_NOTIFICATION BLS Client - Blood Pressure Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type

CYBLE_EVT_BLSC_READ_CHAR_RESPONSE BLS Client - Read Response for Read Request of Blood Pressure Service Characteristic value. The parameter of this event is a structure of CYBLE_BLS_CHAR_VALUE_T type

CYBLE_EVT_BLSC_READ_DESCR_RESPONSE BLS Client - Read Response for Read Request of Blood Pressure Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_BLS_DESCR_VALUE_T type

CYBLE_EVT_BLSC_WRITE_DESCR_RESPONSE BLS Client - Write Response for Write Request of Blood Pressure Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_BLS_DESCR_VALUE_T type

CYBLE_EVT_BMSS_WRITE_CHAR BMS Server - Write Request for Bond Management was received. The parameter of this event is a structure of CYBLE_BMS_CHAR_VALUE_T type.

CYBLE_EVT_BMSC_READ_CHAR_RESPONSE BMS Client - Read Response for Read Request of Bond Management Service Characteristic value. The parameter of this event is a structure of CYBLE_BMS_CHAR_VALUE_T type

CYBLE_EVT_BMSC_WRITE_CHAR_RESPONSE BMS Client - Write Response for Write Request of Bond Management Service Characteristic value. The parameter of this event is a structure of CYBLE_BMS_CHAR_VALUE_T type.

CYBLE_EVT_BMSC_READ_DESCR_RESPONSE BMS Client - Read Response for Read Request of Bond Management Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_BMS_DESCR_VALUE_T type.

CYBLE_EVT_CGMSS_INDICATION_ENABLED CGMS Server - Indication for Continuous Glucose Monitoring Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSS_INDICATION_DISABLED CGMS Server - Indication for Continuous Glucose Monitoring Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSS_INDICATION_CONFIRMED CGMS Server - Continuous Glucose Monitoring Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSS_NOTIFICATION_ENABLED CGMS Server - Notifications for Continuous Glucose Monitoring Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSS_NOTIFICATION_DISABLED CGMS Server - Notifications for Continuous Glucose Monitoring Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSS_WRITE_CHAR CGMS Server - Write Request for Continuous Glucose Monitoring Service was received. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSC_INDICATION CGMS Client - Continuous Glucose Monitoring Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSC_NOTIFICATION CGMS Client - Continuous Glucose Monitoring Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSC_READ_CHAR_RESPONSE CGMS Client - Read Response for Read Request of Continuous Glucose Monitoring Service Characteristic value. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSC_WRITE_CHAR_RESPONSE CGMS Client - Write Response for Write Request of Continuous Glucose Monitoring Service Characteristic value. The parameter of this event is a structure of CYBLE_CGMS_CHAR_VALUE_T type.

CYBLE_EVT_CGMSC_READ_DESCR_RESPONSE CGMS Client - Read Response for Read Request of Continuous Glucose Monitoring Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_CGMS_DESCR_VALUE_T type.

CYBLE_EVT_CGMSC_WRITE_DESCR_RESPONSE CGMS Client - Write Response for Write Request of Continuous Glucose Monitoring Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_CGMS_DESCR_VALUE_T type.

CYBLE_EVT_CPSS_NOTIFICATION_ENABLED CPS Server - Notifications for Cycling Power Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type.

CYBLE_EVT_CPSS_NOTIFICATION_DISABLED CPS Server - Notifications for Cycling Power Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSS_INDICATION_ENABLED CPS Server - Indication for Cycling Power Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSS_INDICATION_DISABLED CPS Server - Indication for Cycling Power Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSS_INDICATION_CONFIRMED CPS Server - Cycling Power Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSS_BROADCAST_ENABLED CPS Server - Broadcast for Cycling Power Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSS_BROADCAST_DISABLED CPS Server - Broadcast for Cycling Power Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSS_CHAR_WRITE CPS Server - Write Request for Cycling Power Service Characteristic was received. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type.

CYBLE_EVT_CPSC_NOTIFICATION CPS Client - Cycling Power Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSC_INDICATION CPS Client - Cycling Power Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSC_READ_CHAR_RESPONSE CPS Client - Read Response for Read Request of Cycling Power Service Characteristic value. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type

CYBLE_EVT_CPSC_WRITE_CHAR_RESPONSE CPS Client - Write Response for Write Request of Cycling Power Service Characteristic value. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type.

CYBLE_EVT_CPSC_READ_DESCR_RESPONSE CPS Client - Read Response for Read Request of Cycling Power Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_CPS_DESCR_VALUE_T type.

CYBLE_EVT_CPSC_WRITE_DESCR_RESPONSE CPS Client - Write Response for Write Request of Cycling Power Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_CPS_DESCR_VALUE_T type.

CYBLE_EVT_CPSC_SCAN_PROGRESS_RESULT CPS Client - This event is triggered every time a device receive non-connectable undirected advertising event. The parameter of this event is a structure of CYBLE_CPS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSS_NOTIFICATION_ENABLED CSCS Server - Notifications for Cycling Speed and Cadence Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSS_NOTIFICATION_DISABLED CSCS Server - Notifications for Cycling Speed and Cadence Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSS_INDICATION_ENABLED CSCS Server - Indication for Cycling Speed and Cadence Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSS_INDICATION_DISABLED CSCS Server - Indication for Cycling Speed and Cadence Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSS_INDICATION_CONFIRMATION CSCS Server - Cycling Speed and Cadence Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSS_CHAR_WRITE CSCS Server - Write Request for Cycling Speed and Cadence Service Characteristic was received. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSC_NOTIFICATION CSCS Client - Cycling Speed and Cadence Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSC_INDICATION CSCS Client - Cycling Speed and Cadence Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSC_READ_CHAR_RESPONSE CSCS Client - Read Response for Read Request of Cycling Speed and Cadence Service Characteristic value. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSC_WRITE_CHAR_RESPONSE CSCS Client - Write Response for Write Request of Cycling Speed and Cadence Service Characteristic value. The parameter of this event is a structure of CYBLE_CSCS_CHAR_VALUE_T type.

CYBLE_EVT_CSCSC_READ_DESCR_RESPONSE CSCS Client - Read Response for Read Request of Cycling Speed and Cadence Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_CSCS_DESCR_VALUE_T type.

CYBLE_EVT_CSCSC_WRITE_DESCR_RESPONSE CSCS Client - Write Response for Write Request of Cycling Speed and Cadence Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_CSCS_DESCR_VALUE_T type.

CYBLE_EVT_CTSS_NOTIFICATION_ENABLED CTS Server - Notification for Current Time Characteristic was enabled. The parameter of this event is a structure of CYBLE_CTS_CHAR_VALUE_T type.

CYBLE_EVT_CTSS_NOTIFICATION_DISABLED CTS Server - Notification for Current Time Characteristic was disabled. The parameter of this event is a structure of CYBLE_CTS_CHAR_VALUE_T type.

CYBLE_EVT_CTSS_CHAR_WRITE CTS Server - Write Request for Current Time Service Characteristic was received. The parameter of this event is a structure of CYBLE_CTS_CHAR_VALUE_T type. When this event is received the user is responsible for performing any kind of data verification and writing the data to the GATT database in case of successful verification or setting the error using CyBle_SetGattError() in case of data verification failure.

CYBLE_EVT_CTSC_NOTIFICATION CTS Client - Current Time Characteristic Notification was received. The parameter of this event is a structure of CYBLE_CTS_CHAR_VALUE_T type.

CYBLE_EVT_CTSC_READ_CHAR_RESPONSE CTS Client - Read Response for Current Time Characteristic Value Read Request. The parameter of this event is a structure of CYBLE_CTS_CHAR_VALUE_T type.

CYBLE_EVT_CTSC_READ_DESCR_RESPONSE CTS Client - Read Response for Current Time Client Characteristic Configuration Descriptor Value Read Request. The parameter of this event is a structure of CYBLE_CTS_DESCR_VALUE_T type.

CYBLE_EVT_CTSC_WRITE_DESCR_RESPONSE CTS Client - Write Response for Current Time Characteristic Configuration Descriptor Value. The parameter of this event is a structure of CYBLE_CTS_DESCR_VALUE_T type.

CYBLE_EVT_CTSC_WRITE_CHAR_RESPONSE CTS Client - Write Response for Current Time or Local Time Information Characteristic Value. The parameter of this event is a structure of CYBLE_CTS_DESCR_VALUE_T type.

CYBLE_EVT_DISC_READ_CHAR_RESPONSE DIS Client - Read Response for a Read Request for a Device Information Service Characteristic. The parameter of this event is a structure of CYBLE_DIS_CHAR_VALUE_T type.

CYBLE_EVT_ESSS_NOTIFICATION_ENABLED ESS Server - Notifications for Environmental Sensing Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSS_NOTIFICATION_DISABLED ESS Server - Notifications for Environmental Sensing Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSS_INDICATION_ENABLED ESS Server - Indication for Environmental Sensing Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSS_INDICATION_DISABLED ESS Server - Indication for Environmental Sensing Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSS_INDICATION_CONFIRMATION ESS Server - Environmental Sensing Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSS_CHAR_WRITE ESS Server - Write Request for Environmental Sensing Service Characteristic was received. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSS_EXEC_WRITE_REQ ESS Server - Execute Write Request for Environmental Sensing Service Characteristic was received. The parameter of this event is a structure of CYBLE_ESS_DESCR_VALUE_T type.

CYBLE_EVT_ESSS_DESCR_WRITE ESS Server - Write Request for Environmental Sensing Service Characteristic Descriptor was received. The parameter of this event is a structure of CYBLE_ESS_DESCR_VALUE_T type. This event is generated only when write for CYBLE_ESS_CHAR_USER_DESCRIPTION_DESCR, CYBLE_ESS_ES_TRIGGER_SETTINGS_DESCR or CYBLE_ESS_ES_CONFIG_DESCR occurred.

CYBLE_EVT_ESSC_NOTIFICATION ESS Client - Environmental Sensing Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSC_INDICATION ESS Client - Environmental Sensing Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSC_READ_CHAR_RESPONSE ESS Client - Read Response for Read Request of Environmental Sensing Service Characteristic value. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSC_WRITE_CHAR_RESPONSE ESS Client - Write Response for Write Request of Environmental Sensing Service Characteristic value. The parameter of this event is a structure of CYBLE_ESS_CHAR_VALUE_T type.

CYBLE_EVT_ESSC_READ_DESCR_RESPONSE ESS Client - Read Response for Read Request of Environmental Sensing Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_ESS_DESCR_VALUE_T type.

CYBLE_EVT_ESSC_WRITE_DESCR_RESPONSE ESS Client - Write Response for Write Request of Environmental Sensing Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_ESS_DESCR_VALUE_T type.

CYBLE_EVT_GLSS_INDICATION_ENABLED GLS Server - Indication for Glucose Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSS_INDICATION_DISABLED GLS Server - Indication for Glucose Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSS_INDICATION_CONFIRMED GLS Server - Glucose Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSS_NOTIFICATION_ENABLED GLS Server - Notifications for Glucose Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSS_NOTIFICATION_DISABLED GLS Server - Notifications for Glucose Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSS_WRITE_CHAR GLS Server - Write Request for Glucose Service was received. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSC_INDICATION GLS Client - Glucose Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSC_NOTIFICATION GLS Client - Glucose Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSC_READ_CHAR_RESPONSE GLS Client - Read Response for Read Request of Glucose Service Characteristic value. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSC_WRITE_CHAR_RESPONSE GLS Client - Write Response for Write Request of Glucose Service Characteristic value. The parameter of this event is a structure of CYBLE_GLS_CHAR_VALUE_T type.

CYBLE_EVT_GLSC_READ_DESCR_RESPONSE GLS Client - Read Response for Read Request of Glucose Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_GLS_DESCR_VALUE_T type.

CYBLE_EVT_GLSC_WRITE_DESCR_RESPONSE GLS Client - Write Response for Write Request of Glucose Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_GLS_DESCR_VALUE_T type.

CYBLE_EVT_HIDSS_NOTIFICATION_ENABLED HIDS Server - Notifications for HID service were enabled. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSS_NOTIFICATION_DISABLED HIDS Server - Notifications for HID service were disabled. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSS_BOOT_MODE_ENTER HIDS Server - Enter boot mode request. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSS_REPORT_MODE_ENTER HIDS Server - Enter report mode request. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSS_SUSPEND HIDS Server - Enter suspend mode request. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSS_EXIT_SUSPEND HIDS Server - Exit suspend mode request. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSS_REPORT_CHAR_WRITE HIDS Server - Write Report characteristic request. The parameter of this event is a structure of CYBLE_HIDSS_REPORT_VALUE_T type.

CYBLE_EVT_HIDSC_NOTIFICATION HIDS Client - HID Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSC_READ_CHAR_RESPONSE HIDS Client - Read Response for Read Request of HID Service Characteristic value. The parameter of this event is a structure of CYBLE_HIDS_DESCR_VALUE_T type.

CYBLE_EVT_HIDSC_WRITE_CHAR_RESPONSE HIDS Client - Write Response for Write Request of HID Service Characteristic value. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HIDSC_READ_DESCR_RESPONSE HIDS Client - Read Response for Read Request of HID Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_HIDS_DESCR_VALUE_T type.

CYBLE_EVT_HIDSC_WRITE_DESCR_RESPONSE HIDS Client - Write Response for Write Request of HID Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_HIDS_CHAR_VALUE_T type.

CYBLE_EVT_HRSS_ENERGY_EXPENDED_RESET HRS Server - Reset Energy Expended. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HRSS_NOTIFICATION_ENABLED HRS Server - Notification for Heart Rate Measurement Characteristic was enabled. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HRSS_NOTIFICATION_DISABLED HRS Server - Notification for Heart Rate Measurement Characteristic was disabled. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HRSC_NOTIFICATION HRS Client - Heart Rate Measurement Characteristic Notification was received. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HRSC_READ_CHAR_RESPONSE HRS Client - Read Response for Read Request of HRS Service Characteristic value. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HRSC_WRITE_CHAR_RESPONSE HRS Client - Write Response for Write Request of HRS Service Characteristic value. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HRSC_READ_DESCR_RESPONSE HRS Client - Read Response for Read Request of HRS Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HRSC_WRITE_DESCR_RESPONSE HRS Client - Write Response for Write Request of HRS Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_HRS_CHAR_VALUE_T type.

CYBLE_EVT_HTSS_NOTIFICATION_ENABLED HTS Server - Notifications for Health Thermometer Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSS_NOTIFICATION_DISABLED HTS Server - Notifications for Health Thermometer Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSS_INDICATION_ENABLED HTS Server - Indication for Health Thermometer Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSS_INDICATION_DISABLED HTS Server - Indication for Health Thermometer Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSS_INDICATION_CONFIRMED HTS Server - Health Thermometer Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSS_CHAR_WRITE HTS Server - Write Request for Health Thermometer Service Characteristic was received. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSC_NOTIFICATION HTS Client - Health Thermometer Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSC_INDICATION HTS Client - Health Thermometer Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSC_READ_CHAR_RESPONSE HTS Client - Read Response for Read Request of Health Thermometer Service Characteristic value. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSC_WRITE_CHAR_RESPONSE HTS Client - Write Response for Write Request of Health Thermometer Service Characteristic value. The parameter of this event is a structure of CYBLE_HTS_CHAR_VALUE_T type.

CYBLE_EVT_HTSC_READ_DESCR_RESPONSE HTS Client - Read Response for Read Request of Health Thermometer Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_HTS_DESCR_VALUE_T type.

CYBLE_EVT_HTSC_WRITE_DESCR_RESPONSE HTS Client - Write Response for Write Request of Health Thermometer Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_HTS_DESCR_VALUE_T type.

CYBLE_EVT_IASS_WRITE_CHAR_CMD IAS Server - Write command request for Alert Level Characteristic. The parameter of this event is a structure of CYBLE_IAS_CHAR_VALUE_T type.

CYBLE_EVT_LLSS_WRITE_CHAR_REQ LLS Server - Write request for Alert Level Characteristic. The parameter of this event is a structure of CYBLE_LLS_CHAR_VALUE_T type.

CYBLE_EVT_LLSC_READ_CHAR_RESPONSE LLS Client - Read response for Alert Level Characteristic. The parameter of this event is a structure of CYBLE_LLS_CHAR_VALUE_T type.

CYBLE_EVT_LLSC_WRITE_CHAR_RESPONSE LLS Client - Write response for write request of Alert Level Characteristic. The parameter of this event is a structure of CYBLE_LLS_CHAR_VALUE_T type.

CYBLE_EVT_LNSS_INDICATION_ENABLED LNS Server - Indication for Location and Navigation Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSS_INDICATION_DISABLED LNS Server - Indication for Location and Navigation Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSS_INDICATION_CONFIRMED LNS Server - Location and Navigation Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSS_NOTIFICATION_ENABLED LNS Server - Notifications for Location and Navigation Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSS_NOTIFICATION_DISABLED LNS Server - Notifications for Location and Navigation Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSS_WRITE_CHAR LNS Server - Write Request for Location and Navigation Service Characteristic was received. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSC_INDICATION LNS Client - Location and Navigation Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSC_NOTIFICATION LNS Client - Location and Navigation Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSC_READ_CHAR_RESPONSE LNS Client - Read Response for Read Request of Location and Navigation Service Characteristic value. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSC_WRITE_CHAR_RESPONSE LNS Client - Write Response for Write Request of Location and Navigation Service Characteristic value. The parameter of this event is a structure of CYBLE_LNS_CHAR_VALUE_T type.

CYBLE_EVT_LNSC_READ_DESCR_RESPONSE LNS Client - Read Response for Read Request of Location and Navigation Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_LNS_DESCR_VALUE_T type.

CYBLE_EVT_LNSC_WRITE_DESCR_RESPONSE LNS Client - Write Response for Write Request of Location and Navigation Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_LNS_DESCR_VALUE_T type.

CYBLE_EVT_NDCSC_READ_CHAR_RESPONSE NDCS Client - Read Response for Read Request of Next DST Change Service Characteristic value. The parameter of this event is a structure of CYBLE_NDCS_CHAR_VALUE_T type.

CYBLE_EVT_PASSS_NOTIFICATION_ENABLED PASS Server - Notifications for Phone Alert Status Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_PASS_CHAR_VALUE_T type.

CYBLE_EVT_PASSS_NOTIFICATION_DISABLED PASS Server - Notifications for Phone Alert Status Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_PASS_CHAR_VALUE_T type.

CYBLE_EVT_PASSS_WRITE_CHAR PASS Server - Write Request for Phone Alert Status Service Characteristic was received. The parameter of this event is a structure of CYBLE_PASS_CHAR_VALUE_T type.

CYBLE_EVT_PASSC_NOTIFICATION PASS Client - Phone Alert Status Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_PASS_CHAR_VALUE_T type.

CYBLE_EVT_PASSC_READ_CHAR_RESPONSE PASS Client - Read Response for Read Request of Phone Alert Status Service Characteristic value. The parameter of this event is a structure of CYBLE_PASS_CHAR_VALUE_T type.

CYBLE_EVT_PASSC_WRITE_CHAR_RESPONSE PASS Client - Write Response for Write Request of Phone Alert Status Service Characteristic value. The parameter of this event is a structure of CYBLE_PASS_CHAR_VALUE_T type.

CYBLE_EVT_PASSC_READ_DESCR_RESPONSE PASS Client - Read Response for Read Request of Phone Alert Status Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_PASS_DESCR_VALUE_T type.

CYBLE_EVT_PASSC_WRITE_DESCR_RESPONSE PASS Client - Write Response for Write Request of Phone Alert Status Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_PASS_DESCR_VALUE_T type.

CYBLE_EVT_RSCSS_NOTIFICATION_ENABLED RSCS Server - Notifications for Running Speed and Cadence Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSS_NOTIFICATION_DISABLED RSCS Server - Notifications for Running Speed and Cadence Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSS_INDICATION_ENABLED RSCS Server - Indication for Running Speed and Cadence Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSS_INDICATION_DISABLED RSCS Server - Indication for Running Speed and Cadence Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSS_INDICATION_CONFIRMATION RSCS Server - Running Speed and Cadence Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSS_CHAR_WRITE RSCS Server - Write Request for Running Speed and Cadence Service Characteristic was received. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSC_NOTIFICATION RSCS Client - Running Speed and Cadence Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSC_INDICATION RSCS Client - Running Speed and Cadence Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSC_READ_CHAR_RESPONSE RSCS Client - Read Response for Read Request of Running Speed and Cadence Service Characteristic value. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSC_WRITE_CHAR_RESPONSE RSCS Client - Write Response for Write Request of Running Speed and Cadence Service Characteristic value. The parameter of this event is a structure of CYBLE_RSCS_CHAR_VALUE_T type.

CYBLE_EVT_RSCSC_READ_DESCR_RESPONSE RSCS Client - Read Response for Read Request of Running Speed and Cadence Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_RSCS_DESCR_VALUE_T type.

CYBLE_EVT_RSCSC_WRITE_DESCR_RESPONSE RSCS Client - Write Response for Write Request of Running Speed and Cadence Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_RSCS_DESCR_VALUE_T type.

CYBLE_EVT_RTUSS_WRITE_CHAR_CMD RTUS Server - Write command request for Reference Time Update Characteristic value. The parameter of this event is a structure of CYBLE_RTUS_CHAR_VALUE_T type.

CYBLE_EVT_RTUSC_READ_CHAR_RESPONSE RTUS Client - Read Response for Read Request of Reference Time Update Service Characteristic value. The parameter of this event is a structure of CYBLE_RTUS_CHAR_VALUE_T type.

CYBLE_EVT_SCPSS_NOTIFICATION_ENABLED ScPS Server - Notifications for Scan Refresh Characteristic were enabled. The parameter of this event is a structure of CYBLE_SCPS_CHAR_VALUE_T type.

CYBLE_EVT_SCPSS_NOTIFICATION_DISABLED ScPS Server - Notifications for Scan Refresh Characteristic were disabled. The parameter of this event is a structure of CYBLE_SCPS_CHAR_VALUE_T type.

CYBLE_EVT_SCPSS_SCAN_INT_WIN_CHAR_WRITE ScPS Client - Read Response for Scan Interval Window Characteristic Value of Scan Parameters Service. The parameter of this event is a structure of CYBLE_SCPS_CHAR_VALUE_T type.

CYBLE_EVT_SCPSC_NOTIFICATION ScPS Client - Scan Refresh Characteristic Notification was received. The parameter of this event is a structure of CYBLE_SCPS_CHAR_VALUE_T type.

CYBLE_EVT_SCPSC_READ_DESCR_RESPONSE ScPS Client - Read Response for Scan Refresh Characteristic Descriptor Read Request. The parameter of this event is a structure of CYBLE_SCPS_DESCR_VALUE_T type.

CYBLE_EVT_SCPSC_WRITE_DESCR_RESPONSE ScPS Client - Write Response for Scan Refresh Client Characteristic Configuration Descriptor Value. The parameter of this event is a structure of CYBLE_SCPS_DESCR_VALUE_T type.

CYBLE_EVT_TPSS_NOTIFICATION_ENABLED TPS Server - Notification for Tx Power Level Characteristic was enabled. The parameter of this event is a structure of CYBLE_TPS_CHAR_VALUE_T type.

CYBLE_EVT_TPSS_NOTIFICATION_DISABLED TPS Server - Notification for Tx Power Level Characteristic was disabled. The parameter of this event is a structure of CYBLE_TPS_CHAR_VALUE_T type.

CYBLE_EVT_TPSC_NOTIFICATION TPS Client - Tx Power Level Characteristic Notification. The parameter of this event is a structure of CYBLE_TPS_CHAR_VALUE_T type.

CYBLE_EVT_TPSC_READ_CHAR_RESPONSE TPS Client - Read Response for Tx Power Level Characteristic Value Read Request. The parameter of this event is a structure of CYBLE_TPS_CHAR_VALUE_T type.

CYBLE_EVT_TPSC_READ_DESCR_RESPONSE TPS Client - Read Response for Tx Power Level Client Characteristic Configuration Descriptor Value Read Request. The parameter of this event is a structure of CYBLE_TPS_DESCR_VALUE_T type.

CYBLE_EVT_TPSC_WRITE_DESCR_RESPONSE TPS Client - Write Response for Tx Power Level Characteristic Descriptor Value Write Request. The parameter of this event is a structure of CYBLE_TPS_DESCR_VALUE_T type.

CYBLE_EVT_UDSS_INDICATION_ENABLED UDS Server - Indication for User Data Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSS_INDICATION_DISABLED UDS Server - Indication for User Data Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSS_INDICATION_CONFIRMED UDS Server - User Data Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSS_NOTIFICATION_ENABLED UDS Server - Notifications for User Data Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSS_NOTIFICATION_DISABLED UDS Server - Notifications for User Data Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSS_READ_CHAR UDS Server - Read Request for User Data Service Characteristic was received. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSS_WRITE_CHAR UDS Server - Write Request for User Data Service Characteristic was received. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSC_INDICATION UDS Client - User Data Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSC_NOTIFICATION UDS Client - User Data Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSC_READ_CHAR_RESPONSE UDS Client - Read Response for Read Request of User Data Service Characteristic value. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSC_WRITE_CHAR_RESPONSE UDS Client - Write Response for Write Request of User Data Service Characteristic value. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_UDSC_READ_DESCR_RESPONSE UDS Client - Read Response for Read Request of User Data Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_UDS_DESCR_VALUE_T type.

CYBLE_EVT_UDSC_WRITE_DESCR_RESPONSE UDS Client - Write Response for Write Request of User Data Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_UDS_DESCR_VALUE_T type.

CYBLE_EVT_UDSC_ERROR_RESPONSE UDS Client - Error Response for Write Request for User Data Service Characteristic Value. The parameter of this event is a structure of CYBLE_UDS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSS_NOTIFICATION_ENABLED WPTS Server - Notifications for Wireless Power Transfer Service Characteristic were enabled. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSS_NOTIFICATION_DISABLED WPTS Server - Notifications for Wireless Power Transfer Service Characteristic were disabled. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSS_INDICATION_ENABLED WPTS Server - Indication for Wireless Power Transfer Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSS_INDICATION_DISABLED WPTS Server - Indication for Wireless Power Transfer Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSS_INDICATION_CONFIRMED WPTS Server - Wireless Power Transfer Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSS_WRITE_CHAR WPTS Server - Write Request for Wireless Power Transfer Service Characteristic was received. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSC_NOTIFICATION WPTS Client - Wireless Power Transfer Service Characteristic Notification was received. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSC_INDICATION WPTS Client - Wireless Power Transfer Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSC_WRITE_CHAR_RESPONSE WPTS Client - Write Response for Read Request of Wireless Power Transfer Service Characteristic value. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSC_READ_CHAR_RESPONSE WPTS Client - Read Response for Read Request of Wireless Power Transfer Service Characteristic value. The parameter of this event is a structure of CYBLE_WPTS_CHAR_VALUE_T type.

CYBLE_EVT_WPTSC_READ_DESCR_RESPONSE WPTS Client - Read Response for Read Request of Wireless Power Transfer Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_WPTS_DESCR_VALUE_T type.

CYBLE_EVT_WPTSC_WRITE_DESCR_RESPONSE WPTS Client - Write Response for Write Request of Wireless Power Transfer Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_WPTS_DESCR_VALUE_T type.

CYBLE_EVT_WSSS_INDICATION_ENABLED WSS Server - Indication for Weight Scale Service Characteristic was enabled. The parameter of this event is a structure of CYBLE_WSS_CHAR_VALUE_T type.

CYBLE_EVT_WSSS_INDICATION_DISABLED WSS Server - Indication for Weight Scale Service Characteristic was disabled. The parameter of this event is a structure of CYBLE_WSS_CHAR_VALUE_T type.

CYBLE_EVT_WSSS_INDICATION_CONFIRMED WSS Server - Weight Scale Service Characteristic Indication was confirmed. The parameter of this event is a structure of CYBLE_WSS_CHAR_VALUE_T type.

CYBLE_EVT_WSSC_INDICATION WSS Client - Weight Scale Service Characteristic Indication was received. The parameter of this event is a structure of CYBLE_WSS_CHAR_VALUE_T type.

CYBLE_EVT_WSSC_READ_CHAR_RESPONSE WSS Client - Read Response for Read Request of Weight Scale Service Characteristic value. The parameter of this event is a structure of CYBLE_WSS_CHAR_VALUE_T type.

CYBLE_EVT_WSSC_READ_DESCR_RESPONSE WSS Client - Read Response for Read Request of Weight Scale Service Characteristic Descriptor Read request. The parameter of this event is a structure of CYBLE_WSS_DESCR_VALUE_T type.

CYBLE_EVT_WSSC_WRITE_DESCR_RESPONSE WSS Client - Write Response for Write Request of Weight Scale Service Characteristic Configuration Descriptor value. The parameter of this event is a structure of CYBLE_WSS_DESCR_VALUE_T type.

Apple Notification Center Service (ANCS)

Description

The Apple Notification Center Service provides iOS notifications from Apple devices for accessories.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The ANCS API names begin with CyBle_Ancs. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- ANCS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- ANCS Server Functions
  APIs unique to ANCS designs configured as a GATT Server role.
- ANCS Client Functions
  APIs unique to ANCS designs configured as a GATT Client role.
- ANCS Definitions and Data Structures
  Contains the ANCS specific definitions and data structures used in the ANCS APIs.

ANCS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Ancs

Functions

- void CyBle_AncsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_AncsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service-specific attribute operations. Service-specific write requests from a peer device will not be handled with an unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for ANCS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void

	*eventParam), where: • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None.

Events

None.

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

ANCS Server Functions

Description

APIs unique to ANCS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Ancss

Functions

- CYBLE_API_RESULT_T CyBle_AncssSetCharacteristicValue (CYBLE_ANCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AncssGetCharacteristicValue (CYBLE_ANCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AncssGetCharacteristicDescriptor (CYBLE_ANCS_CHAR_INDEX_TcharIndex, CYBLE_ANCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AncssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_AncssSetCharacteristicValue (CYBLE_ANCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the value of the characteristic, as identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_AncssGetCharacteristicValue (CYBLE_ANCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the value of the characteristic, as identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - A characteristic is absent.

Events

None.

CYBLE_API_RESULT_TCyBle_AncssGetCharacteristicDescriptor (CYBLE_ANCS_CHAR_INDEX_T *charIndex*, CYBLE_ANCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The Characteristic Descriptor value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - A characteristic is absent.

Events

None.

CYBLE_API_RESULT_TCyBle_AncssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification of the specified characteristic value, as identified by the charIndex.

Parameters:

connHandle	The connection handle that consists of the device ID and ATT connection ID.

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client

Events

None.

ANCS Client Functions

Description

APIs unique to ANCS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Ancsc

Functions

- CYBLE_API_RESULT_T CyBle_AncscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AncscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANCS_CHAR_INDEX_TcharIndex, CYBLE_ANCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AncscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANCS_CHAR_INDEX_TcharIndex, CYBLE_ANCS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_AncscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic (which is identified by charIndex) value attribute in the server. The Write Response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In the case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ANCS service-specific callback is registered (with CyBle_AncsRegisterAttrCallback):

- CYBLE_EVT_ANCSC_WRITE_CHAR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, etc.) are provided with an event parameter structure of type CYBLE_ANCS_CHAR_VALUE_T.

Otherwise (if the ANCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - If the requested attribute is successfully written on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - If there some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_AncscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANCS_CHAR_INDEX_T *charIndex*, CYBLE_ANCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic Value to the server, as identified by its charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successfull execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ANCS service-specific callback is registered (with CyBle_AncsRegisterAttrCallback):

- CYBLE_EVT_ANCSC_WRITE_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index etc.) are provided with an event parameter structure of type CYBLE_ANCS_DESCR_VALUE_T.

Otherwise (if the ANCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - If the requested attribute is successfully written on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T.

CYBLE_API_RESULT_TCyBle_AncscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANCS_CHAR_INDEX_T *charIndex*, CYBLE_ANCS_DESCR_INDEX_T *descrIndex*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ANCS service-specific callback is registered (with CyBle_AncsRegisterAttrCallback):

- CYBLE_EVT_ANCSC_READ_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index, value, etc.) are provided with an event parameter structure of type CYBLE_ANCS_DESCR_VALUE_T.

Otherwise (if the ANCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with an event parameter structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

ANCS Definitions and Data Structures

Description

Contains the ANCS specific definitions and data structures used in the ANCS APIs.

Data Structures

- struct CYBLE_ANCSS_CHAR_T
- struct CYBLE_ANCSS_T
- struct CYBLE_ANCSC_CHAR_T
- struct CYBLE_ANCSC_T
- struct CYBLE_ANCS_CHAR_VALUE_T
- struct CYBLE_ANCS_DESCR_VALUE_T

Enumerations

- enum CYBLE_ANCS_CHAR_INDEX_T{ CYBLE_ANCS_NS, CYBLE_ANCS_CP, CYBLE_ANCS_DS, CYBLE_ANCS_CHAR_COUNT}
- enum CYBLE_ANCS_DESCR_INDEX_T{ CYBLE_ANCS_CCCD, CYBLE_ANCS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_ANCS_CHAR_INDEX_T

ANC Service Characteristics indexes

Enumerator

CYBLE_ANCS_NS Notification Source characteristic index

CYBLE_ANCS_CP Control Point characteristic index

CYBLE_ANCS_DS Data Source characteristic index

CYBLE_ANCS_CHAR_COUNT Total count of ANCS characteristics

enum CYBLE_ANCS_DESCR_INDEX_T

ANC Service Characteristic Descriptors indexes

Enumerator

CYBLE_ANCS_CCCD Client Characteristic Configuration descriptor index

CYBLE_ANCS_DESCR_COUNT Total count of ANCS descriptors

Alert Notification Service (ANS)

Description

The Alert Notification Service exposes alert information in a device.

This information includes:

- Type of alert occurring in a device
- Additional text information such as the caller's ID or sender's ID
- Count of new alerts
- Count of unread alert items

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The ANS API names begin with CyBle_Ans. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- ANS Server and Client Function

  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

- ANS Server Functions
  APIs unique to ANS designs configured as a GATT Server role.
- ANS Client Functions
  APIs unique to ANS designs configured as a GATT Client role.
- ANS Definitions and Data Structures
  Contains the ANS specific definitions and data structures used in the ANS APIs.

ANS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
No letter is appended to the API name: CyBle_Ans

Functions

- void CyBle_AnsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_AnsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for Alert Notification Service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive service specific events from the BLE Component. The definition of CYBLE_CALLBACK_T for Alert Notification Service is, typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_ANSS_NOTIFICATION_ENABLED) • eventParam contains the parameters corresponding to the current event (e.g. Pointer to CYBLE_ANS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

ANS Server Functions

Description

APIs unique to ANS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Anss

Functions

- CYBLE_API_RESULT_T CyBle_AnssSetCharacteristicValue (CYBLE_ANS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AnssGetCharacteristicValue (CYBLE_ANS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AnssGetCharacteristicDescriptor (CYBLE_ANS_CHAR_INDEX_TcharIndex, CYBLE_ANS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AnssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_AnssSetCharacteristicValue (CYBLE_ANS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of Alert Notification Service, which is a value identified by charIndex, to the local database.

Parameters:

charIndex	The index of the service characteristic of type CYBLE_ANS_CHAR_INDEX_T. The valid values are, • CYBLE_ANS_SUPPORTED_NEW_ALERT_CAT • CYBLE_ANS_SUPPORTED_UNREAD_ALERT_CAT
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to characteristic value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

Events

None

CYBLE_API_RESULT_TCyBle_AnssGetCharacteristicValue (CYBLE_ANS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of Alert Notification Service. The value is identified by charIndex.

Parameters:

charIndex	The index of the service characteristic of type CYBLE_ANS_CHAR_INDEX_T. The valid values are, • CYBLE_ANS_NEW_ALERT

	• CYBLE_ANS_UNREAD_ALERT_STATUS
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

CYBLE_API_RESULT_TCyBle_AnssGetCharacteristicDescriptor (CYBLE_ANS_CHAR_INDEX_T *charIndex*, CYBLE_ANS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of the specified characteristic of Alert Notification Service.

Parameters:

charIndex	The index of the service characteristic of type CYBLE_ANS_CHAR_INDEX_T. The valid values are, • CYBLE_ANS_NEW_ALERT • CYBLE_ANS_UNREAD_ALERT_STATUS
descrIndex	The index of the service characteristic descriptor of type CYBLE_ANS_DESCR_INDEX_T. The valid value is, • CYBLE_ANS_CCCD
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

CYBLE_API_RESULT_TCyBle_AnssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification with the characteristic value, as specified by its charIndex, to the Client device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic of type CYBLE_ANS_CHAR_INDEX_T. The valid values are, • CYBLE_ANS_UNREAD_ALERT_STATUS

	• CYBLE_ANS_NEW_ALERT
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The function completed successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameter is failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

Events

None

ANS Client Functions

Description

APIs unique to ANS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Ansc

Functions

- CYBLE_API_RESULT_T CyBle_AnscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_AnscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AnscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANS_CHAR_INDEX_TcharIndex, CYBLE_ANS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_AnscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ANS_CHAR_INDEX_TcharIndex, uint8 descrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_AnscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANS_CHAR_INDEX_T *charIndex*)

Sends a request to the peer device to get a characteristic value, as identified by its charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully;

- CYBLE_ERROR_INVALID_STATE - The component in in invalid state for current operation.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ANS service-specific callback is registered (with CyBle_AnsRegisterAttrCallback):

- CYBLE_EVT_ANSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_ANS_CHAR_VALUE_T.

Otherwise (if the ANS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_AnscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to the peer device to set the characteristic value, as identified by its charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	Size of the Characteristic value attribute.
attrValue	Pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_STATE - The component in in invalid state for current operation.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ANS service-specific callback is registered (with CyBle_AnsRegisterAttrCallback):

- CYBLE_EVT_ANSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_ANS_CHAR_VALUE_T.

Otherwise (if the ANS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.

- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_AnscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANS_CHAR_INDEX_T *charIndex*, CYBLE_ANS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to the peer device to set the characteristic descriptor of the specified characteristic of Alert Notification Service.

Parameters:

connHandle	The BLE peer device connection handle.
charIndex	The index of the ANS characteristic.
descrIndex	The index of the ANS characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	Pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_STATE - The component in in invalid state for current operation.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ANS service-specific callback is registered (with CyBle_AnsRegisterAttrCallback):

- CYBLE_EVT_ANSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_ANS_DESCR_VALUE_T.

Otherwise (if the ANS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_AnscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ANS_CHAR_INDEX_T *charIndex*, uint8 *descrIndex*)

Sends a request to the peer device to get the characteristic descriptor of the specified characteristic of Alert Notification Service.

Parameters:

connHandle	BLE peer device connection handle.
charIndex	The index of the Service Characteristic.
descrIndex	The index of the Service Characteristic Descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - A request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The component is in invalid state for current operation.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Cannot process a request to send PDU due to invalid operation performed by the application.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ANS service-specific callback is registered (with CyBle_AnsRegisterAttrCallback):

- CYBLE_EVT_ANSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_ANS_DESCR_VALUE_T.

Otherwise (if the ANS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

ANS Definitions and Data Structures

Description

Contains the ANS specific definitions and data structures used in the ANS APIs.

Data Structures

- struct CYBLE_ANS_CHAR_VALUE_T
- struct CYBLE_ANS_DESCR_VALUE_T
- struct CYBLE_ANSS_CHAR_T
- struct CYBLE_ANSS_T
- struct CYBLE_SRVR_FULL_CHAR_INFO_T
- struct CYBLE_ANSC_T

Enumerations

- enum CYBLE_ANS_CHAR_INDEX_T{ CYBLE_ANS_SUPPORTED_NEW_ALERT_CAT, CYBLE_ANS_NEW_ALERT, CYBLE_ANS_SUPPORTED_UNREAD_ALERT_CAT, CYBLE_ANS_UNREAD_ALERT_STATUS, CYBLE_ANS_ALERT_NTF_CONTROL_POINT, CYBLE_ANS_CHAR_COUNT}
- enum CYBLE_ANS_DESCR_INDEX_T{ CYBLE_ANS_CCCD, CYBLE_ANS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_ANS_CHAR_INDEX_T

ANS Characteristic indexes

Enumerator

CYBLE_ANS_SUPPORTED_NEW_ALERT_CAT Supported New Alert Category Characteristic index

CYBLE_ANS_NEW_ALERT New Alert Characteristic index

CYBLE_ANS_SUPPORTED_UNREAD_ALERT_CAT Supported Unread Alert Category Characteristic index

CYBLE_ANS_UNREAD_ALERT_STATUS Unread Alert Status Characteristic index

CYBLE_ANS_ALERT_NTF_CONTROL_POINT Alert Notification Control Point Characteristic index

CYBLE_ANS_CHAR_COUNT Total count of ANS characteristics

enum CYBLE_ANS_DESCR_INDEX_T

ANS Characteristic Descriptors indexes

Enumerator

CYBLE_ANS_CCCD Client Characteristic Configuration Descriptor index

CYBLE_ANS_DESCR_COUNT Total count of descriptors

Battery Service BAS

Description

The Battery Service exposes the battery level of a single battery or set of batteries in a device.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The BAS API names begin with CyBle_Bas. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- BAS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- BAS Server Functions
  APIs unique to BAS designs configured as a GATT Server role.
- BAS Client Functions
  APIs unique to BAS designs configured as a GATT Client role.
- BAS Definitions and Data Structures
  Contains the BAS specific definitions and data structures used in the BAS APIs.

BAS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Bas

Functions

- void CyBle_BasRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_BasRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive battery service events from the BLE Component. The definition of CYBLE_CALLBACK_T for Battery Service is, typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_BASS_NOTIFICATION_ENABLED) • eventParam contains the parameters corresponding to the current event (e.g., pointer to CYBLE_BAS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered)

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

BAS Server Functions

Description

APIs unique to BAS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Bass

Functions

- CYBLE_API_RESULT_T CyBle_BassSetCharacteristicValue(uint8 serviceIndex, CYBLE_BAS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BassGetCharacteristicValue(uint8 serviceIndex, CYBLE_BAS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BassGetCharacteristicDescriptor(uint8 serviceIndex, CYBLE_BAS_CHAR_INDEX_TcharIndex, CYBLE_BAS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BassSendNotification (CYBLE_CONN_HANDLE_TconnHandle, uint8 serviceIndex, CYBLE_BAS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_T CyBle_BassSetCharacteristicValue (uint8 *serviceIndex*, CYBLE_BAS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the service in the local database.

Parameters:

serviceIndex	The index of the service instance.
charIndex	The index of the service characteristic of type CYBLE_BAS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute. A battery level characteristic has 1 byte length.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_T CyBle_BassGetCharacteristicValue (uint8 *serviceIndex*, CYBLE_BAS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the Battery service, which is identified by charIndex.

Parameters:

serviceIndex	The index of the service instance. e.g. If two Battery Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a service characteristic of type CYBLE_BAS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute. A battery level characteristic has a 1 byte length.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_T CyBle_BassGetCharacteristicDescriptor (uint8 *serviceIndex*, CYBLE_BAS_CHAR_INDEX_T *charIndex*, CYBLE_BAS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the Battery service from the local GATT database.

Parameters:

serviceIndex	The index of the service instance. e.g. If two Battery Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a service characteristic of type CYBLE_BAS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_BAS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_BassSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *serviceIndex*, CYBLE_BAS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function updates the value of the Battery Level characteristic in the GATT database. If the client has configured a notification on the Battery Level characteristic, the function additionally sends this value using a GATT Notification message.

The CYBLE_EVT_BASC_NOTIFICATION event is received by the peer device, on invoking this function.

Parameters:

connHandle	The BLE peer device connection handle
serviceIndex	The index of the service instance. e.g. If two Battery Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a service characteristic of type CYBLE_BAS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute. A battery level characteristic has 1 byte length.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

BAS Client Functions

Description

APIs unique to BAS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Basc

Functions

- CYBLE_API_RESULT_T CyBle_BascGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, uint8 serviceIndex, CYBLE_BAS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_BascSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, uint8 serviceIndex, CYBLE_BAS_CHAR_INDEX_TcharIndex, CYBLE_BAS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BascGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, uint8 serviceIndex, CYBLE_BAS_CHAR_INDEX_TcharIndex, CYBLE_BAS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_BascGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *serviceIndex*, CYBLE_BAS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic value from a server which is identified by charIndex.

This function call can result in generation of the following events based on the response from the server device.

- CYBLE_EVT_BASC_READ_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The BLE peer device connection handle.
serviceIndex	Index of the service instance. e.g. If two Battery Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a service characteristic of type CYBLE_BAS_CHAR_INDEX_T.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BAS service-specific callback is registered (with CyBle_BasRegisterAttrCallback):

- CYBLE_EVT_BASC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_BAS_CHAR_VALUE_T.

Otherwise (if the BAS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_BascSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *serviceIndex*, CYBLE_BAS_CHAR_INDEX_T *charIndex*, CYBLE_BAS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to set characteristic descriptor of specified Battery Service characteristic on the server device. This function call can result in the generation of the following events based on the response from the server device.

- CYBLE_EVT_BASC_WRITE_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

One of the following events is received by the peer device, on invoking this function.

- CYBLE_EVT_BASS_NOTIFICATION_ENABLED
- CYBLE_EVT_BASS_NOTIFICATION_DISABLED

Parameters:

connHandle	The BLE peer device connection handle.
serviceIndex	Index of the service instance. e.g. If two Battery Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a service characteristic of type CYBLE_BAS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_BAS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	Pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BAS service-specific callback is registered (with CyBle_BasRegisterAttrCallback):

- CYBLE_EVT_BASC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_BAS_DESCR_VALUE_T.

Otherwise (if the BAS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_BascGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *serviceIndex*, CYBLE_BAS_CHAR_INDEX_T *charIndex*, CYBLE_BAS_DESCR_INDEX_T *descrIndex*)

Sends a request to get characteristic descriptor of specified Battery Service characteristic from the server device. This function call can result in generation of the following events based on the response from the server device.

- CYBLE_EVT_BASC_READ_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The BLE peer device connection handle.
serviceIndex	Index of the service instance. e.g. If two Battery Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a Battery service characteristic of type CYBLE_BAS_CHAR_INDEX_T.
descrIndex	The index of a Battery service characteristic descriptor of type CYBLE_BAS_DESCR_INDEX_T.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BAS service-specific callback is registered (with CyBle_BasRegisterAttrCallback):

- CYBLE_EVT_BASC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_BAS_DESCR_VALUE_T.

Otherwise (if the BAS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

BAS Definitions and Data Structures

Description

Contains the BAS specific definitions and data structures used in the BAS APIs.

Data Structures

- struct CYBLE_BASS_T
- struct CYBLE_BASS_NOTIF_PAR_T
- struct CYBLE_BASC_T
- struct CYBLE_BAS_CHAR_VALUE_T
- struct CYBLE_BAS_DESCR_VALUE_T

Enumerations

- enum CYBLE_BAS_CHAR_INDEX_T{ CYBLE_BAS_BATTERY_LEVEL, CYBLE_BAS_CHAR_COUNT}
- enum CYBLE_BAS_DESCR_INDEX_T{ CYBLE_BAS_BATTERY_LEVEL_CCCD, CYBLE_BAS_BATTERY_LEVEL_CPFD, CYBLE_BAS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_BAS_CHAR_INDEX_T

BAS Characteristic indexes

Enumerator

CYBLE_BAS_BATTERY_LEVEL Battery Level characteristic index

CYBLE_BAS_CHAR_COUNT Total count of characteristics

enum CYBLE_BAS_DESCR_INDEX_T

BAS Characteristic Descriptors indexes

Enumerator

CYBLE_BAS_BATTERY_LEVEL_CCCD Client Characteristic Configuration descriptor index

CYBLE_BAS_BATTERY_LEVEL_CPFD Characteristic Presentation Format descriptor index

CYBLE_BAS_DESCR_COUNT Total count of descriptors

Body Composition Service (BCS)

Description

The Environmental Sensing Service exposes data related to body composition from a body composition analyzer (Server) intended for consumer healthcare as well as sports/fitness applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The BCS API names begin with CyBle_Bcs. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- BCS Server and Client Function

  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- BCS Server Functions

  APIs unique to BCS designs configured as a GATT Server role.
- BCS Client Functions

  APIs unique to DIS designs configured as a GATT Client role.
- BCS Definitions and Data Structures

  Contains the BCS specific definitions and data structures used in the BCS APIs.

BCS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Bcs

Functions

- void CyBle_BcsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_BcsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode: Indicates the event that triggered this callback (e.g. CYBLE_EVT_BCSS_INDICATION_ENABLED). • eventParam: Contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_BCS_CHAR_VALUE_T structure that contains details of the characteristic for which notification the enabled event was triggered).

Returns:

None

Events

None

BCS Server Functions

Description

APIs unique to BCS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Bcss

Functions

- CYBLE_API_RESULT_T CyBle_BcssSetCharacteristicValue (CYBLE_BCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BcssGetCharacteristicValue (CYBLE_BCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BcssSetCharacteristicDescriptor (CYBLE_BCS_CHAR_INDEX_TcharIndex, CYBLE_BCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BcssGetCharacteristicDescriptor (CYBLE_BCS_CHAR_INDEX_TcharIndex, CYBLE_BCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_BcssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_BcssSetCharacteristicValue (CYBLE_BCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a value for one of three characteristic values of the Body Composition Service. The characteristic is identified by charIndex.

Parameters:

charIndex	The index of a Body Composition Service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was written successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

Events

None

CYBLE_API_RESULT_TCyBle_BcssGetCharacteristicValue (CYBLE_BCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Reads a characteristic value of the Body Composition Service, which is identified by charIndex from the GATT database.

Parameters:

charIndex	The index of the Body Composition Service characteristic.
attrSize	The size of the Body Composition Service characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

Events

None

CYBLE_API_RESULT_TCyBle_BcssSetCharacteristicDescriptor (CYBLE_BCS_CHAR_INDEX_T *charIndex*, CYBLE_BCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the service characteristic.
charInstance	The instance of the characteristic specified by "charIndex".
attrSize	The size of the characteristic descriptor attribute.

attrValue	The pointer to the descriptor value data to be stored in the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

CYBLE_API_RESULT_TCyBle_BcssGetCharacteristicDescriptor (CYBLE_BCS_CHAR_INDEX_T *charIndex*, CYBLE_BCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Reads a a characteristic descriptor of a specified characteristic of the Body Composition Service from the GATT database.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The optional descriptor is absent.

Events

None

CYBLE_API_RESULT_TCyBle_BcssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication with a characteristic value of the Body Composition Service, which is a value specified by charIndex, to the client's device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client's device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.

- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BCS service-specific callback is registered (with CyBle_BcsRegisterAttrCallback):

- CYBLE_EVT_BCSS_INDICATION_CONFIRMED - If the indication is successfully delivered to the peer device.

Otherwise (if the BCS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - If the indication is successfully delivered to the peer device.

BCS Client Functions

Description

APIs unique to DIS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Bcsc

Functions

- CYBLE_API_RESULT_T CyBle_BcscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BCS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_BcscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BCS_CHAR_INDEX_TcharIndex, CYBLE_BCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BcscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BCS_CHAR_INDEX_TcharIndex, CYBLE_BCS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_BcscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BCS_CHAR_INDEX_T *charIndex*)

This function is used to read a characteristic value, which is a value identified by charIndex, from the server.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance of the characteristic specified by "charIndex".

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BCS service-specific callback is registered (with CyBle_BcsRegisterAttrCallback):

- CYBLE_EVT_BCSC_READ_CHAR_RESPONSE - If the requested attribute is successfully read on the peer device, ! the details (char index , value, etc.) are provided with an event parameter structure of type CYBLE_BCS_CHAR_VALUE_T.

Otherwise (if the BCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_BcscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BCS_CHAR_INDEX_T *charIndex*, CYBLE_BCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic descriptor to the server, which is identified by charIndex and descrIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
descrIndex	The index of the service characteristic descriptor.
charInstance	The instance of the characteristic specified by "charIndex".
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BCS service-specific callback is registered (with CyBle_BcsRegisterAttrCallback):

- CYBLE_EVT_BCSC_WRITE_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index etc.) are provided with an event parameter structure of type CYBLE_BCS_DESCR_VALUE_T.

Otherwise (if the BCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - If the requested attribute is successfully written on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_BcscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BCS_CHAR_INDEX_T *charIndex*, CYBLE_BCS_DESCR_INDEX_T *descrIndex*)

Sends a request to get the characteristic descriptor of the specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance of the characteristic specified by "charIndex".
descrIndex	The index of the service characteristic descriptor.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BCS service-specific callback is registered (with CyBle_BcsRegisterAttrCallback):

- CYBLE_EVT_BCSC_READ_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index, value, etc.) are provided with an event parameter structure of type CYBLE_BCS_DESCR_VALUE_T.

Otherwise (if the BCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with an event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

BCS Definitions and Data Structures

Description

Contains the BCS specific definitions and data structures used in the BCS APIs.

Data Structures

- struct CYBLE_BCS_CHAR_VALUE_T
- struct CYBLE_BCS_DESCR_VALUE_T
- struct CYBLE_BCSS_CHAR_T
- struct CYBLE_BCSS_T
- struct CYBLE_BCSC_CHAR_T
- struct CYBLE_BCSC_T

Enumerations

- enum CYBLE_BCS_CHAR_INDEX_T{ CYBLE_BCS_BODY_COMPOSITION_FEATURE, CYBLE_BCS_BODY_COMPOSITION_MEASUREMENT, CYBLE_BCS_CHAR_COUNT}

- enum CYBLE_BCS_DESCR_INDEX_T{ CYBLE_BCS_CCCD, CYBLE_BCS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_BCS_CHAR_INDEX_T

BCS Characteristic indexes

Enumerator

CYBLE_BCS_BODY_COMPOSITION_FEATURE Body Composition Feature Characteristic index

CYBLE_BCS_BODY_COMPOSITION_MEASUREMENT Body Composition Measurement Characteristic index

CYBLE_BCS_CHAR_COUNT Total count of BCS Characteristics

enum CYBLE_BCS_DESCR_INDEX_T

BCS Characteristic Descriptors indexes

Enumerator

CYBLE_BCS_CCCD Client Characteristic Configuration Descriptor index

CYBLE_BCS_DESCR_COUNT Total count of Descriptors

Blood Pressure Service (BLS)

Description

The Blood Pressure Service exposes blood pressure and other data related to a non-invasive blood pressure monitor for consumer and professional healthcare applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The BLS API names begin with CyBle_Bls. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- BLS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- BLS Server Functions
  APIs unique to BLS designs configured as a GATT Server role.
- BLS Client Functions
  APIs unique to BLS designs configured as a GATT Client role.
- BLS Definitions and Data Structures
  Contains the BLS specific definitions and data structures used in the BLS APIs.

BLS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Bls

Functions

- void CyBle_BlsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_BlsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for Blood Pressure Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_BASS_NOTIFICATION_ENABLED) • eventParam contains the parameters corresponding to the current event (e.g. Pointer to CYBLE_BLS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

BLS Server Functions

Description

APIs unique to BLS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Blss

Functions

- CYBLE_API_RESULT_T CyBle_BlssSetCharacteristicValue (CYBLE_BLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BlssGetCharacteristicValue (CYBLE_BLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BlssGetCharacteristicDescriptor (CYBLE_BLS_CHAR_INDEX_TcharIndex, CYBLE_BLS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BlssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BlssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_BlssSetCharacteristicValue (CYBLE_BLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the value of a characteristic which is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_BlssGetCharacteristicValue (CYBLE_BLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the Blood pressure service, which is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_BlssGetCharacteristicDescriptor (CYBLE_BLS_CHAR_INDEX_T *charIndex*, CYBLE_BLS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the Blood pressure service from the local GATT database.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_T CyBle_BlssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification of the specified characteristic to the Client device.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client

Events

None

CYBLE_API_RESULT_T CyBle_BlssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication of the specified characteristic to the Client device.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed

- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BLS service-specific callback is registered (with CyBle_BlsRegisterAttrCallback):

- CYBLE_EVT_BLSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the BLS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

BLS Client Functions

Description

APIs unique to BLS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Blsc

Functions

- CYBLE_API_RESULT_T CyBle_BlscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BLS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_BlscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BLS_CHAR_INDEX_TcharIndex, CYBLE_BLS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BlscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BLS_CHAR_INDEX_TcharIndex, CYBLE_BLS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_BlscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BLS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a server which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BLS service-specific callback is registered (with CyBle_BlsRegisterAttrCallback):

- CYBLE_EVT_BLSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_BLS_CHAR_VALUE_T.

Otherwise (if the BLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_BlscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BLS_CHAR_INDEX_T *charIndex*, CYBLE_BLS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to set characteristic descriptor of specified Blood Pressure Service characteristic on the server device.

Parameters:

connHandle	The BLE peer device connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
attrValue	Pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BLS service-specific callback is registered (with CyBle_BlsRegisterAttrCallback):

- CYBLE_EVT_BLSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_BLS_DESCR_VALUE_T.

Otherwise (if the BLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_BlscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BLS_CHAR_INDEX_T *charIndex*, CYBLE_BLS_DESCR_INDEX_T *descrIndex*)

Sends a request to get characteristic descriptor of specified Blood Pressure Service characteristic from the server device. This function call can result in the generation of the following events based on the response from the server device.

- CYBLE_EVT_BLSC_READ_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The BLE peer device connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of a service characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BLS service-specific callback is registered (with CyBle_BlsRegisterAttrCallback):

- CYBLE_EVT_BLSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_BLS_DESCR_VALUE_T.

Otherwise (if the BLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

BLS Definitions and Data Structures

Description

Contains the BLS specific definitions and data structures used in the BLS APIs.

Data Structures

- struct CYBLE_BLSS_CHAR_T
- struct CYBLE_BLSS_T
- struct CYBLE_BLSC_CHAR_T
- struct CYBLE_BLSC_T

- struct CYBLE_BLS_CHAR_VALUE_T
- struct CYBLE_BLS_DESCR_VALUE_T

Enumerations

- enum CYBLE_BLS_CHAR_INDEX_T{ CYBLE_BLS_BPM, CYBLE_BLS_ICP, CYBLE_BLS_BPF, CYBLE_BLS_CHAR_COUNT}
- enum CYBLE_BLS_DESCR_INDEX_T{ CYBLE_BLS_CCCD, CYBLE_BLS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_BLS_CHAR_INDEX_T

Service Characteristics indexes

Enumerator

CYBLE_BLS_BPM Blood Pressure Measurement characteristic index

CYBLE_BLS_ICP Intermediate Cuff Pressure Context characteristic index

CYBLE_BLS_BPF Blood Pressure Feature characteristic index

CYBLE_BLS_CHAR_COUNT Total count of BLS characteristics

enum CYBLE_BLS_DESCR_INDEX_T

Service Characteristic Descriptors indexes

Enumerator

CYBLE_BLS_CCCD Client Characteristic Configuration descriptor index

CYBLE_BLS_DESCR_COUNT Total count of BLS descriptors

Bond Management Service (BMS)

Description

The Bond Management Service defines how a peer Bluetooth device can manage the storage of bond information, especially the deletion of it, on the Bluetooth device supporting this service.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The BMS API names begin with CyBle_Bms. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- BMS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- BMS Server Functions
  APIs unique to BMS designs configured as a GATT Server role.
- BMS Client Functions
  APIs unique to BMS designs configured as a GATT Client role.
- BMS Definitions and Data Structures
  Contains the BMS specific definitions and data structures used in the BMS APIs.

BMS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Bms

Functions

- void CyBle_BmsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_BmsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for BM Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

BMS Server Functions

Description

APIs unique to BMS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Bmss

Functions

- CYBLE_API_RESULT_T CyBle_BmssSetCharacteristicValue (CYBLE_BMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BmssGetCharacteristicValue (CYBLE_BMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BmssSetCharacteristicDescriptor (CYBLE_BMS_CHAR_INDEX_TcharIndex, CYBLE_BMS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_BmssGetCharacteristicDescriptor (CYBLE_BMS_CHAR_INDEX_TcharIndex, CYBLE_BMS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_BmssSetCharacteristicValue (CYBLE_BMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the service identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_BmssGetCharacteristicValue (CYBLE_BMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the service, which is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where Characteristic value data should be stored.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_BmssSetCharacteristicDescriptor (CYBLE_BMS_CHAR_INDEX_T *charIndex*, CYBLE_BMS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic descriptor of a specified characteristic of the service.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_BMS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type

	CYBLE_BMS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the descriptor value data that should be stored to the GATT database.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

CYBLE_API_RESULT_TCyBle_BmssGetCharacteristicDescriptor (CYBLE_BMS_CHAR_INDEX_T *charIndex*, CYBLE_BMS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the service.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_BMS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_BMS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

BMS Client Functions

Description

APIs unique to BMS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Bmsc

Functions

- CYBLE_API_RESULT_T CyBle_BmscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BMS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_BmscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_BmscReliableWriteCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_BmscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_BMS_CHAR_INDEX_TcharIndex, CYBLE_BMS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_BmscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BMS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic value from a server which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BMS service-specific callback is registered (with CyBle_BmsRegisterAttrCallback):

- CYBLE_EVT_BMSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_BMS_CHAR_VALUE_T.

Otherwise (if the BMS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_BmscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic (which is identified by charIndex) value attribute to the server. The function supports a long write procedure - it depends on the attrSize parameter - if it is larger than the current MTU size - 1, then the long write will be executed.

The Write response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the

	server device.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BMS service-specific callback is registered (with CyBle_BmsRegisterAttrCallback):

- CYBLE_EVT_BMSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_BMS_CHAR_VALUE_T.

Otherwise (if the BMS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_BmscReliableWriteCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to perform a reliable write command for the Bond Management Control Pointcharacteristic (identified by charIndex) value attribute to the server.

The Write response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

CYBLE_API_RESULT_T CyBle_BmscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_BMS_CHAR_INDEX_T *charIndex*, CYBLE_BMS_DESCR_INDEX_T *descrIndex*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the BMS service-specific callback is registered (with CyBle_BmsRegisterAttrCallback):

- CYBLE_EVT_BMSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_BMS_DESCR_VALUE_T.

Otherwise (if the BMS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

BMS Definitions and Data Structures

Description

Contains the BMS specific definitions and data structures used in the BMS APIs.

Data Structures

- struct CYBLE_BMSS_CHAR_T
- struct CYBLE_BMSS_T
- struct CYBLE_BMSC_CHAR_T
- struct CYBLE_BMSC_T
- struct CYBLE_BMS_CHAR_VALUE_T
- struct CYBLE_BMS_DESCR_VALUE_T

Enumerations

- enum CYBLE_BMS_CHAR_INDEX_T{ CYBLE_BMS_BMCP, CYBLE_BMS_BMFT, CYBLE_BMS_CHAR_COUNT}
- enum CYBLE_BMS_DESCR_INDEX_T{ CYBLE_BMS_CEPD, CYBLE_BMS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_BMS_CHAR_INDEX_T

Service Characteristics indexes

Enumerator

CYBLE_BMS_BMCP Bond Management Control Point characteristic index

CYBLE_BMS_BMFT Bond Management Feature characteristic index

CYBLE_BMS_CHAR_COUNT Total count of BMS characteristics

enum CYBLE_BMS_DESCR_INDEX_T

Service Characteristic Descriptors indexes

Enumerator

CYBLE_BMS_CEPD Characteristic Extended Properties descriptor index

CYBLE_BMS_DESCR_COUNT Total count of CGMS descriptors

Continuous Glucose Monitoring Service (CGMS)

Description

The Continuous Glucose Monitoring Service exposes glucose measurement and other data related to a personal CGM sensor for healthcare applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The BMS API names begin with CyBle_Cgms. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- CGMS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- CGMS Server Functions
  APIs unique to BMS designs configured as a GATT Server role.
- CGMS Client Functions
  APIs unique to BMS designs configured as a GATT Client role.
- CGMS Definitions and Data Structures
  Contains the CGMS specific definitions and data structures used in the CGMS APIs.

CGMS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Cgms

Functions

- void CyBle_CgmsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_CgmsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for CGM Service is,

typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam)

- eventCode indicates the event that triggered this callback.
- eventParam contains the parameters corresponding to the current event.

Returns:

None.

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

CGMS Server Functions

Description

APIs unique to BMS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Cgmss

Functions

- CYBLE_API_RESULT_T CyBle_CgmssSetCharacteristicValue (CYBLE_CGMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CgmssGetCharacteristicValue (CYBLE_CGMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CgmssSetCharacteristicDescriptor (CYBLE_CGMS_CHAR_INDEX_TcharIndex, CYBLE_CGMS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CgmssGetCharacteristicDescriptor (CYBLE_CGMS_CHAR_INDEX_TcharIndex, CYBLE_CGMS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CgmssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CGMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CgmssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CGMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_CgmssSetCharacteristicValue (CYBLE_CGMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the service identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_CgmssGetCharacteristicValue (CYBLE_CGMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the service identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where Characteristic value data should be stored.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_CgmssSetCharacteristicDescriptor (CYBLE_CGMS_CHAR_INDEX_T *charIndex*, CYBLE_CGMS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic descriptor of a specified characteristic of the service.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CGMS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_CGMS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the descriptor value data that should be stored to the

	GATT database.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

CYBLE_API_RESULT_TCyBle_CgmssGetCharacteristicDescriptor (CYBLE_CGMS_CHAR_INDEX_T *charIndex*, CYBLE_CGMS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the service.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CGMS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_CGMS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

CYBLE_API_RESULT_TCyBle_CgmssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CGMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification of the specified characteristic to the client device, as defined by the charIndex value.

Parameters:

connHandle	The connection handle which consists of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the Characteristic value data that should be sent to the client device.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.

- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

Events

None

CYBLE_API_RESULT_TCyBle_CgmssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CGMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication of the specified characteristic to the client device, as defined by the charIndex value.

Parameters:

connHandle	The connection handle which consists of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the Characteristic value data that should be sent to Client device.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CGMS service-specific callback is registered (with CyBle_CgmsRegisterAttrCallback):

- CYBLE_EVT_CGMSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the CGMS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

CGMS Client Functions

Description

APIs unique to BMS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Cgmsc

Functions

- CYBLE_API_RESULT_T CyBle_CgmscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CGMS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CgmscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CGMS_CHAR_INDEX_TcharIndex)

- CYBLE_API_RESULT_T CyBle_CgmscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CGMS_CHAR_INDEX_TcharIndex, CYBLE_CGMS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CgmscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CGMS_CHAR_INDEX_TcharIndex, CYBLE_CGMS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_CgmscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CGMS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic (identified by charIndex) value attribute to the server.

The Write Response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CGMS service-specific callback is registered (with CyBle_CgmsRegisterAttrCallback):

- CYBLE_EVT_CGMSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_CGMS_CHAR_VALUE_T.

Otherwise (if the CGMS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CgmscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CGMS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a server identified by charIndex.

Parameters:

connHandle	The connection handle.

charIndex	The index of the service characteristic.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CGMS service-specific callback is registered (with CyBle_CgmsRegisterAttrCallback):

- CYBLE_EVT_CGMSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_CGMS_CHAR_VALUE_T.

Otherwise (if the CGMS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CgmscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CGMS_CHAR_INDEX_T *charIndex*, CYBLE_CGMS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the Characteristic Descriptor of the specified characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of a service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CGMS service-specific callback is registered (with CyBle_CgmsRegisterAttrCallback):

- CYBLE_EVT_CGMSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_CGMS_DESCR_VALUE_T.

Otherwise (if the CGMS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_CgmscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CGMS_CHAR_INDEX_T *charIndex*, CYBLE_CGMS_DESCR_INDEX_T *descrIndex*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

The return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CGMS service-specific callback is registered (with CyBle_CgmsRegisterAttrCallback):

- CYBLE_EVT_CGMSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_CGMS_DESCR_VALUE_T.

Otherwise (if the CGMS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CGMS Definitions and Data Structures

Description

Contains the CGMS specific definitions and data structures used in the CGMS APIs.

Data Structures

- struct CYBLE_CGMSS_CHAR_T
- struct CYBLE_CGMSS_T
- struct CYBLE_CGMSC_CHAR_T
- struct CYBLE_CGMSC_T
- struct CYBLE_CGMS_CHAR_VALUE_T
- struct CYBLE_CGMS_DESCR_VALUE_T

Enumerations

- enum CYBLE_CGMS_CHAR_INDEX_T{ CYBLE_CGMS_CGMT, CYBLE_CGMS_CGFT, CYBLE_CGMS_CGST, CYBLE_CGMS_SSTM, CYBLE_CGMS_SRTM, CYBLE_CGMS_RACP, CYBLE_CGMS_SOCP, CYBLE_CGMS_CHAR_COUNT}
- enum CYBLE_CGMS_DESCR_INDEX_T{ CYBLE_CGMS_CCCD, CYBLE_CGMS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_CGMS_CHAR_INDEX_T

Service Characteristics indexes

Enumerator

CYBLE_CGMS_CGMT CGM Measurement characteristic index

CYBLE_CGMS_CGFT CGM Feature characteristic index

CYBLE_CGMS_CGST CGM Status characteristic index

CYBLE_CGMS_SSTM CGM Session Start Time characteristic index

CYBLE_CGMS_SRTM CGM Session Run Time characteristic index

CYBLE_CGMS_RACP Record Access Control Point characteristic index

CYBLE_CGMS_SOCP CGM Specific Ops Control Point characteristic index

CYBLE_CGMS_CHAR_COUNT Total count of CGMS characteristics

enum CYBLE_CGMS_DESCR_INDEX_T

Service Characteristic Descriptors indexes

Enumerator

CYBLE_CGMS_CCCD Client Characteristic Configuration descriptor index

CYBLE_CGMS_DESCR_COUNT Total count of CGMS descriptors

Cycling Power Service (CPS)

Description

The Cycling Power Service (CPS) exposes power- and force-related data and optionally speed- and cadence-related data from a Cycling Power sensor (GATT Server) intended for sports and fitness applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The CPS API names begin with CyBle_Cps. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- CPS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- CPS Server Functions
  APIs unique to CPS designs configured as a GATT Server role.
- CPS Client Functions
  APIs unique to CPS designs configured as a GATT Client role.
- CPS Definitions and Data Structures
  Contains the CPS specific definitions and data structures used in the CPS APIs.

CPS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Cps

Functions

- void CyBle_CpsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_CpsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for CPS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None.

Events

None

CPS Server Functions

Description

APIs unique to CPS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Cpss

Functions

- CYBLE_API_RESULT_T CyBle_CpssSetCharacteristicValue (CYBLE_CPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CpssGetCharacteristicValue (CYBLE_CPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CpssSetCharacteristicDescriptor (CYBLE_CPS_CHAR_INDEX_TcharIndex, CYBLE_CPS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CpssGetCharacteristicDescriptor (CYBLE_CPS_CHAR_INDEX_TcharIndex, CYBLE_CPS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CpssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CpssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CpssStartBroadcast(uint16 advInterval, uint8 attrSize, uint8 *attrValue)
- void CyBle_CpssStopBroadcast(void)

Function Documentation

CYBLE_API_RESULT_TCyBle_CpssSetCharacteristicValue (CYBLE_CPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the service in the local database.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_CpssGetCharacteristicValue (CYBLE_CPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the service, which is a value identified by charIndex.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_CpssSetCharacteristicDescriptor (CYBLE_CPS_CHAR_INDEX_T *charIndex*, CYBLE_CPS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic descriptor of a specified characteristic of the service.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_CPS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the descriptor value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_CpssGetCharacteristicDescriptor (CYBLE_CPS_CHAR_INDEX_T *charIndex*, CYBLE_CPS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the service.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_CPS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_T CyBle_CpssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends notification with a characteristic value of the CPS, which is a value specified by charIndex, to the Client device.

Parameters:

connHandle	The connection handle
charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the Client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the Client.

Events

None

CYBLE_API_RESULT_T CyBle_CpssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends indication with a characteristic value of the CPS, which is a value specified by charIndex, to the Client device.

Parameters:

connHandle	The connection handle
charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the Client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the Client

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CPS service-specific callback is registered (with CyBle_CpsRegisterAttrCallback):

- CYBLE_EVT_CPSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the CPS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

CYBLE_API_RESULT_T CyBle_CpssStartBroadcast (uint16 *advInterval*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to start broadcasting of the Cycling Power Measurement characteristic or update broadcasting data when it was started before. It is available only in Broadcaster role.

Parameters:

advInterval	Advertising interval in 625 us units. The valid range is from CYBLE_GAP_ADV_ADVERT_INTERVAL_NONCON_MIN to CYBLE_GAP_ADV_ADVERT_INTERVAL_MAX.
attrSize	The size of the characteristic value attribute. This size is limited by maximum advertising packet length and advertising header size.
attrValue	The pointer to the Cycling Power Measurement characteristic that include the mandatory fields (e.g. the Flags field and the Instantaneous Power field) and depending on the Flags field, some optional fields in a non connectable undirected advertising event.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_INVALID_PARAMETER	On passing an invalid parameter.

void CyBle_CpssStopBroadcast (void)

This function is used to stop broadcasting of the Cycling Power Measurement characteristic.

Returns:

None

CPS Client Functions

Description

APIs unique to CPS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Cpsc

Functions

- CYBLE_API_RESULT_T CyBle_CpscSetCharacteristicValue (CYBLE_CONN_HANDLE_T connHandle, CYBLE_CPS_CHAR_INDEX_T charIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_CpscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CPS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_CpscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CPS_CHAR_INDEX_TcharIndex, CYBLE_CPS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CpscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CPS_CHAR_INDEX_TcharIndex, CYBLE_CPS_DESCR_INDEX_TdescrIndex)
- CYBLE_API_RESULT_T CyBle_CpscStartObserve(void)
- void CyBle_CpscStopObserve(void)

Function Documentation

CYBLE_API_RESULT_TCyBle_CpscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to set a characteristic value of the service, which is a value identified by charIndex, to the server device.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be send to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CPS service-specific callback is registered (with CyBle_CpsRegisterAttrCallback):

- CYBLE_EVT_CPSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_CPS_CHAR_VALUE_T.

Otherwise (if the CPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CpscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CPS_CHAR_INDEX_T *charIndex*)

This function is used to read a characteristic value, which is a value identified by charIndex, from the server.

The Read Response returns the characteristic Value in the Attribute Value parameter.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CPS service-specific callback is registered (with CyBle_CpsRegisterAttrCallback):

- CYBLE_EVT_CPSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_CPS_CHAR_VALUE_T.

Otherwise (if the CPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CpscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CPS_CHAR_INDEX_T *charIndex*, CYBLE_CPS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic descriptor to the server which is identified by charIndex

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_CPS_DESCR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CPS service-specific callback is registered (with CyBle_CpsRegisterAttrCallback):

- CYBLE_EVT_CPSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_CPS_DESCR_VALUE_T.

Otherwise (if the CPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CpscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CPS_CHAR_INDEX_T *charIndex*, CYBLE_CPS_DESCR_INDEX_T *descrIndex*)

Sends a request to get the characteristic descriptor of the specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_CPS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_CPS_DESCR_INDEX_T.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CPS service-specific callback is registered (with CyBle_CpsRegisterAttrCallback):

- CYBLE_EVT_CPSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_CPS_DESCR_VALUE_T.

Otherwise (if the CPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).

- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_CpscStartObserve (void)

This function is used for observing GAP peripheral devices. A device performing the observer role receives only advertisement data from devices irrespective of their discoverable mode settings. Advertisement data received is provided by the event, CYBLE_EVT_CPSC_SCAN_PROGRESS_RESULT. This procedure sets the scanType sub parameter to passive scanning.

If 'scanTo' sub-parameter is set to zero value, then passive scanning procedure will continue until you call CyBle_GapcStopObserve API. Possible generated events are:

- CYBLE_EVT_CPSC_SCAN_PROGRESS_RESULT

None.

Returns:

CYBLE_API_RESULT_T : Return value indicates if the function succeeded or failed. Following are the possible error codes.

Errors codes	Description
CYBLE_ERROR_OK	On successful operation.
CYBLE_ERROR_STACK_INTERNAL	An error occurred in the BLE stack.

void CyBle_CpscStopObserve (void)

This function used to stop the discovery of devices. On stopping discovery operation, CYBLE_EVT_GAPC_SCAN_START_STOP event is generated. Application layer needs to keep track of the function call made before receiving this event to associate this event with either the start or stop discovery function.

Possible events generated are:

- CYBLE_EVT_GAPC_SCAN_START_STOP

Returns:

None

CPS Definitions and Data Structures

Description

Contains the CPS specific definitions and data structures used in the CPS APIs.

Data Structures

- struct CYBLE_CPSS_CHAR_T
- struct CYBLE_CPSS_T
- struct CYBLE_CPSC_CHAR_T
- struct CYBLE_CPSC_T
- struct CYBLE_CPS_CHAR_VALUE_T
- struct CYBLE_CPS_DESCR_VALUE_T
- struct CYBLE_CYPACKED_ATTR

Enumerations

- enum CYBLE_CPS_CHAR_INDEX_T{ CYBLE_CPS_POWER_MEASURE, CYBLE_CPS_POWER_FEATURE, CYBLE_CPS_SENSOR_LOCATION, CYBLE_CPS_POWER_VECTOR, CYBLE_CPS_POWER_CP, CYBLE_CPS_CHAR_COUNT}
- enum CYBLE_CPS_DESCR_INDEX_T{ CYBLE_CPS_CCCD, CYBLE_CPS_SCCD, CYBLE_CPS_DESCR_COUNT}
- enum CYBLE_CPS_CP_OC_T{ CYBLE_CPS_CP_OC_SCV= 1u, CYBLE_CPS_CP_OC_USL, CYBLE_CPS_CP_OC_RSSL, CYBLE_CPS_CP_OC_SCRL, CYBLE_CPS_CP_OC_RCRL, CYBLE_CPS_CP_OC_SCHL, CYBLE_CPS_CP_OC_RCHL, CYBLE_CPS_CP_OC_SCHW, CYBLE_CPS_CP_OC_RCHW, CYBLE_CPS_CP_OC_SSL, CYBLE_CPS_CP_OC_RSL, CYBLE_CPS_CP_OC_SOC, CYBLE_CPS_CP_OC_MCPMCC, CYBLE_CPS_CP_OC_RSR, CYBLE_CPS_CP_OC_RFCD, CYBLE_CPS_CP_OC_RC= 32u}
- enum CYBLE_CPS_CP_RC_T{ CYBLE_CPS_CP_RC_SUCCESS= 1u, CYBLE_CPS_CP_RC_NOT_SUPPORTED, CYBLE_CPS_CP_RC_INVALID_PARAMETER, CYBLE_CPS_CP_RC_OPERATION_FAILED}
- enum CYBLE_CPS_SL_VALUE_T{ **CYBLE_CPS_SL_OTHER**, **CYBLE_CPS_SL_TOP_OF_SHOE**, **CYBLE_CPS_SL_IN_SHOE**, **CYBLE_CPS_SL_HIP**, **CYBLE_CPS_SL_FRONT_WHEEL**, **CYBLE_CPS_SL_LEFT_CRANK**, **CYBLE_CPS_SL_RIGHT_CRANK**, **CYBLE_CPS_SL_LEFT_PEDAL**, **CYBLE_CPS_SL_RIGHT_PEDAL**, **CYBLE_CPS_SL_FRONT_HUB**, **CYBLE_CPS_SL_REAR_DROPOUT**, **CYBLE_CPS_SL_CHAINSTAY**, **CYBLE_CPS_SL_REAR_WHEEL**, **CYBLE_CPS_SL_REAR_HUB**, **CYBLE_CPS_SL_CHEST**, **CYBLE_CPS_SL_COUNT**}

Enumeration Type Documentation

enum CYBLE_CPS_CHAR_INDEX_T

Characteristic indexes

Enumerator

CYBLE_CPS_POWER_MEASURE Cycling Power Measurement characteristic index

CYBLE_CPS_POWER_FEATURE Cycling Power Feature characteristic index

CYBLE_CPS_SENSOR_LOCATION Sensor Location characteristic index

CYBLE_CPS_POWER_VECTOR Cycling Power Vector characteristic index

CYBLE_CPS_POWER_CP Cycling Power Control Point characteristic index

CYBLE_CPS_CHAR_COUNT Total count of CPS characteristics

enum CYBLE_CPS_DESCR_INDEX_T

Characteristic Descriptors indexes

Enumerator

CYBLE_CPS_CCCD Client Characteristic Configuration descriptor index

CYBLE_CPS_SCCD Handle of the Server Characteristic Configuration descriptor

CYBLE_CPS_DESCR_COUNT Total count of descriptors

enum CYBLE_CPS_CP_OC_T

Op Codes of the Cycling Power Control Point characteristic

Enumerator

CYBLE_CPS_CP_OC_SCV Set Cumulative Value

CYBLE_CPS_CP_OC_USL Update Sensor Location

CYBLE_CPS_CP_OC_RSSL Request Supported Sensor Locations

CYBLE_CPS_CP_OC_SCRL Set Crank Length
CYBLE_CPS_CP_OC_RCRL Request Crank Length
CYBLE_CPS_CP_OC_SCHL Set Chain Length
CYBLE_CPS_CP_OC_RCHL Request Chain Length
CYBLE_CPS_CP_OC_SCHW Set Chain Weight
CYBLE_CPS_CP_OC_RCHW Request Chain Weight
CYBLE_CPS_CP_OC_SSL Set Span Length
CYBLE_CPS_CP_OC_RSL Request Span Length
CYBLE_CPS_CP_OC_SOC Start Offset Compensation
CYBLE_CPS_CP_OC_MCPMCC Mask Cycling Power Measurement Characteristic Content
CYBLE_CPS_CP_OC_RSR Request Sampling Rate
CYBLE_CPS_CP_OC_RFCD Request Factory Calibration Date
CYBLE_CPS_CP_OC_RC Response Code

enum CYBLE_CPS_CP_RC_T

Response Code of the Cycling Power Control Point characteristic

Enumerator

CYBLE_CPS_CP_RC_SUCCESS Response for successful operation.
CYBLE_CPS_CP_RC_NOT_SUPPORTED Response if unsupported Op Code is received
CYBLE_CPS_CP_RC_INVALID_PARAMETER Response if Parameter received does not meet the requirements of the service or is outside of the supported range of the Sensor
CYBLE_CPS_CP_RC_OPERATION_FAILED Response if the requested procedure failed

enum CYBLE_CPS_SL_VALUE_T

Sensor Location characteristic value

Cycling Speed and Cadence Service (CSCS)

Description

The Cycling Speed and Cadence (CSC) Service exposes speed-related data and/or cadence-related data while using the Cycling Speed and Cadence sensor (Server).

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The CSCS API names begin with CyBle_Cscs. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- CSCS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- CSCS Server Functions
  APIs unique to CSCS designs configured as a GATT Server role.
- CSCS Client Functions
  APIs unique to CSCS designs configured as a GATT Client role.
- CSCS Definitions and Data Structures
  Contains the CSCS specific definitions and data structures used in the CSCS APIs.

CSCS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Cscs

Functions

- void CyBle_CscsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_CscsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for Cycling Speed and Cadence Service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for CSCS is,

typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam)

- eventCode indicates the event that triggered this callback.
- eventParam contains the parameters corresponding to the current event.

Returns:

None.

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

CSCS Server Functions

Description

APIs unique to CSCS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Cscss

Functions

- CYBLE_API_RESULT_T CyBle_CscssSetCharacteristicValue (CYBLE_CSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CscssGetCharacteristicValue (CYBLE_CSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CscssGetCharacteristicDescriptor (CYBLE_CSCS_CHAR_INDEX_TcharIndex, CYBLE_CSCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CscssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_CscssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_CscssSetCharacteristicValue (CYBLE_CSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets characteristic value of the Cycling Speed and Cadence Service, which is identified by charIndex, to the local database.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CSCS_CHAR_INDEX_T. Valid values are, • CYBLE_CSCS_CSC_FEATURE • CYBLE_CSCS_SENSOR_LOCATION.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic.

Events

None

CYBLE_API_RESULT_TCyBle_CscssGetCharacteristicValue (CYBLE_CSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the Cycling Speed and Cadence Service, which is identified by charIndex, from the GATT database.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CSCS_CHAR_INDEX_T. Valid value is, • CYBLE_CSCS_SC_CONTROL_POINT.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_CscssGetCharacteristicDescriptor (CYBLE_CSCS_CHAR_INDEX_T *charIndex*, CYBLE_CSCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the Cycling Speed and Cadence Service, from the GATT database.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_CSCS_CHAR_INDEX_T. Valid values are, • CYBLE_CSCS_CSC_MEASUREMENT • CYBLE_CSCS_SC_CONTROL_POINT.
descrIndex	The index of a service characteristic descriptor of type CYBLE_CSCS_DESCR_INDEX_T. Valid value is • CYBLE_CSCS_CCCD.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic.

Events

None

CYBLE_API_RESULT_TCyBle_CscssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends notification with a characteristic value, which is specified by charIndex, of the Cycling Speed and Cadence Service to the Client device.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_CSCS_CHAR_INDEX_T. Valid value is • CYBLE_CSCS_CSC_MEASUREMENT.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameter is failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.

Events

None

CYBLE_API_RESULT_T CyBle_CscssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends indication with a characteristic value, which is specified by charIndex, of the Cycling Speed and Cadence Service to the Client device.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_CSCS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request is handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameter is failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CSCS service-specific callback is registered (with CyBle_CscsRegisterAttrCallback):

- CYBLE_EVT_CSCSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the CSCS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

CSCS Client Functions

Description

APIs unique to CSCS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Cscsc

Functions

- CYBLE_API_RESULT_T CyBle_CscscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CscscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CSCS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_CscscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CSCS_CHAR_INDEX_TcharIndex, CYBLE_CSCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CscscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CSCS_CHAR_INDEX_TcharIndex, CYBLE_CSCS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_CscscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to peer device to get characteristic descriptor of specified characteristic of the Cycling Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	Size of the characteristic value attribute.
attrValue	Pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully;
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CSCS service-specific callback is registered (with CyBle_CscsRegisterAttrCallback):

- CYBLE_EVT_CSCSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_CSCS_CHAR_VALUE_T.

Otherwise (if the CSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CscscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CSCS_CHAR_INDEX_T *charIndex*)

Sends a request to peer device to get characteristic value of the Cycling Speed and Cadence Service, which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully;
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CSCS service-specific callback is registered (with CyBle_CscsRegisterAttrCallback):

- CYBLE_EVT_CSCSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_CSCS_CHAR_VALUE_T.

Otherwise (if the CSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CscscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CSCS_CHAR_INDEX_T *charIndex*, CYBLE_CSCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to peer device to get characteristic descriptor of specified characteristic of the Cycling Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a CSCS characteristic.
descrIndex	The index of a CSCS characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request was sent successfully.

- CYBLE_ERROR_INVALID_STATE - connection with the client is not established.
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular descriptor.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CSCS service-specific callback is registered (with CyBle_CscsRegisterAttrCallback):

- CYBLE_EVT_CSCSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_CSCS_DESCR_VALUE_T.

Otherwise (if the CSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_CscscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CSCS_CHAR_INDEX_T *charIndex*, CYBLE_CSCS_DESCR_INDEX_T *descrIndex*)

Sends a request to peer device to get characteristic descriptor of specified characteristic of the Cycling Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a Service Characteristic.
descrIndex	The index of a Service Characteristic Descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the Client is not established.
- CYBLE_ERROR_INVALID_OPERATION - Cannot process a request to send PDU due to invalid operation performed by the application.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular descriptor.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CSCS service-specific callback is registered (with CyBle_CscsRegisterAttrCallback):

- CYBLE_EVT_CSCSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_CSCS_DESCR_VALUE_T.

Otherwise (if the CSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CSCS Definitions and Data Structures

Description

Contains the CSCS specific definitions and data structures used in the CSCS APIs.

Data Structures

- struct CYBLE_CSCS_CHAR_VALUE_T
- struct CYBLE_CSCS_DESCR_VALUE_T
- struct CYBLE_CSCSS_CHAR_T
- struct CYBLE_CSCSS_T
- struct CYBLE_CSCSC_SRVR_FULL_CHAR_INFO_T
- struct CYBLE_CSCSC_T

Enumerations

- enum CYBLE_CSCS_CHAR_INDEX_T{ CYBLE_CSCS_CSC_MEASUREMENT, CYBLE_CSCS_CSC_FEATURE, CYBLE_CSCS_SENSOR_LOCATION, CYBLE_CSCS_SC_CONTROL_POINT, CYBLE_CSCS_CHAR_COUNT}
- enum CYBLE_CSCS_DESCR_INDEX_T{ CYBLE_CSCS_CCCD, CYBLE_CSCS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_CSCS_CHAR_INDEX_T

Characteristic indexes

Enumerator

CYBLE_CSCS_CSC_MEASUREMENT CSC Measurement Characteristic index

CYBLE_CSCS_CSC_FEATURE CSC Feature Characteristic index

CYBLE_CSCS_SENSOR_LOCATION CSC Sensor Location Characteristic index

CYBLE_CSCS_SC_CONTROL_POINT CSC SC Control Point Characteristic index

CYBLE_CSCS_CHAR_COUNT Total count of CSCS Characteristics

enum CYBLE_CSCS_DESCR_INDEX_T

Characteristic Descriptors indexes

Enumerator

CYBLE_CSCS_CCCD Client Characteristic Configuration Descriptor index

CYBLE_CSCS_DESCR_COUNT Total count of Descriptors

Current Time Service (CTS)

Description

Current Time Service defines how a Bluetooth device can expose time information to other Bluetooth devices.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The CTS API names begin with CyBle_Cts. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- CTS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- CTS Server Functions
  APIs unique to CTS designs configured as a GATT Server role.
- CTS Client Functions
  APIs unique to CTS designs configured as a GATT Client role.
- CTS Definitions and Data Structures
  Contains the CTS specific definitions and data structures used in the CTS APIs.

CTS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Cts

Functions

- void CyBle_CtsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_CtsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for Current Time Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_CTSS_NOTIFICATION_ENABLED) • eventParam contains the parameters corresponding to the current event (e.g. Pointer to CYBLE_CTS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

CTS Server Functions

Description

APIs unique to CTS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Ctss

Functions

- CYBLE_API_RESULT_T CyBle_CtssSetCharacteristicValue (CYBLE_CTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CtssGetCharacteristicValue (CYBLE_CTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CtssGetCharacteristicDescriptor (CYBLE_CTS_CHAR_INDEX_TcharIndex, CYBLE_CTS_CHAR_DESCRIPTORS_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CtssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_CtssSetCharacteristicValue (CYBLE_CTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a value for one of three characteristic values of the Current Time Service. The characteristic is identified by charIndex.

Parameters:

charIndex	The index of the Current Time Service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was written successfully
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed

Events

None

CYBLE_API_RESULT_TCyBle_CtssGetCharacteristicValue (CYBLE_CTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the Current Time Service, which is identified by charIndex.

Parameters:

charIndex	The index of a Current Time Service characteristic.

attrSize	The size of the Current Time Service characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed

Events

None

CYBLE_API_RESULT_TCyBle_CtssGetCharacteristicDescriptor (CYBLE_CTS_CHAR_INDEX_T *charIndex*, CYBLE_CTS_CHAR_DESCRIPTORS_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the Current Time Service.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_TCyBle_CtssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification to the client's device. A characteristic value also gets written to the GATT database.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic to be send as a notification to the Client device.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic notification was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.

- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

Events

None

CTS Client Functions

Description

APIs unique to CTS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Ctsc

Functions

- CYBLE_API_RESULT_T CyBle_CtscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CtscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CTS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_CtscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CTS_CHAR_INDEX_TcharIndex, CYBLE_CTS_CHAR_DESCRIPTORS_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_CtscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_CTS_CHAR_INDEX_TcharIndex, uint8 descrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_CtscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the Current Time Service, which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic descriptor attribute.
attrValue	Pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CTS service-specific callback is registered (with CyBle_CtsRegisterAttrCallback):

- CYBLE_EVT_CTSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_CTS_CHAR_VALUE_T.

Otherwise (if the CTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CtscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CTS_CHAR_INDEX_T *charIndex*)

Gets a characteristic value of the Current Time Service, which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CTS service-specific callback is registered (with CyBle_CtsRegisterAttrCallback):

- CYBLE_EVT_CTSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_CTS_CHAR_VALUE_T.

Otherwise (if the CTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CtscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CTS_CHAR_INDEX_T *charIndex*, CYBLE_CTS_CHAR_DESCRIPTORS_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic descriptor of the Current Time Characteristic of the Current Time Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the Current Time Service characteristic.
descrIndex	The index of the Current Time Service characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	Pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on specified attribute.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular descriptor.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CTS service-specific callback is registered (with CyBle_CtsRegisterAttrCallback):

- CYBLE_EVT_CTSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_CTS_DESCR_VALUE_T.

Otherwise (if the CTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_CtscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_CTS_CHAR_INDEX_T *charIndex*, uint8 *descrIndex*)

Gets a characteristic descriptor of the Current Time Characteristic of the Current Time Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of a service characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - State is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on specified attribute.

- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular descriptor.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CTS service-specific callback is registered (with CyBle_CtsRegisterAttrCallback):

- CYBLE_EVT_CTSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_CTS_DESCR_VALUE_T.

Otherwise (if the CTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CTS Definitions and Data Structures

Description

Contains the CTS specific definitions and data structures used in the CTS APIs.

Data Structures

- struct CYBLE_CTS_CURRENT_TIME_T
- struct CYBLE_CTS_LOCAL_TIME_INFO_T
- struct CYBLE_CTS_REFERENCE_TIME_INFO_T
- struct CYBLE_CTS_CHAR_VALUE_T
- struct CYBLE_CTS_DESCR_VALUE_T
- struct CYBLE_CTSS_T
- struct CYBLE_CTSC_T

Enumerations

- enum CYBLE_CTS_CHAR_INDEX_T{ CYBLE_CTS_CURRENT_TIME, CYBLE_CTS_LOCAL_TIME_INFO, CYBLE_CTS_REFERENCE_TIME_INFO, CYBLE_CTS_CHAR_COUNT}
- enum CYBLE_CTS_CHAR_DESCRIPTORS_T{ CYBLE_CTS_CURRENT_TIME_CCCD, CYBLE_CTS_COUNT}

Enumeration Type Documentation

enum CYBLE_CTS_CHAR_INDEX_T

Service Characteristics indexes

Enumerator

CYBLE_CTS_CURRENT_TIME Current Time characteristic index

CYBLE_CTS_LOCAL_TIME_INFO Local Time Information characteristic index

CYBLE_CTS_REFERENCE_TIME_INFO Reference Time Information characteristic index

CYBLE_CTS_CHAR_COUNT Total count of Current Time Service characteristics

enum CYBLE_CTS_CHAR_DESCRIPTORS_T

Service Characteristic Descriptors indexes

Enumerator

CYBLE_CTS_CURRENT_TIME_CCCD Current Time Client Characteristic configuration descriptor index

CYBLE_CTS_COUNT Total count of Current Time Service characteristic descriptors

Device Information Service (DIS)

Description

The Device Information Service exposes manufacturer and/or vendor information about a device.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The DIS API names begin with CyBle_Dis. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- DIS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- DIS Server Functions
  APIs unique to DIS designs configured as a GATT Server role.
- DIS Client Functions
  APIs unique to DIS designs configured as a GATT Client role.
- DIS Definitions and Data Structures
  Contains the DIS specific definitions and data structures used in the DIS APIs.

DIS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Dis

Functions

- void CyBle_DisRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_DisRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Callback doesn't have events in server role.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for Device Information Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback.

	• eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

DIS Server Functions

Description

APIs unique to DIS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Diss

Functions

- CYBLE_API_RESULT_T CyBle_DissSetCharacteristicValue (CYBLE_DIS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_DissGetCharacteristicValue (CYBLE_DIS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_DissSetCharacteristicValue (CYBLE_DIS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the service, which is identified by charIndex, to the local database.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
**attrValue*	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_DissGetCharacteristicValue (CYBLE_DIS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the service, which is identified by charIndex, from the GATT database.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
**attrValue*	The pointer to the location where characteristic value data should be

	stored.

Returns:

Return value is of type CYBLE_API_RESULT_T. Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

DIS Client Functions

Description

APIs unique to DIS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Disc

Functions

- CYBLE_API_RESULT_T CyBle_DiscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_DIS_CHAR_INDEX_TcharIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_DiscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_DIS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a server which is identified by charIndex.

The Read Response returns the characteristic value in the Attribute Value parameter. The Read Response only contains the characteristic value that is less than or equal to (MTU - 1) octets in length. If the characteristic value is greater than (MTU - 1) octets in length, a Read Long Characteristic Value procedure may be used if the rest of the characteristic value is required.

This function call can result in generation of the following events based on the response from the server device.

- CYBLE_EVT_DISC_READ_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the DIS service-specific callback is registered (with CyBle_DisRegisterAttrCallback):

- CYBLE_EVT_DISC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_DIS_CHAR_VALUE_T.

Otherwise (if the DIS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

DIS Definitions and Data Structures

Description

Contains the DIS specific definitions and data structures used in the DIS APIs.

Data Structures

- struct CYBLE_DISS_T
- struct CYBLE_DISC_T
- struct CYBLE_DIS_CHAR_VALUE_T

Enumerations

- enum CYBLE_DIS_CHAR_INDEX_T{ CYBLE_DIS_MANUFACTURER_NAME, CYBLE_DIS_MODEL_NUMBER, CYBLE_DIS_SERIAL_NUMBER, CYBLE_DIS_HARDWARE_REV, CYBLE_DIS_FIRMWARE_REV, CYBLE_DIS_SOFTWARE_REV, CYBLE_DIS_SYSTEM_ID, CYBLE_DIS_REG_CERT_DATA, CYBLE_DIS_PNP_ID, CYBLE_DIS_CHAR_COUNT}

Enumeration Type Documentation

enum CYBLE_DIS_CHAR_INDEX_T

DIS characteristic index

Enumerator

CYBLE_DIS_MANUFACTURER_NAME Manufacturer Name String characteristic index

CYBLE_DIS_MODEL_NUMBER Model Number String characteristic index

CYBLE_DIS_SERIAL_NUMBER Serial Number String characteristic index

CYBLE_DIS_HARDWARE_REV Hardware Revision String characteristic index

CYBLE_DIS_FIRMWARE_REV Firmware Revision String characteristic index

CYBLE_DIS_SOFTWARE_REV Software Revision String characteristic index

CYBLE_DIS_SYSTEM_ID System ID characteristic index

CYBLE_DIS_REG_CERT_DATA IEEE 11073-20601 characteristic index

CYBLE_DIS_PNP_ID PnP ID characteristic index

CYBLE_DIS_CHAR_COUNT Total count of DIS characteristics

Environmental Sensing Service (ESS)

Description

The Environmental Sensing Service exposes measurement data from an environmental sensor intended for sports and fitness applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The ESS API names begin with CyBle_Ess. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- ESS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- ESS Server Functions
  APIs unique to ESS designs configured as a GATT Server role.
- ESS Client Functions
  APIs unique to ESS designs configured as a GATT Client role.
- ESS Definitions and Data Structures
  Contains the ESS specific definitions and data structures used in the ESS APIs.

ESS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Ess

Functions

- void CyBle_EssRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_EssRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for ESS Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode: Indicates the event that triggered this callback (e.g. CYBLE_EVT_ESSS_NOTIFICATION_ENABLED). • eventParam: Contains the parameters corresponding to the current event. (e.g. Pointer to CYBLE_ESS_CHAR_VALUE_T structure that contains details of the characteristic for which the notification enabled event was triggered).

Returns:

None.

Events

None

ESS Server Functions

Description

APIs unique to ESS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Esss

Functions

- CYBLE_API_RESULT_T CyBle_EsssSetChangeIndex(uint16 essIndex)
- CYBLE_API_RESULT_T CyBle_EsssSetCharacteristicValue (CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsssGetCharacteristicValue (CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsssSetCharacteristicDescriptor (CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, CYBLE_ESS_DESCR_INDEX_TdescrIndex, uint16 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsssGetCharacteristicDescriptor (CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, CYBLE_ESS_DESCR_INDEX_TdescrIndex, uint16 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_EsssSetChangeIndex (uint16 *essIndex*)

Performs write operation of two-byte pseudo-random change index to the advertisement packet. The "Service Data" field should be selected in the component customizer GUI and contain a two-byte initial change index value and in opposite case the function will always return "CYBLE_ERROR_INVALID_OPERATION".

Parameters:

essIndex	A two-byte pseudo-random change index to be written to the advertisement data.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_OPERATION - The change index is not present in the advertisement data or its length is not equal to two bytes.

CYBLE_API_RESULT_TCyBle_EsssSetCharacteristicValue (CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the characteristic value of the service in the local database.

Parameters:

charIndex	The index of the service characteristic. Starts with zero.

charInstance	The instance number of the characteristic specified by "charIndex".
attrSize	The size (in Bytes) of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_EsssGetCharacteristicValue (CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the characteristic value of the service, which is a value identified by charIndex.

Parameters:

charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance number of the characteristic specified by "charIndex".
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_EsssSetCharacteristicDescriptor (CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, CYBLE_ESS_DESCR_INDEX_T *descrIndex*, uint16 *attrSize*, uint8 * *attrValue*)

Sets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the service characteristic.
charInstance	The instance number of the characteristic specified by "charIndex".
descrIndex	The index of the service characteristic descriptor of type CYBLE_ESS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the descriptor value data to be stored in the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.

- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_T CyBle_EsssGetCharacteristicDescriptor (CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, CYBLE_ESS_DESCR_INDEX_T *descrIndex*, uint16 *attrSize*, uint8 * *attrValue*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance number of the characteristic specified by "charIndex".
descrIndex	The index of the service characteristic descriptor of type CYBLE_ESS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_T CyBle_EsssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification with a characteristic value of the Environmental Sensing Service, which is a value specified by charIndex, to the client's device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance number of the characteristic specified by "charIndex".
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client's device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - A notification is not enabled by the client.

- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

None

CYBLE_API_RESULT_TCyBle_EsssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication with a characteristic value of the Environmental Sensing Service, which is a value specified by charIndex, to the client's device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
charInstance	The instance number of the characteristic specified by "charIndex".
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client's device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ESS service-specific callback is registered (with CyBle_EssRegisterAttrCallback):

- CYBLE_EVT_ESSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the ESS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

ESS Client Functions

Description

APIs unique to ESS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Essc

Functions

- CYBLE_API_RESULT_T CyBle_EsscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance)

- CYBLE_API_RESULT_T CyBle_EsscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, CYBLE_ESS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, CYBLE_ESS_DESCR_INDEX_TdescrIndex)
- CYBLE_API_RESULT_T CyBle_EsscSetLongCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, CYBLE_ESS_DESCR_INDEX_TdescrIndex, uint16 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_EsscGetLongCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_ESS_CHAR_INDEX_TcharIndex, uint8 charInstance, CYBLE_ESS_DESCR_INDEX_TdescrIndex, uint16 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_EsscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to set a characteristic value of the service, which is a value identified by charIndex, to the server's device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance number of the characteristic specified by "charIndex".
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ESS service-specific callback is registered (with CyBle_EssRegisterAttrCallback):

- CYBLE_EVT_ESSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_ESS_CHAR_VALUE_T.

Otherwise (if the ESS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.

- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_EsscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*)

This function is used to read a characteristic value, which is a value identified by charIndex, from the server.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance number of the characteristic specified by "charIndex".

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ESS service-specific callback is registered (with CyBle_EssRegisterAttrCallback):

- CYBLE_EVT_ESSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_ESS_CHAR_VALUE_T.

Otherwise (if the ESS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_EsscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, CYBLE_ESS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic descriptor to the server, which is identified by charIndex and descrIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
descrIndex	The index of the service characteristic descriptor.
charInstance	The instance number of the characteristic specified by "charIndex".

attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional Characteristic Descriptor is absent.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ESS service-specific callback is registered (with CyBle_EssRegisterAttrCallback):

- CYBLE_EVT_ESSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_ESS_DESCR_VALUE_T.

Otherwise (if the ESS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_EsscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, CYBLE_ESS_DESCR_INDEX_T *descrIndex*)

Sends a request to get the characteristic descriptor of the specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance number of the characteristic specified by "charIndex".
descrIndex	The index of the service characteristic descriptor.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional Characteristic Descriptor is absent.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the ESS service-specific callback is registered (with CyBle_EssRegisterAttrCallback):

- CYBLE_EVT_ESSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_ESS_DESCR_VALUE_T.

Otherwise (if the ESS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_EsscSetLongCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, CYBLE_ESS_DESCR_INDEX_T *descrIndex*, uint16 *attrSize*, uint8 * *attrValue*)

This function is used to write a long characteristic descriptor to the server, which is identified by charIndex and descrIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
descrIndex	The index of the service characteristic descriptor.
charInstance	The instance number of the characteristic specified by "charIndex".
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic Descriptor is absent.

CYBLE_API_RESULT_TCyBle_EsscGetLongCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_ESS_CHAR_INDEX_T *charIndex*, uint8 *charInstance*, CYBLE_ESS_DESCR_INDEX_T *descrIndex*, uint16 *attrSize*, uint8 * *attrValue*)

Sends a request to read long characteristic descriptor of the specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
charInstance	The instance number of the characteristic specified by "charIndex".
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic value attribute.

attrValue	The pointer to the buffer where the read long characteristic descriptor value should be stored.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The optional Characteristic Descriptor is absent.

ESS Definitions and Data Structures

Description

Contains the ESS specific definitions and data structures used in the ESS APIs.

Data Structures

- struct CYBLE_ESSS_CHAR_T
- struct CYBLE_ESSS_CHAR_INFO_PTR_T
- struct CYBLE_ESSS_T
- struct CYBLE_ESSC_CHAR_T
- struct CYBLE_ESSC_CHAR_INFO_PTR_T
- struct CYBLE_ESSC_T
- struct CYBLE_ESS_CHAR_VALUE_T
- struct CYBLE_ESS_DESCR_VALUE_T

Enumerations

- enum CYBLE_ESS_CHAR_INDEX_T{ CYBLE_ESS_DESCRIPTOR_VALUE_CHANGED, CYBLE_ESS_APPARENT_WIND_DIR, CYBLE_ESS_APPARENT_WIND_SPEED, CYBLE_ESS_DEW_POINT, CYBLE_ESS_ELEVATION, CYBLE_ESS_GUST_FACTOR, CYBLE_ESS_HEAT_INDEX, CYBLE_ESS_HUMIDITY, CYBLE_ESS_IRRADIANCE, CYBLE_ESS_POLLEN_CONCENTRATION, CYBLE_ESS_RAINFALL, CYBLE_ESS_PRESSURE, CYBLE_ESS_TEMPERATURE, CYBLE_ESS_TRUE_WIND_DIR, CYBLE_ESS_TRUE_WIND_SPEED, CYBLE_ESS_UV_INDEX, CYBLE_ESS_WIND_CHILL, CYBLE_ESS_BAROMETRIC_PRESSURE_TREND, CYBLE_ESS_MAGNETIC_DECLINATION, CYBLE_ESS_MAGNETIC_FLUX_DENSITY_2D, CYBLE_ESS_MAGNETIC_FLUX_DENSITY_3D, CYBLE_ESS_CHAR_COUNT}
- enum CYBLE_ESS_DESCR_INDEX_T{ CYBLE_ESS_CCCD, CYBLE_ESS_CHAR_EXTENDED_PROPERTIES, CYBLE_ESS_ES_MEASUREMENT_DESCR, CYBLE_ESS_ES_TRIGGER_SETTINGS_DESCR1, CYBLE_ESS_ES_TRIGGER_SETTINGS_DESCR2, CYBLE_ESS_ES_TRIGGER_SETTINGS_DESCR3, CYBLE_ESS_ES_CONFIG_DESCR, CYBLE_ESS_CHAR_USER_DESCRIPTION_DESCR, CYBLE_ESS_VRD, CYBLE_ESS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_ESS_CHAR_INDEX_T

ESS Characteristic indexes

Enumerator

CYBLE_ESS_DESCRIPTOR_VALUE_CHANGED Descriptor Value Changed Characteristic index

CYBLE_ESS_APPARENT_WIND_DIR Apparent Wind Direction Characteristic index

CYBLE_ESS_APPARENT_WIND_SPEED Apparent Wind Speed Characteristic index

CYBLE_ESS_DEW_POINT Dew Point Characteristic index

CYBLE_ESS_ELEVATION Elevation Characteristic index

CYBLE_ESS_GUST_FACTOR Gust Factor Characteristic index

CYBLE_ESS_HEAT_INDEX Heat Index Characteristic index

CYBLE_ESS_HUMIDITY Humidity Characteristic index

CYBLE_ESS_IRRADIANCE Irradiance Characteristic index

CYBLE_ESS_POLLEN_CONCENTRATION Pollen Concentration Characteristic index

CYBLE_ESS_RAINFALL Rainfall Characteristic index

CYBLE_ESS_PRESSURE Pressure Characteristic index

CYBLE_ESS_TEMPERATURE Temperature Characteristic index

CYBLE_ESS_TRUE_WIND_DIR True Wind Direction Characteristic index

CYBLE_ESS_TRUE_WIND_SPEED True Wind Speed Characteristic index

CYBLE_ESS_UV_INDEX UV Index Characteristic index

CYBLE_ESS_WIND_CHILL Wind Chill Characteristic index

CYBLE_ESS_BAROMETRIC_PRESSURE_TREND Barometric Pressure trend Characteristic index

CYBLE_ESS_MAGNETIC_DECLINATION Magnetic Declination Characteristic index

CYBLE_ESS_MAGNETIC_FLUX_DENSITY_2D Magnetic Flux Density 2D Characteristic index

CYBLE_ESS_MAGNETIC_FLUX_DENSITY_3D Magnetic Flux Density 3D Characteristic index

CYBLE_ESS_CHAR_COUNT Total count of ESS characteristics

enum CYBLE_ESS_DESCR_INDEX_T

ESS Characteristic Descriptors indexes

Enumerator

CYBLE_ESS_CCCD Client Characteristic Configuration Descriptor index

CYBLE_ESS_CHAR_EXTENDED_PROPERTIES Characteristic Extended Properties Descriptor index

CYBLE_ESS_ES_MEASUREMENT_DESCR ES Measurement Descriptor index

CYBLE_ESS_ES_TRIGGER_SETTINGS_DESCR1 ES Trigger Settings Descriptor #1 index

CYBLE_ESS_ES_TRIGGER_SETTINGS_DESCR2 ES Trigger Settings Descriptor #2 index

CYBLE_ESS_ES_TRIGGER_SETTINGS_DESCR3 ES Trigger Settings Descriptor #3 index

CYBLE_ESS_ES_CONFIG_DESCR ES Configuration Descriptor index

CYBLE_ESS_CHAR_USER_DESCRIPTION_DESCR Characteristic User Description Descriptor index

CYBLE_ESS_VRD Valid Range Descriptor index

CYBLE_ESS_DESCR_COUNT Total count of descriptors

Glucose Service (GLS)

Description

The Glucose Service exposes glucose and other data related to a personal glucose sensor for consumer healthcare applications and is not designed for clinical use.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The GLS API names begin with CyBle_Gls. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- GLS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- GLS Server Functions
  APIs unique to GLS designs configured as a GATT Server role.
- GLS Client Functions
  APIs unique to GLS designs configured as a GATT Client role.
- GLS Definitions and Data Structures
  Contains the GLS specific definitions and data structures used in the GLS APIs.

GLS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Gls

Functions

- void CyBle_GlsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_GlsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for Glucose Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

GLS Server Functions

Description

APIs unique to GLS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Glss

Functions

- CYBLE_API_RESULT_T CyBle_GlssSetCharacteristicValue (CYBLE_GLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_GlssGetCharacteristicValue (CYBLE_GLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_GlssGetCharacteristicDescriptor (CYBLE_GLS_CHAR_INDEX_TcharIndex, CYBLE_GLS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_GlssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_GlssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_GlssSetCharacteristicValue (CYBLE_GLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the service, which is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
**attrValue*	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_GlssGetCharacteristicValue (CYBLE_GLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the service, which is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
**attrValue*	Pointer to the location where Characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_GlssGetCharacteristicDescriptor (CYBLE_GLS_CHAR_INDEX_T *charIndex*, CYBLE_GLS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value attribute.
**attrValue*	Pointer to the location where the descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_TCyBle_GlssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification of the specified characteristic to the client device, as defined by the charIndex value.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
**attrValue*	Pointer to the Characteristic value data that should be sent to Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed

- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client

Events

None

CYBLE_API_RESULT_TCyBle_GlssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a indication of the specified characteristic to the client device, as defined by the charIndex value.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
**attrValue*	Pointer to the Characteristic value data that should be sent to Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the GLS service-specific callback is registered (with CyBle_GlsRegisterAttrCallback):

- CYBLE_EVT_GLSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the GLS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

GLS Client Functions

Description

APIs unique to GLS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Glsc

Functions

- CYBLE_API_RESULT_T CyBle_GlscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_GlscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GLS_CHAR_INDEX_TcharIndex)

- CYBLE_API_RESULT_T CyBle_GlscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GLS_CHAR_INDEX_TcharIndex, CYBLE_GLS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_GlscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_GLS_CHAR_INDEX_TcharIndex, CYBLE_GLS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_GlscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic (which is identified by charIndex) value attribute to the server. The Write Response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
**attrValue*	The pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the GLS service-specific callback is registered (with CyBle_GlsRegisterAttrCallback):

- CYBLE_EVT_GLSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_GLS_CHAR_VALUE_T.

Otherwise (if the GLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_GlscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GLS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a server which is identified by charIndex.

Parameters:

connHandle	The connection handle.

charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the GLS service-specific callback is registered (with CyBle_GlsRegisterAttrCallback):

- CYBLE_EVT_GLSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_GLS_CHAR_VALUE_T.

Otherwise (if the GLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_GlscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GLS_CHAR_INDEX_T *charIndex*, CYBLE_GLS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the Characteristic Descriptor of the specified Characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of a service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
**attrValue*	Pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the GLS service-specific callback is registered (with CyBle_GlsRegisterAttrCallback):

- CYBLE_EVT_GLSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_GLS_DESCR_VALUE_T.

Otherwise (if the GLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_GlscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_GLS_CHAR_INDEX_T *charIndex*, CYBLE_GLS_DESCR_INDEX_T *descrIndex*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the GLS service-specific callback is registered (with CyBle_GlsRegisterAttrCallback):

- CYBLE_EVT_GLSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_GLS_DESCR_VALUE_T.

Otherwise (if the GLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

GLS Definitions and Data Structures

Description

Contains the GLS specific definitions and data structures used in the GLS APIs.

Data Structures

- struct CYBLE_GLSS_CHAR_T
- struct CYBLE_GLSS_T
- struct CYBLE_GLSC_CHAR_T
- struct CYBLE_GLSC_T
- struct CYBLE_GLS_CHAR_VALUE_T
- struct CYBLE_GLS_DESCR_VALUE_T

Enumerations

- enum CYBLE_GLS_CHAR_INDEX_T{ CYBLE_GLS_GLMT, CYBLE_GLS_GLMC, CYBLE_GLS_GLFT, CYBLE_GLS_RACP, CYBLE_GLS_CHAR_COUNT}
- enum CYBLE_GLS_DESCR_INDEX_T{ CYBLE_GLS_CCCD, CYBLE_GLS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_GLS_CHAR_INDEX_T

Service Characteristics indexes

Enumerator

CYBLE_GLS_GLMT Glucose Measurement characteristic index

CYBLE_GLS_GLMC Glucose Measurement Context characteristic index

CYBLE_GLS_GLFT Glucose Feature characteristic index

CYBLE_GLS_RACP Record Access Control Point characteristic index

CYBLE_GLS_CHAR_COUNT Total count of GLS characteristics

enum CYBLE_GLS_DESCR_INDEX_T

Service Characteristic Descriptors indexes

Enumerator

CYBLE_GLS_CCCD Client Characteristic Configuration descriptor index

CYBLE_GLS_DESCR_COUNT Total count of GLS descriptors

HID Service (HIDS)

Description

The HID Service exposes data and associated formatting for HID Devices and HID Hosts.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The HID API names begin with CyBle_Hid. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- HIDS Server and Client Functions

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

- HIDS Server Functions
  APIs unique to HID designs configured as a GATT Server role.
- HIDS Client Functions
  APIs unique to HID designs configured as a GATT Client role.
- HIDS Definitions and Data Structures
  Contains the HID specific definitions and data structures used in the HID APIs.

HIDS Server and Client Functions

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
No letter is appended to the API name: CyBle_Hid

Functions

- void CyBle_HidsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_HidsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for HID Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_HIDS_NOTIFICATION_ENABLED). • eventParam contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_HIDS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

HIDS Server Functions

Description

APIs unique to HID designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Hids

Functions

- CYBLE_API_RESULT_T CyBle_HidssSetCharacteristicValue(uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HidssGetCharacteristicValue(uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HidssGetCharacteristicDescriptor(uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex, CYBLE_HIDS_DESCR_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HidssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_HidssSetCharacteristicValue (uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets local characteristic value of the specified HID Service characteristics.

Parameters:

serviceIndex	The index of the service instance. e.g. If two HID Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a service characteristic. • CYBLE_HIDS_PROTOCOL_MODE - Protocol Mode characteristic • CYBLE_HIDS_REPORT_MAP - Report Map characteristic • CYBLE_HIDS_INFORMATION - HID Information characteristic • CYBLE_HIDS_CONTROL_POINT - HID Control Point characteristic • CYBLE_HIDS_BOOT_KYBRD_IN_REP - Boot Keyboard Input Report Characteristic • CYBLE_HIDS_BOOT_KYBRD_OUT_REP - Boot Keyboard Output Report Characteristic • CYBLE_HIDS_BOOT_MOUSE_IN_REP - Boot Mouse Input Report Characteristic • CYBLE_HIDS_REPORT - Report Characteristic
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_T CyBle_HidssGetCharacteristicValue (uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets local characteristic value of the specified HID Service characteristics.

Parameters:

serviceIndex	The index of the service instance. e.g. If two HID Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of the service characteristic. • CYBLE_HIDS_PROTOCOL_MODE - Protocol Mode characteristic • CYBLE_HIDS_REPORT_MAP - Report Map characteristic • CYBLE_HIDS_INFORMATION - HID Information characteristic • CYBLE_HIDS_CONTROL_POINT - HID Control Point characteristic • CYBLE_HIDS_BOOT_KYBRD_IN_REP - Boot Keyboard Input Report Characteristic • CYBLE_HIDS_BOOT_KYBRD_OUT_REP - Boot Keyboard Output Report Characteristic • CYBLE_HIDS_BOOT_MOUSE_IN_REP - Boot Mouse Input Report Characteristic • CYBLE_HIDS_REPORT - Report Characteristic
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_T CyBle_HidssGetCharacteristicDescriptor (uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*, CYBLE_HIDS_DESCR_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets local characteristic descriptor of the specified HID Service characteristic.

Parameters:

serviceIndex	The index of the service instance. e.g. If two HID Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of the characteristic. • CYBLE_HIDS_REPORT_MAP - Report Map Characteristic • CYBLE_HIDS_BOOT_KYBRD_IN_REP - Boot Keyboard Input Report Characteristic • CYBLE_HIDS_BOOT_KYBRD_OUT_REP - Boot Keyboard Output Report Characteristic • CYBLE_HIDS_BOOT_MOUSE_IN_REP - Boot Mouse Input Report Characteristic • CYBLE_HIDS_REPORT - Report Characteristic
descrIndex	The index of the descriptor. • CYBLE_HIDS_REPORT_CCCD - Client Characteristic Configuration descriptor • CYBLE_HIDS_REPORT_RRD - Report Reference descriptor • CYBLE_HIDS_REPORT_MAP_ERRD - Report Map External Report Reference descriptor
attrSize	The size of the descriptor value attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_TCyBle_HidssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends specified HID Service characteristic notification to the Client device.

CYBLE_EVT_HIDSC_NOTIFICATION event is received by the peer device, on invoking this function.

Parameters:

connHandle	BLE peer device connection handle.
serviceIndex	The index of the HID service instance. e.g. If two HID Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	Pointer to the characteristic value data that should be sent to the Client

	device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

HIDS Client Functions

Description

APIs unique to HID designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Hidc

Functions

- CYBLE_API_RESULT_T CyBle_HidscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HIDSC_CHAR_WRITE_TsubProcedure, uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HidscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HIDSC_CHAR_READ_TsubProcedure, uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_HidscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex, CYBLE_HIDS_DESCR_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HidscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, uint8 serviceIndex, CYBLE_HIDS_CHAR_INDEX_TcharIndex, CYBLE_HIDS_DESCR_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_HidscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HIDSC_CHAR_WRITE_T *subProcedure*, uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to set characteristic value of the specified HID Service, which is identified by serviceIndex and reportIndex, on the server device. This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_HIDSC_WRITE_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
subProcedure	Characteristic value write sub-procedure. • CYBLE_HIDSC_WRITE_WITHOUT_RESPONSE • CYBLE_HIDSC_WRITE_CHAR_VALUE

serviceIndex	The index of the service instance. e.g. If two HID Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HIDS service-specific callback is registered (with CyBle_HidsRegisterAttrCallback):

- CYBLE_EVT_HIDSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_HIDS_CHAR_VALUE_T.

Otherwise (if the HIDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_HidscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HIDSC_CHAR_READ_T *subProcedure*, uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic value from a server which is identified by charIndex.

The Read Response returns the characteristic value in the Attribute Value parameter.

The Read Response only contains the characteristic value that is less than or equal to (MTU - 1) octets in length. If the characteristic value is greater than (MTU - 1) octets in length, the Read Long Characteristic Value procedure may be used if the rest of the characteristic Value is required.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_HIDSC_READ_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP.

Parameters:

connHandle	The connection handle.
subProcedure	The characteristic value read sub-procedure. • CYBLE_HIDSC_READ_CHAR_VALUE • CYBLE_HIDSC_READ_LONG_CHAR_VALUE.

serviceIndex	The index of the service instance.
charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HIDS service-specific callback is registered (with CyBle_HidsRegisterAttrCallback):

- CYBLE_EVT_HIDSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_HIDS_CHAR_VALUE_T.

Otherwise (if the HIDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_READ_BLOB_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_HidscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*, CYBLE_HIDS_DESCR_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic descriptor to the server, which is identified by charIndex. This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_HIDSC_WRITE_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Following event is received by the peer device, on invoking this function:

- CYBLE_EVT_HIDSS_NOTIFICATION_ENABLED
- CYBLE_EVT_HIDSS_NOTIFICATION_DISABLED

Parameters:

connHandle	The BLE peer device connection handle.
serviceIndex	The index of the service instance. e.g. If two HID Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of the HID service characteristic.
descrIndex	The index of the HID service characteristic descriptor.

attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HIDS service-specific callback is registered (with CyBle_HidsRegisterAttrCallback):

- CYBLE_EVT_HIDSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_HIDS_DESCR_VALUE_T.

Otherwise (if the HIDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_HidscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, uint8 *serviceIndex*, CYBLE_HIDS_CHAR_INDEX_T *charIndex*, CYBLE_HIDS_DESCR_T *descrIndex*)

Gets a characteristic descriptor of the specified characteristic of the HID Service from the server device.

This function call can result in generation of the following events based on the response from the server device.

- CYBLE_EVT_HIDSC_READ_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
serviceIndex	The index of the service instance. e.g. If two HID Services are supported in your design, then first service will be identified by serviceIndex of 0 and the second by serviceIndex of 1.
charIndex	The index of the service characteristic.
descrIndex	The index of the HID Service characteristic descriptor.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed

- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HIDS service-specific callback is registered (with CyBle_HidsRegisterAttrCallback):

- CYBLE_EVT_HIDSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_HIDS_DESCR_VALUE_T.

Otherwise (if the HIDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

HIDS Definitions and Data Structures

Description

Contains the HID specific definitions and data structures used in the HID APIs.

Data Structures

- struct CYBLE_HIDSS_REPORT_REF_T
- struct CYBLE_HIDSS_INFORMATION_T
- struct CYBLE_HIDSS_REPORT_T
- struct CYBLE_HIDSS_T
- struct CYBLE_HIDSC_REPORT_T
- struct CYBLE_HIDSC_REPORT_MAP_T
- struct CYBLE_HIDSC_T
- struct CYBLE_HIDS_CHAR_VALUE_T
- struct CYBLE_HIDS_DESCR_VALUE_T

Enumerations

- enum CYBLE_HIDS_CHAR_INDEX_T{ CYBLE_HIDS_PROTOCOL_MODE, CYBLE_HIDS_INFORMATION, CYBLE_HIDS_CONTROL_POINT, CYBLE_HIDS_REPORT_MAP, CYBLE_HIDS_BOOT_KYBRD_IN_REP, CYBLE_HIDS_BOOT_KYBRD_OUT_REP, CYBLE_HIDS_BOOT_MOUSE_IN_REP, CYBLE_HIDS_REPORT, CYBLE_HIDS_REPORT_END= CYBLE_HIDS_REPORT + CYBLE_HIDS_REPORT_COUNT - 1, CYBLE_HIDS_CHAR_COUNT}
- enum CYBLE_HIDS_DESCR_T{ CYBLE_HIDS_REPORT_CCCD, CYBLE_HIDS_REPORT_RRD, CYBLE_HIDS_REPORT_MAP_ERRD, CYBLE_HIDS_DESCR_COUNT}
- enum CYBLE_HIDSC_CHAR_WRITE_T{ CYBLE_HIDSC_WRITE_WITHOUT_RESPONSE, CYBLE_HIDSC_WRITE_CHAR_VALUE}
- enum CYBLE_HIDSC_CHAR_READ_T{ CYBLE_HIDSC_READ_CHAR_VALUE, CYBLE_HIDSC_READ_LONG_CHAR_VALUE}

Enumeration Type Documentation

enum CYBLE_HIDS_CHAR_INDEX_T

HIDS characteristic indexes

Enumerator

CYBLE_HIDS_PROTOCOL_MODE Protocol Mode Characteristic index

CYBLE_HIDS_INFORMATION HID Information Characteristic index

CYBLE_HIDS_CONTROL_POINT HID Control Point Characteristic index

CYBLE_HIDS_REPORT_MAP Report Map Characteristic index

CYBLE_HIDS_BOOT_KYBRD_IN_REP Boot Keyboard Input Report Characteristic index

CYBLE_HIDS_BOOT_KYBRD_OUT_REP Boot Keyboard Output Report Characteristic index

CYBLE_HIDS_BOOT_MOUSE_IN_REP Boot Mouse Input Report Characteristic index

CYBLE_HIDS_REPORT Report Characteristic index

CYBLE_HIDS_REPORT_END Index of last Report Char

CYBLE_HIDS_CHAR_COUNT Total count of characteristics

enum CYBLE_HIDS_DESCR_T

HID Service Characteristic Descriptors indexes

Enumerator

CYBLE_HIDS_REPORT_CCCD Client Characteristic Configuration descriptor index

CYBLE_HIDS_REPORT_RRD Report Reference descriptor index

CYBLE_HIDS_REPORT_MAP_ERRD Report Map External Report Reference descriptor index

CYBLE_HIDS_DESCR_COUNT Total count of descriptors

enum CYBLE_HIDSC_CHAR_WRITE_T

Characteristic Value Write Sub-Procedure supported by HID Service

Enumerator

CYBLE_HIDSC_WRITE_WITHOUT_RESPONSE Write Without Response

CYBLE_HIDSC_WRITE_CHAR_VALUE Write Characteristic Value

enum CYBLE_HIDSC_CHAR_READ_T

Characteristic Value Read Sub-Procedure supported by HID Service

Enumerator

CYBLE_HIDSC_READ_CHAR_VALUE Read Characteristic Value

CYBLE_HIDSC_READ_LONG_CHAR_VALUE Read Long Characteristic Values

Heart Rate Service (HRS)

Description

The Heart Rate Service exposes heart rate and other data related to a heart rate sensor intended for fitness applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The HRS API names begin with CyBle_Hrs. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- HRS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- HRS Server Functions
  APIs unique to HRS designs configured as a GATT Server role.
- HRS Client Functions
  APIs unique to HRS designs configured as a GATT Client role.
- HRS Definitions and Data Structures
  Contains the HRS specific definitions and data structures used in the HRS APIs.

HRS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
No letter is appended to the API name: CyBle_Hrs

Functions

- void CyBle_HrsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_HrsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for HRS Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_HRSS_NOTIFICATION_ENABLED). • eventParam contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_HRS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

HRS Server Functions

Description

APIs unique to HRS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Hrss

Functions

- CYBLE_API_RESULT_T CyBle_HrssSetCharacteristicValue (CYBLE_HRS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HrssGetCharacteristicValue (CYBLE_HRS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HrssGetCharacteristicDescriptor (CYBLE_HRS_CHAR_INDEX_TcharIndex, CYBLE_HRS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HrssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HRS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_HrssSetCharacteristicValue (CYBLE_HRS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets local characteristic value of the specified Heart Rate Service characteristic.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute. The Heart Rate Measurement characteristic has a 20 byte length (by default). The Body Sensor Location and Control Point characteristic both have 1 byte length.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_HrssGetCharacteristicValue (CYBLE_HRS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the local characteristic value of specified Heart Rate Service characteristic.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute. The Heart Rate Measurement characteristic has a 20 byte length (by default). The Body Sensor Location and Control Point characteristic both have 1 byte length.

attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_HrssGetCharacteristicDescriptor (CYBLE_HRS_CHAR_INDEX_T *charIndex*, CYBLE_HRS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the local characteristic descriptor of the specified Heart Rate Service characteristic.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value attribute. The Heart Rate Measurement characteristic client configuration descriptor has 2 bytes length.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_TCyBle_HrssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HRS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends notification of a specified Heart Rate Service characteristic value to the Client device. No response is expected.

The CYBLE_EVT_HRSC_NOTIFICATION event is received by the peer device, on invoking this function.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute. The Heart Rate Measurement characteristic has a 20 byte length (by default). The Body Sensor Location and Control Point characteristic both have 1 byte length.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

Events

None

HRS Client Functions

Description

APIs unique to HRS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Hrsc

Functions

- CYBLE_API_RESULT_T CyBle_HrscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HRS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HrscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HRS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_HrscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HRS_CHAR_INDEX_TcharIndex, CYBLE_HRS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HrscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HRS_CHAR_INDEX_TcharIndex, CYBLE_HRS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_HrscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HRS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic value attribute (identified by charIndex) to the server. The Write Response just confirms the operation success.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_HRSC_WRITE_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HRS service-specific callback is registered (with CyBle_HrsRegisterAttrCallback):

- CYBLE_EVT_HRSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_HRS_CHAR_VALUE_T.

Otherwise (if the HRS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_HrscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HRS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a server which is identified by charIndex.

The Read Response returns the characteristic Value in the Attribute Value parameter.

The Read Response only contains the characteristic Value that is less than or equal to (MTU - 1) octets in length. If the characteristic Value is greater than (MTU - 1) octets in length, the Read Long Characteristic Value procedure may be used if the rest of the characteristic Value is required.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HRS service-specific callback is registered (with CyBle_HrsRegisterAttrCallback):

- CYBLE_EVT_HRSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_HRS_CHAR_VALUE_T.

Otherwise (if the HRS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_HrscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HRS_CHAR_INDEX_T *charIndex*, CYBLE_HRS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic Value to the server, which is identified by charIndex.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_HRSC_WRITE_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

One of the following events is received by the peer device, on invoking this function:

- CYBLE_EVT_HRSS_NOTIFICATION_ENABLED
- CYBLE_EVT_HRSS_NOTIFICATION_DISABLED

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HRS service-specific callback is registered (with CyBle_HrsRegisterAttrCallback):

- CYBLE_EVT_HRSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_HRS_DESCR_VALUE_T.

Otherwise (if the HRS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.

- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_HrscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HRS_CHAR_INDEX_T *charIndex*, CYBLE_HRS_DESCR_INDEX_T *descrIndex*)

Gets a characteristic descriptor of a specified characteristic of the service.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_HRSC_READ_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HRS service-specific callback is registered (with CyBle_HrsRegisterAttrCallback):

- CYBLE_EVT_HRSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_HRS_DESCR_VALUE_T.

Otherwise (if the HRS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

HRS Definitions and Data Structures

Description

Contains the HRS specific definitions and data structures used in the HRS APIs.

Data Structures

- struct CYBLE_HRSS_T
- struct CYBLE_HRSC_T

- struct CYBLE_HRS_CHAR_VALUE_T
- struct CYBLE_HRS_DESCR_VALUE_T

Enumerations

- enum CYBLE_HRS_CHAR_INDEX_T{ CYBLE_HRS_HRM, CYBLE_HRS_BSL, CYBLE_HRS_CPT, CYBLE_HRS_CHAR_COUNT}
- enum CYBLE_HRS_DESCR_INDEX_T{ CYBLE_HRS_HRM_CCCD, CYBLE_HRS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_HRS_CHAR_INDEX_T

HRS Characteristics indexes

Enumerator

CYBLE_HRS_HRM Heart Rate Measurement characteristic index

CYBLE_HRS_BSL Body Sensor Location characteristic index

CYBLE_HRS_CPT Control Point characteristic index

CYBLE_HRS_CHAR_COUNT Total count of HRS characteristics

enum CYBLE_HRS_DESCR_INDEX_T

HRS Characteristic Descriptors indexes

Enumerator

CYBLE_HRS_HRM_CCCD Heart Rate Measurement client char. config. descriptor index

CYBLE_HRS_DESCR_COUNT Total count of HRS HRM descriptors

Health Thermometer Service (HTS)

Description

The Health Thermometer Service exposes temperature and other data related to a thermometer used for healthcare applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The HTS API names begin with CyBle_Hts. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- HTS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- HTS Server Functions
  APIs unique to HTS designs configured as a GATT Server role.
- HTS Client Functions
  APIs unique to HTS designs configured as a GATT Client role.
- HTS Definitions and Data Structures
  Contains the HTS specific definitions and data structures used in the HTS APIs.

HTS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Hts

Functions

- void CyBle_HtsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_HtsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for HTS Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_HTSS_NOTIFICATION_ENABLED). • eventParam contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_HTS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

HTS Server Functions

Description

APIs unique to HTS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Htss

Functions

- CYBLE_API_RESULT_T CyBle_HtssSetCharacteristicValue (CYBLE_HTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HtssGetCharacteristicValue (CYBLE_HTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HtssSetCharacteristicDescriptor (CYBLE_HTS_CHAR_INDEX_TcharIndex, CYBLE_HTS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_HtssGetCharacteristicDescriptor (CYBLE_HTS_CHAR_INDEX_TcharIndex, CYBLE_HTS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HtssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HtssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_HtssSetCharacteristicValue (CYBLE_HTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the characteristic value of the service in the local database.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size (in Bytes) of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_HtssGetCharacteristicValue (CYBLE_HTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the characteristic value of the service, which is a value identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_HtssSetCharacteristicDescriptor (CYBLE_HTS_CHAR_INDEX_T *charIndex*, CYBLE_HTS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the service characteristic.

descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the descriptor value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_HtssGetCharacteristicDescriptor (CYBLE_HTS_CHAR_INDEX_T *charIndex*, CYBLE_HTS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_HtssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends notification with a characteristic value of the Health Thermometer Service, which is a value specified by charIndex, to the Client device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client's device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established

- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

Events

None

CYBLE_API_RESULT_T CyBle_HtssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends indication with a characteristic value of the Health Thermometer Service, which is a value specified by charIndex, to the Client device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HTS service-specific callback is registered (with CyBle_HtsRegisterAttrCallback):

- CYBLE_EVT_HTSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the HTS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

HTS Client Functions

Description

APIs unique to HTS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Htsc

Functions

- CYBLE_API_RESULT_T CyBle_HtscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HtscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HTS_CHAR_INDEX_TcharIndex)

- CYBLE_API_RESULT_T CyBle_HtscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HTS_CHAR_INDEX_TcharIndex, CYBLE_HTS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_HtscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_HTS_CHAR_INDEX_TcharIndex, CYBLE_HTS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_HtscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to set a characteristic value of the service, which is a value identified by charIndex,to the server device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HTS service-specific callback is registered (with CyBle_HtsRegisterAttrCallback):

- CYBLE_EVT_HTSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_HTS_CHAR_VALUE_T.

Otherwise (if the HTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_HtscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HTS_CHAR_INDEX_T *charIndex*)

This function is used to read a characteristic value, which is a value identified by charIndex, from the server.

Parameters:

connHandle	The connection handle.

charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HTS service-specific callback is registered (with CyBle_HtsRegisterAttrCallback):

- CYBLE_EVT_HTSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_HTS_CHAR_VALUE_T.

Otherwise (if the HTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_HtscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HTS_CHAR_INDEX_T *charIndex*, CYBLE_HTS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic descriptor to the server, which is identified by charIndex and descrIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HTS service-specific callback is registered (with CyBle_HtsRegisterAttrCallback):

- CYBLE_EVT_HTSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_HTS_DESCR_VALUE_T.

Otherwise (if the HTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_HtscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_HTS_CHAR_INDEX_T *charIndex*, CYBLE_HTS_DESCR_INDEX_T *descrIndex*)

Gets the characteristic descriptor of the specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the HTS service-specific callback is registered (with CyBle_HtsRegisterAttrCallback):

- CYBLE_EVT_HTSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_HTS_DESCR_VALUE_T.

Otherwise (if the HTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

HTS Definitions and Data Structures

Description

Contains the HTS specific definitions and data structures used in the HTS APIs.

Data Structures

- struct CYBLE_HTSS_CHAR_T
- struct CYBLE_HTSS_T
- struct CYBLE_HTSC_CHAR_T
- struct CYBLE_HTSC_T
- struct CYBLE_HTS_CHAR_VALUE_T
- struct CYBLE_HTS_DESCR_VALUE_T
- struct CYBLE_HTS_FLOAT32

Enumerations

- enum CYBLE_HTS_CHAR_INDEX_T{ CYBLE_HTS_TEMP_MEASURE, CYBLE_HTS_TEMP_TYPE, CYBLE_HTS_INTERM_TEMP, CYBLE_HTS_MEASURE_INTERVAL, CYBLE_HTS_CHAR_COUNT}
- enum CYBLE_HTS_DESCR_INDEX_T{ CYBLE_HTS_CCCD, CYBLE_HTS_VRD, CYBLE_HTS_DESCR_COUNT}
- enum CYBLE_HTS_TEMP_TYPE_T{ CYBLE_HTS_TEMP_TYPE_ARMPIT= 0x01u, CYBLE_HTS_TEMP_TYPE_BODY, CYBLE_HTS_TEMP_TYPE_EAR, CYBLE_HTS_TEMP_TYPE_FINGER, CYBLE_HTS_TEMP_TYPE_GI_TRACT, CYBLE_HTS_TEMP_TYPE_MOUTH, CYBLE_HTS_TEMP_TYPE_RECTUM, CYBLE_HTS_TEMP_TYPE_TOE, CYBLE_HTS_TEMP_TYPE_TYMPANUM}

Enumeration Type Documentation

enum CYBLE_HTS_CHAR_INDEX_T

HTS Characteristic indexes

Enumerator

CYBLE_HTS_TEMP_MEASURE Temperature Measurement characteristic index

CYBLE_HTS_TEMP_TYPE Temperature Type characteristic index

CYBLE_HTS_INTERM_TEMP Intermediate Temperature characteristic index

CYBLE_HTS_MEASURE_INTERVAL Measurement Interval characteristic index

CYBLE_HTS_CHAR_COUNT Total count of HTS characteristics

enum CYBLE_HTS_DESCR_INDEX_T

HTS Characteristic Descriptors indexes

Enumerator

CYBLE_HTS_CCCD Client Characteristic Configuration descriptor index

CYBLE_HTS_VRD Valid Range descriptor index

CYBLE_HTS_DESCR_COUNT Total count of descriptors

enum CYBLE_HTS_TEMP_TYPE_T

Temperature Type measurement indicates where the temperature was measured

Enumerator

CYBLE_HTS_TEMP_TYPE_ARMPIT Armpit

CYBLE_HTS_TEMP_TYPE_BODY Body (general)

CYBLE_HTS_TEMP_TYPE_EAR Ear (usually ear lobe)

CYBLE_HTS_TEMP_TYPE_FINGER Finger

CYBLE_HTS_TEMP_TYPE_GI_TRACT Gastro-intestinal Tract
CYBLE_HTS_TEMP_TYPE_MOUTH Mouth
CYBLE_HTS_TEMP_TYPE_RECTUM Rectum
CYBLE_HTS_TEMP_TYPE_TOE Toe
CYBLE_HTS_TEMP_TYPE_TYMPANUM Tympanum (ear drum)

Immediate Alert Service (IAS)

Description

The Immediate Alert Service exposes a control point to allow a peer device to cause the device to immediately alert.

The Immediate Alert Service uses the Alert Level Characteristic to cause an alert when it is written with a value other than "No Alert".

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The IAS API names begin with CyBle_Ias. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- IAS Server Functions
  APIs unique to IAS designs configured as a GATT Server role.
- IAS Client Functions
  APIs unique to IAS designs configured as a GATT Client role.
- IAS Definitions and Data Structures
  Contains the IAS specific definitions and data structures used in the IAS APIs.

IAS Server Functions

Description

APIs unique to IAS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Iass

Functions

- void CyBle_IasRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)
- CYBLE_API_RESULT_T CyBle_IassGetCharacteristicValue (CYBLE_IAS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

void CyBle_IasRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for IAS Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam)

	• eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_IASS_NOTIFICATION_ENABLED). • eventParam contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_IAS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

Note : IAS only has events for the GATT server. There are no events for the GATT client since the client sends data without waiting for response. Therefore there is no need to register a callback through CyBle_IasRegisterAttrCallback for an IAS GATT client.

CYBLE_API_RESULT_TCyBle_IassGetCharacteristicValue (CYBLE_IAS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the Alert Level characteristic value of the service, which is identified by charIndex.

Parameters:

charIndex	The index of the Alert Level characteristic.
attrSize	The size of the Alert Level characteristic value attribute.
attrValue	The pointer to the location where the Alert Level characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed

Events

None

IAS Client Functions

Description

APIs unique to IAS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Iasc

Functions

- CYBLE_API_RESULT_T CyBle_IascSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_IAS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_IascSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_IAS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a Alert Level characteristic value of the service, which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the Alert Level service characteristic.
attrSize	The size of the Alert Level characteristic value attribute.
attrValue	The pointer to the Alert Level characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the IAS service-specific callback is registered (with CyBle_IasRegisterAttrCallback):

- CYBLE_EVT_IASC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_IAS_CHAR_VALUE_T.

Otherwise (if the IAS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

IAS Definitions and Data Structures

Description

Contains the IAS specific definitions and data structures used in the IAS APIs.

Data Structures

- struct CYBLE_IASS_T
- struct CYBLE_IAS_CHAR_VALUE_T
- struct CYBLE_IASC_T

Enumerations

- enum CYBLE_IAS_CHAR_INDEX_T{ CYBLE_IAS_ALERT_LEVEL, CYBLE_IAS_CHAR_COUNT}

Enumeration Type Documentation

enum CYBLE_IAS_CHAR_INDEX_T

Immediate Alert Service Characteristic indexes

Enumerator

CYBLE_IAS_ALERT_LEVEL Alert Level Characteristic index

CYBLE_IAS_CHAR_COUNT Total count of characteristics

Link Loss Service (LLS)

Description

The Link Loss Service uses the Alert Level Characteristic to cause an alert in the device when the link is lost.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The LLS API names begin with CyBle_Lls. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- LLS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- LLS Server Functions
  APIs unique to LLS designs configured as a GATT Server role.
- LLS Client Functions
  APIs unique to LLS designs configured as a GATT Client role.
- LLS Definitions and Data Structures
  Contains the LLS specific definitions and data structures used in the LLS APIs.

LLS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Lls

Functions

- void CyBle_LlsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_LlsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for Link Loss Service is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void

	*eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_LLSS_NOTIFICATION_ENABLED). • eventParam contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_LLS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

LLS Server Functions

Description

APIs unique to LLS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Llss

Functions

- CYBLE_API_RESULT_T CyBle_LlssGetCharacteristicValue (CYBLE_LLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_LlssGetCharacteristicValue (CYBLE_LLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets an Alert Level characteristic value of the service, which is identified by charIndex.

Parameters:

charIndex	The index of an Alert Level characteristic.
attrSize	The size of the Alert Level characteristic value attribute.
attrValue	The pointer to the location where an Alert Level characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed

Events

None

LLS Client Functions

Description

APIs unique to LLS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Llsc

Functions

- CYBLE_API_RESULT_T CyBle_LlscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LLS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_LlscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LLS_CHAR_INDEX_TcharIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_LlscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LLS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the Alert Level characteristic value of the Link Loss Service, which is identified by charIndex.

This function call can result in generation of the following events based on the response from the server device.

- CYBLE_EVT_LLSC_WRITE_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of the Alert Level service characteristic.
attrSize	The size of the Alert Level characteristic value attribute.
attrValue	The pointer to the Alert Level characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the LLS service-specific callback is registered (with CyBle_LlsRegisterAttrCallback):

- CYBLE_EVT_LLSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_LLS_CHAR_VALUE_T.

Otherwise (if the LLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_LlscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LLS_CHAR_INDEX_T *charIndex*)

Sends a request to get characteristic value of the Link Loss Service, which is identified by charIndex.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_LLSC_READ_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of the Link Loss Service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the LLS service-specific callback is registered (with CyBle_LlsRegisterAttrCallback):

- CYBLE_EVT_LLSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_LLS_CHAR_VALUE_T.

Otherwise (if the LLS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

LLS Definitions and Data Structures

Description

Contains the LLS specific definitions and data structures used in the LLS APIs.

Data Structures

- struct CYBLE_LLS_CHAR_VALUE_T
- struct CYBLE_LLSS_T
- struct CYBLE_LLSC_T

Enumerations

- enum CYBLE_LLS_CHAR_INDEX_T{ CYBLE_LLS_ALERT_LEVEL, CYBLE_LLS_CHAR_COUNT}

Enumeration Type Documentation

enum CYBLE_LLS_CHAR_INDEX_T

Link Loss Service Characteristic indexes

Enumerator

CYBLE_LLS_ALERT_LEVEL Alert Level Characteristic index

CYBLE_LLS_CHAR_COUNT Total count of characteristics

Location and Navigation Service (LNS)

Description

The Location and Navigation Service exposes location and navigation-related data from a Location and Navigation sensor (Server) intended for outdoor activity applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The LNS API names begin with CyBle_Lns. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- LNS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- LNS Server Functions
  APIs unique to LNS designs configured as a GATT Server role.
- LNS Client Functions
  APIs unique to LNS designs configured as a GATT Client role.
- LNS Definitions and Data Structures
  Contains the LNS specific definitions and data structures used in the LNS APIs.

LNS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Lns

Functions

- void CyBle_LnsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_LnsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for LNS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void

	*eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

LNS Server Functions

Description

APIs unique to LNS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Lnss

Functions

- CYBLE_API_RESULT_T CyBle_LnssSetCharacteristicValue (CYBLE_LNS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_LnssGetCharacteristicValue (CYBLE_LNS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_LnssGetCharacteristicDescriptor (CYBLE_LNS_CHAR_INDEX_TcharIndex, CYBLE_LNS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_LnssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LNS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_LnssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LNS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_LnssSetCharacteristicValue (CYBLE_LNS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the value of the characteristic, as identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_T CyBle_LnssGetCharacteristicValue (CYBLE_LNS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the value of the characteristic, as identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - Characteristic value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Characteristic is absent.

Events

None

CYBLE_API_RESULT_T CyBle_LnssGetCharacteristicDescriptor (CYBLE_LNS_CHAR_INDEX_T *charIndex*, CYBLE_LNS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - Characteristic Descriptor value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Characteristic is absent.

Events

None

CYBLE_API_RESULT_T CyBle_LnssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LNS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification of the specified characteristic value, as identified by the charIndex.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT

	connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client

Events

None

CYBLE_API_RESULT_TCyBle_LnssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LNS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication of the specified characteristic value, as identified by the charIndex.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client
- CYBLE_ERROR_IND_DISABLED - Indication is disabled for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the LNS service-specific callback is registered (with CyBle_LnsRegisterAttrCallback):

- CYBLE_EVT_LNSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the LNS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

LNS Client Functions

Description

APIs unique to LNS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Lnsc

Functions

- CYBLE_API_RESULT_T CyBle_LnscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LNS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_LnscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LNS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_LnscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LNS_CHAR_INDEX_TcharIndex, CYBLE_LNS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_LnscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_LNS_CHAR_INDEX_TcharIndex, CYBLE_LNS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_LnscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LNS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic (which is identified by charIndex) value attribute in the server.

The Write Response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the LNS service-specific callback is registered (with CyBle_LnsRegisterAttrCallback):

- CYBLE_EVT_LNSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_LNS_CHAR_VALUE_T.

Otherwise (if the LNS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_LnscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LNS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a server, as identified by its charIndex

The Read Response returns the characteristic Value in the Attribute Value parameter.

The Read Response only contains the characteristic Value that is less than or equal to (MTU - 1) octets in length. If the characteristic Value is greater than (MTU - 1) octets in length, the Read Long Characteristic Value procedure may be used if the rest of the characteristic Value is required.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the LNS service-specific callback is registered (with CyBle_LnsRegisterAttrCallback):

- CYBLE_EVT_LNSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_LNS_CHAR_VALUE_T.

Otherwise (if the LNS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_LnscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LNS_CHAR_INDEX_T *charIndex*, CYBLE_LNS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic Value to the server, as identified by its charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the LNS service-specific callback is registered (with CyBle_LnsRegisterAttrCallback):

- CYBLE_EVT_LNSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_LNS_DESCR_VALUE_T.

Otherwise (if the LNS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_LnscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_LNS_CHAR_INDEX_T *charIndex*, CYBLE_LNS_DESCR_INDEX_T *descrIndex*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed

- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the LNS service-specific callback is registered (with CyBle_LnsRegisterAttrCallback):

- CYBLE_EVT_LNSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_LNS_DESCR_VALUE_T.

Otherwise (if the LNS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

LNS Definitions and Data Structures

Description

Contains the LNS specific definitions and data structures used in the LNS APIs.

Data Structures

- struct CYBLE_LNSS_CHAR_T
- struct CYBLE_LNSS_T
- struct CYBLE_LNSC_CHAR_T
- struct CYBLE_LNSC_T
- struct CYBLE_LNS_CHAR_VALUE_T
- struct CYBLE_LNS_DESCR_VALUE_T

Enumerations

- enum CYBLE_LNS_CHAR_INDEX_T{ CYBLE_LNS_FT, CYBLE_LNS_LS, CYBLE_LNS_PQ, CYBLE_LNS_CP, CYBLE_LNS_NV, CYBLE_LNS_CHAR_COUNT}
- enum CYBLE_LNS_DESCR_INDEX_T{ CYBLE_LNS_CCCD, CYBLE_LNS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_LNS_CHAR_INDEX_T

LNS Service Characteristics indexes

Enumerator

CYBLE_LNS_FT Location and Navigation Feature characteristic index

CYBLE_LNS_LS Location and Speed characteristic index

CYBLE_LNS_PQ Position Quality characteristic index

CYBLE_LNS_CP Location and Navigation Control Point characteristic index
CYBLE_LNS_NV Navigation characteristic index
CYBLE_LNS_CHAR_COUNT Total count of LNS characteristics

enum CYBLE_LNS_DESCR_INDEX_T

LNS Service Characteristic Descriptors indexes

Enumerator

CYBLE_LNS_CCCD Client Characteristic Configuration descriptor index
CYBLE_LNS_DESCR_COUNT Total count of LNS descriptors

Next DST Change Service (NDCS)

Description

This Service enables a BLE device that has knowledge about the next occurrence of a DST change to expose this information to another Bluetooth device. The Service uses the "Time with DST" Characteristic and the functions exposed in this Service are used to interact with that Characteristic.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The NDSC API names begin with CyBle_Ndsc. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- NDCS Server and Client Functions
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- NDCS Server Functions
  APIs unique to NDSC designs configured as a GATT Server role.
- NDCS Client Functions
  APIs unique to NDSC designs configured as a GATT Client role.
- NDCS Definitions and Data Structures
  Contains the NDSC specific definitions and data structures used in the NDSC APIs.

NDCS Server and Client Functions

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Ndsc

Functions

- void CyBle_NdcsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_NdcsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for Next DST Change Service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for NDCS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None.

Events

None

NDCS Server Functions

Description

APIs unique to NDSC designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Ndscs

Functions

- CYBLE_API_RESULT_T CyBle_NdcssSetCharacteristicValue (CYBLE_NDCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_NdcssGetCharacteristicValue (CYBLE_NDCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_NdcssSetCharacteristicValue (CYBLE_NDCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets characteristic value of the Next DST Change Service, which is identified by charIndex in the local database.

Parameters:

CYBLE_NDCS_CHAR_INDEX_T	charIndex: The index of a service characteristic of type CYBLE_NDCS_CHAR_INDEX_T.
uint8	attrSize: The size of the characteristic value attribute.
uint8	*attrValue: The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request is handled successfully;
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameters failed.

Events

None

CYBLE_API_RESULT_TCyBle_NdcssGetCharacteristicValue (CYBLE_NDCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the Next DST Change Service, which is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_NDCS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request is handled successfully;
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameter failed.

Events

None

NDCS Client Functions

Description

APIs unique to NDSC designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Ndscc

Functions

- CYBLE_API_RESULT_T CyBle_NdcscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_NDCS_CHAR_INDEX_TcharIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_NdcscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_NDCS_CHAR_INDEX_T *charIndex*)

Sends a request to peer device to set characteristic value of the Next DST Change Service, which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request was sent successfully.
- CYBLE_ERROR_INVALID_STATE - connection with the client is not established.
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the NDCS service-specific callback is registered (with CyBle_NdcsRegisterAttrCallback):

- CYBLE_EVT_NDCSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_NDCS_CHAR_VALUE_T.

Otherwise (if the NDCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

NDCS Definitions and Data Structures

Description

Contains the NDSC specific definitions and data structures used in the NDSC APIs.

Data Structures

- struct CYBLE_NDCS_CHAR_VALUE_T
- struct CYBLE_NDCSS_T
- struct CYBLE_NDCSC_T

Enumerations

- enum CYBLE_NDCS_CHAR_INDEX_T{ CYBLE_NDCS_TIME_WITH_DST, CYBLE_NDCS_CHAR_COUNT}

Enumeration Type Documentation

enum CYBLE_NDCS_CHAR_INDEX_T

Characteristic indexes

Enumerator

CYBLE_NDCS_TIME_WITH_DST Time with DST Characteristic index

CYBLE_NDCS_CHAR_COUNT Total count of NDCS Characteristics

Phone Alert Status Service (PASS)

Description

The Phone Alert Status Service uses the Alert Status Characteristic and Ringer Setting Characteristic to expose the phone alert status and uses the Ringer Control Point Characteristic to control the phone's ringer into mute or enable.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The PASS API names begin with CyBle_Pass. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- PASS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- PASS Server Functions

APIs unique to PASS designs configured as a GATT Server role.

- PASS Client Functions
  APIs unique to PASS designs configured as a GATT Client role.
- PASS Definitions and Data Structures
  Contains the PASS specific definitions and data structures used in the PASS APIs.

PASS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
No letter is appended to the API name: CyBle_Pass

Functions

- void CyBle_PassRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_PassRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for PASS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

PASS Server Functions

Description

APIs unique to PASS designs configured as a GATT Server role.
A letter 's' is appended to the API name: CyBle_Passs

Functions

- CYBLE_API_RESULT_T CyBle_PasssSetCharacteristicValue (CYBLE_PASS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_PasssGetCharacteristicValue (CYBLE_PASS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_PasssGetCharacteristicDescriptor (CYBLE_PASS_CHAR_INDEX_TcharIndex, CYBLE_PASS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_PasssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_PASS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_PasssSetCharacteristicValue (CYBLE_PASS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the value of a characteristic which is identified by charIndex.

Parameters:

charIndex	the index of a service characteristic.
attrSize	the size of the characteristic value attribute.
attrValue	the pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_PasssGetCharacteristicValue (CYBLE_PASS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the value of a characteristic which is identified by charIndex.

Parameters:

charIndex	the index of a service characteristic.
attrSize	the size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_TCyBle_PasssGetCharacteristicDescriptor (CYBLE_PASS_CHAR_INDEX_T *charIndex*, CYBLE_PASS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of a specified characteristic of the service.

Parameters:

charIndex	The index of the characteristic.

descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value attribute.
attrValue	The pointer to the descriptor value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_TCyBle_PasssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_PASS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification of the specified by the charIndex characteristic value.

Parameters:

connHandle	The connection handle which consists of the device ID and ATT connection ID.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the Client

Events

None

PASS Client Functions

Description

APIs unique to PASS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Passc

Functions

- CYBLE_API_RESULT_T CyBle_PasscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_PASS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_PasscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_PASS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_PasscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_PASS_CHAR_INDEX_TcharIndex, CYBLE_PASS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_PasscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_PASS_CHAR_INDEX_TcharIndex, CYBLE_PASS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_PasscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_PASS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic (which is identified by charIndex) value attribute to the Server.

The Write Response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the PASS service-specific callback is registered (with CyBle_PassRegisterAttrCallback):

- CYBLE_EVT_PASSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_PASS_CHAR_VALUE_T.

Otherwise (if the PASS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_PasscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_PASS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a Server which is identified by the charIndex.

The Read Response returns the characteristic Value in the Attribute Value parameter.

The Read Response only contains the characteristic Value that is less than or equal to (MTU - 1) octets in length. If the characteristic Value is greater than (MTU - 1) octets in length, the Read Long Characteristic Value procedure may be used if the rest of the characteristic Value is required.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the Server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the PASS service-specific callback is registered (with CyBle_PassRegisterAttrCallback):

- CYBLE_EVT_PASSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_PASS_CHAR_VALUE_T.

Otherwise (if the PASS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_PasscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_PASS_CHAR_INDEX_T *charIndex*, CYBLE_PASS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic Value to the server which is identified by the charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of a service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the PASS service-specific callback is registered (with CyBle_PassRegisterAttrCallback):

- CYBLE_EVT_PASSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_PASS_DESCR_VALUE_T.

Otherwise (if the PASS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_PasscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_PASS_CHAR_INDEX_T *charIndex*, CYBLE_PASS_DESCR_INDEX_T *descrIndex*)

Gets a characteristic descriptor of a specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
descrIndex	The index of a service characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the PASS service-specific callback is registered (with CyBle_PassRegisterAttrCallback):

- CYBLE_EVT_PASSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_PASS_DESCR_VALUE_T.

Otherwise (if the PASS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).

- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

PASS Definitions and Data Structures

Description

Contains the PASS specific definitions and data structures used in the PASS APIs.

Data Structures

- struct CYBLE_PASSS_CHAR_T
- struct CYBLE_PASSS_T
- struct CYBLE_PASSC_CHAR_T
- struct CYBLE_PASSC_T
- struct CYBLE_PASS_CHAR_VALUE_T
- struct CYBLE_PASS_DESCR_VALUE_T

Enumerations

- enum CYBLE_PASS_CHAR_INDEX_T{ CYBLE_PASS_AS, CYBLE_PASS_RS, CYBLE_PASS_CP, CYBLE_PASS_CHAR_COUNT}
- enum CYBLE_PASS_DESCR_INDEX_T{ CYBLE_PASS_CCCD, CYBLE_PASS_DESCR_COUNT}
- enum CYBLE_PASS_RS_T{ CYBLE_PASS_RS_SILENT, CYBLE_PASS_RS_NORMAL}
- enum CYBLE_PASS_CP_T{ CYBLE_PASS_CP_SILENT= 1, CYBLE_PASS_CP_MUTE, CYBLE_PASS_CP_CANCEL}

Enumeration Type Documentation

enum CYBLE_PASS_CHAR_INDEX_T

Service Characteristics indexes

Enumerator

CYBLE_PASS_AS Alert Status characteristic index

CYBLE_PASS_RS Ringer Setting characteristic index

CYBLE_PASS_CP Ringer Control Point characteristic index

CYBLE_PASS_CHAR_COUNT Total count of PASS characteristics

enum CYBLE_PASS_DESCR_INDEX_T

Service Characteristic Descriptors indexes

Enumerator

CYBLE_PASS_CCCD Client Characteristic Configuration descriptor index

CYBLE_PASS_DESCR_COUNT Total count of PASS descriptors

enum CYBLE_PASS_RS_T

Ringer Setting values

Enumerator

CYBLE_PASS_RS_SILENT Ringer Silent

CYBLE_PASS_RS_NORMAL Ringer Normal

enum CYBLE_PASS_CP_T

Ringer Control Point values

Enumerator

CYBLE_PASS_CP_SILENT Silent Mode

CYBLE_PASS_CP_MUTE Mute Once

CYBLE_PASS_CP_CANCEL Cancel Silent Mode

Running Speed and Cadence Service (RSCS)

Description

The Running Speed and Cadence (RSC) Service exposes speed, cadence and other data related to fitness applications such as the stride length and the total distance the user has travelled while using the Running Speed and Cadence sensor (Server).

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The RSCS API names begin with CyBle_Rscs. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- RSCS Server and Client Functions
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- RSCS Server Functions
  APIs unique to RSCS designs configured as a GATT Server role.
- RSCS Client Functions
  APIs unique to RSCS designs configured as a GATT Client role.
- RSCS Definitions and Data Structures
  Contains the RSCS specific definitions and data structures used in the RSCS APIs.

RSCS Server and Client Functions

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Rscs

Functions

- void CyBle_RscsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_RscsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for Running Speed and Cadence Service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for RSCS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void

	*eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

RSCS Server Functions

Description

APIs unique to RSCS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Rscss

Functions

- CYBLE_API_RESULT_T CyBle_RscssSetCharacteristicValue (CYBLE_RSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RscssGetCharacteristicValue (CYBLE_RSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RscssGetCharacteristicDescriptor (CYBLE_RSCS_CHAR_INDEX_TcharIndex, CYBLE_RSCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RscssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RscssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_RscssSetCharacteristicValue (CYBLE_RSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the characteristic value of the Running Speed and Cadence Service in the local GATT database. The characteristic is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic. Valid values are, • CYBLE_RSCS_RSC_FEATURE • CYBLE_RSCS_SENSOR_LOCATION.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_RscssGetCharacteristicValue (CYBLE_RSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the characteristic value of the Running Speed and Cadence Service from the GATT database. The characteristic is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic

Events

None

CYBLE_API_RESULT_TCyBle_RscssGetCharacteristicDescriptor (CYBLE_RSCS_CHAR_INDEX_T *charIndex*, CYBLE_RSCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the characteristic descriptor of a specified characteristic of the Running Speed and Cadence Service from the GATT database.

Parameters:

charIndex	The index of a service characteristic. Valid values are, • CYBLE_RSCS_RSC_MEASUREMENT • CYBLE_RSCS_SC_CONTROL_POINT
descrIndex	The index of a service characteristic descriptor. Valid value is, • CYBLE_RSCS_CCCD
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular descriptor

Events

None

CYBLE_API_RESULT_TCyBle_RscssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification with the characteristic value to the Client device. This is specified by charIndex of the Running Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic. Valid value is, • CYBLE_RSCS_RSC_MEASUREMENT
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameter is failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.

Events

None

CYBLE_API_RESULT_TCyBle_RscssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication with a characteristic value to the Client device. This is specified by charIndex of the Running Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameter is failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.

- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the RSCS service-specific callback is registered (with CyBle_RscsRegisterAttrCallback):

- CYBLE_EVT_RSCSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the RSCS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

RSCS Client Functions

Description

APIs unique to RSCS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Rscsc

Functions

- CYBLE_API_RESULT_T CyBle_RscscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RSCS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RscscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RSCS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_RscscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RSCS_CHAR_INDEX_TcharIndex, CYBLE_RSCS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RscscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RSCS_CHAR_INDEX_TcharIndex, uint8 descrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_RscscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RSCS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to the peer device to get the characteristic descriptor of the specified characteristic of the Running Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	Size of the characteristic value attribute.
attrValue	Pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the RSCS service-specific callback is registered (with CyBle_RscsRegisterAttrCallback):

- CYBLE_EVT_RSCSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_RSCS_CHAR_VALUE_T.

Otherwise (if the RSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_RscscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RSCS_CHAR_INDEX_T *charIndex*)

Sends a request to the peer device to set the characteristic value of the Running Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the RSCS service-specific callback is registered (with CyBle_RscsRegisterAttrCallback):

- CYBLE_EVT_RSCSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_RSCS_CHAR_VALUE_T.

Otherwise (if the RSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).

- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_RscscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RSCS_CHAR_INDEX_T *charIndex*, CYBLE_RSCS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to the peer device to get the characteristic descriptor of the specified characteristic of the Running Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a RSCS characteristic.
descrIndex	The index of a RSCS characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request was sent successfully
- CYBLE_ERROR_INVALID_STATE - connection with the client is not established
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular descriptor

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the RSCS service-specific callback is registered (with CyBle_RscsRegisterAttrCallback):

- CYBLE_EVT_RSCSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_RSCS_DESCR_VALUE_T.

Otherwise (if the RSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_RscscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RSCS_CHAR_INDEX_T *charIndex*, uint8 *descrIndex*)

Sends a request to the peer device to get characteristic descriptor of the specified characteristic of the Running Speed and Cadence Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a Service Characteristic.

descrIndex	The index of a Service Characteristic Descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_INVALID_OPERATION - Cannot process a request to send PDU due to invalid operation performed by the application
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Peer device doesn't have a particular descriptor

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the RSCS service-specific callback is registered (with CyBle_RscsRegisterAttrCallback):

- CYBLE_EVT_RSCSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_RSCS_DESCR_VALUE_T.

Otherwise (if the RSCS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

RSCS Definitions and Data Structures

Description

Contains the RSCS specific definitions and data structures used in the RSCS APIs.

Data Structures

- struct CYBLE_RSCS_CHAR_VALUE_T
- struct CYBLE_RSCS_DESCR_VALUE_T
- struct CYBLE_RSCSS_CHAR_T
- struct CYBLE_RSCSS_T
- struct CYBLE_RSCSC_SRVR_FULL_CHAR_INFO_T
- struct CYBLE_RSCSC_T

Enumerations

- enum CYBLE_RSCS_CHAR_INDEX_T{ CYBLE_RSCS_RSC_MEASUREMENT, CYBLE_RSCS_RSC_FEATURE, CYBLE_RSCS_SENSOR_LOCATION, CYBLE_RSCS_SC_CONTROL_POINT, CYBLE_RSCS_CHAR_COUNT}
- enum CYBLE_RSCS_DESCR_INDEX_T{ CYBLE_RSCS_CCCD, CYBLE_RSCS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_RSCS_CHAR_INDEX_T

RSCS Characteristic indexes

Enumerator

CYBLE_RSCS_RSC_MEASUREMENT RSC Measurement Characteristic index

CYBLE_RSCS_RSC_FEATURE RSC Feature Characteristic index

CYBLE_RSCS_SENSOR_LOCATION Sensor Location Characteristic index

CYBLE_RSCS_SC_CONTROL_POINT SC Control Point Characteristic index

CYBLE_RSCS_CHAR_COUNT Total count of RSCS characteristics

enum CYBLE_RSCS_DESCR_INDEX_T

RSCS Characteristic Descriptors indexes

Enumerator

CYBLE_RSCS_CCCD Client Characteristic Configuration Descriptor index

CYBLE_RSCS_DESCR_COUNT Total count of descriptors

Reference Time Update Service (RTUS)

Description

This Service enables a Bluetooth device that can update the system time using the reference time such as a GPS receiver to expose a control point and expose the accuracy (drift) of the local system time compared to the reference time source.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The RTUS API names begin with CyBle_Rtus. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- RTUS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- RTUS Server Functions
  APIs unique to RTUS designs configured as a GATT Server role.
- RTUS Client Functions
  APIs unique to RTUS designs configured as a GATT Client role.
- RTUS Definitions and Data Structures
  Contains the RTUS specific definitions and data structures used in the RTUS APIs.

RTUS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Rtus

Functions

- void CyBle_RtusRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_RtusRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for Reference Time Update Service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for RTUS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None.

Events

None

RTUS Server Functions

Description

APIs unique to RTUS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Rtuss

Functions

- CYBLE_API_RESULT_T CyBle_RtussSetCharacteristicValue (CYBLE_RTUS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RtussGetCharacteristicValue (CYBLE_RTUS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_RtussSetCharacteristicValue (CYBLE_RTUS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets characteristic value of the Reference Time Update Service, which is identified by charIndex in the local database.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_RTUS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request is handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameters failed

Events

None

CYBLE_API_RESULT_TCyBle_RtussGetCharacteristicValue (CYBLE_RTUS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the Reference Time Update Service, which is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_RTUS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request is handled successfully;
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameter failed.

Events

None

RTUS Client Functions

Description

APIs unique to RTUS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Rtusc

Functions

- CYBLE_API_RESULT_T CyBle_RtuscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RTUS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_RtuscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_RTUS_CHAR_INDEX_TcharIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_RtuscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RTUS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to peer device to get characteristic descriptor of specified characteristic of the Reference Time Update Service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.
attrSize	Size of the characteristic value attribute.
attrValue	Pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_STATE - Connection with the Client is not established.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the RTUS service-specific callback is registered (with CyBle_RtusRegisterAttrCallback):

- CYBLE_EVT_RTUSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_RTUS_CHAR_VALUE_T.

Otherwise (if the RTUS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_RtuscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_RTUS_CHAR_INDEX_T *charIndex*)

Sends a request to a peer device to set characteristic value of the Reference Time Update Service, which is identified by charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - the request was sent successfully;
- CYBLE_ERROR_INVALID_STATE - connection with the Client is not established.
- CYBLE_ERROR_INVALID_PARAMETER - validation of the input parameters failed.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the RTUS service-specific callback is registered (with CyBle_RtusRegisterAttrCallback):

- CYBLE_EVT_RTUSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_RTUS_CHAR_VALUE_T.

Otherwise (if the RTUS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

RTUS Definitions and Data Structures

Description

Contains the RTUS specific definitions and data structures used in the RTUS APIs.

Data Structures

- struct CYBLE_RTUS_CHAR_VALUE_T
- struct CYBLE_RTUS_TIME_UPDATE_STATE_T
- struct CYBLE_RTUSS_T
- struct CYBLE_RTUSC_T

Enumerations

- enum CYBLE_RTUS_CHAR_INDEX_T{ CYBLE_RTUS_TIME_UPDATE_CONTROL_POINT, CYBLE_RTUS_TIME_UPDATE_STATE, CYBLE_RTUS_CHAR_COUNT}

Enumeration Type Documentation

enum CYBLE_RTUS_CHAR_INDEX_T

Characteristic indexes

Enumerator

CYBLE_RTUS_TIME_UPDATE_CONTROL_POINT Time Update Control Point Characteristic index

CYBLE_RTUS_TIME_UPDATE_STATE Time Update State Characteristic index

CYBLE_RTUS_CHAR_COUNT Total count of RTUS characteristics

Scan Parameters Service (ScPS)

Description

The Scan Parameters Service enables a Server device to expose a Characteristic for the GATT Client to write its scan interval and scan window on the Server device, and enables a Server to request a refresh of the GATT Client scan interval and scan window.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The ScPS API names begin with CyBle_Scps. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- ScPS Server and Client Functions
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- ScPS Server Functions
  APIs unique to ScPS designs configured as a GATT Server role.
- ScPS Client Functions
  APIs unique to ScPS designs configured as a GATT Client role.
- ScPS Definitions and Data Structures
  Contains the ScPS specific definitions and data structures used in the ScPS APIs.

ScPS Server and Client Functions

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Scps

Functions

- void CyBle_ScpsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_ScpsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for ScPS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

ScPS Server Functions

Description

APIs unique to ScPS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Scpss

Functions

- CYBLE_API_RESULT_T CyBle_ScpssSetCharacteristicValue (CYBLE_SCPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_ScpssGetCharacteristicValue (CYBLE_SCPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_ScpssGetCharacteristicDescriptor (CYBLE_SCPS_CHAR_INDEX_TcharIndex, CYBLE_SCPS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_ScpssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_SCPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_T CyBle_ScpssSetCharacteristicValue (CYBLE_SCPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the Scan Parameters service, which is identified by charIndex.

Parameters:

charIndex	The index of the service characteristic. • CYBLE_SCPS_SCAN_INT_WIN - The Scan Interval Window characteristic index • CYBLE_SCPS_SCAN_REFRESH - The Scan Refresh characteristic index
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent

Events

None

CYBLE_API_RESULT_T CyBle_ScpssGetCharacteristicValue (CYBLE_SCPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic value of the Scan Parameters service, which is identified by charIndex.

Parameters:

charIndex	The index of the service characteristic. • CYBLE_SCPS_SCAN_INT_WIN - The Scan Interval Window characteristic index • CYBLE_SCPS_SCAN_REFRESH - The Scan Refresh characteristic index
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent

Events

None

CYBLE_API_RESULT_T CyBle_ScpssGetCharacteristicDescriptor (CYBLE_SCPS_CHAR_INDEX_T *charIndex*, CYBLE_SCPS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of the specified characteristic of the Scan Parameters service.

Parameters:

charIndex	The index of the characteristic. • CYBLE_SCPS_SCAN_REFRESH - The Scan Refresh characteristic index
descrIndex	The index of the descriptor. • CYBLE_SCPS_SCAN_REFRESH_CCCD - The Client Characteristic Configuration descriptor index of the Scan Refresh characteristic
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where the characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_T CyBle_ScpssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_SCPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function notifies the client that the server requires the Scan Interval Window Characteristic to be written with the latest values upon notification.

The CYBLE_EVT_SCPSC_NOTIFICATION event is received by the peer device, on invoking this function.

Parameters:

connHandle	The connection handle
charIndex	The index of the characteristic. • CYBLE_SCPS_SCAN_REFRESH - The Scan Refresh characteristic index
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established

- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

Events

None

ScPS Client Functions

Description

APIs unique to ScPS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Scpsc

Functions

- CYBLE_API_RESULT_T CyBle_ScpscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_SCPS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_ScpscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_SCPS_CHAR_INDEX_TcharIndex, CYBLE_SCPS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_ScpscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_SCPS_CHAR_INDEX_TcharIndex, CYBLE_SCPS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_ScpscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_SCPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the Scan Parameters Service, which is identified by charIndex.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_GATTC_WRITE_RSP
- CYBLE_EVT_GATTC_ERROR_RSP

The CYBLE_EVT_SCPSS_SCAN_INT_WIN_CHAR_WRITE event is received by the peer device on invoking this function.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the CSPS service-specific callback is registered (with CyBle_CspsRegisterAttrCallback):

- CYBLE_EVT_CSPSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_SCPS_CHAR_VALUE_T.

Otherwise (if the CSPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_ScpscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_SCPS_CHAR_INDEX_T *charIndex*, CYBLE_SCPS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets characteristic descriptor of specified characteristic of the Scan Parameters Service.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_SCPSC_WRITE_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Following events can be received by the peer device on invoking this function:

- CYBLE_EVT_SCPSS_NOTIFICATION_ENABLED
- CYBLE_EVT_SCPSS_NOTIFICATION_DISABLED

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the descriptor value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the SCPS service-specific callback is registered (with CyBle_ScpsRegisterAttrCallback):

- CYBLE_EVT_SCPSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_SCPS_DESCR_VALUE_T.

Otherwise (if the SCPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_ScpscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_SCPS_CHAR_INDEX_T *charIndex*, CYBLE_SCPS_DESCR_INDEX_T *descrIndex*)

Gets characteristic descriptor of specified characteristic of the Scan Parameters Service.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_SCPSC_READ_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of a Service Characteristic.
descrIndex	The index of a Service Characteristic Descriptor.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - The state is not valid
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the SCPS service-specific callback is registered (with CyBle_ScpsRegisterAttrCallback):

- CYBLE_EVT_SCPSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_SCPS_DESCR_VALUE_T.

Otherwise (if the SCPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

ScPS Definitions and Data Structures

Description

Contains the ScPS specific definitions and data structures used in the ScPS APIs.

Data Structures

- struct CYBLE_SCPSS_T
- struct CYBLE_SCPSC_T
- struct CYBLE_SCPS_CHAR_VALUE_T
- struct CYBLE_SCPS_DESCR_VALUE_T

Enumerations

- enum CYBLE_SCPS_CHAR_INDEX_T{ CYBLE_SCPS_SCAN_INT_WIN, CYBLE_SCPS_SCAN_REFRESH, CYBLE_SCPS_CHAR_COUNT}
- enum CYBLE_SCPS_DESCR_INDEX_T{ CYBLE_SCPS_SCAN_REFRESH_CCCD, CYBLE_SCPS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_SCPS_CHAR_INDEX_T

ScPS Characteristic indexes

Enumerator

CYBLE_SCPS_SCAN_INT_WIN Scan Interval Window characteristic index

CYBLE_SCPS_SCAN_REFRESH Scan Refresh characteristic index

CYBLE_SCPS_CHAR_COUNT Total count of characteristics

enum CYBLE_SCPS_DESCR_INDEX_T

ScPS Characteristic Descriptors indexes

Enumerator

CYBLE_SCPS_SCAN_REFRESH_CCCD Client Characteristic Configuration descriptor index

CYBLE_SCPS_DESCR_COUNT Total count of descriptors

TX Power Service (TPS)

Description

The Tx Power Service uses the Tx Power Level Characteristic to expose the current transmit power level of a device when in a connection.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The TPS API names begin with CyBle_Tps. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- TPS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- TPS Server Functions

APIs unique to TPS designs configured as a GATT Server role.

- TPS Client Functions
  APIs unique to TPS designs configured as a GATT Client role.
- TPS Definitions and Data Structures
  Contains the TPS specific definitions and data structures used in the TPS APIs.

TPS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Tps

Functions

- void CyBle_TpsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_TpsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for TPS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback. • eventParam contains the parameters corresponding to the current event.

Returns:

None

Events

None

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

TPS Server Functions

Description

APIs unique to TPS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Tpss

Functions

- CYBLE_API_RESULT_T CyBle_TpssSetCharacteristicValue (CYBLE_TPS_CHAR_INDEX_TcharIndex, uint8 attrSize, int8 *attrValue)
- CYBLE_API_RESULT_T CyBle_TpssGetCharacteristicValue (CYBLE_TPS_CHAR_INDEX_TcharIndex, uint8 attrSize, int8 *attrValue)
- CYBLE_API_RESULT_T CyBle_TpssGetCharacteristicDescriptor (CYBLE_TPS_CHAR_INDEX_TcharIndex, CYBLE_TPS_CHAR_DESCRIPTORS_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_TpssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_TPS_CHAR_INDEX_TcharIndex, uint8 attrSize, int8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_TpssSetCharacteristicValue (CYBLE_TPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, int8 * *attrValue*)

Sets characteristic value of the Tx Power Service, which is identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored in the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameters failed.

Events

None

CYBLE_API_RESULT_TCyBle_TpssGetCharacteristicValue (CYBLE_TPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, int8 * *attrValue*)

Gets characteristic value of the Tx Power Service, which is identified by charIndex.

Parameters:

charIndex	The index of the Tx Power characteristic.
attrSize	The size of the Tx Power characteristic value attribute.
attrValue	The pointer to the location where Tx Power characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - Characteristic value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed

Events

None

CYBLE_API_RESULT_TCyBle_TpssGetCharacteristicDescriptor (CYBLE_TPS_CHAR_INDEX_T *charIndex*, CYBLE_TPS_CHAR_DESCRIPTORS_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets characteristic descriptor of specified characteristic of the Tx Power Service.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - Characteristic Descriptor value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameters failed
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional descriptor is absent

Events

None

CYBLE_API_RESULT_TCyBle_TpssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_TPS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, int8 * *attrValue*)

Sends a notification with the characteristic value, as specified by charIndex, to the Client device.

The CYBLE_EVT_TPSC_NOTIFICATION event is received by the peer device on invoking this function.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client's device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this. characteristic.
- CYBLE_ERROR_INVALID_STATE - Connection with client is not established.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.

Events

None

TPS Client Functions

Description

APIs unique to TPS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Tpsc

Functions

- CYBLE_API_RESULT_T CyBle_TpscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_TPS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_TpscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_TPS_CHAR_INDEX_TcharIndex, CYBLE_TPS_CHAR_DESCRIPTORS_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_TpscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_TPS_CHAR_INDEX_TcharIndex, CYBLE_TPS_CHAR_DESCRIPTORS_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_TpscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_TPS_CHAR_INDEX_T *charIndex*)

Gets the characteristic value of the Tx Power Service, which is identified by charIndex.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_TPSC_READ_CHAR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of the characteristic.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - Request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the TPS service-specific callback is registered (with CyBle_AncsRegisterAttrCallback):

- CYBLE_EVT_TPSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_TPS_CHAR_VALUE_T.

Otherwise (if the TPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_TpscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_TPS_CHAR_INDEX_T *charIndex*, CYBLE_TPS_CHAR_DESCRIPTORS_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic descriptor value of the Tx Power Service.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_TPSC_WRITE_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Following events can be received by the peer device, on invoking this function:

- CYBLE_EVT_TPSS_NOTIFICATION_ENABLED
- CYBLE_EVT_TPSS_NOTIFICATION_DISABLED

Parameters:

connHandle	The connection handle.
charIndex	The index of the Characteristic
descrIndex	The index of the TX Power Service characteristic descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the TPS service-specific callback is registered (with CyBle_AncsRegisterAttrCallback):

- CYBLE_EVT_TPSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_TPS_DESCR_VALUE_T.

Otherwise (if the TPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_TpscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_TPS_CHAR_INDEX_T *charIndex*, CYBLE_TPS_CHAR_DESCRIPTORS_T *descrIndex*)

Gets a characteristic descriptor of the Tx Power Service.

This function call can result in generation of the following events based on the response from the server device:

- CYBLE_EVT_TPSC_READ_DESCR_RESPONSE
- CYBLE_EVT_GATTC_ERROR_RSP

Parameters:

connHandle	The connection handle.
charIndex	The index of the characteristic.
descrIndex	The index of the characteristic descriptor.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - Request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The component in in invalid state for current operation.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - Cannot process request to send PDU due to invalid operation performed by the application.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the TPS service-specific callback is registered (with CyBle_AncsRegisterAttrCallback):

- CYBLE_EVT_TPSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_TPS_DESCR_VALUE_T.

Otherwise (if the TPS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

TPS Definitions and Data Structures

Description

Contains the TPS specific definitions and data structures used in the TPS APIs.

Data Structures

- struct CYBLE_TPS_CHAR_VALUE_T
- struct CYBLE_TPS_DESCR_VALUE_T
- struct CYBLE_TPSS_T
- struct CYBLE_TPSC_T

Enumerations

- enum CYBLE_TPS_CHAR_INDEX_T{ CYBLE_TPS_TX_POWER_LEVEL, CYBLE_TPS_CHAR_COUNT}
- enum CYBLE_TPS_CHAR_DESCRIPTORS_T{ CYBLE_TPS_CCCD, CYBLE_TPS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_TPS_CHAR_INDEX_T

TPS Characteristic indexes

Enumerator

CYBLE_TPS_TX_POWER_LEVEL Tx Power Level characteristic index

CYBLE_TPS_CHAR_COUNT Total count of characteristics

enum CYBLE_TPS_CHAR_DESCRIPTORS_T

TPS Characteristic Descriptors indexes

Enumerator

CYBLE_TPS_CCCD Tx Power Level Client Characteristic configuration descriptor index

CYBLE_TPS_DESCR_COUNT Total count of Tx Power Service characteristic descriptors

User Data Service (UDS)

Description

The User Data Service exposes user-related data in the sports and fitness environment. This allows remote access and update of user data by a Client as well as the synchronization of user data between a Server and a Client.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The UDSAPI names begin with CyBle_Uds. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- UDS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- UDS Server Functions
  APIs unique to UDS designs configured as a GATT Server role.
- UDS Client Functions
  APIs unique to UDS designs configured as a GATT Client role.
- UDS Definitions and Data Structures
  Contains the UDS specific definitions and data structures used in the UDS APIs.

UDS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Uds

Functions

- void CyBle_UdsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_UdsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service-specific attribute operations. Service-specific write requests from a peer device will not be handled with an unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T for UDS is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam), where: • eventCode indicates the event that triggered this callback.

	• eventParam contains the parameters corresponding to the current event.

Returns:

None.

Events

None.

Side Effects

The *eventParams in the callback function should not be used by the application once the callback function execution is finished. Otherwise this data may become corrupted.

UDS Server Functions

Description

APIs unique to UDS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Udss

Functions

- CYBLE_API_RESULT_T CyBle_UdssSetCharacteristicValue (CYBLE_UDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_UdssGetCharacteristicValue (CYBLE_UDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_UdssGetCharacteristicDescriptor (CYBLE_UDS_CHAR_INDEX_TcharIndex, CYBLE_UDS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_UdssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_UDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_UdssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_UDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_UdssSetCharacteristicValue (CYBLE_UDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the value of the characteristic, as identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent

Events

None

CYBLE_API_RESULT_TCyBle_UdssGetCharacteristicValue (CYBLE_UDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets the value of the characteristic, as identified by charIndex.

Parameters:

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - A characteristic is absent.

Events

None.

CYBLE_API_RESULT_TCyBle_UdssGetCharacteristicDescriptor (CYBLE_UDS_CHAR_INDEX_T *charIndex*, CYBLE_UDS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Gets a characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - Characteristic Descriptor value was read successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - A characteristic is absent.

Events

None.

CYBLE_API_RESULT_TCyBle_UdssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_UDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a notification of the specified characteristic value, as identified by the charIndex.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.

charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.

Events

None.

CYBLE_API_RESULT_TCyBle_UdssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_UDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication of the specified characteristic value, as identified by the charIndex.

Parameters:

connHandle	The connection handle which consist of the device ID and ATT connection ID.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - An optional characteristic is absent.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the client.
- CYBLE_ERROR_IND_DISABLED - Indication is disabled for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the UDS service-specific callback is registered (with CyBle_UdsRegisterAttrCallback):

- CYBLE_EVT_UDSS_INDICATION_CONFIRMED - If the indication is successfully delivered to the peer device.

Otherwise (if the UDS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - If the indication is successfully delivered to the peer device.

UDS Client Functions

Description

APIs unique to UDS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Udsc

Functions

- CYBLE_API_RESULT_T CyBle_UdscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_UDS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_UdscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_UDS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_UdscGetLongCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_UDS_CHAR_INDEX_TcharIndex, uint16 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_UdscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_UDS_CHAR_INDEX_TcharIndex, CYBLE_UDS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_UdscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_UDS_CHAR_INDEX_TcharIndex, CYBLE_UDS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_UdscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_UDS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic (which is identified by charIndex) value attribute in the server.

The Write Response just confirms the operation success.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In the case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the UDS service-specific callback is registered (with CyBle_UdsRegisterAttrCallback):

- CYBLE_EVT_UDSC_WRITE_CHAR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, etc.) are provided with an event parameter structure of type CYBLE_UDS_CHAR_VALUE_T.

Otherwise (if the UDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - If the requested attribute is successfully written on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_UdscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_UDS_CHAR_INDEX_T *charIndex*)

This function is used to read the characteristic Value from a server, as identified by its charIndex

The Read Response returns the characteristic Value in the Attribute Value parameter.

The Read Response only contains the characteristic Value that is less than or equal to (MTU - 1) octets in length. If the characteristic Value is greater than (MTU - 1) octets in length, the Read Long Characteristic Value procedure may be used if the rest of the characteristic Value is required.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the UDS service-specific callback is registered (with CyBle_UdsRegisterAttrCallback):

- CYBLE_EVT_UDSC_READ_CHAR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index , value, etc.) are provided with an event parameter structure of type CYBLE_UDS_CHAR_VALUE_T.

Otherwise (if the UDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with an event parameter structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_UdscGetLongCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_UDS_CHAR_INDEX_T *charIndex*, uint16 *attrSize*, uint8 * *attrValue*)

Sends a request to read a long characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the buffer where the read long characteristic descriptor value should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In the case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the UDS service-specific callback is registered (with CyBle_UdsRegisterAttrCallback):

- CYBLE_EVT_UDSC_READ_CHAR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index , value, etc.) are provided with an event parameter structure of type CYBLE_UDS_CHAR_VALUE_T.

Otherwise (if the UDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_BLOB_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with an event parameter structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_UdscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_UDS_CHAR_INDEX_T *charIndex*, CYBLE_UDS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic Value to the server, as identified by its charIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.
attrSize	The size of the characteristic descriptor value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute

Events

In the case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the UDS service-specific callback is registered (with CyBle_UdsRegisterAttrCallback):

- CYBLE_EVT_UDSC_WRITE_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index etc.) are provided with an event parameter structure of type CYBLE_UDS_DESCR_VALUE_T.

Otherwise (if the UDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - If the requested attribute is successfully written on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_UdscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_UDS_CHAR_INDEX_T *charIndex*, CYBLE_UDS_DESCR_INDEX_T *descrIndex*)

Gets the characteristic descriptor of the specified characteristic.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
descrIndex	The index of the service characteristic descriptor.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular descriptor.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In the case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the UDS service-specific callback is registered (with CyBle_UdsRegisterAttrCallback):

- CYBLE_EVT_UDSC_READ_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index, value, etc.) are provided with an event parameter structure of type CYBLE_UDS_DESCR_VALUE_T.

Otherwise (if the UDS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with an event parameter structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is some trouble with the requested attribute on the peer device, the details are provided with an event parameter structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

UDS Definitions and Data Structures

Description

Contains the UDS specific definitions and data structures used in the UDS APIs.

Data Structures

- struct CYBLE_UDSS_CHAR_T
- struct CYBLE_UDSS_T
- struct CYBLE_UDSC_CHAR_T
- struct CYBLE_UDSC_T
- struct CYBLE_UDS_CHAR_VALUE_T
- struct CYBLE_UDS_DESCR_VALUE_T

Enumerations

- enum CYBLE_UDS_CHAR_INDEX_T{ CYBLE_UDS_FNM, CYBLE_UDS_LNM, CYBLE_UDS_EML, CYBLE_UDS_AGE, CYBLE_UDS_DOB, CYBLE_UDS_GND, CYBLE_UDS_WGT, CYBLE_UDS_HGT, CYBLE_UDS_VO2, CYBLE_UDS_HRM, CYBLE_UDS_RHR, CYBLE_UDS_MRH, CYBLE_UDS_AET, CYBLE_UDS_ANT, CYBLE_UDS_STP, CYBLE_UDS_DTA, CYBLE_UDS_WCC, CYBLE_UDS_HCC, CYBLE_UDS_FBL, CYBLE_UDS_FBU, CYBLE_UDS_AEL, CYBLE_UDS_AEU, CYBLE_UDS_ANL, CYBLE_UDS_ANU, CYBLE_UDS_5ZL, CYBLE_UDS_3ZL, CYBLE_UDS_2ZL, CYBLE_UDS_DCI, CYBLE_UDS_UIX, CYBLE_UDS_UCP, CYBLE_UDS_LNG, CYBLE_UDS_CHAR_COUNT}
- enum CYBLE_UDS_DESCR_INDEX_T{ CYBLE_UDS_CCCD, CYBLE_UDS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_UDS_CHAR_INDEX_T

UDS Service Characteristics indexes

Enumerator

CYBLE_UDS_FNM First Name characteristic index

CYBLE_UDS_LNM Last Name characteristic index

CYBLE_UDS_EML Email Address characteristic index

CYBLE_UDS_AGE Age characteristic index

CYBLE_UDS_DOB Date of Birth characteristic index

CYBLE_UDS_GND Gender characteristic index

CYBLE_UDS_WGT Weight characteristic index

CYBLE_UDS_HGT Height characteristic index

CYBLE_UDS_VO2 VO2 Max characteristic index

CYBLE_UDS_HRM Heart Rate Max characteristic index

CYBLE_UDS_RHR Resting Heart Rate characteristic index
CYBLE_UDS_MRH Maximum Recommended Heart Rate characteristic index
CYBLE_UDS_AET Aerobic Threshold characteristic index
CYBLE_UDS_ANT Anaerobic Threshold characteristic index
CYBLE_UDS_STP Sport Type for Aerobic and Anaerobic Thresholds characteristic index
CYBLE_UDS_DTA Date of Threshold Assessment characteristic index
CYBLE_UDS_WCC Waist Circumference characteristic index
CYBLE_UDS_HCC Hip Circumference characteristic index
CYBLE_UDS_FBL Fat Burn Heart Rate Lower Limit characteristic index
CYBLE_UDS_FBU Fat Burn Heart Rate Upper Limit characteristic index
CYBLE_UDS_AEL Aerobic Heart Rate Lower Limit characteristic index
CYBLE_UDS_AEU Aerobic Heart Rate Upper Limit characteristic index
CYBLE_UDS_ANL Anaerobic Heart Rate Lower Limit characteristic index
CYBLE_UDS_ANU Anaerobic Heart Rate Upper Limit characteristic index
CYBLE_UDS_5ZL Five Zone Heart Rate Limits characteristic index
CYBLE_UDS_3ZL Three Zone Heart Rate Limits characteristic index
CYBLE_UDS_2ZL Two Zone Heart Rate Limit characteristic index
CYBLE_UDS_DCI Database Change Increment characteristic index
CYBLE_UDS_UIX User Index characteristic index
CYBLE_UDS_UCP User Control Point characteristic index
CYBLE_UDS_LNG Language characteristic index
CYBLE_UDS_CHAR_COUNT Total count of UDS characteristics

enum CYBLE_UDS_DESCR_INDEX_T

UDS Service Characteristic Descriptors indexes

Enumerator

CYBLE_UDS_CCCD Client Characteristic Configuration descriptor index
CYBLE_UDS_DESCR_COUNT Total count of UDS descriptors

Wireless Power Transfer Service (WPTS)

Description

The Wireless Power Transfer Service enables communication between Power Receiver Unit and Power Transmitter Unit in the Wireless Power Transfer systems.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The WPTS API names begin with CyBle_Wpts. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- WPTS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- WPTS Server Functions
  APIs unique to WPTS designs configured as a GATT Server role.
- WPTS Client Functions

APIs unique to WPTS designs configured as a GATT Client role.

- WPTS Definitions and Data Structures
  Contains the WPTS specific definitions and data structures used in the WPTS APIs.

WPTS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Wpts

Functions

- void CyBle_WptsRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_WptsRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode indicates the event that triggered this callback (e.g. CYBLE_EVT_WPTSS_INDICATION_ENABLED). • eventParam contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_WPTS_CHAR_VALUE_T structure that contains details of the characteristic for which notification enabled event was triggered).

Returns:

None

Events

None

WPTS Server Functions

Description

APIs unique to WPTS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Wptss

Functions

- CYBLE_API_RESULT_T CyBle_WptssSetCharacteristicValue (CYBLE_WPTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_WptssGetCharacteristicValue (CYBLE_WPTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WptssSetCharacteristicDescriptor (CYBLE_WPTS_CHAR_INDEX_TcharIndex, CYBLE_WPTS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WptssGetCharacteristicDescriptor (CYBLE_WPTS_CHAR_INDEX_TcharIndex, CYBLE_WPTS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WptssSendNotification (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WPTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WptssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WPTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

CYBLE_API_RESULT_TCyBle_WptssSetCharacteristicValue (CYBLE_WPTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a characteristic value of the Wireless Power Transfer Service in the local GATT database. The characteristic is identified by charIndex.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was written successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

Events

None

CYBLE_API_RESULT_TCyBle_WptssGetCharacteristicValue (CYBLE_WPTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Reads a characteristic value of the Wireless Power Transfer Service, which is identified by charIndex from the GATT database.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

Events

None

CYBLE_API_RESULT_TCyBle_WptssSetCharacteristicDescriptor (CYBLE_WPTS_CHAR_INDEX_T *charIndex*, CYBLE_WPTS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_WPTS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the descriptor value data that should be stored to the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None

CYBLE_API_RESULT_TCyBle_WptssGetCharacteristicDescriptor (CYBLE_WPTS_CHAR_INDEX_T *charIndex*, CYBLE_WPTS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Reads a a characteristic descriptor of a specified characteristic of the Wireless Power Transfer Service from the GATT database.

Parameters:

charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_WPTS_DESCR_INDEX_T.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed

Events

None

CYBLE_API_RESULT_TCyBle_WptssSendNotification (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WPTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends notification with a characteristic value of the WPTS, which is a value specified by charIndex, to the Client device.

Parameters:

connHandle	The connection handle
charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the Client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_NTF_DISABLED - Notification is not enabled by the Client.

Events

None

CYBLE_API_RESULT_TCyBle_WptssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WPTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication with a characteristic value of the Wireless Power Transfer Service, which is a value specified by charIndex, to the Client device.

Parameters:

connHandle	The connection handle
charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the Client device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - Optional characteristic is absent
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WPTS service-specific callback is registered (with CyBle_WptsRegisterAttrCallback):

- CYBLE_EVT_WPTSS_INDICATION_CONFIRMED - in case if the indication is successfully delivered to the peer device.

Otherwise (if the WPTS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - in case if the indication is successfully delivered to the peer device.

WPTS Client Functions

Description

APIs unique to WPTS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Wptsc

Functions

- void CyBle_WptscDiscovery (CYBLE_GATT_DB_ATTR_HANDLE_TservHandle)
- CYBLE_API_RESULT_T CyBle_WptscSetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WPTS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WptscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WPTS_CHAR_INDEX_TcharIndex)
- CYBLE_API_RESULT_T CyBle_WptscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WPTS_CHAR_INDEX_TcharIndex, CYBLE_WPTS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WptscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WPTS_CHAR_INDEX_TcharIndex, CYBLE_WPTS_DESCR_INDEX_TdescrIndex)

Function Documentation

void CyBle_WptscDiscovery (CYBLE_GATT_DB_ATTR_HANDLE_T *servHandle*)

This function discovers the PRU's WPT service and characteristics using the GATT Primary Service Handle, received through the WPT Service Data within the PRU advertisement payload, together with the handle offsets defined A4WP specification.

The PTU may perform service discovery using the CyBle_GattcStartDiscovery() API. This function may be used in response to Service Changed indication or to discover services other than the WPT service supported by the PRU.

Parameters:

servHandle	GATT Primary Service Handle of the WPT service.

Returns:

None

CYBLE_API_RESULT_TCyBle_WptscSetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WPTS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends a request to set a characteristic value of the service, which is a value identified by charIndex, to the server device.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.

attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be send to the server device.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WPTS service-specific callback is registered (with CyBle_WptsRegisterAttrCallback):

- CYBLE_EVT_WPTSC_WRITE_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, etc.) are provided with event parameter structure of type CYBLE_WPTS_CHAR_VALUE_T.

Otherwise (if the WPTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_WptscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WPTS_CHAR_INDEX_T *charIndex*)

This function is used to read a characteristic value, which is a value identified by charIndex, from the server.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.

Returns:

Return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WPTS service-specific callback is registered (with CyBle_WptsRegisterAttrCallback):

- CYBLE_EVT_WPTSC_READ_CHAR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index , value, etc.) are provided with event parameter structure of type CYBLE_WPTS_CHAR_VALUE_T.

Otherwise (if the WPTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_WptscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WPTS_CHAR_INDEX_T *charIndex*, CYBLE_WPTS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic descriptor to the server, which is identified by charIndex and descrIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_WPTS_DESCR_INDEX_T.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WPTS service-specific callback is registered (with CyBle_WptsRegisterAttrCallback):

- CYBLE_EVT_WPTSC_WRITE_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_WPTS_DESCR_VALUE_T.

Otherwise (if the WPTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - in case if the requested attribute is successfully wrote on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_T CyBle_WptscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WPTS_CHAR_INDEX_T *charIndex*, CYBLE_WPTS_DESCR_INDEX_T *descrIndex*)

Sends a request to get the characteristic descriptor of the specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of a service characteristic of type CYBLE_WPTS_CHAR_INDEX_T.
descrIndex	The index of a service characteristic descriptor of type CYBLE_WPTS_DESCR_INDEX_T.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WPTS service-specific callback is registered (with CyBle_WptsRegisterAttrCallback):

- CYBLE_EVT_WPTSC_READ_DESCR_RESPONSE - in case if the requested attribute is successfully wrote on the peer device, the details (char index, descr index, value, etc.) are provided with event parameter structure of type CYBLE_WPTS_DESCR_VALUE_T.

Otherwise (if the WPTS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - in case if the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - in case if there some trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

WPTS Definitions and Data Structures

Description

Contains the WPTS specific definitions and data structures used in the WPTS APIs.

Data Structures

- struct CYBLE_WPTSS_CHAR_T
- struct CYBLE_WPTS_CHAR_VALUE_T
- struct CYBLE_WPTS_DESCR_VALUE_T
- struct CYBLE_WPTSS_T
- struct CYBLE_WPTSC_CHAR_T
- struct CYBLE_WPTSC_T

Enumerations

- enum CYBLE_WPTS_CHAR_INDEX_T{ CYBLE_WPTS_PRU_CONTROL, CYBLE_WPTS_PTU_STATIC_PAR, CYBLE_WPTS_PRU_ALERT, CYBLE_WPTS_PRU_STATIC_PAR, CYBLE_WPTS_PRU_DYNAMIC_PAR, CYBLE_WPTS_CHAR_COUNT}
- enum CYBLE_WPTS_DESCR_INDEX_T{ CYBLE_WPTS_CCCD, CYBLE_WPTS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_WPTS_CHAR_INDEX_T

WPTS Characteristic indexes

Enumerator

CYBLE_WPTS_PRU_CONTROL PRU Control Characteristic index

CYBLE_WPTS_PTU_STATIC_PAR PTU Static Parameter Characteristic index

CYBLE_WPTS_PRU_ALERT PRU Alert Characteristic index

CYBLE_WPTS_PRU_STATIC_PAR PRU Static Parameter Characteristic index

CYBLE_WPTS_PRU_DYNAMIC_PAR PRU Dynamic Parameter Characteristic index

CYBLE_WPTS_CHAR_COUNT Total count of WPTS Characteristics

enum CYBLE_WPTS_DESCR_INDEX_T

WPTS Characteristic Descriptors indexes

Enumerator

CYBLE_WPTS_CCCD Client Characteristic Configuration Descriptor index

CYBLE_WPTS_DESCR_COUNT Total count of Descriptors

Weight Scale Service (WSS)

Description

The Weight Scale Service exposes weight and related data from a weight scale (Server) intended for consumer healthcare as well as sports/fitness applications.

Depending on the chosen GATT role in the GUI, you may use a subset of the supported APIs.

The WSS API names begin with CyBle_Wss. In addition to this, the APIs also append the GATT role initial letter in the API name.

Modules

- WSS Server and Client Function
  These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.
- WSS Server Functions
  APIs unique to WSS designs configured as a GATT Server role.
- WSS Client Functions
  APIs unique to WSS designs configured as a GATT Client role.
- WSS Definitions and Data Structures
  Contains the WSS specific definitions and data structures used in the WSS APIs.

WSS Server and Client Function

Description

These are APIs common to both GATT Client role and GATT Server role. You may use them in either roles.

No letter is appended to the API name: CyBle_Wss

Functions

- void CyBle_WssRegisterAttrCallback (CYBLE_CALLBACK_TcallbackFunc)

Function Documentation

void CyBle_WssRegisterAttrCallback (CYBLE_CALLBACK_T *callbackFunc*)

Registers a callback function for service specific attribute operations. Service specific write requests from peer device will not be handled with unregistered callback function.

Parameters:

callbackFunc	An application layer event callback function to receive events from the BLE Component. The definition of CYBLE_CALLBACK_T is: typedef void (* CYBLE_CALLBACK_T) (uint32 eventCode, void *eventParam) • eventCode - Indicates the event that triggered this callback (e.g. CYBLE_EVT_WSSS_INDICATION_ENABLED). • eventParam - Contains the parameters corresponding to the current event. (e.g. pointer to CYBLE_WSS_CHAR_VALUE_T structure that contains details of the characteristic for which an indication enabled event was triggered).

Returns:

None.

Events

None.

WSS Server Functions

Description

APIs unique to WSS designs configured as a GATT Server role.

A letter 's' is appended to the API name: CyBle_Wsss

Functions

- uint8 CyBle_WssGetAdUserIdListSize(void)
- CYBLE_API_RESULT_T CyBle_WssSetAdUserId(uint8 listSize, const uint8 userIdList[])
- CYBLE_API_RESULT_T CyBle_WsssSetCharacteristicValue (CYBLE_WSS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WsssGetCharacteristicValue (CYBLE_WSS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

- CYBLE_API_RESULT_T CyBle_WsssSetCharacteristicDescriptor (CYBLE_WSS_CHAR_INDEX_TcharIndex, CYBLE_WSS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WsssGetCharacteristicDescriptor (CYBLE_WSS_CHAR_INDEX_TcharIndex, CYBLE_WSS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WsssSendIndication (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WSS_CHAR_INDEX_TcharIndex, uint8 attrSize, uint8 *attrValue)

Function Documentation

uint8 CyBle_WssGetAdUserIdListSize (void)

Returns the size (in bytes) of User ID List in the advertisement packet.

Returns:

Size of User ID List.

CYBLE_API_RESULT_TCyBle_WssSetAdUserId (uint8 *listSize*, const uint8 *userIdList*[])

Sets the User ID List to the advertisement packet. To be able to set the User ID List with this function, the advertisement packet should be configured in the component GUI to include Weight Scale Service UUID in the Service Data field. The Service Data should have enough room to fit the User ID List that is planned to be advertised. To reserve the room for the User ID List, the Service Data for WSS should be filled with Unknown User ID - 0xFF. The amount of 0xFF's should be equal to User List Size that is planned to be advertised.

Parameters:

listSize	The size of the User List.
userIdList	The array contains a User List.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_OPERATION - The advertisement packet doesn't contain the User List or it is to small.

CYBLE_API_RESULT_TCyBle_WsssSetCharacteristicValue (CYBLE_WSS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets a value for one of two characteristic values of the Weight Scale Service. The characteristic is identified by charIndex.

Parameters:

charIndex	The index of a Weight Scale Service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be stored to the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was written successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

Events

None.

CYBLE_API_RESULT_TCyBle_WsssGetCharacteristicValue (CYBLE_WSS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Reads a characteristic value of the Weight Scale Service, which is identified by charIndex from the GATT database.

Parameters:

charIndex	The index of the Weight Scale Service characteristic.
attrSize	The size of the Weight Scale Service characteristic value attribute.
attrValue	The pointer to the location where characteristic value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The characteristic value was read successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.

Events

None.

CYBLE_API_RESULT_TCyBle_WsssSetCharacteristicDescriptor (CYBLE_WSS_CHAR_INDEX_T *charIndex*, CYBLE_WSS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sets the characteristic descriptor of the specified characteristic.

Parameters:

charIndex	The index of the service characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the characteristic descriptor attribute.
attrValue	The pointer to the descriptor value data to be stored in the GATT database.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.

Events

None.

CYBLE_API_RESULT_TCyBle_WsssGetCharacteristicDescriptor (CYBLE_WSS_CHAR_INDEX_T *charIndex*, CYBLE_WSS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Reads a a characteristic descriptor of a specified characteristic of the Weight Scale Service from the GATT database.

Parameters:

charIndex	The index of the characteristic.
descrIndex	The index of the descriptor.
attrSize	The size of the descriptor value.
attrValue	The pointer to the location where characteristic descriptor value data should be stored.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request handled successfully.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The optional descriptor is absent.

Events

None.

CYBLE_API_RESULT_TCyBle_WsssSendIndication (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WSS_CHAR_INDEX_T *charIndex*, uint8 *attrSize*, uint8 * *attrValue*)

Sends an indication with a characteristic value of the Weight Scale Service, which is a value specified by charIndex, to the client's device.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic.
attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic value data that should be sent to the client's device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was handled successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameter failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted.
- CYBLE_ERROR_INVALID_STATE - Connection with the client is not established.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_IND_DISABLED - Indication is not enabled by the client.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WSS service-specific callback is registered (with CyBle_WssRegisterAttrCallback):

- CYBLE_EVT_WSSS_INDICATION_CONFIRMED - If the indication is successfully delivered to the peer device.

Otherwise (if the WSS service-specific callback is not registered):

- CYBLE_EVT_GATTS_HANDLE_VALUE_CNF - If the indication is successfully delivered to the peer device.

WSS Client Functions

Description

APIs unique to WSS designs configured as a GATT Client role.

A letter 'c' is appended to the API name: CyBle_Wssc

Functions

- CYBLE_API_RESULT_T CyBle_WsscGetCharacteristicValue (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WSS_CHAR_INDEX_TcharIndex)

- CYBLE_API_RESULT_T CyBle_WsscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WSS_CHAR_INDEX_TcharIndex, CYBLE_WSS_DESCR_INDEX_TdescrIndex, uint8 attrSize, uint8 *attrValue)
- CYBLE_API_RESULT_T CyBle_WsscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_TconnHandle, CYBLE_WSS_CHAR_INDEX_TcharIndex, CYBLE_WSS_DESCR_INDEX_TdescrIndex)

Function Documentation

CYBLE_API_RESULT_TCyBle_WsscGetCharacteristicValue (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WSS_CHAR_INDEX_T *charIndex*)

This function is used to read a characteristic value, which is a value identified by charIndex, from the server.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The read request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE - The peer device doesn't have the particular characteristic.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_STATE - Connection with the server is not established.
- CYBLE_ERROR_INVALID_OPERATION - Operation is invalid for this characteristic.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WSS service-specific callback is registered (with CyBle_WssRegisterAttrCallback):

- CYBLE_EVT_WSSC_READ_CHAR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index , value, etc.) are provided with an event parameter structure of type CYBLE_WSS_CHAR_VALUE_T.

Otherwise (if the WSS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with an event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_WsscSetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WSS_CHAR_INDEX_T *charIndex*, CYBLE_WSS_DESCR_INDEX_T *descrIndex*, uint8 *attrSize*, uint8 * *attrValue*)

This function is used to write the characteristic descriptor to the server, which is identified by charIndex and descrIndex.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
descrIndex	The index of the service characteristic descriptor.

attrSize	The size of the characteristic value attribute.
attrValue	The pointer to the characteristic descriptor value data that should be sent to the server device.

Returns:

A return value is of type CYBLE_API_RESULT_T.

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WSS service-specific callback is registered (with CyBle_WssRegisterAttrCallback):

- CYBLE_EVT_WSSC_WRITE_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index etc.) are provided with event parameter structure of type CYBLE_WSS_DESCR_VALUE_T.

Otherwise (if the WSS service-specific callback is not registered):

- CYBLE_EVT_GATTC_WRITE_RSP - If the requested attribute is successfully written on the peer device.
- CYBLE_EVT_GATTC_ERROR_RSP - If there is trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

CYBLE_API_RESULT_TCyBle_WsscGetCharacteristicDescriptor (CYBLE_CONN_HANDLE_T *connHandle*, CYBLE_WSS_CHAR_INDEX_T *charIndex*, CYBLE_WSS_DESCR_INDEX_T *descrIndex*)

Sends a request to get the characteristic descriptor of the specified characteristic of the service.

Parameters:

connHandle	The connection handle.
charIndex	The index of the service characteristic. Starts with zero.
descrIndex	The index of the service characteristic descriptor.

Returns:

- CYBLE_ERROR_OK - The request was sent successfully.
- CYBLE_ERROR_INVALID_PARAMETER - Validation of the input parameters failed.
- CYBLE_ERROR_INVALID_STATE - The state is not valid.
- CYBLE_ERROR_MEMORY_ALLOCATION_FAILED - Memory allocation failed.
- CYBLE_ERROR_INVALID_OPERATION - This operation is not permitted on the specified attribute.

Events

In case of successful execution (return value = CYBLE_ERROR_OK) the next events can appear:

If the WSS service-specific callback is registered (with CyBle_WssRegisterAttrCallback):

- CYBLE_EVT_WSSC_READ_DESCR_RESPONSE - If the requested attribute is successfully written on the peer device, the details (char index, descr index, value, etc.) are provided with an event parameter structure of type CYBLE_WSS_DESCR_VALUE_T.

Otherwise (if the WSS service-specific callback is not registered):

- CYBLE_EVT_GATTC_READ_RSP - If the requested attribute is successfully read on the peer device, the details (handle, value, etc.) are provided with an event parameters structure (CYBLE_GATTC_READ_RSP_PARAM_T).
- CYBLE_EVT_GATTC_ERROR_RSP - If there is trouble with the requested attribute on the peer device, the details are provided with event parameters structure (CYBLE_GATTC_ERR_RSP_PARAM_T).

WSS Definitions and Data Structures

Description

Contains the WSS specific definitions and data structures used in the WSS APIs.

Data Structures

- struct CYBLE_WSS_CHAR_VALUE_T
- struct CYBLE_WSS_DESCR_VALUE_T
- struct CYBLE_WSSS_CHAR_T
- struct CYBLE_WSSS_T
- struct CYBLE_WSSC_CHAR_T
- struct CYBLE_WSSC_T

Enumerations

- enum CYBLE_WSS_CHAR_INDEX_T{ CYBLE_WSS_WEIGHT_SCALE_FEATURE, CYBLE_WSS_WEIGHT_MEASUREMENT, CYBLE_WSS_CHAR_COUNT}
- enum CYBLE_WSS_DESCR_INDEX_T{ CYBLE_WSS_CCCD, CYBLE_WSS_DESCR_COUNT}

Enumeration Type Documentation

enum CYBLE_WSS_CHAR_INDEX_T

WSS Characteristic indexes

Enumerator

CYBLE_WSS_WEIGHT_SCALE_FEATURE Weight Scale Feature Characteristic index

CYBLE_WSS_WEIGHT_MEASUREMENT Weight Measurement Characteristic index

CYBLE_WSS_CHAR_COUNT Total count of WSS Characteristics

enum CYBLE_WSS_DESCR_INDEX_T

WSS Characteristic Descriptors indexes

Enumerator

CYBLE_WSS_CCCD Client Characteristic Configuration Descriptor index

CYBLE_WSS_DESCR_COUNT Total count of Descriptors

Custom Service

Description

This section contains the CYBLE_CUSTOMS_INFO_T and CYBLE_CUSTOMS_T structs used for Custom Services.

Data Structures

- struct CYBLE_CUSTOMS_INFO_T
- struct CYBLE_CUSTOMS_T

Data Structure Documentation

CY_BLE_FLASH_STORAGE Struct Reference

Data Fields

- uint8 **stackFlashptr** [CYBLE_STACK_FLASH_SIZE]
- uint8 **attValuesCCCDFlashMemory** [CYBLE_GAP_MAX_BONDED_DEVICE+1u][CYBLE_GATT_DB_FLASH_CCCD_COUNT]
- uint8 **cccdCount**
- uint8 **boundedDevCount**

CYBLE_ANCS_CHAR_VALUE_T Struct Reference

Description

ANCS Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_ANCS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value
- CYBLE_GATT_ERR_CODE_T**gattErrorCode**

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_ANCS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_ANCS_CHAR_INDEX_TCYBLE_ANCS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_ANCS_CHAR_VALUE_T::value

Characteristic value

CYBLE_ANCS_DESCR_VALUE_T Struct Reference

Description

ANCS Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_ANCS_CHAR_INDEX_T charIndex

- CYBLE_ANCS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_ANCS_DESCR_VALUE_T::connHandle
Peer device handle

CYBLE_ANCS_CHAR_INDEX_T CYBLE_ANCS_DESCR_VALUE_T::charIndex
Index of service characteristic

CYBLE_ANCS_DESCR_INDEX_T CYBLE_ANCS_DESCR_VALUE_T::descrIndex
Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_ANCS_DESCR_VALUE_T::value
Descriptor value

CYBLE_ANCSC_CHAR_T Struct Reference

Description

ANCS client characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_ANCS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_ANCSC_CHAR_T::properties
Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_ANCSC_CHAR_T::valueHandle
Handle of server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_ANCSC_CHAR_T::descrHandle[CYBLE_ANCS_DESCR_COUNT]
ANCS client char. descriptor handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_ANCSC_CHAR_T::endHandle
Characteristic End Handle

CYBLE_ANCSC_T Struct Reference

Description

Structure with discovered attributes information of ANC Service

Data Fields

- CYBLE_ANCSC_CHAR_T charInfo[CYBLE_ANCS_CHAR_COUNT]

Field Documentation

CYBLE_ANCSC_CHAR_TCYBLE_ANCSC_T::charInfo[CYBLE_ANCS_CHAR_COUNT]

Characteristics handle + properties array

CYBLE_ANCSS_CHAR_T Struct Reference

Description

ANC Service Characteristic structure type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_ANCS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ANCSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ANCSS_CHAR_T::descrHandle[CYBLE_ANCS_DESCR_COUNT]

Handle of descriptor

CYBLE_ANCSS_T Struct Reference

Description

Structure with ANC Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_ANCSS_CHAR_T charInfo[CYBLE_ANCS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ANCSS_T::serviceHandle

ANC Service handle

CYBLE_ANCSS_CHAR_TCYBLE_ANCSS_T::charInfo[CYBLE_ANCS_CHAR_COUNT]

ANC Service characteristics info array

CYBLE_ANS_CHAR_VALUE_T Struct Reference

Description

Alert Notification Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_ANS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_ANS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_ANS_CHAR_INDEX_T CYBLE_ANS_CHAR_VALUE_T::charIndex

Index of Alert Notification Service Characteristic

CYBLE_GATT_VALUE_T* CYBLE_ANS_CHAR_VALUE_T::value

Pointer to Characteristic value

CYBLE_ANS_DESCR_VALUE_T Struct Reference

Description

Alert Notification Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_ANS_CHAR_INDEX_T charIndex
- CYBLE_ANS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_ANS_DESCR_VALUE_T::connHandle

Connection handle

CYBLE_ANS_CHAR_INDEX_T CYBLE_ANS_DESCR_VALUE_T::charIndex

Characteristic index of Service

CYBLE_ANS_DESCR_INDEX_T CYBLE_ANS_DESCR_VALUE_T::descrIndex

Service Characteristic Descriptor index

CYBLE_GATT_VALUE_T* CYBLE_ANS_DESCR_VALUE_T::value

Pointer to value of Service Characteristic Descriptor value

CYBLE_ANSC_T Struct Reference

Description

Structure with discovered attributes information of Alert Notification Service

Data Fields

- CYBLE_SRVR_FULL_CHAR_INFO_T characteristics[CYBLE_ANS_CHAR_COUNT]

Field Documentation

CYBLE_SRVR_FULL_CHAR_INFO_TCYBLE_ANSC_T::characteristics[CYBLE_ANS_CHAR_COUNT]

Structure with Characteristic handles + properties of Alert Notification Service

CYBLE_ANSS_CHAR_T Struct Reference

Description

ANS Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_ANS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ANSS_CHAR_T::charHandle

Handle of Characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ANSS_CHAR_T::descrHandle[CYBLE_ANS_DESCR_COUNT]

Handle of Descriptor

CYBLE_ANSS_T Struct Reference

Description

Structure with Alert Notification Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_ANSS_CHAR_T charInfo[CYBLE_ANS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ANSS_T::serviceHandle

Alert Notification Service handle

CYBLE_ANSS_CHAR_TCYBLE_ANSS_T::charInfo[CYBLE_ANS_CHAR_COUNT]

Array of Alert Notification Service Characteristics + Descriptors handles

CYBLE_BAS_CHAR_VALUE_T Struct Reference

Description

Battery Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- uint8 serviceIndex
- CYBLE_BAS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_BAS_CHAR_VALUE_T::connHandle

Peer device handle

uint8 CYBLE_BAS_CHAR_VALUE_T::serviceIndex

Service instance

CYBLE_BAS_CHAR_INDEX_T CYBLE_BAS_CHAR_VALUE_T::charIndex

Index of a service characteristic

CYBLE_GATT_VALUE_T* CYBLE_BAS_CHAR_VALUE_T::value

Characteristic value

CYBLE_BAS_DESCR_VALUE_T Struct Reference

Description

Battery Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- uint8 serviceIndex
- CYBLE_BAS_CHAR_INDEX_T charIndex
- CYBLE_BAS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_BAS_DESCR_VALUE_T::connHandle

Peer device handle

uint8 CYBLE_BAS_DESCR_VALUE_T::serviceIndex

Service instance

CYBLE_BAS_CHAR_INDEX_T CYBLE_BAS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_BAS_DESCR_INDEX_T CYBLE_BAS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_BAS_DESCR_VALUE_T::value

Descriptor value

CYBLE_BASC_T Struct Reference

Description

Structure with discovered attributes information of Battery Service

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_SRVR_CHAR_INFO_T batteryLevel
- CYBLE_GATT_DB_ATTR_HANDLE_T cpfdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T rrdHandle

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_BASC_T::connHandle

Peer device handle

CYBLE_SRVR_CHAR_INFO_TCYBLE_BASC_T::batteryLevel

Battery Level characteristic info

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BASC_T::cpfdHandle

Characteristic Presentation Format descriptor handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BASC_T::cccdHandle

Client Characteristic Configuration descriptor handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BASC_T::rrdHandle

Report Reference descriptor handle

CYBLE_BASS_NOTIF_PAR_T Struct Reference

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- uint8 serviceIndex
- CYBLE_BAS_CHAR_INDEX_T charIndex

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_BASS_NOTIF_PAR_T::connHandle

Peer device handle

uint8 CYBLE_BASS_NOTIF_PAR_T::serviceIndex

Service instance

CYBLE_BAS_CHAR_INDEX_T CYBLE_BASS_NOTIF_PAR_T::charIndex

Index of a service characteristic

CYBLE_BASS_T Struct Reference

Description

Structure with Battery Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T batteryLevelHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cpfdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BASS_T::serviceHandle

Battery Service handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BASS_T::batteryLevelHandle

Battery Level characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BASS_T::cpfdHandle

Characteristic Presentation Format Descriptor handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BASS_T::cccdHandle

Client Characteristic Configuration descriptor handle

CYBLE_BCS_CHAR_VALUE_T Struct Reference

Description

BCS Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_BCS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_BCS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_BCS_CHAR_INDEX_T CYBLE_BCS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_BCS_CHAR_VALUE_T::value

Characteristic value

CYBLE_BCS_DESCR_VALUE_T Struct Reference

Description

BCS Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_BCS_CHAR_INDEX_T charIndex
- CYBLE_BCS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_BCS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_BCS_CHAR_INDEX_TCYBLE_BCS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_BCS_DESCR_INDEX_TCYBLE_BCS_DESCR_VALUE_T::descrIndex

Index of descriptor

CYBLE_GATT_VALUE_T* CYBLE_BCS_DESCR_VALUE_T::value

Characteristic value

CYBLE_BCSC_CHAR_T Struct Reference

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BCSC_CHAR_T::valueHandle

Handle of characteristic value

uint8 CYBLE_BCSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BCSC_CHAR_T::endHandle

End handle of a characteristic

CYBLE_BCSC_T Struct Reference

Description

BCS Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_BCSC_CHAR_T charInfo[CYBLE_BCS_CHAR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T bodyCompositionMeasurementCccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BCSC_T::serviceHandle

Body Composition Service handle

CYBLE_BCSC_CHAR_TCYBLE_BCSC_T::charInfo[CYBLE_BCS_CHAR_COUNT]

Body Composition Service characteristics info structure

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BCSC_T::bodyCompositionMeasurementCccdHandle

Body Composition Measurement Client Characteristic Configuration handle

CYBLE_BCSS_CHAR_T Struct Reference

Description

Structure with Body Composition Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_BCS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BCSS_CHAR_T::charHandle

Handle of Characteristic Value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BCSS_CHAR_T::descrHandle[CYBLE_BCS_DESCR_COUNT]

Array of Descriptor handles

CYBLE_BCSS_T Struct Reference

Description

BCS Characteristic with descriptors handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_BCSS_CHAR_T charInfo[CYBLE_BCS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BCSS_T::serviceHandle

Body Composition Service handle

CYBLE_BCSS_CHAR_T CYBLE_BCSS_T::charInfo[CYBLE_BCS_CHAR_COUNT]

Array of characteristics and descriptors handles

CYBLE_BLESS_CLK_CFG_PARAMS_T Struct Reference

Description

BLE clock configuration parameters

Data Fields

- CYBLE_BLESS_WCO_SCA_CFG_T bleLlSca
- CYBLE_BLESS_ECO_CLK_DIV_T bleLlClockDiv
- uint16 ecoXtalStartUpTime

Field Documentation

CYBLE_BLESS_WCO_SCA_CFG_T CYBLE_BLESS_CLK_CFG_PARAMS_T::bleLlSca

Sleep Clock accuracy in PPM, 32Khz Cycles

CYBLE_BLESS_ECO_CLK_DIV_T CYBLE_BLESS_CLK_CFG_PARAMS_T::bleLlClockDiv

Link Layer clock divider

uint16 CYBLE_BLESS_CLK_CFG_PARAMS_T::ecoXtalStartUpTime

ECO crystal startup time in multiple of 62.5us

CYBLE_BLESS_PWR_IN_DB_T Struct Reference

Description

Structure to set/get BLE radio power

Data Fields

- CYBLE_BLESS_PWR_LVL_T blePwrLevelInDbm
- CYBLE_BLESS_PHY_CH_GRP_ID_T bleSsChId

Field Documentation

CYBLE_BLESS_PWR_LVL_T CYBLE_BLESS_PWR_IN_DB_T::blePwrLevelInDbm

Output Power level

CYBLE_BLESS_PHY_CH_GRP_ID_T CYBLE_BLESS_PWR_IN_DB_T::bleSsChId

Channel group ID for which power level is to be read/written

CYBLE_BLS_CHAR_VALUE_T Struct Reference

Description

Blood Pressure Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_BLS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_BLS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_BLS_CHAR_INDEX_T CYBLE_BLS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_BLS_CHAR_VALUE_T::value

Characteristic value

CYBLE_BLS_DESCR_VALUE_T Struct Reference

Description

Blood Pressure Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_BLS_CHAR_INDEX_T charIndex
- CYBLE_BLS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_BLS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_BLS_CHAR_INDEX_T CYBLE_BLS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_BLS_DESCR_INDEX_T CYBLE_BLS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_BLS_DESCR_VALUE_T::value

Descriptor value

CYBLE_BLSC_CHAR_T Struct Reference

Description

Blood Pressure Client Server's Characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_BLSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BLSC_CHAR_T::valueHandle

Handle of server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BLSC_CHAR_T::cccdHandle

Blood Pressure client char. config. descriptor's handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BLSC_CHAR_T::endHandle

Characteristic end handle

CYBLE_BLSC_T Struct Reference

Description

Structure with discovered atributes information of Blood Pressure Service

Data Fields

- CYBLE_BLSC_CHAR_T charInfo[CYBLE_BLS_CHAR_COUNT]

Field Documentation

CYBLE_BLSC_CHAR_TCYBLE_BLSC_T::charInfo[CYBLE_BLS_CHAR_COUNT]

Structure with Characteristic handles + properties of Blood Pressure Service

CYBLE_BLSS_CHAR_T Struct Reference

Description

Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BLSS_CHAR_T::charHandle

Blood Pressure Service characteristic's handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BLSS_CHAR_T::cccdHandle

Blood Pressure Service char. descriptor's handle

CYBLE_BLSS_T Struct Reference

Description

Structure with Blood Pressure Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_BLSS_CHAR_T charInfo[CYBLE_BLS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BLSS_T::serviceHandle

Blood Pressure Service handle

CYBLE_BLSS_CHAR_T CYBLE_BLSS_T::charInfo[CYBLE_BLS_CHAR_COUNT]

Array of Blood Pressure Service Characteristics + Descriptors handles

CYBLE_BMS_CHAR_VALUE_T Struct Reference

Description

Service Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_BMS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value
- CYBLE_GATT_ERR_CODE_T gattErrorCode

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_BMS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_BMS_CHAR_INDEX_T CYBLE_BMS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_BMS_CHAR_VALUE_T::value

Characteristic value

CYBLE_GATT_ERR_CODE_T CYBLE_BMS_CHAR_VALUE_T::gattErrorCode

GATT error code for checking the authorization code

CYBLE_BMS_DESCR_VALUE_T Struct Reference

Description

Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_BMS_CHAR_INDEX_T charIndex
- CYBLE_BMS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_BMS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_BMS_CHAR_INDEX_T CYBLE_BMS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_BMS_DESCR_INDEX_T CYBLE_BMS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_BMS_DESCR_VALUE_T::value

Descriptor value

CYBLE_BMSC_CHAR_T Struct Reference

Description

Client Characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_BMS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_BMSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_BMSC_CHAR_T::valueHandle

Handle of Server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BMSC_CHAR_T::descrHandle[CYBLE_BMS_DESCR_COUNT]
Characteristics descriptors handles

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BMSC_CHAR_T::endHandle
Characteristic End Handle

CYBLE_BMSC_T Struct Reference

Description
Service structure type

Data Fields
- CYBLE_BMSC_CHAR_T charInfo[CYBLE_BMS_CHAR_COUNT]

Field Documentation

CYBLE_BMSC_CHAR_TCYBLE_BMSC_T::charInfo[CYBLE_BMS_CHAR_COUNT]
Characteristics handle + properties array

CYBLE_BMSS_CHAR_T Struct Reference

Description
Characteristic with descriptors type

Data Fields
- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_BMS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BMSS_CHAR_T::charHandle
Handle of Characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BMSS_CHAR_T::descrHandle[CYBLE_BMS_DESCR_COUNT]
Handles of Descriptors

CYBLE_BMSS_T Struct Reference

Description
Structure with Service attribute handles

Data Fields
- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_BMSS_CHAR_T charInfo[CYBLE_BMS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BMSS_T::serviceHandle

Service handle

CYBLE_BMSS_CHAR_TCYBLE_BMSS_T::charInfo[CYBLE_BMS_CHAR_COUNT]

Service characteristics info array

CYBLE_BTS_INFO_T Struct Reference

Description

Contains information about Bootloader Characteristic structure

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T btServiceCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T btServiceCharDescriptors[CYBLE_BT_SERVICE_CHAR_DESCRIPTORS_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BTS_INFO_T::btServiceCharHandle

Bootloader Characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BTS_INFO_T::btServiceCharDescriptors[CYBLE_BT_SERVICE_CHAR_DESCRIPTORS_COUNT]

Bootloader Characteristic Descriptors handles

CYBLE_BTSS_T Struct Reference

Description

Structure with Bootloader Service attribute handles.

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T btServiceHandle
- CYBLE_BTS_INFO_T btServiceInfo[CYBLE_BT_SERVICE_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_BTSS_T::btServiceHandle

Handle of a Bootloader Service

CYBLE_BTS_INFO_TCYBLE_BTSS_T::btServiceInfo[CYBLE_BT_SERVICE_CHAR_COUNT]

Information about Bootloader Characteristics

CYBLE_CGMS_CHAR_VALUE_T Struct Reference

Description

CGM Service Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CGMS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value
- CYBLE_GATT_ERR_CODE_T gattErrorCode

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_CGMS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_CGMS_CHAR_INDEX_T CYBLE_CGMS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_CGMS_CHAR_VALUE_T::value

Characteristic value

CYBLE_GATT_ERR_CODE_T CYBLE_CGMS_CHAR_VALUE_T::gattErrorCode

GATT error code for access control

CYBLE_CGMS_DESCR_VALUE_T Struct Reference

Description

CGM Service Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CGMS_CHAR_INDEX_T charIndex
- CYBLE_CGMS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_CGMS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_CGMS_CHAR_INDEX_T CYBLE_CGMS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_CGMS_DESCR_INDEX_T CYBLE_CGMS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_CGMS_DESCR_VALUE_T::value

Descriptor value

CYBLE_CGMSC_CHAR_T Struct Reference

Description

CGM Client Characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_CGMS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_CGMSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CGMSC_CHAR_T::valueHandle

Handle of Server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CGMSC_CHAR_T::descrHandle[CYBLE_CGMS_DESCR_COUNT]

Characteristics descriptors handles

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CGMSC_CHAR_T::endHandle

Characteristic End Handle

CYBLE_CGMSC_T Struct Reference

Description

CGM Service structure type

Data Fields

- CYBLE_CGMSC_CHAR_T charInfo[CYBLE_CGMS_CHAR_COUNT]

Field Documentation

CYBLE_CGMSC_CHAR_TCYBLE_CGMSC_T::charInfo[CYBLE_CGMS_CHAR_COUNT]

Characteristics handle + properties array

CYBLE_CGMSS_CHAR_T Struct Reference

Description

Characteristic with descriptors type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_CGMS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CGMSS_CHAR_T::charHandle

Handle of Characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CGMSS_CHAR_T::descrHandle[CYBLE_CGMS_DESCR_COUNT]

Handles of Descriptors

CYBLE_CGMSS_T Struct Reference

Description

Structure with CGM Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_CGMSS_CHAR_T charInfo[CYBLE_CGMS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CGMSS_T::serviceHandle

CGM Service handle

CYBLE_CGMSS_CHAR_TCYBLE_CGMSS_T::charInfo[CYBLE_CGMS_CHAR_COUNT]

CGM Service characteristics info array

CYBLE_CONN_HANDLE_T Struct Reference

Description

Connection Handle

Data Fields

- uint8 bdHandle
- uint8 attId

Field Documentation

uint8 CYBLE_CONN_HANDLE_T::bdHandle

Identifies the peer device(s) bonded or in current connection. Stack supports CYBLE_GAP_MAX_BONDED_DEVICE+1 devices. first device connected is assinged value CYBLE_GAP_MAX_BONDED_DEVICE. If previous device is bonded then current device will be assigned value CYBLE_GAP_MAX_BONDED_DEVICE-1, else CYBLE_GAP_MAX_BONDED_DEVICE.

uint8 CYBLE_CONN_HANDLE_T::attId

Identifies the ATT Instance. Current implementation supports only one att instance (0) due to availability of only on fixed channel for att. This parameter is introduced as part of connection handle to keep the interface unchanged event if new Bluetooth spect defines more fixed channels for ATT payload.

CYBLE_CPS_CHAR_VALUE_T Struct Reference

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CPS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_CPS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_CPS_CHAR_INDEX_TCYBLE_CPS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_CPS_CHAR_VALUE_T::value

Characteristic value

CYBLE_CPS_DESCR_VALUE_T Struct Reference

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CPS_CHAR_INDEX_T charIndex
- CYBLE_CPS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_CPS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_CPS_CHAR_INDEX_TCYBLE_CPS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_CPS_DESCR_INDEX_TCYBLE_CPS_DESCR_VALUE_T::descrIndex

Index of descriptor

CYBLE_GATT_VALUE_T* CYBLE_CPS_DESCR_VALUE_T::value

Characteristic value

CYBLE_CPSC_CHAR_T Struct Reference

Description

Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_CPS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- uint8 properties

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CPSC_CHAR_T::descrHandle[CYBLE_CPS_DESCR_COUNT]

Handles of descriptors

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CPSC_CHAR_T::valueHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CPSC_CHAR_T::endHandle

End handle of characteristic

uint8 CYBLE_CPSC_CHAR_T::properties

Properties for value field

CYBLE_CPSC_T Struct Reference

Description

Structure with discovered attributes information of Cycling Power Service

Data Fields

- CYBLE_CPSC_CHAR_T charInfo[CYBLE_CPS_CHAR_COUNT]

Field Documentation

CYBLE_CPSC_CHAR_TCYBLE_CPSC_T::charInfo[CYBLE_CPS_CHAR_COUNT]

Characteristics handles array

CYBLE_CPSS_CHAR_T Struct Reference

Description

Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_CPS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_CPSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_CPSS_CHAR_T::descrHandle[CYBLE_CPS_DESCR_COUNT]

Handle of descriptor

CYBLE_CPSS_T Struct Reference

Description

Structure with Cycling Power Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_CPSS_CHAR_T charInfo[CYBLE_CPS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_CPSS_T::serviceHandle

Cycling Power Service handle

CYBLE_CPSS_CHAR_T CYBLE_CPSS_T::charInfo[CYBLE_CPS_CHAR_COUNT]

Cycling Power Service Characteristic handles

CYBLE_CSCS_CHAR_VALUE_T Struct Reference

Description

Cycling Speed and Cadence Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CSCS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_CSCS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_CSCS_CHAR_INDEX_T CYBLE_CSCS_CHAR_VALUE_T::charIndex

Index of Cycling Speed and Cadence Service Characteristic

CYBLE_GATT_VALUE_T* CYBLE_CSCS_CHAR_VALUE_T::value

Characteristic value

CYBLE_CSCS_DESCR_VALUE_T Struct Reference

Description

Cycling Speed and Cadence Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CSCS_CHAR_INDEX_T charIndex
- CYBLE_CSCS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_CSCS_DESCR_VALUE_T::connHandle

Connection handle

CYBLE_CSCS_CHAR_INDEX_T CYBLE_CSCS_DESCR_VALUE_T::charIndex

Characteristic index of the Service

CYBLE_CSCS_DESCR_INDEX_T CYBLE_CSCS_DESCR_VALUE_T::descrIndex

Characteristic Descriptor index

CYBLE_GATT_VALUE_T* CYBLE_CSCS_DESCR_VALUE_T::value

Pointer to value of the Service Characteristic Descriptor

CYBLE_CSCSC_SRVR_FULL_CHAR_INFO_T Struct Reference

Description

Service full Characteristic information type

Data Fields

- CYBLE_SRVR_CHAR_INFO_T charInfo
- CYBLE_GATT_DB_ATTR_HANDLE_T descriptors[CYBLE_CSCS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_CSCSC_SRVR_FULL_CHAR_INFO_T::charInfo

Characteristic handle and properties

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_CSCSC_SRVR_FULL_CHAR_INFO_T::descriptors[CYBLE_CSCS_DESCR_COUNT]

Characteristic descriptors handles

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_CSCSC_SRVR_FULL_CHAR_INFO_T::endHandle

End handle of Characteristic

CYBLE_CSCSC_T Struct Reference

Description

Structure with discovered attributes information of Cycling Speed and Cadence Service

Data Fields

- CYBLE_CSCSC_SRVR_FULL_CHAR_INFO_T characteristics[CYBLE_CSCS_CHAR_COUNT]

Field Documentation

CYBLE_CSCSC_SRVR_FULL_CHAR_INFO_TCYBLE_CSCSC_T::characteristics[CYBLE_CSCS_CHAR_COUNT]

Characteristics handles array

CYBLE_CSCSS_CHAR_T Struct Reference

Description

Characteristic with descriptors type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_CSCS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CSCSS_CHAR_T::charHandle

Handle of the Characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CSCSS_CHAR_T::descrHandle[CYBLE_CSCS_DESCR_COUNT]

Handles of the Descriptors

CYBLE_CSCSS_T Struct Reference

Description

Structure with Cycling Speed and Cadence Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_CSCSS_CHAR_T charInfo[CYBLE_CSCS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CSCSS_T::serviceHandle

Cycling Speed and Cadence Service handle

CYBLE_CSCSS_CHAR_T CYBLE_CSCSS_T::charInfo[CYBLE_CSCS_CHAR_COUNT]

Array of Cycling Speed and Cadence Service Characteristics and Descriptors handles

CYBLE_CTS_CHAR_VALUE_T Struct Reference

Description

Current Time Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CTS_CHAR_INDEX_T charIndex
- CYBLE_GATT_ERR_CODE_T gattErrorCode
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_CTS_CHAR_VALUE_T::connHandle

Connection handle

CYBLE_CTS_CHAR_INDEX_T CYBLE_CTS_CHAR_VALUE_T::charIndex

Characteristic index of Current Time Service

CYBLE_GATT_ERR_CODE_T CYBLE_CTS_CHAR_VALUE_T::gattErrorCode

GATT error code for access control

CYBLE_GATT_VALUE_T* CYBLE_CTS_CHAR_VALUE_T::value

Pointer to value of Current Time Service characteristic

CYBLE_CTS_CURRENT_TIME_T Struct Reference

Description

Current Time Characteristic structure

Data Fields

- uint8 yearLow
- uint8 yearHigh
- uint8 month
- uint8 day
- uint8 hours
- uint8 minutes
- uint8 seconds
- uint8 dayOfWeek
- uint8 fractions256
- uint8 adjustReason

Field Documentation

uint8 CYBLE_CTS_CURRENT_TIME_T::yearLow
LSB of current year

uint8 CYBLE_CTS_CURRENT_TIME_T::yearHigh
MSB of current year

uint8 CYBLE_CTS_CURRENT_TIME_T::month
Current month

uint8 CYBLE_CTS_CURRENT_TIME_T::day
Current day

uint8 CYBLE_CTS_CURRENT_TIME_T::hours
Current time - hours

uint8 CYBLE_CTS_CURRENT_TIME_T::minutes
Current time - minutes

uint8 CYBLE_CTS_CURRENT_TIME_T::seconds
Current time - seconds

uint8 CYBLE_CTS_CURRENT_TIME_T::dayOfWeek
Current day of week

uint8 CYBLE_CTS_CURRENT_TIME_T::fractions256
The value of 1/256th of second

uint8 CYBLE_CTS_CURRENT_TIME_T::adjustReason
Reason of Current Time service characteristics change

CYBLE_CTS_DESCR_VALUE_T Struct Reference

Description

Current Time Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_CTS_CHAR_INDEX_T charIndex
- CYBLE_CTS_CHAR_DESCRIPTORS_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_CTS_DESCR_VALUE_T::connHandle
Connection handle

CYBLE_CTS_CHAR_INDEX_T CYBLE_CTS_DESCR_VALUE_T::charIndex

Characteristic index of Current Time Service

CYBLE_CTS_CHAR_DESCRIPTORS_T CYBLE_CTS_DESCR_VALUE_T::descrIndex

Characteristic index Descriptor of Current Time Service

CYBLE_GATT_VALUE_T* CYBLE_CTS_DESCR_VALUE_T::value

Pointer to value of Current Time Service characteristic

CYBLE_CTS_LOCAL_TIME_INFO_T Struct Reference

Description

Local Time Information Characteristic structure

Data Fields

- int8 timeZone
- uint8 dst

Field Documentation

int8 CYBLE_CTS_LOCAL_TIME_INFO_T::timeZone

Current Time Zone

uint8 CYBLE_CTS_LOCAL_TIME_INFO_T::dst

Daylight Saving Time value

CYBLE_CTS_REFERENCE_TIME_INFO_T Struct Reference

Description

Reference Time Information Characteristic structure

Data Fields

- uint8 timeSource
- uint8 timeAccuracy
- uint8 daysSinceUpdate
- uint8 hoursSinseUpdate

Field Documentation

uint8 CYBLE_CTS_REFERENCE_TIME_INFO_T::timeSource

Time update source

uint8 CYBLE_CTS_REFERENCE_TIME_INFO_T::timeAccuracy

Time accuracy

uint8 CYBLE_CTS_REFERENCE_TIME_INFO_T::daysSinceUpdate

Days since last time update

uint8 CYBLE_CTS_REFERENCE_TIME_INFO_T::hoursSinseUpdate

Hours since last time update

CYBLE_CTSC_T Struct Reference

Description

Structure with discovered attributes information of Current Time Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T currTimeCharacteristics[CYBLE_CTS_CHAR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T currTimeCccdHandle

Field Documentation

CYBLE_SRVR_CHAR_INFO_TCYBLE_CTSC_T::currTimeCharacteristics[CYBLE_CTS_CHAR_COUNT]

Structure with Characteristic handles + properties of Current Time Service

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CTSC_T::currTimeCccdHandle

Current Time Client Characteristic Configuration handle of Current Time Service

CYBLE_CTSS_T Struct Reference

Description

Structure with Current Time Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T currTimeCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T currTimeCccdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T localTimeInfCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T refTimeInfCharHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CTSS_T::serviceHandle

Current Time Service handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CTSS_T::currTimeCharHandle

Current Time Characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CTSS_T::currTimeCccdHandle

Current Time Client Characteristic Configuration Characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CTSS_T::localTimeInfCharHandle

Local Time Information Characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CTSS_T::refTimeInfCharHandle

Reference Time Information Characteristic handle

CYBLE_CUSTOMS_INFO_T Struct Reference

Description

Contains information about Custom Characteristic structure

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T customServCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T customServCharDesc[CYBLE_CUSTOM_SERVICE_CHAR_DESCRIPTORS_COUNT==0u?1u:CYBLE_CUSTOM_SERVICE_CHAR_DESCRIPTORS_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CUSTOMS_INFO_T::customServCharHandle

Custom Characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CUSTOMS_INFO_T::customServCharDesc[CYBLE_CUSTOM_SERVICE_CHAR_DESCRIPTORS_COUNT==0u?1u:CYBLE_CUSTOM_SERVICE_CHAR_DESCRIPTORS_COUNT]

Custom Characteristic Descriptors handles

CYBLE_CUSTOMS_T Struct Reference

Description

Structure with Custom Service attribute handles.

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T customServHandle
- CYBLE_CUSTOMS_INFO_T customServInfo[CYBLE_CUSTOM_SERVICE_CHAR_COUNT==0u?1u:CYBLE_CUSTOM_SERVICE_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_CUSTOMS_T::customServHandle

Handle of a Custom Service

CYBLE_CUSTOMS_INFO_TCYBLE_CUSTOMS_T::customServInfo[CYBLE_CUSTOM_SERVICE_CHAR_COUNT==0u?1u:CYBLE_CUSTOM_SERVICE_CHAR_COUNT]

Information about Custom Characteristics

CYBLE_CYPACKED_ATTR Struct Reference

Data Fields

- uint16 **year**

- uint8 **month**
- uint8 **day**
- uint8 **hours**
- uint8 **minutes**
- uint8 **seconds**
- uint16 crankLength
- uint16 chainLength
- uint16 chainWeight
- uint16 spanLength
- CYBLE_CPS_DATE_TIME_T factoryCalibrationDate
- uint8 samplingRate
- int16 offsetCompensation

Field Documentation

uint16 CYBLE_CYPACKED_ATTR::crankLength
In millimeters with a resolution of 1/2 millimeter

uint16 CYBLE_CYPACKED_ATTR::chainLength
In millimeters with a resolution of 1 millimeter

uint16 CYBLE_CYPACKED_ATTR::chainWeight
In grams with a resolution of 1 gram

uint16 CYBLE_CYPACKED_ATTR::spanLength
In millimeters with a resolution of 1 millimeter

CYBLE_CPS_DATE_TIME_T CYBLE_CYPACKED_ATTR::factoryCalibrationDate
Use the same format as the Date Time characteristic

uint8 CYBLE_CYPACKED_ATTR::samplingRate
In Hertz with a resolution of 1 Hertz

int16 CYBLE_CYPACKED_ATTR::offsetCompensation
Either the raw force in Newton or the raw torque in 1/32 Newton meter based on the server capabilities. 0xFFFF means "Not Available"

CYBLE_DIS_CHAR_VALUE_T Struct Reference

Description

Device Information Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_DIS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_DIS_CHAR_VALUE_T::connHandle
Peer device handle

CYBLE_DIS_CHAR_INDEX_T CYBLE_DIS_CHAR_VALUE_T::charIndex
Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_DIS_CHAR_VALUE_T::value
Characteristic value

CYBLE_DISC_CHAR_INFO_T Struct Reference

Description

Characteristic data received with read by type response during discovery process

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charDeclHandle
- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_UUID_T uuid
- uint8 uuidFormat

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_DISC_CHAR_INFO_T::charDeclHandle
Handle for characteristic declaration

uint8 CYBLE_DISC_CHAR_INFO_T::properties
Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_DISC_CHAR_INFO_T::valueHandle
Handle to server database attribute value entry

CYBLE_UUID_T CYBLE_DISC_CHAR_INFO_T::uuid
Characteristic UUID

uint8 CYBLE_DISC_CHAR_INFO_T::uuidFormat
UUID Format - 16-bit (0x01) or 128-bit (0x02)

CYBLE_DISC_DESCR_INFO_T Struct Reference

Description

Characteristic descriptor data received with find info response during discovery process

Data Fields

- CYBLE_CONN_HANDLE_T connHandle

- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle
- CYBLE_UUID_T uuid
- uint8 uuidFormat

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_DISC_DESCR_INFO_T::connHandle
Handle to server database attribute entry

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_DISC_DESCR_INFO_T::descrHandle
Descriptor handle

CYBLE_UUID_T CYBLE_DISC_DESCR_INFO_T::uuid
Descriptor UUID

uint8 CYBLE_DISC_DESCR_INFO_T::uuidFormat
UUID Format - 16-bit (0x01) or 128-bit (0x02)

CYBLE_DISC_INCL_INFO_T Struct Reference

Description
Included service data received with read by type response during discovery process

Data Fields
- CYBLE_GATT_DB_ATTR_HANDLE_T inclDefHandle
- CYBLE_GATT_ATTR_HANDLE_RANGE_T inclHandleRange
- CYBLE_UUID_T uuid
- uint8 uuidFormat

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_DISC_INCL_INFO_T::inclDefHandle
Included definition handle

CYBLE_GATT_ATTR_HANDLE_RANGE_T CYBLE_DISC_INCL_INFO_T::inclHandleRange
Included declaration handle range

CYBLE_UUID_T CYBLE_DISC_INCL_INFO_T::uuid
Included UUID

uint8 CYBLE_DISC_INCL_INFO_T::uuidFormat
UUID Format - 16-bit (0x01) or 128-bit (0x02)

CYBLE_DISC_SRVC128_INFO_T Struct Reference

Description
Service data received with read by group type response during discovery process including 128 bit UUID

Data Fields

- CYBLE_GATT_ATTR_HANDLE_RANGE_T **range**
- CYBLE_UUID_T **uuid**

CYBLE_DISC_SRVC_INFO_T Struct Reference

Description

Service data received with read by group type response during discovery process

Data Fields

- CYBLE_GATT_ATTR_HANDLE_RANGE_T **range**
- uint16 **uuid**

CYBLE_DISC_T Struct Reference

Description

Structure with discovered attributes information of Device Information Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T charInfo[CYBLE_DIS_CHAR_COUNT]

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_DISC_T::charInfo[CYBLE_DIS_CHAR_COUNT]

Characteristics handle + properties array

CYBLE_DISS_T Struct Reference

Description

Structure with Device Information Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle[CYBLE_DIS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_DISS_T::serviceHandle

Device Information Service handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_DISS_T::charHandle[CYBLE_DIS_CHAR_COUNT]

Device Information Service Characteristic handles

CYBLE_ESS_CHAR_VALUE_T Struct Reference

Description

ESS Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_ESS_CHAR_INDEX_T charIndex
- uint8 charInstance
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_ESS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_ESS_CHAR_INDEX_T CYBLE_ESS_CHAR_VALUE_T::charIndex

Index of service characteristic

uint8 CYBLE_ESS_CHAR_VALUE_T::charInstance

Instance of specific service characteristic

CYBLE_GATT_VALUE_T* CYBLE_ESS_CHAR_VALUE_T::value

Characteristic value

CYBLE_ESS_DESCR_VALUE_T Struct Reference

Description

ESS Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_ESS_CHAR_INDEX_T charIndex
- uint8 charInstance
- CYBLE_ESS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_ERR_CODE_T gattErrorCode
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_ESS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_ESS_CHAR_INDEX_T CYBLE_ESS_DESCR_VALUE_T::charIndex

Index of service characteristic

uint8 CYBLE_ESS_DESCR_VALUE_T::charInstance

Instance of specific service characteristic

CYBLE_ESS_DESCR_INDEX_TCYBLE_ESS_DESCR_VALUE_T::descrIndex

Index of descriptor

CYBLE_GATT_ERR_CODE_TCYBLE_ESS_DESCR_VALUE_T::gattErrorCode

Error code received from application (optional)

CYBLE_GATT_VALUE_T* CYBLE_ESS_DESCR_VALUE_T::value

Characteristic value

CYBLE_ESSC_CHAR_INFO_PTR_T Struct Reference

Description

Structure to hold pointer to CYBLE_ESSC_CHAR_T

Data Fields

- CYBLE_ESSC_CHAR_T* charInfoPtr

Field Documentation

CYBLE_ESSC_CHAR_T* CYBLE_ESSC_CHAR_INFO_PTR_T::charInfoPtr

Pointer to CYBLE_ESSC_CHAR_T which holds information about specific ES Characteristic.

CYBLE_ESSC_CHAR_T Struct Reference

Description

ESS Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_ESS_DESCR_COUNT]
- uint8 properties

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ESSC_CHAR_T::valueHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ESSC_CHAR_T::endHandle

End handle of characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ESSC_CHAR_T::descrHandle[CYBLE_ESS_DESCR_COUNT]

Array of Descriptor handles

uint8 CYBLE_ESSC_CHAR_T::properties
Properties for value field

CYBLE_ESSC_T Struct Reference

Description
Structure with discovered attributes information of Environmental Sensing Service.

Data Fields
- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_ESSC_CHAR_INFO_PTR_T charInfoAddr[CYBLE_ESS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ESSC_T::serviceHandle
Environmental Sensing Service handle

CYBLE_ESSC_CHAR_INFO_PTR_TCYBLE_ESSC_T::charInfoAddr[CYBLE_ESS_CHAR_COUNT]
Environmental Sensing Service Array with pointers to characteristic information.

CYBLE_ESSS_CHAR_INFO_PTR_T Struct Reference

Description
Structure to hold pointer to CYBLE_ESSS_CHAR_T

Data Fields
- CYBLE_ESSS_CHAR_T* charInfoPtr

Field Documentation

CYBLE_ESSS_CHAR_T* CYBLE_ESSS_CHAR_INFO_PTR_T::charInfoPtr
Pointer to CYBLE_ESSS_CHAR_T which holds information about specific ES Characteristic

CYBLE_ESSS_CHAR_T Struct Reference

Description
ESS Characteristic with descriptors

Data Fields
- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_ESS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ESSS_CHAR_T::charHandle
Handles of Characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ESSS_CHAR_T::descrHandle[CYBLE_ESS_DESCR_COUNT]

Array of Descriptor handles

CYBLE_ESSS_T Struct Reference

Description

Structure with Environmental Sensing Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_ESSS_CHAR_INFO_PTR_T charInfoAddr[CYBLE_ESS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_ESSS_T::serviceHandle

Environmental Sensing Service handle

CYBLE_ESSS_CHAR_INFO_PTR_TCYBLE_ESSS_T::charInfoAddr[CYBLE_ESS_CHAR_COUNT]

Environmental Sensing Service Array with pointers to Characteristic handles.

CYBLE_GAP_AUTH_INFO_T Struct Reference

Description

Authentication Parameters Information

Data Fields

- uint8 security
- uint8 bonding
- uint8 ekeySize
- CYBLE_GAP_AUTH_FAILED_REASON_T authErr

Field Documentation

uint8 CYBLE_GAP_AUTH_INFO_T::security

Security Mode setting will be as follows: (CYBLE_GAP_SEC_MODE_1 | CYBLE_GAP_SEC_LEVEL_1) (CYBLE_GAP_SEC_MODE_1 | CYBLE_GAP_SEC_LEVEL_2) (CYBLE_GAP_SEC_MODE_1 | CYBLE_GAP_SEC_LEVEL_3) (CYBLE_GAP_SEC_MODE_2 | CYBLE_GAP_SEC_LEVEL_2) (CYBLE_GAP_SEC_MODE_2 | CYBLE_GAP_SEC_LEVEL_3)

uint8 CYBLE_GAP_AUTH_INFO_T::bonding

Bonding type setting: CYBLE_GAP_BONDING_NONE CYBLE_GAP_BONDING

uint8 CYBLE_GAP_AUTH_INFO_T::ekeySize

Encryption Key Size (octets) Minimum = 7 maximum = 16

CYBLE_GAP_AUTH_FAILED_REASON_TCYBLE_GAP_AUTH_INFO_T::authErr

Parameter to say it authentication is accepted or rejected with reason. accepted = CYBLE_GAP_AUTH_ERROR_NONE or error code CYBLE_GAP_AUTH_FAILED_REASON_T.

CYBLE_GAP_BD_ADDR_T Struct Reference

Description

Bluetooth Device Address

Data Fields

- uint8 bdAddr[CYBLE_GAP_BD_ADDR_SIZE]
- uint8 type

Field Documentation

uint8 CYBLE_GAP_BD_ADDR_T::bdAddr[CYBLE_GAP_BD_ADDR_SIZE]

Bluetooth device address

uint8 CYBLE_GAP_BD_ADDR_T::type

public = 0, Random = 1

CYBLE_GAP_BONDED_DEV_ADDR_LIST_T Struct Reference

Description

Bluetooth Bonded Device Address list

Data Fields

- uint8 count
- CYBLE_GAP_BD_ADDR_T bdAddrList[CYBLE_GAP_MAX_BONDED_DEVICE]

Field Documentation

uint8 CYBLE_GAP_BONDED_DEV_ADDR_LIST_T::count

Number of bonded devices

CYBLE_GAP_BD_ADDR_TCYBLE_GAP_BONDED_DEV_ADDR_LIST_T::bdAddrList[CYBLE_GAP_MAX_BONDED_DEVICE]

Pointer to list of bluetooth device addresses of bonded devices, of type 'CYBLE_GAP_BD_ADDR_T'. 'CYBLE_GAP_MAX_BONDED_DEVICE' is a '#define' to be defined during build-time.

CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T Struct Reference

Description

Current Connection Parameters used by controller

Data Fields

- uint8 status
- uint16 connIntv
- uint16 connLatency
- uint16 supervisionTO

Field Documentation

uint8 CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T::status

status corresponding to this event will be HCI error code as defined in BLE spec 4.1

uint16 CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T::connIntv

Connection interval used on this connection. Range: 0x0006 to 0x0C80 Time Range: 7.5 ms to 4 sec

uint16 CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T::connLatency

Slave latency for the connection in number of connection events. Range: 0x0000 to 0x01F4

uint16 CYBLE_GAP_CONN_PARAM_UPDATED_IN_CONTROLLER_T::supervisionTO

Supervision timeout for the LE Link. Supervision timeout will be supervisionTO * 10 ms Time Range: 100 msec to 32 secs

CYBLE_GAP_CONN_UPDATE_PARAM_T Struct Reference

Description

GAP Connection Update parameters

Data Fields

- uint16 connIntvMin
- uint16 connIntvMax
- uint16 connLatency
- uint16 supervisionTO

Field Documentation

uint16 CYBLE_GAP_CONN_UPDATE_PARAM_T::connIntvMin

Minimum value for the connection event interval. This shall be less than or equal to conn_Interval_Max. Minimum connection interval will be connIntvMin * 1.25 ms Time Range: 7.5 ms to 4 sec

uint16 CYBLE_GAP_CONN_UPDATE_PARAM_T::connIntvMax

Maximum value for the connection event interval. This shall be greater than or equal to conn_Interval_Min. Maximum connection interval will be connIntvMax * 1.25 ms Time Range: 7.5 ms to 4 sec

uint16 CYBLE_GAP_CONN_UPDATE_PARAM_T::connLatency

Slave latency for the connection in number of connection events. Range: 0x0000 to 0x01F4

uint16 CYBLE_GAP_CONN_UPDATE_PARAM_T::supervisionTO

Supervision timeout for the LE Link. Supervision timeout will be supervisionTO * 10 ms Time Range: 100 msec to 32 secs

CYBLE_GAP_PASSKEY_DISP_INFO_T Struct Reference

Description

Passkey display information

Data Fields

- uint8 bdHandle
- uint32 passkey

Field Documentation

uint8 CYBLE_GAP_PASSKEY_DISP_INFO_T::bdHandle

bd handle of the remote device

uint32 CYBLE_GAP_PASSKEY_DISP_INFO_T::passkey

size = 6, not null terminated

CYBLE_GAP_SMP_KEY_DIST_T Struct Reference

Description

Security Manager Key Distribution data

Data Fields

- uint8 ltkInfo[CYBLE_GAP_SMP_LTK_SIZE]
- uint8 midInfo[CYBLE_GAP_SMP_MID_INFO_SIZE]
- uint8 irkInfo[CYBLE_GAP_SMP_IRK_SIZE]
- uint8 idAddrInfo[CYBLE_GAP_SMP_IDADDR_DATA_SIZE]
- uint8 csrkInfo[CYBLE_GAP_SMP_CSRK_SIZE]

Field Documentation

uint8 CYBLE_GAP_SMP_KEY_DIST_T::ltkInfo[CYBLE_GAP_SMP_LTK_SIZE]

Long Term Key

uint8 CYBLE_GAP_SMP_KEY_DIST_T::midInfo[CYBLE_GAP_SMP_MID_INFO_SIZE]

Encrypted Diversifier and Randdom Number

uint8 CYBLE_GAP_SMP_KEY_DIST_T::irkInfo[CYBLE_GAP_SMP_IRK_SIZE]

Identity Resolving Key

uint8 CYBLE_GAP_SMP_KEY_DIST_T::idAddrInfo[CYBLE_GAP_SMP_IDADDR_DATA_SIZE]

Public device/Static Random address type

uint8 CYBLE_GAP_SMP_KEY_DIST_T::csrkInfo[CYBLE_GAP_SMP_CSRK_SIZE]

Connection Signature Resolving Key

CYBLE_GAPC_ADV_REPORT_T Struct Reference

Description

Advertisement report received by GAP Central

Data Fields

- CYBLE_GAPC_ADV_EVENT_T eventType
- uint8 peerAddrType
- uint8 * peerBdAddr
- uint8 dataLen
- uint8 * data
- int8 rssi

Field Documentation

CYBLE_GAPC_ADV_EVENT_TCYBLE_GAPC_ADV_REPORT_T::eventType

Advertisement event type

- Connectable undirected advertising = 0x00
- Connectable directed advertising = 0x01
- Scannable undirected advertising = 0x02
- Non connectable undirected advertising = 0x03
- Scan Response = 0x04

uint8 CYBLE_GAPC_ADV_REPORT_T::peerAddrType

bd address type of the device advertising.

- CYBLE_GAP_ADDR_TYPE_PUBLIC (Public device address)
- CYBLE_GAP_ADDR_TYPE_RANDOM (Random device address)

uint8* CYBLE_GAPC_ADV_REPORT_T::peerBdAddr

Public Device Address or Random Device Address for each device which responded to scanning.

uint8 CYBLE_GAPC_ADV_REPORT_T::dataLen

length of the data for each device that responded to scanning

uint8* CYBLE_GAPC_ADV_REPORT_T::data

Pointer to advertising or scan response data

int8 CYBLE_GAPC_ADV_REPORT_T::rssi

Rssi of the responding device. Range: -85 <= N <= 0 Units: dBm

CYBLE_GAPC_CONN_PARAM_T Struct Reference

Description

Connection parameters at the GAP Central end

Data Fields

- uint16 scanIntv
- uint16 scanWindow
- uint8 initiatorFilterPolicy
- uint8 peerBdAddr[CYBLE_GAP_BD_ADDR_SIZE]
- uint8 peerAddrType
- uint8 ownAddrType
- uint16 connIntvMin
- uint16 connIntvMax
- uint16 connLatency
- uint16 supervisionTO
- uint16 minCeLength
- uint16 maxCeLength

Field Documentation

uint16 CYBLE_GAPC_CONN_PARAM_T::scanIntv

The time interval from when last LE scan is started until next subsequent LE scan.

- Time Range: 2.5 ms to 10.24 sec.

uint16 CYBLE_GAPC_CONN_PARAM_T::scanWindow

The time duration of scanning to be performed

- Time Range: 2.5 ms to 10.24 sec

uint8 CYBLE_GAPC_CONN_PARAM_T::initiatorFilterPolicy

Filter policies to be applied during connection procedure

- CYBLE_GAPC_CONN_ALL (White list is not used to determine which advertiser to connect. Peer address is used)
- CYBLE_GAPC_CONN_WHITELIST (White list is used to determine which advertiser to connect to. Peer address shall be ignored)

uint8 CYBLE_GAPC_CONN_PARAM_T::peerBdAddr[CYBLE_GAP_BD_ADDR_SIZE]

Peer's bd address with whom connection to be established

uint8 CYBLE_GAPC_CONN_PARAM_T::peerAddrType

Peer's bd address type

- CYBLE_GAP_ADDR_TYPE_PUBLIC (Public device address)
- CYBLE_GAP_ADDR_TYPE_RANDOM (Random device address)

uint8 CYBLE_GAPC_CONN_PARAM_T::ownAddrType

Own bd address type

- CYBLE_GAP_ADDR_TYPE_PUBLIC (Public device address)
- CYBLE_GAP_ADDR_TYPE_RANDOM (Random device address)

uint16 CYBLE_GAPC_CONN_PARAM_T::connIntvMin

Minimum value for the connection event interval. This shall be less than or equal to conn_Interval_Max. Minimum connection interval will be connIntvMin * 1.25 ms Time Range: 7.5 ms to 4 sec

uint16 CYBLE_GAPC_CONN_PARAM_T::connIntvMax

Maximum value for the connection event interval. This shall be greater than or equal to conn_Interval_Min. Maximum connection interval will be connIntvMax * 1.25 ms Time Range: 7.5 ms to 4 sec

uint16 CYBLE_GAPC_CONN_PARAM_T::connLatency

Slave latency for the connection in number of connection events. Range: 0x0000 to 0x01F4

uint16 CYBLE_GAPC_CONN_PARAM_T::supervisionTO

Supervision timeout for the LE Link. Supervision timeout will be supervisionTO * 10 ms Time Range: 100 msec to 32 secs

uint16 CYBLE_GAPC_CONN_PARAM_T::minCeLength

Minimum length of connection needed for this LE connection. Range: 0x0000 - 0xFFFF

uint16 CYBLE_GAPC_CONN_PARAM_T::maxCeLength

Maximum length of connection needed for this LE connection. Range: 0x0000 - 0xFFFF

CYBLE_GAPC_DISC_INFO_T Struct Reference

Description

Discovery information collected by Client

Data Fields

- uint8 discProcedure
- uint8 scanType
- uint16 scanIntv
- uint16 scanWindow
- uint8 ownAddrType
- uint8 scanFilterPolicy
- uint16 scanTo
- uint8 filterDuplicates

Field Documentation

uint8 CYBLE_GAPC_DISC_INFO_T::discProcedure

Observation and discovery procedure.

- CYBLE_GAPC_OBSER_PROCEDURE (Observation procedure)
- CYBLE_GAPC_LTD_DISC_PROCEDURE (Limited discovery procedure)

- CYBLE_GAPC_GEN_DISC_PROCEDURE (General discovery procedure)

uint8 CYBLE_GAPC_DISC_INFO_T::scanType

Type of scan to perform

- CYBLE_GAPC_PASSIVE_SCANNING (Passive Scanning)
- CYBLE_GAPC_ACTIVE_SCANNING (Active scanning)

uint16 CYBLE_GAPC_DISC_INFO_T::scanIntv

The time interval from when last LE scan is started until next subsequent LE scan.

- Time Range: 2.5 ms to 10.24 sec.

uint16 CYBLE_GAPC_DISC_INFO_T::scanWindow

The time duration of scanning to be performed

- Time Range: 2.5 ms to 10.24 sec

uint8 CYBLE_GAPC_DISC_INFO_T::ownAddrType

Own BD Address Type

- CYBLE_GAP_ADDR_TYPE_PUBLIC (Public device address)
- CYBLE_GAP_ADDR_TYPE_RANDOM (Random device address)

uint8 CYBLE_GAPC_DISC_INFO_T::scanFilterPolicy

Filter policies to be applied during scanning procedure

- CYBLE_GAPC_ADV_ACCEPT_ALL_PKT (Accept all advertisement packets)
- CYBLE_GAPC_ADV_ACCEPT_WHITELIST_PKT (Ignore advertisement packets from devices not in the White List)

uint16 CYBLE_GAPC_DISC_INFO_T::scanTo

Scan timeout. Timeout is in seconds and none zero. If timeout is set as 0, then there will not be any timeout scanTo can be used for all GAP timeouts related to Central operation.

uint8 CYBLE_GAPC_DISC_INFO_T::filterDuplicates

Filter Duplicate Advertisement. The Filter Duplicates parameter controls whether the Link Layer shall filter duplicate advertising reports to the Host, or if the Link Layer should generate advertising reports for each packet received.

- CYBLE_GAPC_FILTER_DUP_DISABLE (Duplicate filtering disabled)
- CYBLE_GAPC_FILTER_DUP_ENABLE (Duplicate filtering enabled)

By default, duplicate filtering is enabled

CYBLE_GAPC_T Struct Reference

Description

GAP Service characteristics server's GATT DB handles structure type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T deviceNameCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T appearanceCharHandle

- CYBLE_GATT_DB_ATTR_HANDLE_T periphPrivacyCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T reconnAddrCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T prefConnParamCharHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GAPC_T::deviceNameCharHandle
Handle of the GAPS Device Name Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GAPC_T::appearanceCharHandle
Handle of the GAPS Appearance Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GAPC_T::periphPrivacyCharHandle
Handle of the GAPS Peripheral Privacy Flag Parameters Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GAPC_T::reconnAddrCharHandle
Handle of the GAPS Reconnection Address Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GAPC_T::prefConnParamCharHandle
Handle of the GAPS Peripheral Preferred Connection Parameters Characteristic

CYBLE_GAPP_DISC_DATA_T Struct Reference

Description
Advertising data

Data Fields
- uint8 advData[CYBLE_GAP_MAX_ADV_DATA_LEN]
- uint8 advDataLen

Field Documentation

uint8 CYBLE_GAPP_DISC_DATA_T::advData[CYBLE_GAP_MAX_ADV_DATA_LEN]
GAP Advertisement Parameters which includes Flags, Service UUIDs and short name

uint8 CYBLE_GAPP_DISC_DATA_T::advDataLen
length of the advertising data. This should be made zero if there is no data

CYBLE_GAPP_DISC_MODE_INFO_T Struct Reference

Description
Advertising information

Data Fields
- uint8 discMode
- CYBLE_GAPP_DISC_PARAM_T* advParam
- CYBLE_GAPP_DISC_DATA_T* advData

- CYBLE_GAPP_SCAN_RSP_DATA_T* scanRspData
- uint16 advTo

Field Documentation

uint8 CYBLE_GAPP_DISC_MODE_INFO_T::discMode

Broadcaster and discoverable mode

- CYBLE_GAPP_NONE_DISC_BROADCAST_MODE (Applicable for Broadcaster or non-discoverable mode)
- CYBLE_GAPP_LTD_DISC_MODE (Limited discovery mode)
- CYBLE_GAPP_GEN_DISC_MODE (General discovery mode)

CYBLE_GAPP_DISC_PARAM_T* CYBLE_GAPP_DISC_MODE_INFO_T::advParam

Advertisement parameters

CYBLE_GAPP_DISC_DATA_T* CYBLE_GAPP_DISC_MODE_INFO_T::advData

Advertisement data

CYBLE_GAPP_SCAN_RSP_DATA_T* CYBLE_GAPP_DISC_MODE_INFO_T::scanRspData

Scan Response data

uint16 CYBLE_GAPP_DISC_MODE_INFO_T::advTo

Advertisement timeout is in seconds. If timeout is set to 0, then there will not be any timeout. Parameter 'advTo' can be used for all GAP timeouts related to peripheral operation. For General discoverable mode, this timer will be ignored. Application is expected to exit from discoverable mode explicitly by calling CyBle_GappExitDiscoveryMode() function. For Limited discoverable mode, 'advTo' should not exceed 180 Sec.

CYBLE_GAPP_DISC_PARAM_T Struct Reference

Description

Advertising parameters

Data Fields

- uint16 advIntvMin
- uint16 advIntvMax
- CYBLE_GAPP_ADV_T advType
- uint8 ownAddrType
- uint8 directAddrType
- uint8 directAddr[CYBLE_GAP_BD_ADDR_SIZE]
- uint8 advChannelMap
- uint8 advFilterPolicy

Field Documentation

uint16 CYBLE_GAPP_DISC_PARAM_T::advIntvMin

Minimum advertising interval for undirected and low duty cycle directed advertising.

- Time Range: 20 ms to 10.24 sec

uint16 CYBLE_GAPP_DISC_PARAM_T::advIntvMax

Maximum advertising interval for undirected and low duty cycle directed advertising.

- Time Range: 20 ms to 10.24 sec

CYBLE_GAPP_ADV_TCYBLE_GAPP_DISC_PARAM_T::advType

Type of advertisement

- Connectable undirected advertising (0x00)
- Connectable high duty cycle directed advertising (0x01)
- Scannable undirected advertising (0x02)
- Non connectable undirected advertising (0x03)
- Connectable low duty cycle directed advertising (0x04)

uint8 CYBLE_GAPP_DISC_PARAM_T::ownAddrType

Own BD Address Type

- CYBLE_GAP_ADDR_TYPE_PUBLIC (Public device address)
- CYBLE_GAP_ADDR_TYPE_RANDOM (Random device address)

uint8 CYBLE_GAPP_DISC_PARAM_T::directAddrType

Address type of the Bluetooth device address being used for directed advertising, not applicable otherwise

- CYBLE_PUBLIC_DEV_ADDR (Public device address)

CYBLE_RANDOM_DEV_ADDR (Random device address)

uint8 CYBLE_GAPP_DISC_PARAM_T::directAddr[CYBLE_GAP_BD_ADDR_SIZE]

This parameter specifies Bluetooth device address of the device to be connected while using directed advertising. In case of none direct advertising, parameter will be 0

uint8 CYBLE_GAPP_DISC_PARAM_T::advChannelMap

Advertising channels that shall be used when transmitting advertising packets. Channel map selection:

- Enable channel 37 = bitmask. xxxxxxx1b
- Enable channel 38 = bitmask. xxxxxx1xb
- Enable channel 39 = bitmask. xxxxx1xxb

uint8 CYBLE_GAPP_DISC_PARAM_T::advFilterPolicy

Advertising Filter Policy

- CYBLE_GAPP_SCAN_ANY_CONN_ANY (Allow Scan Request from Any, Allow Connect Request from Any (Default))
- CYBLE_GAPP_SCAN_WHITELIST_CONN_ANY (Allow Scan Request from White List Only, Allow Connect Request)
- CYBLE_GAPP_SCAN_ANY_CONN_WHITELIST (Allow Scan Request from Any, Allow Connect Request from White List Only)
- CYBLE_GAPP_SCAN_CONN_WHITELIST_ONLY (Allow Scan Request from White List Only, Allow Connect Request from White List Only)

CYBLE_GAPP_SCAN_RSP_DATA_T Struct Reference

Description

Scan response data

Data Fields

- uint8 scanRspData[CYBLE_GAP_MAX_SCAN_RSP_DATA_LEN]
- uint8 scanRspDataLen

Field Documentation

uint8 CYBLE_GAPP_SCAN_RSP_DATA_T::scanRspData[CYBLE_GAP_MAX_SCAN_RSP_DATA_LEN]

Static user data transmitted in scan response. This should be made NULL if there is no data. Maximum length of the data is equal to 31 bytes

uint8 CYBLE_GAPP_SCAN_RSP_DATA_T::scanRspDataLen

Length of the scan response data. This should be made zero if there is no data

CYBLE_GATT_ATTR_HANDLE_RANGE_T Struct Reference

Description

GATT Attribute Handle Range type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T startHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GATT_ATTR_HANDLE_RANGE_T::startHandle

Start Handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GATT_ATTR_HANDLE_RANGE_T::endHandle

End Handle

CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T Struct Reference

Description

GATT Handle Value Pair along with offset type

Data Fields

- CYBLE_GATT_HANDLE_VALUE_PAIR_T handleValuePair
- uint16 offset

Field Documentation

CYBLE_GATT_HANDLE_VALUE_PAIR_TCYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T::handleValuePair

Attribute Handle & Value to be Written

uint16 CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T::offset

Offset at which Write is to be performed

CYBLE_GATT_HANDLE_VALUE_PAIR_T Struct Reference

Description

GATT handle - value pair type

Data Fields

- CYBLE_GATT_VALUE_T value
- CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle

Field Documentation

CYBLE_GATT_VALUE_TCYBLE_GATT_HANDLE_VALUE_PAIR_T::value

Attribute Value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GATT_HANDLE_VALUE_PAIR_T::attrHandle

Attribute Handle of GATT DB

CYBLE_GATT_VALUE_T Struct Reference

Data Fields

- uint8 * val
- uint16 len
- uint16 actualLen

Field Documentation

uint8* CYBLE_GATT_VALUE_T::val

Pointer to the value to be packed

uint16 CYBLE_GATT_VALUE_T::len

Length of Value to be packed

uint16 CYBLE_GATT_VALUE_T::actualLen

Out Parameter Indicating Actual Length Packed and sent over the air. Actual length can be less than or equal to the 'len' parameter value. This provides information to application that what is the actual length of data that is transmitted over the air. Each GATT procedures defines different length of data that can ne transmitted over the air. If application sends more than that, all data may not transmitted over air.

CYBLE_GATT_XCHG_MTU_PARAM_T Struct Reference

Description

GATT MTU exchange parameter type

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- uint16 mtu

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATT_XCHG_MTU_PARAM_T::connHandle

Connection handle

uint16 CYBLE_GATT_XCHG_MTU_PARAM_T::mtu

Client/Server Rx/Tx GATT MTU Size

CYBLE_GATTC_ERR_RSP_PARAM_T Struct Reference

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_PDU_T opCode
- CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle
- CYBLE_GATT_ERR_CODE_T errorCode

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTC_ERR_RSP_PARAM_T::connHandle

Connection handle

CYBLE_GATT_PDU_T CYBLE_GATTC_ERR_RSP_PARAM_T::opCode

Opcode which has resulted in Error

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_GATTC_ERR_RSP_PARAM_T::attrHandle

Attribute Handle in which error is generated

CYBLE_GATT_ERR_CODE_T CYBLE_GATTC_ERR_RSP_PARAM_T::errorCode

Error Code describing cause of error

CYBLE_GATTC_EXEC_WRITE_RSP_T Struct Reference

Description

Execute Write result

Data Fields

- CYBLE_CONN_HANDLE_T connHandle

- uint8 result

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTC_EXEC_WRITE_RSP_T::connHandle
Connection handle

uint8 CYBLE_GATTC_EXEC_WRITE_RSP_T::result
Result of the execute write request

CYBLE_GATTC_FIND_BY_TYPE_RSP_PARAM_T Struct Reference

Description
GATT find by type value response received from server

Data Fields
- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_ATTR_HANDLE_RANGE_T* range
- uint8 count

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTC_FIND_BY_TYPE_RSP_PARAM_T::connHandle
Connection handle

CYBLE_GATT_ATTR_HANDLE_RANGE_T* CYBLE_GATTC_FIND_BY_TYPE_RSP_PARAM_T::range
Handle Range List

uint8 CYBLE_GATTC_FIND_BY_TYPE_RSP_PARAM_T::count
Size of List

CYBLE_GATTC_FIND_BY_TYPE_VALUE_REQ_T Struct Reference

Description
GATT find by type value request to be sent to Server

Data Fields
- CYBLE_GATT_VALUE_T value
- CYBLE_GATT_ATTR_HANDLE_RANGE_T range
- CYBLE_UUID16 uuid

Field Documentation

CYBLE_GATT_VALUE_T CYBLE_GATTC_FIND_BY_TYPE_VALUE_REQ_T::value
Attribute Value to Find

CYBLE_GATT_ATTR_HANDLE_RANGE_T CYBLE_GATTC_FIND_BY_TYPE_VALUE_REQ_T::range

Handle Range - Start and End Handle

CYBLE_UUID16 CYBLE_GATTC_FIND_BY_TYPE_VALUE_REQ_T::uuid

16-bit UUID to Find

CYBLE_GATTC_FIND_INFO_RSP_PARAM_T Struct Reference

Description

GATT find info response received from Server

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATTC_HANDLE_UUID_LIST_PARAM_T handleValueList
- uint8 uuidFormat

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTC_FIND_INFO_RSP_PARAM_T::connHandle

Connection handle

CYBLE_GATTC_HANDLE_UUID_LIST_PARAM_T CYBLE_GATTC_FIND_INFO_RSP_PARAM_T::handleValueList

Handle Value List

uint8 CYBLE_GATTC_FIND_INFO_RSP_PARAM_T::uuidFormat

Format indicating, 16 bit (0x01) or 128 bit (0x02) UUIDs

CYBLE_GATTC_GRP_ATTR_DATA_LIST_T Struct Reference

Description

Data Element for Group Response

Data Fields

- uint8 * attrValue
- uint16 length
- uint16 attrLen

Field Documentation

uint8* CYBLE_GATTC_GRP_ATTR_DATA_LIST_T::attrValue

atribute handle value pair

uint16 CYBLE_GATTC_GRP_ATTR_DATA_LIST_T::length

Length of each Attribute Data Element including the Handle Range

uint16 CYBLE_GATTC_GRP_ATTR_DATA_LIST_T::attrLen

Total Length of Attribute Data

CYBLE_GATTC_HANDLE_LIST_T Struct Reference

Description

GATT handle list type

Data Fields

- uint16 * handleList
- uint16 listCount
- uint16 actualCount

Field Documentation

uint16* CYBLE_GATTC_HANDLE_LIST_T::handleList

Handle list where the UUID with value Indicated is found

uint16 CYBLE_GATTC_HANDLE_LIST_T::listCount

Number of Handles in the list

uint16 CYBLE_GATTC_HANDLE_LIST_T::actualCount

Actual Number of Handles Packed. This is a output parameter

CYBLE_GATTC_HANDLE_UUID_LIST_PARAM_T Struct Reference

Description

GATT list of Handle UUID pair parameter type

Data Fields

- uint8 * list
- uint16 byteCount

Field Documentation

uint8* CYBLE_GATTC_HANDLE_UUID_LIST_PARAM_T::list

Handle - UUID Pair list This is a packed byte stream, hence it needs to be unpacked and decoded.

uint16 CYBLE_GATTC_HANDLE_UUID_LIST_PARAM_T::byteCount

Number of elements in the list in bytes

CYBLE_GATTC_HANDLE_VALUE_NTF_PARAM_T Struct Reference

Description

Handle value notification data received from server

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_HANDLE_VALUE_PAIR_T handleValPair

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTC_HANDLE_VALUE_NTF_PARAM_T::connHandle

Connection handle

CYBLE_GATT_HANDLE_VALUE_PAIR_T CYBLE_GATTC_HANDLE_VALUE_NTF_PARAM_T::handleValPair

handle value pair, actual length files needs to be ignored

CYBLE_GATTC_READ_BLOB_REQ_T Struct Reference

Description

Read blob request to be sent to Server

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle
- uint16 offset

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_GATTC_READ_BLOB_REQ_T::attrHandle

Handle on which Read Blob is requested

uint16 CYBLE_GATTC_READ_BLOB_REQ_T::offset

Value Offset from which the Read is Requested

CYBLE_GATTC_READ_BY_GRP_RSP_PARAM_T Struct Reference

Description

Read By Group Response received from Server

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATTC_GRP_ATTR_DATA_LIST_T attrData

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTC_READ_BY_GRP_RSP_PARAM_T::connHandle

Connection handle

CYBLE_GATTC_GRP_ATTR_DATA_LIST_T CYBLE_GATTC_READ_BY_GRP_RSP_PARAM_T::attrData

Group attribute data list

CYBLE_GATTC_READ_BY_TYPE_REQ_T Struct Reference

Description

GATT read by type request to be sent to Server

Data Fields

- CYBLE_GATT_ATTR_HANDLE_RANGE_T range
- CYBLE_UUID_T uuid
- uint8 uuidFormat

Field Documentation

CYBLE_GATT_ATTR_HANDLE_RANGE_TCYBLE_GATTC_READ_BY_TYPE_REQ_T::range

Handle Range

CYBLE_UUID_TCYBLE_GATTC_READ_BY_TYPE_REQ_T::uuid

GATT UUID type

uint8 CYBLE_GATTC_READ_BY_TYPE_REQ_T::uuidFormat

Format indicating, 16 bit or 128 bit UUIDs For 16bits UUID format - CYBLE_GATT_16_BIT_UUID_FORMAT (0x01) For 128bits UUID format - CYBLE_GATT_128_BIT_UUID_FORMAT (0x02)

CYBLE_GATTC_READ_RSP_PARAM_T Struct Reference

Description

Read response parameter type received from server

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_VALUE_T value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_GATTC_READ_RSP_PARAM_T::connHandle

Connection handle

CYBLE_GATT_VALUE_TCYBLE_GATTC_READ_RSP_PARAM_T::value

Attribute Value

CYBLE_GATTC_T Struct Reference

Data Fields

- CYBLE_SRVR_CHAR_INFO_T serviceChanged
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_GATTC_T::serviceChanged

Handle of the Service Changed characteristic

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_GATTC_T::cccdHandle

Client Characteristic Configuration descriptor handle

CYBLE_GATTS_ATT_GEN_VAL_LEN_T Struct Reference

Description

Attribute value type used in GATT database

Data Fields

- uint16 actualLength
- void * attGenericVal

Field Documentation

uint16 CYBLE_GATTS_ATT_GEN_VAL_LEN_T::actualLength

Length in number of bytes for attGenericVal

void* CYBLE_GATTS_ATT_GEN_VAL_LEN_T::attGenericVal

Buffer to the store generic characteristic value based on length or complete UUID value if the attribute is of type 128-bit UUID and 32-bit UUID type.

CYBLE_GATTS_ATT_PACK_VAL_LEN_T Struct Reference

Description

Attribute value type used in GATT database

Data Fields

- uint16 maxAttrLength
- CYBLE_GATTS_ATT_GEN_VAL_LEN_T* attGenericValLen

Field Documentation

uint16 CYBLE_GATTS_ATT_PACK_VAL_LEN_T::maxAttrLength

Length in number of bytes for attGenericVal

CYBLE_GATTS_ATT_GEN_VAL_LEN_T* CYBLE_GATTS_ATT_PACK_VAL_LEN_T::attGenericValLen

Buffer to the store generic characteristic value based on length or complete UUID value if the attribute is of type 128-bit UUID and 32-bit UUID type.

CYBLE_GATTS_ATT_VALUE_T Union Reference

Data Fields

- CYBLE_GATTS_ATT_PACK_VAL_LEN_T **attFormatValue**
- uint16 **attValueUuid**

CYBLE_GATTS_CHAR_VAL_READ_REQ_T Struct Reference

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle
- CYBLE_GATT_ERR_CODE_T gattErrorCode

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTS_CHAR_VAL_READ_REQ_T::connHandle

Connection handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_GATTS_CHAR_VAL_READ_REQ_T::attrHandle

Attribute Handle

CYBLE_GATT_ERR_CODE_T CYBLE_GATTS_CHAR_VAL_READ_REQ_T::gattErrorCode

Output Param: Profile/Service specific error code, profile or application need to change this to service specific error based on service/profile requirements.

CYBLE_GATTS_DB_T Struct Reference

Description

GATT database structure used in the GAP Server

Data Fields

- uint16 attHandle
- uint16 attType
- uint32 permission
- uint16 attEndHandle
- CYBLE_GATTS_ATT_VALUE_T attValue

Field Documentation

uint16 CYBLE_GATTS_DB_T::attHandle

Start Handle: Act as an index for querying BLE GATT database

uint16 CYBLE_GATTS_DB_T::attType

UUID: 16 bit UUID type for an attribute entry, for 32 bit and 128 bit UUIDs the last 16 bits should be stored in this entry GATT DB access layer shall retrieve complete 128 bit UUID from CYBLE_GATTS_ATT_GENERIC_VAL_T structure.

uint32 CYBLE_GATTS_DB_T::permission

The permission bits are clubbed in to a 32-bit field. These 32-bits can be grouped in to 4 bytes. The lowest significant byte is byte 0 (B0) and the most significant byte is byte 3 (B3). The bytes where the permissions have been grouped is as given below. Attribute permissions (B0) Characteristic permissions (B1) Implementation specific permission (B3, B2)

uint16 CYBLE_GATTS_DB_T::attEndHandle

Attribute end handle, indicating logical boundary of given attribute.

CYBLE_GATTS_ATT_VALUE_TCYBLE_GATTS_DB_T::attValue

Attribute value format, it can be one of following: uint16 16bit - UUID for 16bit service & characteristic declaration CYBLE_GATTS_ATT_GENERIC_VAL_T attFormatValue - Buffer containing 32 bit or 128 bit UUID values for service & charactertistic declaration CYBLE_GATTS_ATT_GENERIC_VAL_T attFormatValue - Buffer contraining generic char definition value, or generic descriptor values

CYBLE_GATTS_ERR_PARAM_T Struct Reference

Description

GATT Server Error Response parameter type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle
- uint8 opcode
- CYBLE_GATT_ERR_CODE_T errorCode

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GATTS_ERR_PARAM_T::attrHandle

Handle in which error is generated

uint8 CYBLE_GATTS_ERR_PARAM_T::opcode

Opcode which has resulted in Error Information on ATT/GATT opcodes is available in the Bluetooth specification.

CYBLE_GATT_ERR_CODE_TCYBLE_GATTS_ERR_PARAM_T::errorCode

Error Code describing cause of error

CYBLE_GATTS_EXEC_WRITE_REQ_T Struct Reference

Description

Execute Write result

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T* baseAddr
- uint8 prepWriteReqCount
- uint8 execWriteFlag

- CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle
- uint8 gattErrorCode

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTS_EXEC_WRITE_REQ_T::connHandle

Connection handle

CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T* CYBLE_GATTS_EXEC_WRITE_REQ_T::baseAddr

Base address of the queue where data is queued. Queue is of type CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T. baseAddr[0].handleValuePair.value.val provides the base address of the total data stored in prepare write queue internally by stack. Application can calculate the total length based on each each array element. i.e total length = baseAddr[0].handleValuePair.value.len+ ....+baseAddr[prepWriteReqCount-1].handleValuePair.value.len

uint8 CYBLE_GATTS_EXEC_WRITE_REQ_T::prepWriteReqCount

Total count of prepare request from remote. This parameter can be used to access the data from 'baseAddr[]'. array index will range from 0 to prepWriteReqCount - 1

uint8 CYBLE_GATTS_EXEC_WRITE_REQ_T::execWriteFlag

Execute write flag received from remote

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_GATTS_EXEC_WRITE_REQ_T::attrHandle

Attribute Handle at which error occurred. This is an o/p param

uint8 CYBLE_GATTS_EXEC_WRITE_REQ_T::gattErrorCode

Application provide GATT error code for the procedure. This is an o/p param

CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T Struct Reference

Description

Prepare write request parameter received from Client

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T* baseAddr
- uint8 currentPrepWriteReqCount
- uint8 gattErrorCode

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T::connHandle

Connection handle

CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T* CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T::baseAddr

Base address of the queue where data is queued, Queue is of type CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T. Each baseAddr[currentPrepWriteReqCount-1].handleValuePair.value.val provides the current data and baseAddr[0].handleValuePair.value.val provides the

base address of the data buffer where full value will be stored. Application can calculate the total length based on each each array element. i.e total length up current request = baseAddr[0].handleValuePair.value.len+ ....+baseAddr[currentPrepWriteReqCount-1].handleValuePair.value.len

uint8 CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T::currentPrepWriteReqCount

Current count of prepare request from remote. This parameter can be used to access the data from 'baseAddr[]'. Array index will range from 0 to currentPrepWriteReqCount - 1

uint8 CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T::gattErrorCode

Application provide GATT error code for the procedure. This is an o/p parameter

CYBLE_GATTS_T Struct Reference

Description

Structure with Generic Attribute Service (GATTS) attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T serviceChangedHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GATTS_T::serviceHandle

Service handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GATTS_T::serviceChangedHandle

Handle of the Service Changed characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GATTS_T::cccdHandle

Client Characteristic Configuration descriptor handle

CYBLE_GATTS_WRITE_REQ_PARAM_T Struct Reference

Description

Write request parameter received from Client

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GATT_HANDLE_VALUE_PAIR_T handleValPair

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_GATTS_WRITE_REQ_PARAM_T::connHandle

Connection handle

CYBLE_GATT_HANDLE_VALUE_PAIR_TCYBLE_GATTS_WRITE_REQ_PARAM_T::handleValPair

handle value pair

CYBLE_GLS_CHAR_VALUE_T Struct Reference

Description

Glucose Service Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GLS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GLS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_GLS_CHAR_INDEX_T CYBLE_GLS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_GLS_CHAR_VALUE_T::value

Characteristic value

CYBLE_GLS_DESCR_VALUE_T Struct Reference

Description

Glucose Service Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_GLS_CHAR_INDEX_T charIndex
- CYBLE_GLS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_GLS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_GLS_CHAR_INDEX_T CYBLE_GLS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GLS_DESCR_INDEX_T CYBLE_GLS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_GLS_DESCR_VALUE_T::value

Descriptor value

CYBLE_GLSC_CHAR_T Struct Reference

Description

Glucose Client Characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_GLSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GLSC_CHAR_T::valueHandle

Handle of server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GLSC_CHAR_T::cccdHandle

Glucose client char. descriptor handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GLSC_CHAR_T::endHandle

Characteristic End Handle

CYBLE_GLSC_T Struct Reference

Description

Glucose Service structure type

Data Fields

- CYBLE_GLSC_CHAR_T charInfo[CYBLE_GLS_CHAR_COUNT]

Field Documentation

CYBLE_GLSC_CHAR_TCYBLE_GLSC_T::charInfo[CYBLE_GLS_CHAR_COUNT]

Characteristics handle + properties array

CYBLE_GLSS_CHAR_T Struct Reference

Description

Glucose Server Characteristic structure type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GLSS_CHAR_T::charHandle

Glucose Service char handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GLSS_CHAR_T::cccdHandle

Glucose Service CCCD handle

CYBLE_GLSS_T Struct Reference

Description

Structure with Glucose Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GLSS_CHAR_T charInfo[CYBLE_GLS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_GLSS_T::serviceHandle

Glucose Service handle

CYBLE_GLSS_CHAR_TCYBLE_GLSS_T::charInfo[CYBLE_GLS_CHAR_COUNT]

Glucose Service characteristics info array

CYBLE_HIDS_CHAR_VALUE_T Struct Reference

Description

HID Service Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- uint8 serviceIndex
- CYBLE_HIDS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_HIDS_CHAR_VALUE_T::connHandle

Peer device handle

uint8 CYBLE_HIDS_CHAR_VALUE_T::serviceIndex

Index of HID Service

CYBLE_HIDS_CHAR_INDEX_TCYBLE_HIDS_CHAR_VALUE_T::charIndex

Index of HID Service Characteristic

CYBLE_GATT_VALUE_T* CYBLE_HIDS_CHAR_VALUE_T::value
Pointer to Characteristic value

CYBLE_HIDS_DESCR_VALUE_T Struct Reference

Description

HID Service Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- uint8 serviceIndex
- CYBLE_HIDS_CHAR_INDEX_T charIndex
- CYBLE_HIDS_DESCR_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_HIDS_DESCR_VALUE_T::connHandle
Peer device handle

uint8 CYBLE_HIDS_DESCR_VALUE_T::serviceIndex
Index of HID Service

CYBLE_HIDS_CHAR_INDEX_TCYBLE_HIDS_DESCR_VALUE_T::charIndex
Index of HID Service Characteristic

CYBLE_HIDS_DESCR_TCYBLE_HIDS_DESCR_VALUE_T::descrIndex
Service Characteristic Descriptor index

CYBLE_GATT_VALUE_T* CYBLE_HIDS_DESCR_VALUE_T::value
Pointer to value of Service Characteristic Descriptor value

CYBLE_HIDSC_REPORT_MAP_T Struct Reference

Description

HID client Report map characteristic

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T errdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- uint8 properties

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_REPORT_MAP_T::errdHandle
Handle of Report Map External Report Reference descriptor

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_REPORT_MAP_T::valueHandle
Handle of Report characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_REPORT_MAP_T::endHandle
End handle of characteristic

uint8 CYBLE_HIDSC_REPORT_MAP_T::properties
Properties for value field

CYBLE_HIDSC_REPORT_T Struct Reference

Description

HID Client Report characteristic

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T rrdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- uint8 properties

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_REPORT_T::cccdHandle
Handle of Client Characteristic Configuration Descriptor

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_REPORT_T::rrdHandle
Handle of Report Reference Descriptor

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_REPORT_T::valueHandle
Handle of Report Characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_REPORT_T::endHandle
End handle of Characteristic

uint8 CYBLE_HIDSC_REPORT_T::properties
Properties for value field

CYBLE_HIDSC_T Struct Reference

Description

Structure with discovered attributes information of HID Service

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_SRVR_CHAR_INFO_T protocolMode
- CYBLE_HIDSC_REPORT_T bootReport[CYBLE_HIDS_BOOT_REPORT_COUNT]
- CYBLE_HIDSC_REPORT_MAP_T reportMap
- CYBLE_SRVR_CHAR_INFO_T information
- CYBLE_SRVR_CHAR_INFO_T controlPoint
- CYBLE_HIDSC_REPORT_T report[CYBLE_HIDSC_REPORT_COUNT]
- uint8 reportCount
- CYBLE_GATT_DB_ATTR_HANDLE_T includeHandle

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_HIDSC_T::connHandle

Peer device handle

CYBLE_SRVR_CHAR_INFO_TCYBLE_HIDSC_T::protocolMode

Protocol Mode Characteristic handle and properties

CYBLE_HIDSC_REPORT_TCYBLE_HIDSC_T::bootReport[CYBLE_HIDS_BOOT_REPORT_COUNT]

Boot Report Characteristic info

CYBLE_HIDSC_REPORT_MAP_TCYBLE_HIDSC_T::reportMap

Report Map Characteristic handle and descriptors

CYBLE_SRVR_CHAR_INFO_TCYBLE_HIDSC_T::information

Information Characteristic handle and properties

CYBLE_SRVR_CHAR_INFO_TCYBLE_HIDSC_T::controlPoint

Control Point Characteristic handle and properties

CYBLE_HIDSC_REPORT_TCYBLE_HIDSC_T::report[CYBLE_HIDSC_REPORT_COUNT]

Report Characteristic info

uint8 CYBLE_HIDSC_T::reportCount

Number of report Characteristics

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSC_T::includeHandle

Included declaration handle

CYBLE_HIDSS_INFORMATION_T Struct Reference

Description

HID Information characteristic value

Data Fields

- uint16 bcdHID

- uint8 bCountryCode
- uint8 flags

Field Documentation

uint16 CYBLE_HIDSS_INFORMATION_T::bcdHID

Version number of HIDSe USB HID Specification implemented by HID Device

uint8 CYBLE_HIDSS_INFORMATION_T::bCountryCode

Identifies which country hardware is localized for

uint8 CYBLE_HIDSS_INFORMATION_T::flags

Bit 0: RemoteWake - Indicates whether HID Device is capable of sending wake-signal to HID Host. Bit 1: NormallyConnectable - Indicates whether HID Device will be advertising when bonded but not connected.

CYBLE_HIDSS_REPORT_REF_T Struct Reference

Description

HID server Report Reference descriptor value - Report ID and Report Type

Data Fields

- uint8 reportId
- uint8 reportType

Field Documentation

uint8 CYBLE_HIDSS_REPORT_REF_T::reportId

Non-zero value if there are more than one instance of the same Report Type

uint8 CYBLE_HIDSS_REPORT_REF_T::reportType

Type of Report characteristic

CYBLE_HIDSS_REPORT_T Struct Reference

Description

HID Server Report characteristic

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T reportHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T cccdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T rrdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_REPORT_T::reportHandle

Handle of Report characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_REPORT_T::cccdHandle
Handle of Client Characteristic Configuration descriptor

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_REPORT_T::rrdHandle
Handle of Report Reference descriptor

CYBLE_HIDSS_T Struct Reference

Description

Structure with HID Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T protocolModeHandle
- uint8 reportCount
- const CYBLE_HIDSS_REPORT_T* reportArray
- CYBLE_HIDSS_REPORT_T bootReportArray[CYBLE_HIDS_BOOT_REPORT_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T reportMapHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T reportMapErrdHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T informationHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T controlPointHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_T::serviceHandle
Handle of HID service

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_T::protocolModeHandle
Handle of Protocol Mode Characteristic

uint8 CYBLE_HIDSS_T::reportCount
Number of report Characteristics

const CYBLE_HIDSS_REPORT_T* CYBLE_HIDSS_T::reportArray
Info about report Characteristics

CYBLE_HIDSS_REPORT_TCYBLE_HIDSS_T::bootReportArray[CYBLE_HIDS_BOOT_REPORT_COUNT]
Info about Boot Report Characteristics

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_T::reportMapHandle
Handle of Report Map Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_T::reportMapErrdHandle
Handle of Report Map External Report Reference descr.

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_T::informationHandle
Handle of HID Information Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HIDSS_T::controlPointHandle

Handle of HID Control Point Characteristic

CYBLE_HRS_CHAR_VALUE_T Struct Reference

Description

HRS Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_HRS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_HRS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_HRS_CHAR_INDEX_TCYBLE_HRS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_HRS_CHAR_VALUE_T::value

Characteristic value

CYBLE_HRS_DESCR_VALUE_T Struct Reference

Description

HRS Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_HRS_CHAR_INDEX_T charIndex
- CYBLE_HRS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_HRS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_HRS_CHAR_INDEX_TCYBLE_HRS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_HRS_DESCR_INDEX_TCYBLE_HRS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_HRS_DESCR_VALUE_T::value

Descriptor value

CYBLE_HRSC_T Struct Reference

Description

Structure with discovered attributes information of Heart Rate Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T charInfo[CYBLE_HRS_CHAR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T hrmCccdHandle

Field Documentation

CYBLE_SRVR_CHAR_INFO_TCYBLE_HRSC_T::charInfo[CYBLE_HRS_CHAR_COUNT]

Heart Rate Service characteristics handles and properties array

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HRSC_T::hrmCccdHandle

Heart Rate Measurement client char. config. descriptor Handle

CYBLE_HRSS_T Struct Reference

Description

Structure with Heart Rate Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle[CYBLE_HRS_CHAR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T hrmCccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HRSS_T::serviceHandle

Heart Rate Service handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HRSS_T::charHandle[CYBLE_HRS_CHAR_COUNT]

Heart Rate Service characteristics handles and properties array

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HRSS_T::hrmCccdHandle

Heart Rate Measurement client char. config. descriptor Handle

CYBLE_HTS_CHAR_VALUE_T Struct Reference

Description

HTS Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_HTS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_HTS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_HTS_CHAR_INDEX_T CYBLE_HTS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_HTS_CHAR_VALUE_T::value

Characteristic value

CYBLE_HTS_DESCR_VALUE_T Struct Reference

Description

HTS Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_HTS_CHAR_INDEX_T charIndex
- CYBLE_HTS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_HTS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_HTS_CHAR_INDEX_T CYBLE_HTS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_HTS_DESCR_INDEX_T CYBLE_HTS_DESCR_VALUE_T::descrIndex

Index of descriptor

CYBLE_GATT_VALUE_T* CYBLE_HTS_DESCR_VALUE_T::value

Characteristic value

CYBLE_HTS_FLOAT32 Struct Reference

Data Fields

- int8 exponent
- int32 mantissa

Field Documentation

int8 CYBLE_HTS_FLOAT32::exponent
Base 10 exponent

int32 CYBLE_HTS_FLOAT32::mantissa
Mantissa, should be using only 24 bits

CYBLE_HTSC_CHAR_T Struct Reference

Description
HTS Characteristic with descriptors

Data Fields
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_HTS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- uint8 properties

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HTSC_CHAR_T::descrHandle[CYBLE_HTS_DESCR_COUNT]
Handle of descriptor

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HTSC_CHAR_T::valueHandle
Handle of Report characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HTSC_CHAR_T::endHandle
End handle of characteristic

uint8 CYBLE_HTSC_CHAR_T::properties
Properties for value field

CYBLE_HTSC_T Struct Reference

Description
Structure with discovered attributes information of Health Thermometer Service

Data Fields
- CYBLE_HTSC_CHAR_T charInfo[CYBLE_HTS_CHAR_COUNT]

Field Documentation

CYBLE_HTSC_CHAR_TCYBLE_HTSC_T::charInfo[CYBLE_HTS_CHAR_COUNT]
Characteristics handles array

CYBLE_HTSS_CHAR_T Struct Reference

Description

HTS Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_HTS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HTSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HTSS_CHAR_T::descrHandle[CYBLE_HTS_DESCR_COUNT]

Handle of descriptor

CYBLE_HTSS_T Struct Reference

Description

Structure with Health Thermometer Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_HTSS_CHAR_T charInfo[CYBLE_HTS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_HTSS_T::serviceHandle

Health Thermometer Service handle

CYBLE_HTSS_CHAR_TCYBLE_HTSS_T::charInfo[CYBLE_HTS_CHAR_COUNT]

Health Thermometer Service Characteristic handles

CYBLE_IAS_CHAR_VALUE_T Struct Reference

Description

Immediate Alert Service Characteristic Value parameters structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_IAS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_IAS_CHAR_VALUE_T::connHandle
Connection handle

CYBLE_IAS_CHAR_INDEX_T CYBLE_IAS_CHAR_VALUE_T::charIndex
Characteristic index of Immediate Alert Service

CYBLE_GATT_VALUE_T* CYBLE_IAS_CHAR_VALUE_T::value
Pointer to value of Immediate Alert Service characteristic

CYBLE_IASC_T Struct Reference

Description

Structure with discovered attributes information of Immediate Alert Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T alertLevelChar

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_IASC_T::alertLevelChar
Handle of Alert Level Characteristic of Immediate Alert Service

CYBLE_IASS_T Struct Reference

Description

Structure with Immediate Alert Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T alertLevelCharHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_IASS_T::serviceHandle
Immediate Alert Service handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_IASS_T::alertLevelCharHandle
Handle of Alert Level Characteristic

CYBLE_L2CAP_CBFC_CONN_CNF_PARAM_T Struct Reference

Description

Connect confirmation parameter

Data Fields

- uint8 bdHandle
- uint16 lCid
- uint16 response
- CYBLE_L2CAP_CBFC_CONNECT_PARAM_T connParam

Field Documentation

uint8 CYBLE_L2CAP_CBFC_CONN_CNF_PARAM_T::bdHandle
bd handle of the remote device

uint16 CYBLE_L2CAP_CBFC_CONN_CNF_PARAM_T::lCid
Local CID

uint16 CYBLE_L2CAP_CBFC_CONN_CNF_PARAM_T::response
Response codes for Connection parameter update request

CYBLE_L2CAP_CBFC_CONNECT_PARAM_TCYBLE_L2CAP_CBFC_CONN_CNF_PARAM_T::connParam
L2CAP Credit based flow Connection parameter

CYBLE_L2CAP_CBFC_CONN_IND_PARAM_T Struct Reference

Description

Connect indication parameter

Data Fields

- uint8 bdHandle
- uint16 lCid
- uint16 psm
- CYBLE_L2CAP_CBFC_CONNECT_PARAM_T connParam

Field Documentation

uint8 CYBLE_L2CAP_CBFC_CONN_IND_PARAM_T::bdHandle
bd handle of the remote device

uint16 CYBLE_L2CAP_CBFC_CONN_IND_PARAM_T::lCid
Local CID

uint16 CYBLE_L2CAP_CBFC_CONN_IND_PARAM_T::psm
PSM value for the Protocol

CYBLE_L2CAP_CBFC_CONNECT_PARAM_TCYBLE_L2CAP_CBFC_CONN_IND_PARAM_T::connParam
L2CAP Credit based flow Connection parameter

CYBLE_L2CAP_CBFC_CONNECT_PARAM_T Struct Reference

Description

L2CAP Credit based flow Connection parameter

Data Fields

- uint16 mtu
- uint16 mps
- uint16 credit

Field Documentation

uint16 CYBLE_L2CAP_CBFC_CONNECT_PARAM_T::mtu

L2CAP MTU - Maximum SDU Size

The L2CAP MTU field specifies the maximum SDU size (in octets) that the L2CAP layer entity sending the LE Credit Based Connection Request can receive on this channel. L2CAP implementations shall support a minimum L2CAP MTU size of 23 octets.

uint16 CYBLE_L2CAP_CBFC_CONNECT_PARAM_T::mps

MPS - Maximum PDU Size

The MPS field specifies the maximum payload size (in octets) that the L2CAP layer entity sending the LE Credit Based Connection Request is capable of receiving on this channel. L2CAP implementations shall support a minimum MPS of 23 octets and may support an MPS up to 65488 octets.

uint16 CYBLE_L2CAP_CBFC_CONNECT_PARAM_T::credit

Initial number of Credits

The initial credit value indicates the number of LE-frames that the peer device can send to the L2CAP layer entity sending the LE Credit Based Connection Request. The initial credit value shall be in the range of 0 to

1.

CYBLE_L2CAP_CBFC_DATA_WRITE_PARAM_T Struct Reference

Description

Data Write parameter

Data Fields

- uint16 lCid
- CYBLE_L2CAP_RESULT_PARAM_T result
- uint8 * buffer
- uint16 bufferLength

Field Documentation

uint16 CYBLE_L2CAP_CBFC_DATA_WRITE_PARAM_T::lCid

Local CID

CYBLE_L2CAP_RESULT_PARAM_TCYBLE_L2CAP_CBFC_DATA_WRITE_PARAM_T::result

The result field indicates the outcome of the connection request. The result value of 0x0000 indicates success while a non-zero value indicates the connection request failed or is pending.

uint8* CYBLE_L2CAP_CBFC_DATA_WRITE_PARAM_T::buffer

Currently NULL. For future usage

uint16 CYBLE_L2CAP_CBFC_DATA_WRITE_PARAM_T::bufferLength

Currently 0. For future usage

CYBLE_L2CAP_CBFC_DISCONN_CNF_PARAM_T Struct Reference

Description

Disconnect confirmation parameter

Data Fields

- uint16 lCid
- CYBLE_L2CAP_RESULT_PARAM_T result

Field Documentation

uint16 CYBLE_L2CAP_CBFC_DISCONN_CNF_PARAM_T::lCid

Local CID

CYBLE_L2CAP_RESULT_PARAM_TCYBLE_L2CAP_CBFC_DISCONN_CNF_PARAM_T::result

The result field indicates the outcome of the connection request. The result value of 0x0000 indicates success while a non-zero value indicates the connection request failed or is pending.

CYBLE_L2CAP_CBFC_LOW_RX_CREDIT_PARAM_T Struct Reference

Description

Rx credit info parameter

Data Fields

- uint16 lCid
- uint16 credit

Field Documentation

uint16 CYBLE_L2CAP_CBFC_LOW_RX_CREDIT_PARAM_T::lCid

Local CID

uint16 CYBLE_L2CAP_CBFC_LOW_RX_CREDIT_PARAM_T::credit

The number of credits (LE-frames)

CYBLE_L2CAP_CBFC_LOW_TX_CREDIT_PARAM_T Struct Reference

Description

Tx credit info parameter

Data Fields

- uint16 lCid
- CYBLE_L2CAP_RESULT_PARAM_T result
- uint16 credit

Field Documentation

uint16 CYBLE_L2CAP_CBFC_LOW_TX_CREDIT_PARAM_T::lCid

Local CID

CYBLE_L2CAP_RESULT_PARAM_TCYBLE_L2CAP_CBFC_LOW_TX_CREDIT_PARAM_T::result

A result value of 0x0000 indicates success, while a non-zero value indicates an error condition (e.g. credit overflow, if total number of credits crosses specification defined maximum limit of 0xFFFF)

uint16 CYBLE_L2CAP_CBFC_LOW_TX_CREDIT_PARAM_T::credit

The number of credits (LE-frames)

CYBLE_L2CAP_CBFC_RX_PARAM_T Struct Reference

Description

Receive Data parameter

Data Fields

- uint16 lCid
- CYBLE_L2CAP_RESULT_PARAM_T result
- uint8 * rxData
- uint16 rxDataLength

Field Documentation

uint16 CYBLE_L2CAP_CBFC_RX_PARAM_T::lCid

Local CID

CYBLE_L2CAP_RESULT_PARAM_TCYBLE_L2CAP_CBFC_RX_PARAM_T::result

A result value of 0x0000 indicates success, while a non-zero value indicates an error condition (e.g. peer device violating credit flow, or L2CAP MTU size limit)

uint8* CYBLE_L2CAP_CBFC_RX_PARAM_T::rxData

Received L2cap Data

uint16 CYBLE_L2CAP_CBFC_RX_PARAM_T::rxDataLength

Received L2cap Data Length

CYBLE_LLS_CHAR_VALUE_T Struct Reference

Description

Link Loss Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_LLS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_LLS_CHAR_VALUE_T::connHandle

Connection handle

CYBLE_LLS_CHAR_INDEX_T CYBLE_LLS_CHAR_VALUE_T::charIndex

Characteristic index of Link Loss Service

CYBLE_GATT_VALUE_T* CYBLE_LLS_CHAR_VALUE_T::value

Pointer to value of Link Loss Service characteristic

CYBLE_LLSC_T Struct Reference

Description

Structure with discovered attributes information of Link Loss Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T alertLevelChar

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_LLSC_T::alertLevelChar

Handle of Alert Level Characteristic of Link Loss Service

CYBLE_LLSS_T Struct Reference

Description

Structure with Link Loss Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T alertLevelCharHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_LLSS_T::serviceHandle

Link Loss Service handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_LLSS_T::alertLevelCharHandle

Handle of Alert Level Characteristic

CYBLE_LNS_CHAR_VALUE_T Struct Reference

Description

LNS Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_LNS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_LNS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_LNS_CHAR_INDEX_TCYBLE_LNS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_LNS_CHAR_VALUE_T::value

Characteristic value

CYBLE_LNS_DESCR_VALUE_T Struct Reference

Description

LNS Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_LNS_CHAR_INDEX_T charIndex
- CYBLE_LNS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_LNS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_LNS_CHAR_INDEX_TCYBLE_LNS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_LNS_DESCR_INDEX_TCYBLE_LNS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_LNS_DESCR_VALUE_T::value

Descriptor value

CYBLE_LNSC_CHAR_T Struct Reference

Description

Location and Navigation Client Characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_LNS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_LNSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_LNSC_CHAR_T::valueHandle

Handle of server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_LNSC_CHAR_T::descrHandle[CYBLE_LNS_DESCR_COUNT]

Location and Navigation client char. descriptor handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_LNSC_CHAR_T::endHandle

Characteristic End Handle

CYBLE_LNSC_T Struct Reference

Description

Structure with discovered attributes information of Location and Navigation Service

Data Fields

- CYBLE_LNSC_CHAR_T charInfo[CYBLE_LNS_CHAR_COUNT]

Field Documentation

CYBLE_LNSC_CHAR_TCYBLE_LNSC_T::charInfo[CYBLE_LNS_CHAR_COUNT]

Characteristics handle + properties array

CYBLE_LNSS_CHAR_T Struct Reference

Description

Location and Navigation Server Characteristic structure type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_LNS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_LNSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_LNSS_CHAR_T::descrHandle[CYBLE_LNS_DESCR_COUNT]

Handle of descriptor

CYBLE_LNSS_T Struct Reference

Description

Structure with Location and Navigation Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_LNSS_CHAR_T charInfo[CYBLE_LNS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_LNSS_T::serviceHandle

Location and Navigation Service handle

CYBLE_LNSS_CHAR_TCYBLE_LNSS_T::charInfo[CYBLE_LNS_CHAR_COUNT]

Location and Navigation Service characteristics info array

CYBLE_NDCS_CHAR_VALUE_T Struct Reference

Description

Next DST Change Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_NDCS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_NDCS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_NDCS_CHAR_INDEX_TCYBLE_NDCS_CHAR_VALUE_T::charIndex

Index of Next DST Change Service Characteristic

CYBLE_GATT_VALUE_T* CYBLE_NDCS_CHAR_VALUE_T::value

Characteristic value

CYBLE_NDCSC_T Struct Reference

Description

Structure with discovered attributes information of Next DST Change Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T charInfo[CYBLE_NDCS_CHAR_COUNT]

Field Documentation

CYBLE_SRVR_CHAR_INFO_TCYBLE_NDCSC_T::charInfo[CYBLE_NDCS_CHAR_COUNT]

Characteristic handle and properties

CYBLE_NDCSS_T Struct Reference

Description

Structure with Device Information Service atribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T timeWithDst

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_NDCSS_T::serviceHandle

Handle of the Next DST Change Service

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_NDCSS_T::timeWithDst

Handle of the Time with DST Characteristic

CYBLE_PASS_CHAR_VALUE_T Struct Reference

Description

Phone Alert Status Service Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_PASS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_PASS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_PASS_CHAR_INDEX_T CYBLE_PASS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_PASS_CHAR_VALUE_T::value

Characteristic value

CYBLE_PASS_DESCR_VALUE_T Struct Reference

Description

Phone Alert Status Service Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_PASS_CHAR_INDEX_T charIndex
- CYBLE_PASS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_PASS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_PASS_CHAR_INDEX_T CYBLE_PASS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_PASS_DESCR_INDEX_T CYBLE_PASS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_PASS_DESCR_VALUE_T::value

Descriptor value

CYBLE_PASSC_CHAR_T Struct Reference

Description

Phone Alert Status Client Server's Characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_PASS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_PASSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_PASSC_CHAR_T::valueHandle

Handle of Server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_PASSC_CHAR_T::descrHandle[CYBLE_PASS_DESCR_COUNT]

Phone Alert Status Client characteristics descriptors handles

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_PASSC_CHAR_T::endHandle

Characteristic End Handle

CYBLE_PASSC_T Struct Reference

Description

Structure with discovered attributes information of Phone Alert Status Service

Data Fields

- CYBLE_PASSC_CHAR_T charInfo[CYBLE_PASS_CHAR_COUNT]

Field Documentation

CYBLE_PASSC_CHAR_TCYBLE_PASSC_T::charInfo[CYBLE_PASS_CHAR_COUNT]

Characteristics handle and properties array

CYBLE_PASSS_CHAR_T Struct Reference

Description

Structure with Phone Alert Status Service characteristics and descriptors attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_PASS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_PASSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_PASSS_CHAR_T::descrHandle[CYBLE_PASS_DESCR_COUNT]

Handle of descriptor

CYBLE_PASSS_T Struct Reference

Description

Structure with Phone Alert Status Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_PASSS_CHAR_T charInfo[CYBLE_PASS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_PASSS_T::serviceHandle

Phone Alert Status Service handle

CYBLE_PASSS_CHAR_T CYBLE_PASSS_T::charInfo[CYBLE_PASS_CHAR_COUNT]

Phone Alert Status Service characteristics info array

CYBLE_RSCS_CHAR_VALUE_T Struct Reference

Description

Running Speed and Cadence Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_RSCS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_RSCS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_RSCS_CHAR_INDEX_T CYBLE_RSCS_CHAR_VALUE_T::charIndex

Index of Running Speed and Cadence Service Characteristic

CYBLE_GATT_VALUE_T* CYBLE_RSCS_CHAR_VALUE_T::value

Characteristic value

CYBLE_RSCS_DESCR_VALUE_T Struct Reference

Description

Running Speed and Cadence Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_RSCS_CHAR_INDEX_T charIndex
- CYBLE_RSCS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_RSCS_DESCR_VALUE_T::connHandle
Connection handle

CYBLE_RSCS_CHAR_INDEX_T CYBLE_RSCS_DESCR_VALUE_T::charIndex
Characteristic index of the Service

CYBLE_RSCS_DESCR_INDEX_T CYBLE_RSCS_DESCR_VALUE_T::descrIndex
Characteristic index Descriptor the Service

CYBLE_GATT_VALUE_T* CYBLE_RSCS_DESCR_VALUE_T::value
Pointer to value of the Service Characteristic Descriptor

CYBLE_RSCSC_SRVR_FULL_CHAR_INFO_T Struct Reference

Description

RSCS Service Full characteristic information type

Data Fields

- CYBLE_SRVR_CHAR_INFO_T charInfo
- CYBLE_GATT_DB_ATTR_HANDLE_T descriptors[CYBLE_RSCS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_RSCSC_SRVR_FULL_CHAR_INFO_T::charInfo
Characteristic handle + properties

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_RSCSC_SRVR_FULL_CHAR_INFO_T::descriptors[CYBLE_RSCS_DESCR_COUNT]
Characteristic descriptors handles handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_RSCSC_SRVR_FULL_CHAR_INFO_T::endHandle
End handle of characteristic

CYBLE_RSCSC_T Struct Reference

Description

Structure with discovered attributes information of Running Speed and Cadence Service

Data Fields

- CYBLE_RSCSC_SRVR_FULL_CHAR_INFO_T characteristics[CYBLE_RSCS_CHAR_COUNT]

Field Documentation

CYBLE_RSCSC_SRVR_FULL_CHAR_INFO_TCYBLE_RSCSC_T::characteristics[CYBLE_RSCS_CHAR_COUNT]

Characteristics handles array

CYBLE_RSCSS_CHAR_T Struct Reference

Description

RSCS Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_RSCS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_RSCSS_CHAR_T::charHandle

Handle of the characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_RSCSS_CHAR_T::descrHandle[CYBLE_RSCS_DESCR_COUNT]

Handle of the descriptor

CYBLE_RSCSS_T Struct Reference

Description

Structure with Running Speed and Cadence Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_RSCSS_CHAR_T charInfo[CYBLE_RSCS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_RSCSS_T::serviceHandle

Running Speed and Cadence Service handle

CYBLE_RSCSS_CHAR_TCYBLE_RSCSS_T::charInfo[CYBLE_RSCS_CHAR_COUNT]

Array of Running Speed and Cadence Service Characteristics + Descriptors handles

CYBLE_RTUS_CHAR_VALUE_T Struct Reference

Description

Reference Time Update Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_RTUS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_RTUS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_RTUS_CHAR_INDEX_T CYBLE_RTUS_CHAR_VALUE_T::charIndex

Index of Reference Time Update Service Characteristic

CYBLE_GATT_VALUE_T* CYBLE_RTUS_CHAR_VALUE_T::value

Characteristic value

CYBLE_RTUS_TIME_UPDATE_STATE_T Struct Reference

Description

Time Update State Characteristic structure

Data Fields

- uint8 currentState
- uint8 result

Field Documentation

uint8 CYBLE_RTUS_TIME_UPDATE_STATE_T::currentState

Current state

uint8 CYBLE_RTUS_TIME_UPDATE_STATE_T::result

Result of Time update

CYBLE_RTUSC_T Struct Reference

Description

Structure with discovered attributes information of Reference Time Update Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T charInfo[CYBLE_RTUS_CHAR_COUNT]

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_RTUSC_T::charInfo[CYBLE_RTUS_CHAR_COUNT]

Characteristic handle and properties

CYBLE_RTUSS_T Struct Reference

Description

Structure with Reference Time Update Service atribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T timeUpdateCpHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T timeUpdateStateHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_RTUSS_T::serviceHandle

Handle of the Reference Time Update Service

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_RTUSS_T::timeUpdateCpHandle

Handle of the Time Update Control Point Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_RTUSS_T::timeUpdateStateHandle

Handle of the Time Update State Characteristic

CYBLE_SCPS_CHAR_VALUE_T Struct Reference

Description

Scan Parameters Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_SCPS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_SCPS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_SCPS_CHAR_INDEX_TCYBLE_SCPS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_SCPS_CHAR_VALUE_T::value

Characteristic value

CYBLE_SCPS_DESCR_VALUE_T Struct Reference

Description

Scan Parameters Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_SCPS_CHAR_INDEX_T charIndex
- CYBLE_SCPS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_SCPS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_SCPS_CHAR_INDEX_T CYBLE_SCPS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_SCPS_DESCR_INDEX_T CYBLE_SCPS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_SCPS_DESCR_VALUE_T::value

Descriptor value

CYBLE_SCPSC_T Struct Reference

Description

Structure with discovered attributes information of Scan Parameters Service

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_SRVR_CHAR_INFO_T intervalWindowChar
- CYBLE_SRVR_CHAR_INFO_T refreshChar
- CYBLE_GATT_DB_ATTR_HANDLE_T refreshCccdHandle

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_SCPSC_T::connHandle

Peer device handle

CYBLE_SRVR_CHAR_INFO_T CYBLE_SCPSC_T::intervalWindowChar

Handle + properties of Scan Interval Window Characteristic

CYBLE_SRVR_CHAR_INFO_T CYBLE_SCPSC_T::refreshChar

Handle + properties of Scan Refresh Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_SCPSC_T::refreshCccdHandle

Handle of Client Characteristic Configuration Descriptor

CYBLE_SCPSS_T Struct Reference

Description

Structure with Scan Parameters Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T intervalWindowCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T refreshCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T refreshCccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_SCPSS_T::serviceHandle

Scan Parameter Service handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_SCPSS_T::intervalWindowCharHandle

Handle of Scan Interval Window Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_SCPSS_T::refreshCharHandle

Handle of Scan Refresh Characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_SCPSS_T::refreshCccdHandle

Handle of Client Characteristic Configuration Descriptor

CYBLE_SRVR_CHAR_INFO_T Struct Reference

Description

Characteristic Attribute handle + properties structure

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle

Field Documentation

uint8 CYBLE_SRVR_CHAR_INFO_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_SRVR_CHAR_INFO_T::valueHandle

Handle of server database attribute value entry

CYBLE_SRVR_FULL_CHAR_INFO_T Struct Reference

Description

Service Full characteristic information type

Data Fields

- CYBLE_SRVR_CHAR_INFO_T charInfo
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descriptors[CYBLE_ANS_DESCR_COUNT]

Field Documentation

CYBLE_SRVR_CHAR_INFO_TCYBLE_SRVR_FULL_CHAR_INFO_T::charInfo

Characteristic handle + properties

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_SRVR_FULL_CHAR_INFO_T::endHandle

End handle of characteristic

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_SRVR_FULL_CHAR_INFO_T::descriptors[CYBLE_ANS_DESCR_COUNT]

Characteristic descriptors handles

CYBLE_STACK_LIB_VERSION_T Struct Reference

Description

This structure is used to hold version information of the BLE Stack Library

Data Fields

- uint8 majorVersion
- uint8 minorVersion
- uint8 patch
- uint8 buildNumber

Field Documentation

uint8 CYBLE_STACK_LIB_VERSION_T::majorVersion

The major version of the library

uint8 CYBLE_STACK_LIB_VERSION_T::minorVersion

The minor version of the library

uint8 CYBLE_STACK_LIB_VERSION_T::patch

The patch number of the library

uint8 CYBLE_STACK_LIB_VERSION_T::buildNumber

The build number of the library

CYBLE_STK_APP_DATA_BUFF_T Struct Reference

Description

Set of buffers to be allocated by stack for stack operation

Data Fields

- uint16 bufferSize
- uint8 bufferUnits

Field Documentation

uint16 CYBLE_STK_APP_DATA_BUFF_T::bufferSize

Size of the buffer chunk

uint8 CYBLE_STK_APP_DATA_BUFF_T::bufferUnits

Number of the buffers units of 'bufferSize'

CyBLE_timerConfig Struct Reference

Data Fields

- uint32 timerPeriod
- uint8 timerMode

Field Documentation

uint32 CyBLE_timerConfig::timerPeriod

In ms

uint8 CyBLE_timerConfig::timerMode

One shot, continuous.

CYBLE_TPS_CHAR_VALUE_T Struct Reference

Description

Tx Power Service Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_TPS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_TPS_CHAR_VALUE_T::connHandle

Connection handle

CYBLE_TPS_CHAR_INDEX_TCYBLE_TPS_CHAR_VALUE_T::charIndex

Characteristic index of Tx Power Service

CYBLE_GATT_VALUE_T* CYBLE_TPS_CHAR_VALUE_T::value

Pointer to value of Tx Power Service characteristic

CYBLE_TPS_DESCR_VALUE_T Struct Reference

Description

Tx Power Service Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_TPS_CHAR_INDEX_T charIndex
- CYBLE_TPS_CHAR_DESCRIPTORS_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_TPS_DESCR_VALUE_T::connHandle

Connection handle

CYBLE_TPS_CHAR_INDEX_T CYBLE_TPS_DESCR_VALUE_T::charIndex

Characteristic index of Tx Power Service

CYBLE_TPS_CHAR_DESCRIPTORS_T CYBLE_TPS_DESCR_VALUE_T::descrIndex

Characteristic index Descriptor of Tx Power Service

CYBLE_GATT_VALUE_T* CYBLE_TPS_DESCR_VALUE_T::value

Pointer to value of Tx Power Service characteristic

CYBLE_TPSC_T Struct Reference

Description

Structure with discovered attributes information of Tx Power Service

Data Fields

- CYBLE_SRVR_CHAR_INFO_T txPowerLevelChar
- CYBLE_GATT_DB_ATTR_HANDLE_T txPowerLevelCccdHandle

Field Documentation

CYBLE_SRVR_CHAR_INFO_T CYBLE_TPSC_T::txPowerLevelChar

Tx Power Level Characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_TPSC_T::txPowerLevelCccdHandle

Tx Power Level Client Characteristic Configuration Descriptor handle

CYBLE_TPSS_T Struct Reference

Description

Structure with Tx Power Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T txPowerLevelCharHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T txPowerLevelCccdHandle

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_TPSS_T::serviceHandle

Tx Power Service handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_TPSS_T::txPowerLevelCharHandle

Tx Power Level Characteristic handle

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_TPSS_T::txPowerLevelCccdHandle

Tx Power Level Client Characteristic Configuration Descriptor handle

CYBLE_UDS_CHAR_VALUE_T Struct Reference

Description

UDS Characteristic Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_UDS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value
- CYBLE_GATT_ERR_CODE_T gattErrorCode

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_UDS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_UDS_CHAR_INDEX_TCYBLE_UDS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_UDS_CHAR_VALUE_T::value

Characteristic value

CYBLE_GATT_ERR_CODE_TCYBLE_UDS_CHAR_VALUE_T::gattErrorCode

GATT error code for access control

CYBLE_UDS_DESCR_VALUE_T Struct Reference

Description

UDS Characteristic Descriptor Value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_UDS_CHAR_INDEX_T charIndex
- CYBLE_UDS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_UDS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_UDS_CHAR_INDEX_T CYBLE_UDS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_UDS_DESCR_INDEX_T CYBLE_UDS_DESCR_VALUE_T::descrIndex

Index of service characteristic descriptor

CYBLE_GATT_VALUE_T* CYBLE_UDS_DESCR_VALUE_T::value

Descriptor value

CYBLE_UDSC_CHAR_T Struct Reference

Description

User Data Client Characteristic structure type

Data Fields

- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_UDS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle

Field Documentation

uint8 CYBLE_UDSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_UDSC_CHAR_T::valueHandle

Handle of server database attribute value entry

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_UDSC_CHAR_T::descrHandle[CYBLE_UDS_DESCR_COUNT]

User Data client char. descriptor handle

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_UDSC_CHAR_T::endHandle

Characteristic End Handle

CYBLE_UDSC_T Struct Reference

Description

Structure with discovered attributes information of User Data Service

Data Fields

- CYBLE_UDSC_CHAR_T charInfo[CYBLE_UDS_CHAR_COUNT]

Field Documentation

CYBLE_UDSC_CHAR_TCYBLE_UDSC_T::charInfo[CYBLE_UDS_CHAR_COUNT]

Characteristics handle + properties array

CYBLE_UDSS_CHAR_T Struct Reference

Description

User Data Server Characteristic structure type

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_UDS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_UDSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_UDSS_CHAR_T::descrHandle[CYBLE_UDS_DESCR_COUNT]

Handle of descriptor

CYBLE_UDSS_T Struct Reference

Description

Structure with User Data Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_UDSS_CHAR_T charInfo[CYBLE_UDS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_UDSS_T::serviceHandle

User Data Service handle

CYBLE_UDSS_CHAR_TCYBLE_UDSS_T::charInfo[CYBLE_UDS_CHAR_COUNT]

User Data Service characteristics info array

CYBLE_UUID128_T Struct Reference

Description

GATT 128 Bit UUID type

Data Fields

- uint8 **value** [CYBLE_GATT_128_BIT_UUID_SIZE]

CYBLE_UUID_T Union Reference

Description

GATT UUID type

Data Fields

- CYBLE_UUID16 uuid16
- CYBLE_UUID128_T uuid128

Field Documentation

CYBLE_UUID16CYBLE_UUID_T::uuid16

16 Bit UUID

CYBLE_UUID128_TCYBLE_UUID_T::uuid128

128 Bit UUID

CYBLE_WPTS_CHAR_VALUE_T Struct Reference

Description

WPTS Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_WPTS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_TCYBLE_WPTS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_WPTS_CHAR_INDEX_TCYBLE_WPTS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_WPTS_CHAR_VALUE_T::value

Characteristic value

CYBLE_WPTS_DESCR_VALUE_T Struct Reference

Description

WPTS Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_WPTS_CHAR_INDEX_T charIndex
- CYBLE_WPTS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_WPTS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_WPTS_CHAR_INDEX_T CYBLE_WPTS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_WPTS_DESCR_INDEX_T CYBLE_WPTS_DESCR_VALUE_T::descrIndex

Index of descriptor

CYBLE_GATT_VALUE_T* CYBLE_WPTS_DESCR_VALUE_T::value

Characteristic value

CYBLE_WPTSC_CHAR_T Struct Reference

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_WPTS_DESCR_COUNT]
- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- uint8 properties

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WPTSC_CHAR_T::descrHandle[CYBLE_WPTS_DESCR_COUNT]

Handles of descriptors

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WPTSC_CHAR_T::valueHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WPTSC_CHAR_T::endHandle

End handle of a characteristic

uint8 CYBLE_WPTSC_CHAR_T::properties

Properties for value field

CYBLE_WPTSC_T Struct Reference

Description

WPTS Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_WPTSC_CHAR_T charInfo[CYBLE_WPTS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_WPTSC_T::serviceHandle

Wireless Power Transfer Service handle

CYBLE_WPTSC_CHAR_TCYBLE_WPTSC_T::charInfo[CYBLE_WPTS_CHAR_COUNT]

Wireless Power Transfer Service characteristics info structure

CYBLE_WPTSS_CHAR_T Struct Reference

Description

Characteristic with descriptors

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_WPTS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_WPTSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_TCYBLE_WPTSS_CHAR_T::descrHandle[CYBLE_WPTS_DESCR_COUNT]

Handle of descriptor

CYBLE_WPTSS_T Struct Reference

Description

Structure with Wireless Power Transfer Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_WPTSS_CHAR_T charInfo[CYBLE_WPTS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WPTSS_T::serviceHandle

Wireless Power Transfer Service handle

CYBLE_WPTSS_CHAR_T CYBLE_WPTSS_T::charInfo[CYBLE_WPTS_CHAR_COUNT]

Wireless Power Transfer Characteristic handles

CYBLE_WSS_CHAR_VALUE_T Struct Reference

Description

WSS Characteristic value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_WSS_CHAR_INDEX_T charIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_WSS_CHAR_VALUE_T::connHandle

Peer device handle

CYBLE_WSS_CHAR_INDEX_T CYBLE_WSS_CHAR_VALUE_T::charIndex

Index of service characteristic

CYBLE_GATT_VALUE_T* CYBLE_WSS_CHAR_VALUE_T::value

Characteristic value

CYBLE_WSS_DESCR_VALUE_T Struct Reference

Description

WSS Characteristic descriptor value parameter structure

Data Fields

- CYBLE_CONN_HANDLE_T connHandle
- CYBLE_WSS_CHAR_INDEX_T charIndex
- CYBLE_WSS_DESCR_INDEX_T descrIndex
- CYBLE_GATT_VALUE_T* value

Field Documentation

CYBLE_CONN_HANDLE_T CYBLE_WSS_DESCR_VALUE_T::connHandle

Peer device handle

CYBLE_WSS_CHAR_INDEX_T CYBLE_WSS_DESCR_VALUE_T::charIndex

Index of service characteristic

CYBLE_WSS_DESCR_INDEX_T CYBLE_WSS_DESCR_VALUE_T::descrIndex

Index of descriptor

CYBLE_GATT_VALUE_T* CYBLE_WSS_DESCR_VALUE_T::value

Characteristic value

CYBLE_WSSC_CHAR_T Struct Reference

Description

WSS Service Full characteristic information structure

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T valueHandle
- uint8 properties
- CYBLE_GATT_DB_ATTR_HANDLE_T endHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_WSS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WSSC_CHAR_T::valueHandle

Handle of characteristic value

uint8 CYBLE_WSSC_CHAR_T::properties

Properties for value field

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WSSC_CHAR_T::endHandle

End handle of characteristic

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WSSC_CHAR_T::descrHandle[CYBLE_WSS_DESCR_COUNT]

Array of descriptor handles

CYBLE_WSSC_T Struct Reference

Description

Structure with discovered attributes information of Weight Scale Service

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_WSSC_CHAR_T charInfo[CYBLE_WSS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WSSC_T::serviceHandle

Weight Scale Service handle

CYBLE_WSSC_CHAR_T CYBLE_WSSC_T::charInfo[CYBLE_WSS_CHAR_COUNT]

Weight Scale Service characteristics info structure

CYBLE_WSSS_CHAR_T Struct Reference

Description

Structure with Weight Scale Service attribute handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T charHandle
- CYBLE_GATT_DB_ATTR_HANDLE_T descrHandle[CYBLE_WSS_DESCR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WSSS_CHAR_T::charHandle

Handle of characteristic value

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WSSS_CHAR_T::descrHandle[CYBLE_WSS_DESCR_COUNT]

Array of descriptor handles

CYBLE_WSSS_T Struct Reference

Description

WSS Characteristic with descriptors handles

Data Fields

- CYBLE_GATT_DB_ATTR_HANDLE_T serviceHandle
- CYBLE_WSSS_CHAR_T charInfo[CYBLE_WSS_CHAR_COUNT]

Field Documentation

CYBLE_GATT_DB_ATTR_HANDLE_T CYBLE_WSSS_T::serviceHandle

Weight Scale Service handle

CYBLE_WSSS_CHAR_T CYBLE_WSSS_T::charInfo[CYBLE_WSS_CHAR_COUNT]

Array of characteristics and descriptors handles

Resources

The BLE Component uses one BLESS block, two external crystals, interrupt(s), and an optional SCB Block:

Configuration	Resource Type				
	BLESS	SCB [1]	Interrupt	ECO	WCO [2]
Profile Mode	1	-	1	1	1
HCI Mode	1	1	2	1	1

DC and AC Electrical Characteristics

Specifications are valid for –40 °C ≤ T_A ≤ 85 °C and T_J ≤ 100 °C, except where noted.
Specifications are valid for 1.71 V to 5.5 V, except where noted.

Parameter	Description	Min	Typ	Max	Units	Details/Conditions
RF Receiver Specification						
RXS, IDLE	RX sensitivity with idle transmitter	–	–89	–	dBm	
	RX sensitivity with idle transmitter excluding Balun loss	–	–91	–	dBm	Guaranteed by design simulation
RXS, DIRTY	RX sensitivity with dirty transmitter	–	–87	–70	dBm	RF-PHY Specification (RCV-LE/CA/01/C)
RXS, HIGHGAIN	RX sensitivity in high-gain mode with idle transmitter	–	–91	–	dBm	
PRXMAX	Maximum input power	–10	–1	–	dBm	RF-PHY Specification (RCV-LE/CA/06/C)
CI1	Cochannel interference, Wanted signal at –67 dBm and Interferer at FRX	–	9	21	dB	RF-PHY Specification (RCV-LE/CA/03/C)
CI2	Adjacent channel interference Wanted signal at –67 dBm and Interferer at FRX ±1 MHz	–	3	15	dB	RF-PHY Specification (RCV-LE/CA/03/C)
CI3	Adjacent channel interference Wanted signal at –67 dBm and Interferer at FRX ±2 MHz	–	–29	–	dB	RF-PHY Specification (RCV-LE/CA/03/C)

1 The BLE Component instantiates an SCB Component when configured in HCI Mode. Refer to the SCB Component datasheet for its resource usage.

2 WCO is optional. It is used if Component deep sleep is required. If WCO is not used, then ILO is used as the LFCLK source.

Parameter	Description	Min	Typ	Max	Units	Details/Conditions
CI4	Adjacent channel interference Wanted signal at –67 dBm and Interferer at ≥FRX ±3 MHz	–	–39	–	dB	RF-PHY Specification (RCV-LE/CA/03/C)
CI5	Adjacent channel interference Wanted Signal at –67 dBm and Interferer at Image frequency (F_{IMAGE})	–	–20	–	dB	RF-PHY Specification (RCV-LE/CA/03/C)
CI3	Adjacent channel interference Wanted signal at –67 dBm and Interferer at Image frequency (F_{IMAGE} ± 1 MHz)	–	–30	–	dB	RF-PHY Specification (RCV-LE/CA/03/C)
OBB1	Out-of-band blocking, Wanted signal at –67 dBm and Interferer at F = 30–2000 MHz	–30	–27	–	dBm	RF-PHY Specification (RCV-LE/CA/04/C)
OBB2	Out-of-band blocking, Wanted signal at –67 dBm and Interferer at F = 2003–2399 MHz	–35	–27	–	dBm	RF-PHY Specification (RCV-LE/CA/04/C)
OBB3	Out-of-band blocking, Wanted signal at –67 dBm and Interferer at F = 2484–2997 MHz	–35	–27	–	dBm	RF-PHY Specification (RCV-LE/CA/04/C)
OBB4	Out-of-band blocking, Wanted signal a –67 dBm and Interferer at F = 3000–12750 MHz	–30	–27	–	dBm	RF-PHY Specification (RCV-LE/CA/04/C)
IMD	Intermodulation performance Wanted signal at –64 dBm and 1-Mbps BLE, third, fourth, and fifth offset channel	–50	–	–	dBm	RF-PHY Specification (RCV-LE/CA/05/C)
RXSE1	Receiver spurious emission 30 MHz to 1.0 GHz	–	–	–57	dBm	100-kHz measurement bandwidth ETSI EN300 328 V1.8.1
RXSE2	Receiver spurious emission 1.0 GHz to 12.75 GHz	–	–	–47	dBm	1-MHz measurement bandwidth ETSI EN300 328 V1.8.1
RF Transmitter Specifications						
TXP, ACC	RF power accuracy	–	–	±4	dB	
TXP, RANGE	RF power control range	–	20	–	dB	
TXP, 0dBm	Output power, 0-dB Gain setting (PA7)	–4	0	3	dBm	
TXP, MAX	Output power, maximum power setting (PA10)	–1	3	6	dBm	
TXP, MIN	Output power, minimum power setting (PA1)	–	–18	–	dBm	
F2AVG	Average frequency deviation for 10101010 pattern	185	–	–	kHz	RF-PHY Specification (TRM-LE/CA/05/C)

Parameter	Description	Min	Typ	Max	Units	Details/Conditions
F1AVG	Average frequency deviation for 11110000 pattern	225	250	275	kHz	RF-PHY Specification (TRM-LE/CA/05/C)
EO	Eye opening = ΔF2AVG/ΔF1AVG	0.8	–	–		RF-PHY Specification (TRM-LE/CA/05/C)
FTX, ACC	Frequency accuracy	–150	–	150	kHz	RF-PHY Specification (TRM-LE/CA/06/C)
FTX, MAXDR	Maximum frequency drift	–50	–	50	kHz	RF-PHY Specification (TRM-LE/CA/06/C)
FTX, INITDR	Initial frequency drift	–20	–	20	kHz	RF-PHY Specification (TRM-LE/CA/06/C)
FTX, DR	Maximum drift rate	–20	–	20	kHz/ 50 µs	RF-PHY Specification (TRM-LE/CA/06/C)
IBSE1	In-band spurious emission at 2-MHz offset	–	–	–20	dBm	RF-PHY Specification (TRM-LE/CA/03/C)
IBSE2	In-band spurious emission at ≥3-MHz offset	–	–	-30	dBm	RF-PHY Specification (TRM-LE/CA/03/C)
TXSE1	Transmitter spurious emissions (average), <1.0 GHz	–	–	-55.5	dBm	FCC-15.247
TXSE2	Transmitter spurious emissions (average), >1.0 GHz	–	–	-41.5	dBm	FCC-15.247
RF Current Specifications						
IRX	Receive current in normal mode	–	18.7	–	mA	
IRX_RF	Radio receive current in normal mode	–	16.4	–	mA	Measured at V_{DDR}
IRX, HIGHGAIN	Receive current in high-gain mode	–	21.5	–	mA	
ITX, 3dBm	TX current at 3-dBm setting (PA10)	–	20	–	mA	
ITX, 0dBm	TX current at 0-dBm setting (PA7)	–	16.5	–	mA	
ITX_RF, 0dBm	Radio TX current at 0 dBm setting (PA7)	–	15.6	–	mA	Measured at V_{DDR}
ITX_RF, 0dBm	Radio TX current at 0 dBm excluding Balun loss	–	14.2	–	mA	Guaranteed by design simulation
ITX,-3dBm	TX current at –3-dBm setting (PA4)	–	15.5	–	mA	
ITX,-6dBm	TX current at –6-dBm setting (PA3)	–	14.5	–	mA	
ITX,-12dBm	TX current at –12-dBm setting (PA2)	–	13.2	–	mA	
ITX,-18dBm	TX current at –18-dBm setting (PA1)	–	12.5	–	mA	
Iavg_1sec, 0dBm	Average current at 1-second BLE connection interval	–	18.9	–	µA	TXP: 0 dBm; ±20-ppm master and slave clock accuracy.
Iavg_4sec, 0dBm	Average current at 4-second BLE connection interval	–	6.25	–	µA	TXP: 0 dBm; ±20-ppm master and slave clock accuracy.

Parameter	Description	Min	Typ	Max	Units	Details/Conditions
General RF Specifications						
FREQ	RF operating frequency	2400	–	2482	MHz	
CHBW	Channel spacing	–	2	–	MHz	
DR	On-air data rate	–	1000	–	kbps	
IDLE2TX	BLE.IDLE to BLE. TX transition time	–	120	140	µs	
IDLE2RX	BLE.IDLE to BLE. RX transition time	–	75	120	µs	
RSSI Specifications						
RSSI, ACC	RSSI accuracy	–	±5	–	dB	
RSSI, RES	RSSI resolution	–	1	–	dB	
RSSI, PER	RSSI sample period	–	6	–	µs	

The following table summarizes the different measurements of the time taken by the BLE firmware stack to perform / initiate different BLE operations. The measurements have been performed with IMO set to 12 MHz and connection interval set to 7.5ms.

Operation	Duration (µs)
'CyBle_ProcessEvents' execution time (Best case)	4
Worst case BLE ISR Execution time	86.3
Start Scan execution time	1860
Passive Scan receive advertisement duration	168
Active Scan receive {Advertisement + Scan Response} duration	320
Read request processing time on GATT Server (Attribute MTU = 512 Bytes)	23600
Write request processing time on GATT Server (Attribute MTU = 512 Bytes)	16800
Connection time on GAP Central	2690
Connection time on GAP Peripheral	1300
Start advertisement execution time	2960
'CyBle_EnterLPM' execution time	342
Notification processing time on GATT Server (Attribute MTU = 23 Bytes)	673
Write command processing time on GATT Server (Attribute MTU = 23 Bytes)	646

Updating to BLE v2.x

If you are updating to BLE v2.x from version v1.0, 1.10 or 1.20 and if you have used *CYBLE_EVT_GATTS_PREP_WRITE_REQ* or *CYBLE_EVT_GATTS_EXEC_WRITE_REQ* events in your existing design, it is likely that your design will not build after the update.

The reason for this is that the mechanism for the events generation and the event parameters were modified to allow the *CYBLE_EVT_GATTS_PREP_WRITE_REQ* and *CYBLE_EVT_GATTS_EXEC_WRITE_REQ* events to be used by the Long Write Value and Reliable Write procedures.

The following table shows the changes between version 2.x and older versions of the BLE component.

#	v1.0-1.20	v2.x
1	Single *CYBLE_EVT_GATTS_PREP_WRITE_REQ* event is generated.	Multiple *CYBLE_EVT_GATTS_PREP_WRITE_REQ* events are generated
2	Multiple *CYBLE_EVT_GATTS_EXEC_WRITE_REQ* events are generated	Single *CYBLE_EVT_GATTS_EXEC_WRITE_REQ* event is generated.

3	The *CYBLE_EVT_GATTS_PREP_WRITE_REQ* event has the following parameter structure:
	`typedef struct {`
	`  CYBLE_CONN_HANDLE_T connHandle;`
	`  CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle;`
	`} CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T`
		The *CYBLE_EVT_GATTS_PREP_WRITE_REQ* event has the following parameter structure:
		`typedef struct {`
		`  CYBLE_CONN_HANDLE_T connHandle;`
		`  CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T * baseAddr;`
		`  uint8 currentPrepWriteReqCount;`
		`  uint8 gattErrorCode;`
		`} CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T`

4	The *CYBLE_EVT_GATTS_EXEC_WRITE_REQ* event has the following parameter structure:
	`typedef struct {`
	`  CYBLE_CONN_HANDLE_T connHandle;`
	`  CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle;`
	`  uint16 length;`
	`  uint16 offset;`
	`  uint8 result;`
	`} CYBLE_GATTS_EXEC_WRITE_REQ_T`
		The CYBLE_EVT_GATTS_EXEC_WRITE_REQ event has the following parameter structure:
		`typedef struct {`
		`  CYBLE_CONN_HANDLE_T connHandle;`
		`  CYBLE_GATT_HANDLE_VALUE_OFFSET_PARAM_T * baseAddr;`
		`  uint8 prepWriteReqCount;`
		`  uint8 execWriteFlag;`
		`  CYBLE_GATT_DB_ATTR_HANDLE_T attrHandle;`
		`  uint8 gattErrorCode;`
		`} CYBLE_GATTS_EXEC_WRITE_REQ_T`

The following are detailed descriptions of the changes described in the table, and how they may impact your design:

Item #1:

In the older versions of the BLE component, the *CYBLE_EVT_GATTS_PREP_WRITE_REQ* event was generated only once when the device received the first Prepare Write Request of a Long Write Value procedure. For responding to the *CYBLE_EVT_GATTS_PREP_WRITE_REQ* event, the CyBle_GattsPrepWriteReqSupport() function should be called by the application to inform the Client if the Server supports Long Writes. This functionality remains in BLE v2.x component.

In BLE v2.x, the CyBle_GattsPrepWriteReqSupport() function should be called each time the device receives the first *CYBLE_EVT_GATTS_PREP_WRITE_REQ* event of Long Write Value procedure. For the Reliable Write Procedure, the *CYBLE_EVT_GATTS_PREP_WRITE_REQ* event is generated for each unique attribute handle, and therefore it requires calling the CyBle_GattsPrepWriteReqSupport() function.

Item #2:

In the older versions of the BLE component, the *CYBLE_EVT_GATTS_EXEC_WRITE_REQ* event was generated multiple times, and the number of events was dependent on the attribute MTU size and the length of the long attribute. This event contained the burst data of the long attribute, with the length and offset specified in the event parameter structure. When the last *CYBLE_EVT_GATTS_EXEC_WRITE_REQ* was received, the event signaled that the data was actually written to the GATT database.

In the BLE v2.x component, the event is generated once for each Long Write Value procedure, and the event parameter provides the pointer to the start of the buffer where the data is temporarily stored. The data will be written to the GATT database only if there is a successful indication from the user, or if *gattErrorCode* equals to *CYBLE_GATT_ERR_NONE*.

Item #3:

In the older BLE component versions, the *CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T event* included the *eventParam -> attrHandle* parameter that included the attribute handle of a long attribute value that has been written.

In the BLE v2.x component, this parameter is placed in the following location of the event parameter structure:

> *eventParam -> baseAddr[eventParam -> currentPrepWriteReqCount].handleValuePair.attrHandle.*

For detailed description of each element, refer to the CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T section.

Item #4:

In the older BLE component versions, the *CYBLE_GATTS_EXEC_WRITE_REQ_T* event included the *eventParam -> length* and *eventParam -> offset* parameters. These are respectively equivalent to *eventParam -> baseAddr[n].handleValuePair.value.len* and *eventParam -> baseAddr[n].offset* in the BLE v2.x Component.

The *n* means the number of the burst to which the entire long value is divided. Both the older versions and BLE v2.x components include *eventParam -> attrHandle* parameters. However, in the BLE v2.x component, the parameter has a different purpose. The attribute handle is stored in the *eventParam -> baseAddr[n].handleValuePair.attrHandle* similar to *CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T* struct. In the BLE v2.x component, the *eventParam -> result* was renamed to *eventParam -> execWriteFlag.*

For detailed description of each element, refer to the CYBLE_GATTS_EXEC_WRITE_REQ_T section.

Component Errata

This section lists known problems with the component.

Cypress ID	Component Version	Problem	Workaround
210832	2.0, 2.10, 2.20, 2.30	Application using IMO to source HFCLK (at 3 MHz) for low power state may lead to CPU not waking up from deep sleep upon disconnection.	As per AN92584 (001-92584 *A), application should use ECO sourced HFCLK (at 3 MHz) instead of IMO. No workaround exists if customer insists on using IMO to source HFCLK instead of ECO for low power application.
224335	2.30	Scanning does not stop some times when the application is frequently switching between scanning and advertising operations.	Implement the application level timeout to restart scanning. This issue is fixed in the BLE 3.0 component.
225509	2.30	When the application tries to send L2CAP data, data transfer fails due to memory allocation failure. The issue occurs only when L2CAP is configured for MTU = 512 and MPS = 23. Issue does not occur in other configurations.	Recommendation is to use MPS, such that MTU/MPS <=10. This issue will be fixed in the BLE 3.0 component production release.

BLE Stack Changes

This section lists changes made to the BLE Stack.

Version	Description of Changes	Reason for Changes / Impact
2.3.0.46	Updated internal operation of the CyBle_GappStopAdvertisement() API to wait on BLESS hardware ADV_ON_STATUS bit until advertising is actually stopped. It is done to reflect integrated “Advertising Status” for BLESS hardware and BLE Stack to support correct ADV stop operation to support all different IMO and BLESS frequency ranges.	BLESS DSM entry was not happening when a device advertisement of type high duty cycle ADV_DIRECT_IND was stopped by the application and the CPU was running at 7 MHz or less frequency.
	Updated description of GapcSetHostChannelClassification() API. Updated the HCI event handler function to return HCI Status event to application, when invalid parameters are passed to the function.	API description was not clear enough to use this API. Host was not returning the HCI status event for invalid input parameters.
	Updated the description for the CyBle_L2capChannelDataWrite() API. BLE Stack will return error code ‘CYBLE_ERROR_INVALID_PARAMETER’ when data input size is higher than permitted in the channel.	‘CYBLE_ERROR_INVALID_PARAMETER’ error code in more accurate than default ‘CYBLE_ERROR_MAX’ for this condition.
	Changed a default random address to Static random address in the BLE configuration data file.	The default random address, returned by the Stack, did not meet the criteria for a random address. Note that application is expected to set the random address and not use a default random address.
	All References to MTU in BLE Stack header files are replaced with either GATT MTU or L2CAP MTU explicitly.	MTU is used for both ATT and L2CAP MTU references.
	Removed ‘CYBLE_ERROR_NO_DEVICE_ENTITY’ error code from CyBle_GapRemoveOldestDeviceFromBondedList() API Description.	‘CYBLE_ERROR_NO_DEVICE_ENTITY’ error code is never returned by BLE Stack.
	Added descriptions for the following ENUM definitions: CYBLE_EVT_HOST_INVALID CYBLE_BLESS_PWR_LVL_T CYBLE_BLESS_ECO_CLK_DIV_T	Provide meaningful description to ENUMs.
	SMP FSM handler was modified to update negotiated authentication parameters to authenticated property, if OOB is used.	Core v4.1, Vol 3, Part H, Section 2.3.5.1 "If the out of band authentication method is used the key is assumed to be Authenticated MITM Protection."

Version	Description of Changes	Reason for Changes / Impact
	Changed number of bits used to generate random number for passkey display from 16 bits to 20 bits. Change is made in SMP FSM handler.	Passkey generated to display was never larger than 65535. As per spec (Core v4.2, Vol 3, Part C, Section 3.2.3.3) value should be between 000000 – 999999.
	BLE Stack updated to filter duplicate “scannable unidirect” type of advertising packets.	BLE device continuously receives Advertisement report if Filter Policy is set to "Scan Request: White list"
	Documentation update for the following functions: CyBle_EnterLPM() CyBle_ExitLPM() CyBle_ProcessEvents()	Documented usage of CPU Sleep Mode in BLE Stack while BLESS force exit is issued by BLE Stack when BLESS is in BLE Deep Sleep Mode. More clarity is added in all BLESS Low Power Mode APIs as call to CyBle_ProcessEvents(), CYBLe_ExitLPM() can cause BLESS force DSM exit.
	Updated the BT Timer code to handle timer creation with any order of timeouts.	If two timers were started simultaneously, the timeout didn’t happen as per timeout provided. If a second timer was started with a lesser timeout thsn first, then second timer did not work as expected.
	L2CAP data path is modified for allocation and freeing of L2CAP data queue element.	Functional issue was found when bidirectional continuous large MTU size data transfer over L2CAP-CBFC was interrupted frequently.
2.2.0.36	Updated Synth Delay to interop with HP laptop and to avoid the extra modulated stream on '0's.	Touch Mouse was not able to establish connection with HP laptop which has Ralink RT3290 BLE4.0 Chipset.
	Clear the disconnection status in LL Connection Entity every time upon CONN_FAILED interrupt. UNSPECIFIED ERROR passed to application for any other possible corner case for application to remain in synch with BLE Component/Stack.	Sometime application never receives disconnect event even when the peer device is powered off.
	Changed the sequence of enabling/disabling interrupts during SCAN start and SCAN stop to avoid race condition where high priority interrupts occur to avoid SCAN FIFO becomes full.	Central hangs in scanning mode when lots of devices are advertising. GAPC_SCAN_PROGRESS_RESULT event is never generated.
2.1.0.30.	Updated existing interface between BLE component and BLE stack CyBle_StackInit() API for providing the flash address for storing the information with respect to bonding	To allow to retain the information of bonding when application is updated using OTA.
	Reduced the BLE stack start up time by removing the delay of 10ms used for FPGA. Reducing redundant HCI command exchanges between the Host and Controller layer during initialization in SoC mode	Reduced the BLE stack start up time which reduces the power during initialization.
	Dynamic memory usage within BLE Stack is optimized.	Effective RAM utilization

Version	Description of Changes	Reason for Changes / Impact
	Enhancement to register multiple L2CAP PSM specified during the Ble stack initialization.	Enhancement
	Memory corruption due to out of bound copying during read request is fixed.	Defect fix.
	Defect fixed to eanable retrieving SMP keys using IDADDR.	Privacy 1.1: Device was not able to identify the device when connected with a public address which was previously Bonded with random address.
2.0.0.81	Removed autonomous initiation of VERSION_EXCHANGE after connection establishment from BLE Stack.	Resolves the interoperability issue with MI4 phone Bluetooth host. No impact to existing functionality.
	Added configurability for optimal RAM usage and consequently updated following. Updated existing interface between BLE Component and BLE Stack for CyBle_StackInit() API Added CyBle_L2capSetConfig() API	Added configurability for optimal RAM usage in BLE Component and Stack based on application configuration/requirement for usage of MTU and L2CAP features. CyBle_L2capSetConfig() API is added to configure the BLE Stack for following L2CAP configuration: Total dynamic channels (CIDs) required by application. Total number of Credit Based Flow Control (CBFC) Protocol Service Multiplexing (PSM) channels required. L2CAP Signaling transactions related timeout
	Updated handling of “CYBLE_EVT_GAPC_SCAN_PROGRESS_RESULT” in to filter and do not propagate advertising reports of type ADV_DIR_IND.	ADV_DIR_IND shall be sent to application only during observation procedure. This was being sent when the device is performing Limited or General Discovery procedure.
	Updated CyBle_GapcSetRemoteAddr() API	CyBle_GapcSetRemoteAddr was failing on subsequent call when same peer device changes its address between public and random. API is the updated to fix the issue.
	Updated CyBle_GapRemoveOldestDeviceFromBondedList() API.	The oldest device from the bond list was not getting removed from retention memory. It was only getting removed from RAM. Added error code return value CYBLE_ERROR_NO_DEVICE_ENTITY to caller API in case where no device is present in bond list and the API is invoked.
	Updated CyBle_GapcResolveDevice() API	The CyBle_GapcResolveDevice() API had a side-effect, as the value of the input parameter identity resolution key “uint8 *irk” was getting changed after API execution.

Version	Description of Changes	Reason for Changes / Impact
	Updated CyBle_SetTxPower API	The API is changed for user convenience to avoid the value change of input parameter "CYBLE_BLESS_PWR_IN_DB_T *bleSsPwrLvl" after API execution.
	Updated handling of internal low power operation when simultaneous operation for ADV, CONN and SCAN is in progress.	Updated the internal low power operation for CONN to sustain when non-connectable ADV or passive SCAN is going on.
	Added event "CYBLE_EVT_GATTC_STOP_CMD_COMPLETE" Updated internal handling of GATT stop procedure to propagate "CYBLE_EVT_GATTC_STOP_CMD_COMPLETE" to application.	Added event "CYBLE_EVT_GATTC_STOP_CMD_COMPLETE" to indicate CyBle_GattcStopCmd() API operation is complete.
	GATT Database is enhanced to support varying length characteristic at run time.	Upcoming profile application such as User Data Service (UDS) require supporting varying length characteristic. Previous approach had current attribute length store in FLASH and hence prevented run time modification.
	Updated BLE Stack to give timeout event CYBLE_EVT_TIMEOUT correctly for discovery procedure or observation procedure.	Observation procedure timeout did not occur after step 3: Connect with peer device and start any GATT procedure (MTU Exchange). Disconnect from peer device Start observation procedure with timeout
	Bonded device list handling is updated for clearing bond device operation.	Sixth time connection was failing after following steps are performed for 5-6 times Change local device address Connect and bond with peer device Disconnect and clear bonding info
	Updated BLE Stack to return CYBLE_ERROR_INVALID_PARAMETER when GATT write operation with invalid length is performed.	Error code "CYBLE_ERROR_INVALID_PARAMETER" was not given when GATT write characteristic operation was performed with invalid length with respect to set MTU size.
	L2CAP module modified to fix memory leak	Memory leak in L2CAP credit based flow control (CBFC) data path is fixed
1.0.0.184	Updated the CyBle_GattcDiscoverCharacteristicByUuid API to achieve characteristic discovery with 128-bit UUID using this API.	Defect fix
	Optimized the BLE Stack to reduce the system power consumption for BLE solutions.	Power optimization for BLE solutions

Version	Description of Changes	Reason for Changes / Impact
	Corrected the GATT server access error code when the attribute is not found.	Defect fix
	Provided more clarification for CYBLE_EVT_STACK_BUSY_STATUS event handling.	Better user experience.
1.0.0.181	Update internal device settings.	Fix for BLE RF link (transmit/receive) issues observed on some devices. Increase of ~0.3 mA on Rx current.
1.0.0.169	Initial BLE Stack version.	

Component Changes

This section lists the major changes in the component from the previous version.

Version	Description of Changes	Reason for Changes / Impact
2.30.b	Updated the Component Errata section to add two more items.	Added desriptions for Cypress IDs 224335 and 225509.
2.30.a	Edited the datasheet.	Updated the description for BLE Stack Changes.
2.30	Added validation of the TX power level in the component GUI. 3 dBm value can be set only for both Adv/Scan TX power level and Connection TX power level simultaneously.	Hardware limitations.
	The new QD ID and Declaration ID# for BLE component Profiles were added in the table of Bluetooth Qualification section	New QD ID and Declaration ID# were introduced to include qualification details about UDS, WSS, WSP, BCS and CTS (v1.1).
	The generation of an erroneous value length for a Custom Descriptor with 32-bit or 128-bit UUID was fixed.	In case when 32-bit or 128-bit UUID was used for the Custom Descriptor and BLE device was acting as a GATT Server, a wrong Descriptor UUID and value length were generated by the component.
	Updated the CyBle_NdcssGetCharacteristicValue() and CyBle_RtussGetCharacteristicValue() functions. They were always returning CYBLE_ERROR_INVALID_PARAMETER.	The reason for this was an incorrect condition check that was done after the value was written to the GATT database.
	Updated the following services: HIDS, SCPS, ESS, BMS, UDS, CTS. In cases of security mode usage, where pairing is required, these services were generating WRITE CHARACTERISTIC/DESCRIPTOR, NOTIFIFICATION or INDICATION ENABLED/DISABLED events even though the device wasn't paired. Also, the data wasn't written to the GATT DB.	Due to erroneous code, the events were generated prior to checking security settings.

Version	Description of Changes	Reason for Changes / Impact
	BLE Stack was updated to version 2.3.0.46.	See BLE Stack Changes.
2.20	Support of the following profiles/services was added to the component: Apple Notification Center Service (ANCS) Body Composition Service (BCS) Bootloader Service (BTS) User Data Service (UDS) Weight Scale Profile (WSP) Weight Scale Service (WSS)	New feature-support added.
	BLE Code Snippets feature description added.	New feature-support added.
	A defect in the Current Time Service was fixed. The optional write permission of the Current Time and Local Time Information characteristics are now controlled by the corresponding permission flags in the BLE component customizer GUI.	In previous BLE component versions, the Current Time and Local Time Information characteristics were always writable regardless of permission flag settings. If you write the Current Time and/or Local Time Information characteristics in your projects, make sure to update the corresponding permission flags properly, because by defaut the optional write permission is disabled.
	BLE stack was updated to version 2.2.0.36.	See BLE Stack Changes.
2.10.a	Added the Component Errata section	Document known issues.
2.10	Support of the Wireless Power Transfer (WPT) Profile was added to the component.	New feature-support added.
	BLE stack was updated to version 2.1.0.30.	See BLE Stack Changes.
2.0.a	Minor datasheet edits.	Fixed several typos.
2.0	Support of the following profiles was added to the component: Environmental Sensing Profile (ESP) Continuous Glucose Monitoring Profile (CGMP) Bond Management Service (BMS) Internet Protocol Support Profile (IPSP)	New feature-support added.
	Updated CyBle_StoreBondingData API description. New BLE device with 256K of Flash memory is not affected by modification of the clock settings.	New flash memory type doesn't require clock settings modification.

Version	Description of Changes	Reason for Changes / Impact
	Changed long write and reliable write procedures. Refer to the Updating to v2.x section for more information on the design impact of this change.	The component addresses a defect, where the application did not have the option to validate the data and only one prepare write event and multiple execute write events were going to the application. User impact: This change may have backward compatibility issues for some designs. The details are described in the Updating to v2.x section. The following structures are modified: 'CYBLE_GATTS_PREP_WRITE_REQ_PARAM_T' 'CYBLE_GATTS_EXEC_WRITE_REQ_T'
	BLE stack was updated to version 2.0.0.81	See BLE Stack Changes.
1.20	Improved TX power level performance for +3 dBm option.	+3 dBm Tx Power level had no effect compared to 0 dBm
	Fixed Advertising Channel Map bit mask for "Channel 39" and "Channels 37 and 38" items.	Advertising Channel Map bit masks generated for "Channel 39" and "Channels 37 and 38" items were swapped.
	Changed the functions CyBle_CscssGetCharacteristicDescriptor() and CyBle_RscssGetCharacteristicDescriptor() to use CyBle_GattsReadAttributeValue() instead of CyBle_GattsWriteAttributeValue().	This corected the functions that were not working.
	For Health Thermometer Service the "Out of Range" error code changed from 0xff (defined by Supplement to Bluetooth Core Specification) to 0x80 which is defined by HEALTH THERMOMETER SERVICE specification.	The change was made to bring the implementation in accordance with the Health Thermometer Service specification.
	Added CyBle_ChangeAdDeviceAddress API to update the Bluetooth device address in the advertisement or scan response data structure. Added CyBle_GattGetBusyStatus API description in datasheet	Device address was not updated in advertisement packet when silicon generated option selected in customizer.
	Fixed scanning state in Central role to reflect the customizer selection.	BLE Scan Type was always set to active scan.
	Extended values input range for several characteristics to include "Unknown" value: - Time Zone - DST Offset - Day of Week	Characteristics for CTS did not allow 'Unknown' settings
	Simplified the usage of CyBLE_GapUpdateAdvData API. Now CyBLE_GapUpdateAdvData API works in all BLESS states.	Better user experience.

Version	Description of Changes	Reason for Changes / Impact
	BLE stack was updated to version 1.0.1.184	See BLE Stack Changes.
1.10	BLE Stack was updated to version 1.0.0.181.	See BLE Stack Changes.
1.0.b	Support of the following profiles was added to the component: • Phone Alert Status Profile (PASP) • Location and Navigation Profile (LNP) • Cycling Speed and Cadence Profile (CSCP) • Cycling Power Profile (CPP)	New feature-support added.
	The `CYBLE_L2CAP_COMMAND_REJ_REASON_T` event was renamed to `CYBLE_EVT_L2CAP_COMMAND_REJ`.	The event was renamed to be consistent with other event name formats.
	The `CYBLE_EVT_GAP_RESOLVE_PVT_ADDR_VERIFY_CNF` event was removed.	The event became obsolete.
	Removed WDT from the BLE Component.	In the preliminary release of the BLE Component, the protocol procedure timeout functionality was implemented using the WDT. For the production release, the Component was optimized to use the BLESS Link Layer timer.
	Edits to the datasheet.	Update Configure dialog screen captures. Added the APIs into the datasheet. Added Unsupported Features section. Added characterization data. Addressed all Errata from the preliminary version of the datasheet and removed the section.

	The following members of the `CYBLE_API_RESULT_T` structure were deprecated:
	`CYBLE_ERROR_GATT_DB_INVALID_OFFSET,`
	`CYBLE_ERROR_GATT_DB_NULL_PARAMETER_NOT_ALLOWED,`
	`CYBLE_ERROR_GATT_DB_UNSUPPORTED_GROUP_TYPE,`
	`CYBLE_ERROR_GATT_DB_INSUFFICIENT_BUFFER_LEN,`
	`CYBLE_ERROR_GATT_DB_MORE_MATCHING_RESULT_FOUND,`
	`CYBLE_ERROR_GATT_DB_NO_MATCHING_RESULT,`
	`CYBLE_ERROR_GATT_DB_HANDLE_NOT_FOUND,`
	`CYBLE_ERROR_GATT_DB_HANDLE_NOT_IN_RANGE,`
		The elements weren't used as return values in any of the API functions.

Version	Description of Changes	Reason for Changes / Impact
	CYBLE_ERROR_GATT_DB_HANDLE_IN_GROUP_RANGE, CYBLE_ERROR_GATT_DB_INVALID_OPERATION, CYBLE_ERROR_GATT_DB_UUID_NOT_IN_BT_SPACE, CYBLE_ERROR_GATT_DB_INVALID_ATTR_HANDLE, CYBLE_ERROR_GATT_DB_INSUFFICIENT_SECURITY, CYBLE_ERROR_GATT_DB_INSUFFICIENT_ENC_KEY_SIZE, CYBLE_ERROR_GATT_DB_INVALID_INSTANCE, CYBLE_ERROR_GATT_DB_INCORRECT_UUID_FRMT, CYBLE_ERROR_GATT_DB_UUID_FRMT_UNSUPPORTED, CYBLE_ERROR_GATT_DB_TYPE_MISMATCH, CYBLE_ERROR_GATT_DB_INSUFFICIENT_ENCRYPTION, CYBLE_ERROR_L2CAP_NOT_ENOUGH_CREDITS	
1.0.a	Edits to the datasheet.	Added sections to describe WDT counter and interrupt. Clarified descriptions for several APIs and GUIs. Added Errata section. Moved API documentation to separate CHM file. Updated Functional Description section.
1.0	Initial document for new Component.	
	Initial BLE Stack version 1.0.0.169.	

© Cypress Semiconductor Corporation, 2015. The information contained herein is subject to change without notice. Cypress Semiconductor Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in a Cypress product. Nor does it convey or imply any license under patent or other rights. Cypress products are not warranted nor intended to be used for medical, life support, life saving, critical control or safety applications, unless pursuant to an express written agreement with Cypress. Furthermore, Cypress does not authorize its products for use as critical Components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress products in life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

PSoC® is a registered trademark, and PSoC Creator™ and Programmable System-on-Chip™ are trademarks of Cypress Semiconductor Corp. All other trademarks or registered trademarks referenced herein are property of the respective corporations.

Any Source Code (software and/or firmware) is owned by Cypress Semiconductor Corporation (Cypress) and is protected by and subject to worldwide patent protection (United States and foreign), United States copyright laws and international treaty provisions. Cypress hereby grants to licensee a personal, non-exclusive, non-transferable license to copy, use, modify, create derivative works of, and compile the Cypress Source Code and derivative works for the sole purpose of creating custom software and or firmware in support of licensee product to be used only in conjunction with a Cypress integrated circuit as specified in the applicable agreement. Any reproduction, modification, translation, compilation, or representation of this Source Code except as specified above is prohibited without the express written permission of Cypress.

Disclaimer: CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Cypress reserves the right to make changes without further notice to the materials described herein. Cypress does not assume any liability arising out of the application or use of any product or circuit described herein. Cypress does not authorize its products for use as critical Components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress' product in a life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Use may be limited by and subject to the applicable Cypress software license agreement.