AN214869

Over-the-Air Throughput Test Setup for Classic Bluetooth

Associated Part Family: CYW20734

This application note contains instructions for using Cypress BlueTool™ software to prepare two CYW20734-equipped devices for Bluetooth throughput testing.

Contents

1 Introduction 1
1.1 Cypress Part Numbering Scheme 1
1.2 Acronyms and Abbreviations 1
2 IoT Resources 2
3 System Requirements 2
3.1 Host System Requirements 2
3.2 Hardware Requirements 2
3.3 Software Requirements 2
4 System Connections 3
5 Launching BlueTool 3
6 Configuring BlueTool for Throughput Testing 3
6.1 Setting Up the HCI Control Transport 4
6.2 Setting Up for Throughput Testing 9
7 BlueTool Support for Perl Scripts 12
8 References 12
Document History Page 13
Worldwide Sales and Design Support 14

1 Introduction

This application note is for engineers responsible for conducting Bluetooth throughput measurements of CYW20734-equipped devices.

1.1 Cypress Part Numbering Scheme

Cypress is converting the acquired IoT part numbers from Broadcom to the Cypress part numbering scheme. Due to this conversion, there is no change in form, fit, or function as a result of offering the device with Cypress part number marking. The table provides Cypress ordering part number that matches an existing IoT part number.

Table 1: Mapping Table for Part Number between Broadcom and Cypress

Broadcom Part Number	Cypress Part Number
BCM20734	CYW20734

1.2 Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined upon first use. For a more complete list of acronyms and other terms used in Cypress documents, go to: http://www.cypress.com/glossary.

2 IoT Resources

Cypress provides a wealth of data at http://www.cypress.com/internet-things-iot to help you to select the right IoT device for your design, and quickly and effectively integrate the device into your design. Cypress provides customer access to a wide range of information, including technical documentation, schematic diagrams, product bill of materials, PCB layout information, and software updates. Customers can acquire technical documentation and software from the Cypress Support Community website (http://community.cypress.com/).

3 System Requirements

3.1 Host System Requirements

A personal computer running the Microsoft® Windows® operating system is required to use BlueTool. Broadcom recommends running Windows XP; however, other versions of Windows are supported.

Note: BlueTool is constantly being revised, resulting in operational and other changes to the graphical user interface. Consequently, this document only contains basic instructions on using BlueTool. These instructions should remain the same for all BlueTool releases. If discrepancies exist between this document and the version of BlueTool you are using, contact your Broadcom technical representative or visit Broadcom's CSP (see also Technical Support .

3.2 Hardware Requirements

The following hardware is required to use BlueTool:

- Two USB cables.
- Two Cypress Bluetooth CYW20734-based devices.
- Two UART-to-USB adapter boards.

Note: Contact your Cypress sales representative for the UART-to-USB adapter boards.

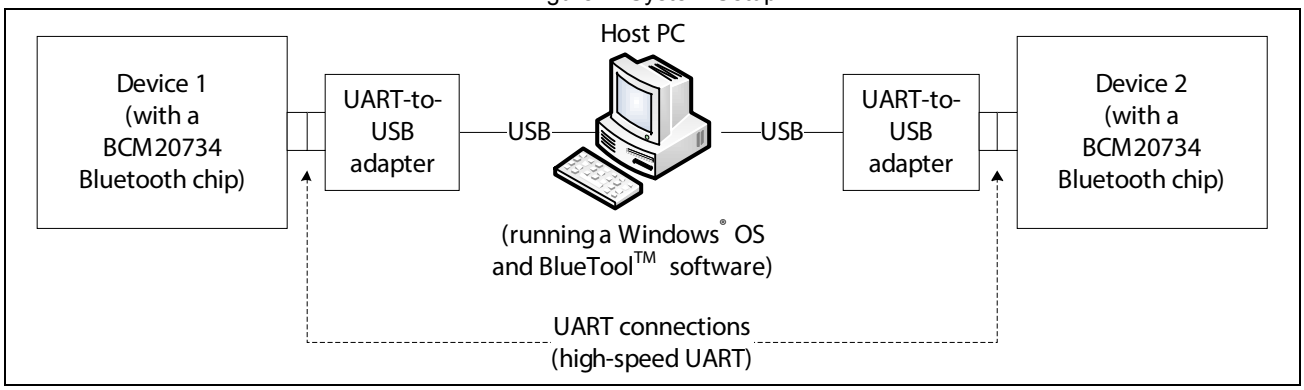
3.3 Software Requirements

BlueTool provides support for Perl® scripting. If this feature is being used to automate throughput testing (see BlueTool Support for Perl Scripts), a Win32® version of ActivePerl (5.8.4 or higher) must be installed on the host computer. Earlier versions of ActivePerl are not supported.

Note: ActivePerl is available from ActiveState at www.activestate.com.

4 System Connections

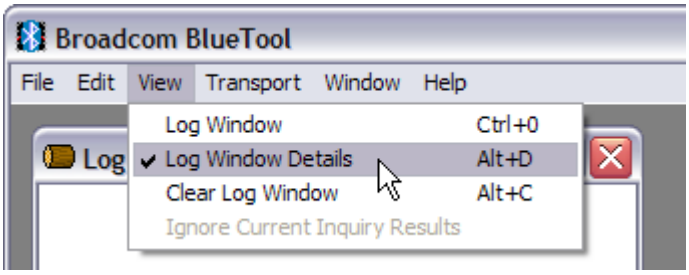
Figure 1. System Setup



5 Launching BlueTool

Complete these steps to launch BlueTool and display the log window:

1. Click **Start>All Programs>Broadcom BlueTool>BlueTool** to open the BlueTool application.
2. In BlueTool, click **View>Log Window** to display the log window.
3. Click **View>Log Window Details** to enable the log window to display detailed log information.



6 Configuring BlueTool for Throughput Testing

This section contains instructions on configuring BlueTool for over-the-air throughput testing.

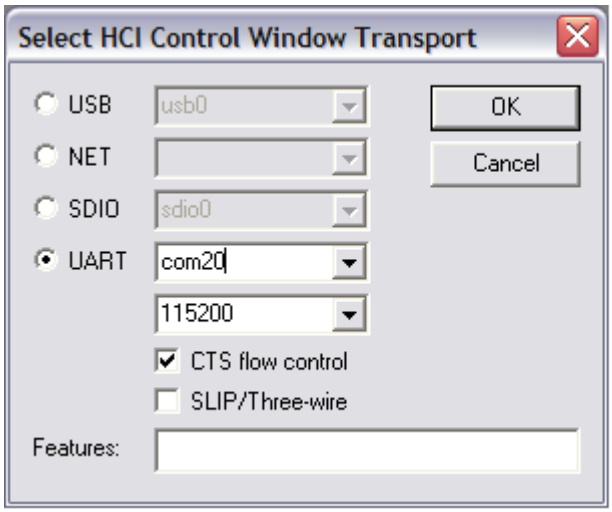
- Setting Up the HCI Control Transport
- Setting Up HCI Control
- Setting Up for Throughput Testing

Note: As shown in Figure 5 , the host PC has two UART connections. The associated COM ports displayed in the screenshots of this section are com20 and com21. These COM ports can vary among different test setups.

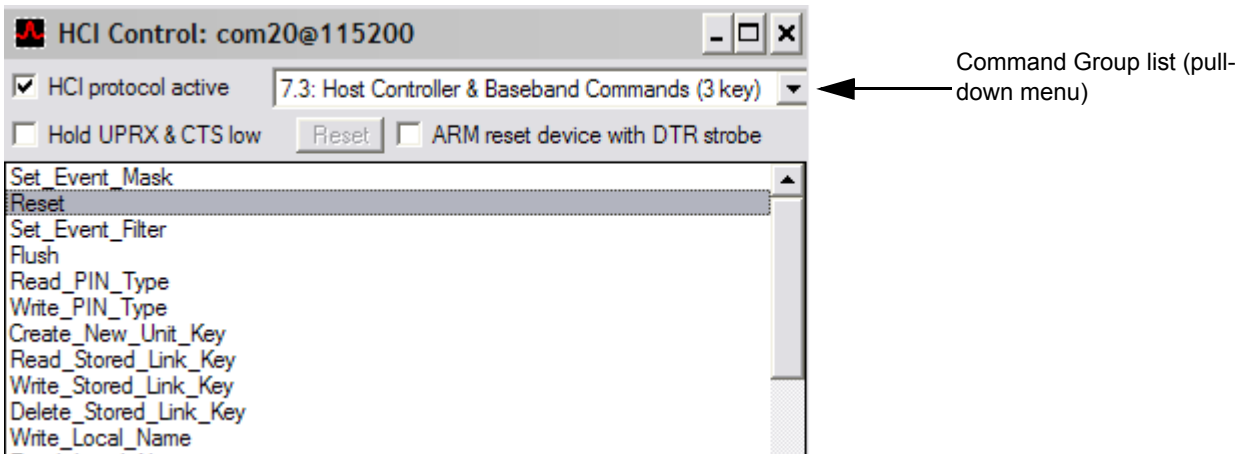
6.1 Setting Up the HCI Control Transport

6.1.1 Setting Up the HCI Control Transport for Device 1

1. Click **Transport>HCI Control** (keyboard shortcut **CTRL+1**) to display the Select HCI Control Window Transport window.

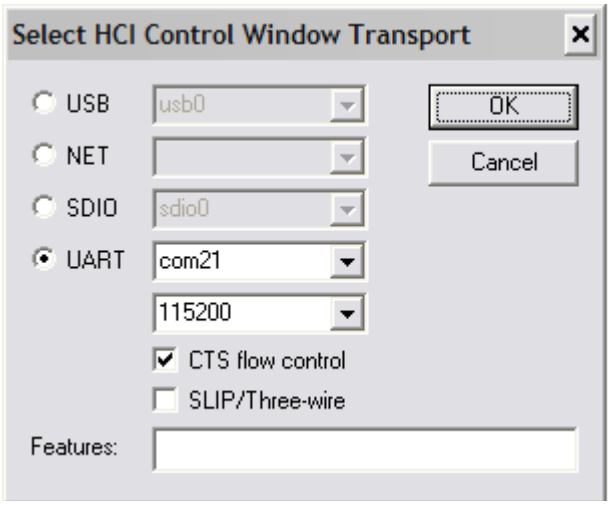


2. Select the **UART** option and select or type the Device 1 COM port, and then click **OK**.
   BlueTool displays an HCI Control window with the selected COM port and rate displayed in the window title. For the case of the following screenshot, the port and rate are shown as com20@115200.

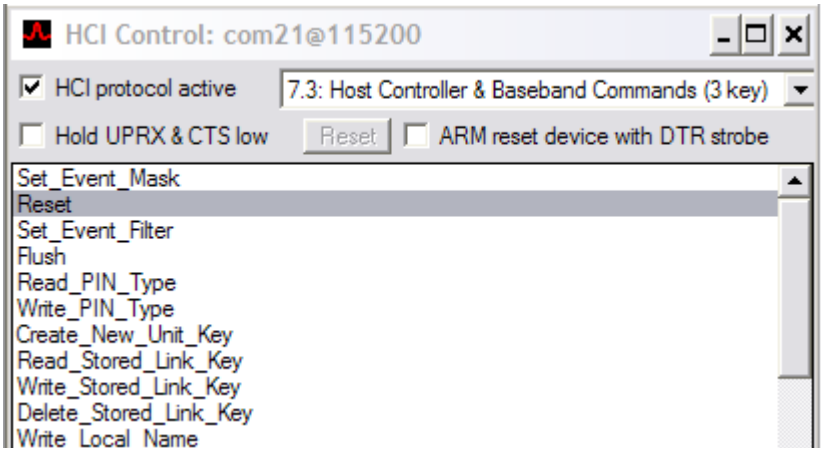


6.1.2 Setting Up the HCI Control Transport for Device 2

1. Click **Transport>HCI Control** (keyboard shortcut **CTRL+1**) to display the Select HCI Control Window Transport window.



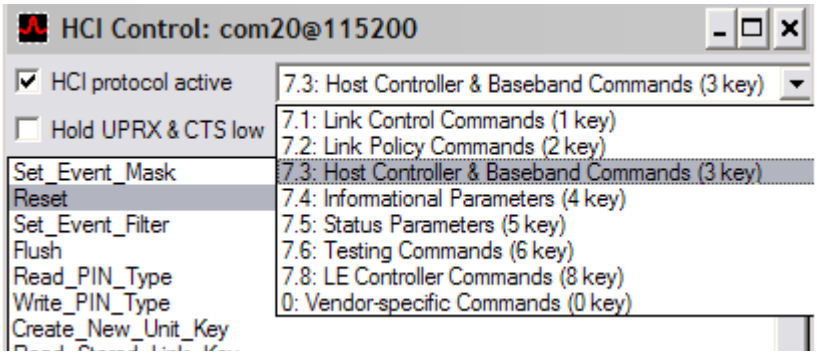
2. Select the **UART** option and select or type the Device 2 COM port, and then click **OK**.
   BlueTool displays an HCI Control window with the selected COM port and rate displayed in the window title. For the case of the following screenshot, the port and rate are shown as com21@115200.



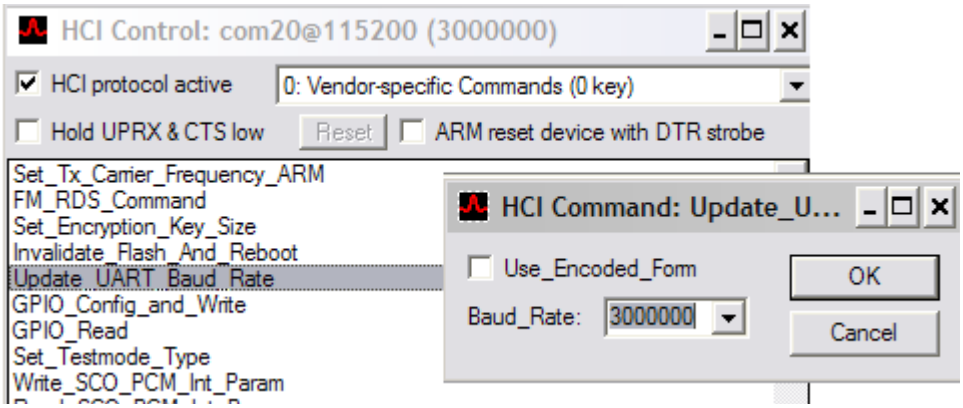
6.2 Setting Up HCI Control

6.2.1 Setting Up HCI Control for Device 1

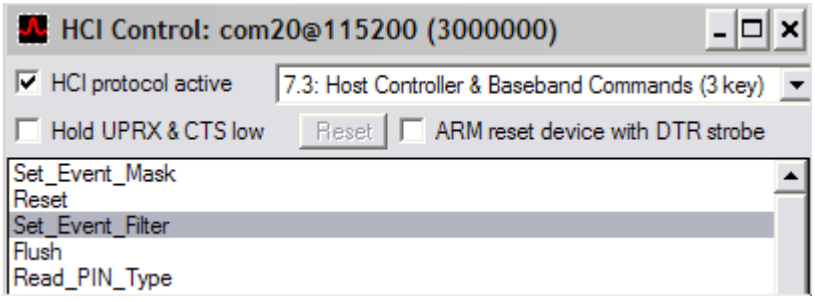
1. In the HCI Control window, do the following to reset the device:
   a. Select **7.3: Host Controller & Baseband Commands (3 key)** from the Command Group list.
   b. Double-click **Reset** to reset the device (reset status will be available in the log window)



2. In the HCI Control window, do the following to update the UART baud rate:
   a. Select **0: Vendor-specific Commands (0 key)** from the Command Group list.
   b. Double-click **Update_UART_Baud_Rate**.
   c. Select **3000000** from the Baud_Rate list and click **OK**.

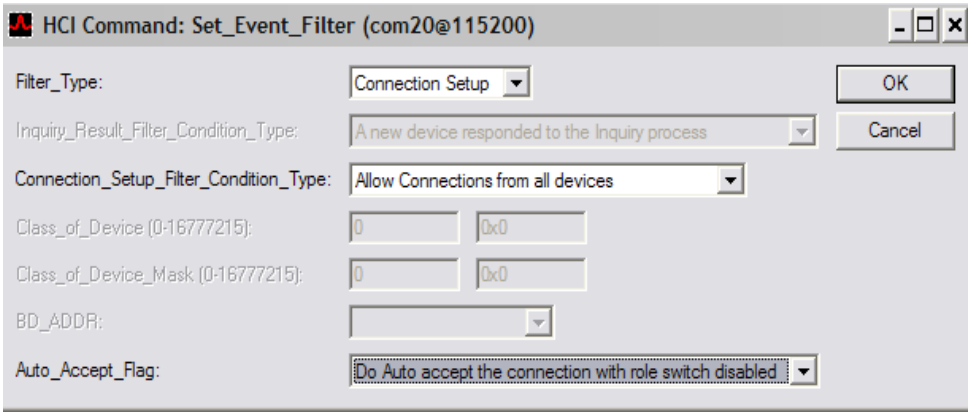


3. In the HCI Control window, do the following to evoke the HCI Command window for setting the event filter:
   a. Select **7.3: Host Controller & Baseband Commands (3 key)** from the Command Group list.
   b. Double-click **Set_Event_Filter**.



4. In the HCI Command window, do the following to set the event filter:
   a. Set Filter_Type to **Connection Setup**.
   b. Set Connection_Setup_Filter_Condition_Type to **Allow connections from all devices**.
   c. Set Auto_Accept_Flag to **Do Auto accept the connection with role switch disabled**.

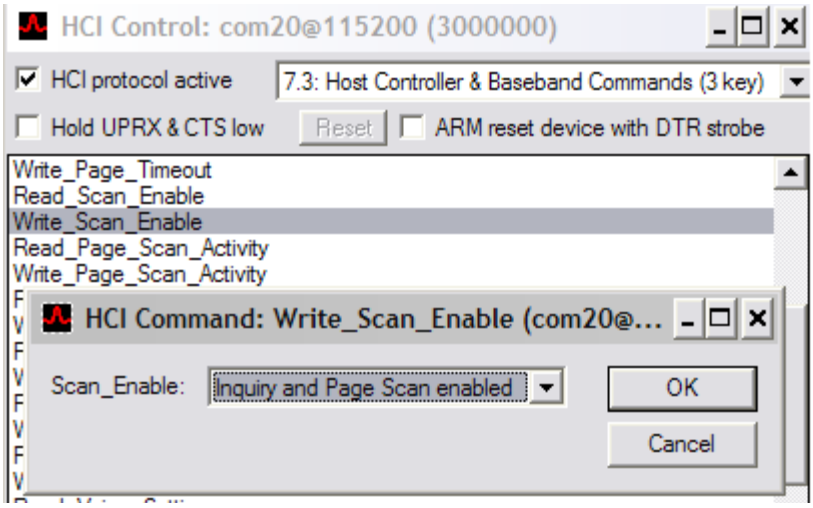
d. Click **OK**.



5. Do the following to enable inquiry and page scanning:

a. In the HCI Control window, double-click **Write_Scan_Enable**

b. In the HCI Command: Write_Scan_Enable window, select **Inquiry and Page Scan enabled** and click **OK**.

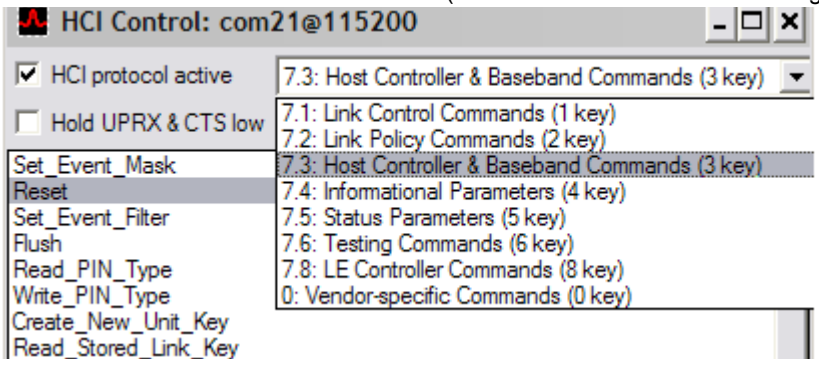


6.2.2 Setting Up HCI Control for Device 2

1. In the HCI Control window, do the following to reset the device:

a. Select **7.3: Host Controller & Baseband Commands (3 key)** from the Command Group list.

b. Double-click **Reset** to reset the device (check for Success status in the log window)

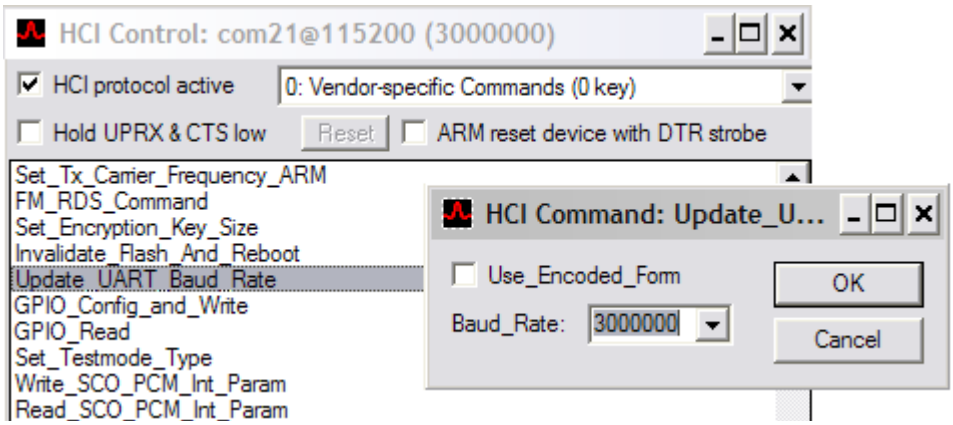


2. In the HCI Control window, do the following to update the UART baud rate:

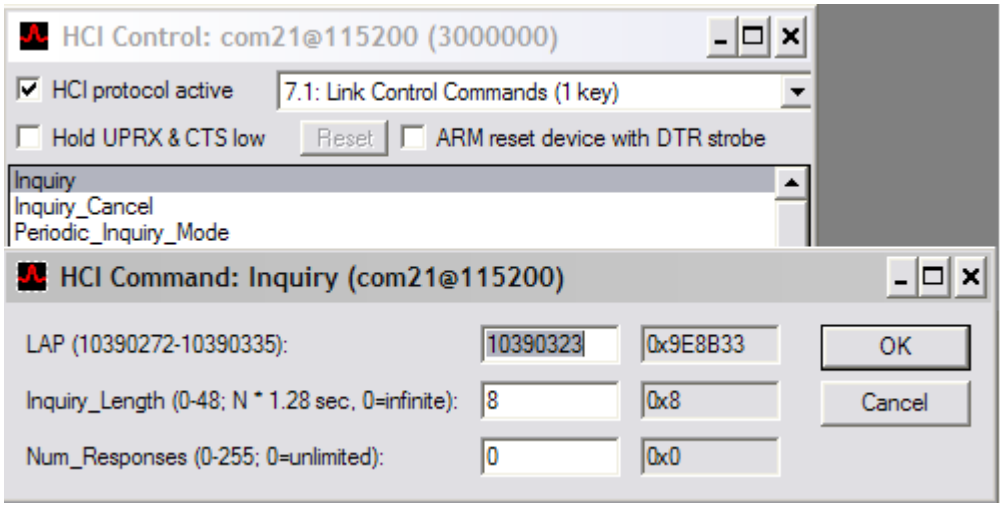
a. Select **0: Vendor-specific Commands (0 key)** from the Command Group list.

b. Double-click **Update_UART_Baud_Rate**.

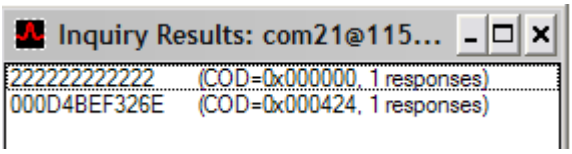
c. Select **3000000** from the Baud_Rate list and click **OK**.



3. Do the following to enter the Inquiry scan state:
   a. In the HCI Control window, select **7.1: Link Control Commands (1 key)**, then double-click **Inquiry**.
   b. In the HCI Command: Inquiry window, click **OK**.

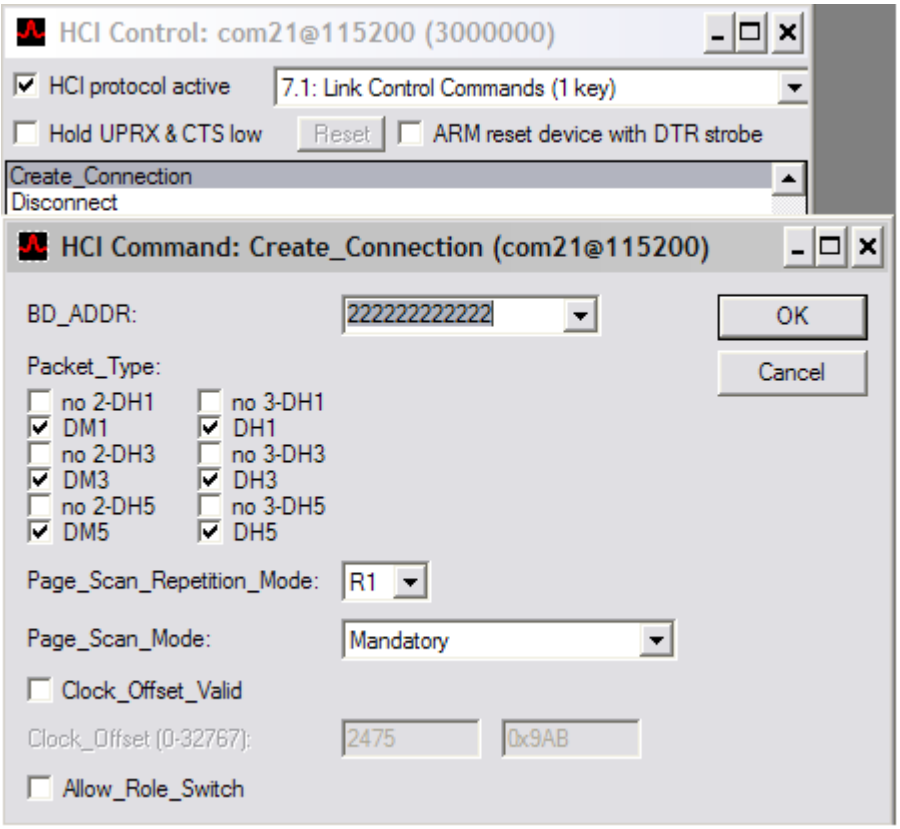


BlueTool displays the Inquiry Results window, which shows the Bluetooth device address (BD ADDR) of nearby Bluetooth devices.



4. Do the following to create a Bluetooth link between Device 1 and Device 2:
   a. In the HCI Control window, double-click **Create_Connection**.
   b. In the HCI Command: Create Connection window:
      - From the BD_ADDR list, select the Bluetooth device to which a connection is to be made.
      - Under Packet_Type select the packet types to be used.

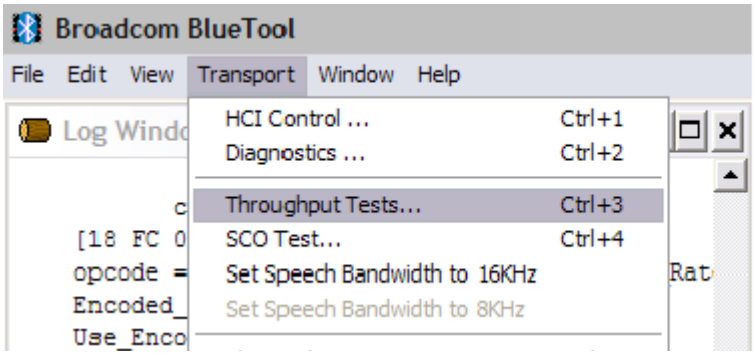
- Click **OK**.



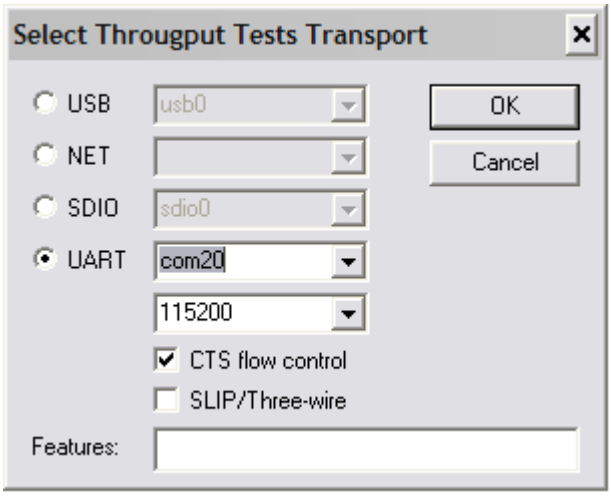
6.3 Setting Up for Throughput Testing

6.3.1 Setting Up Device 1 for Throughput Testing

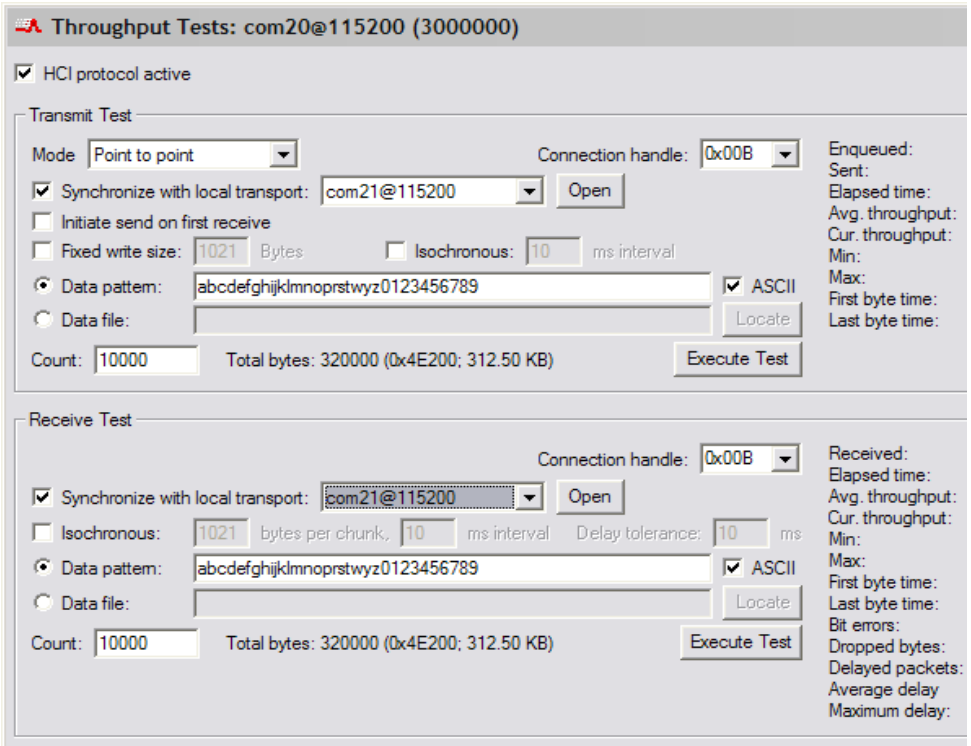
1. Click **Transport>Throughput Tests...** (keyboard shortcut **CTRL+3**).



2. In the Select Throughput Tests Transport window, choose **UART**, select or type the Device 1 COM port, and then click **OK**.



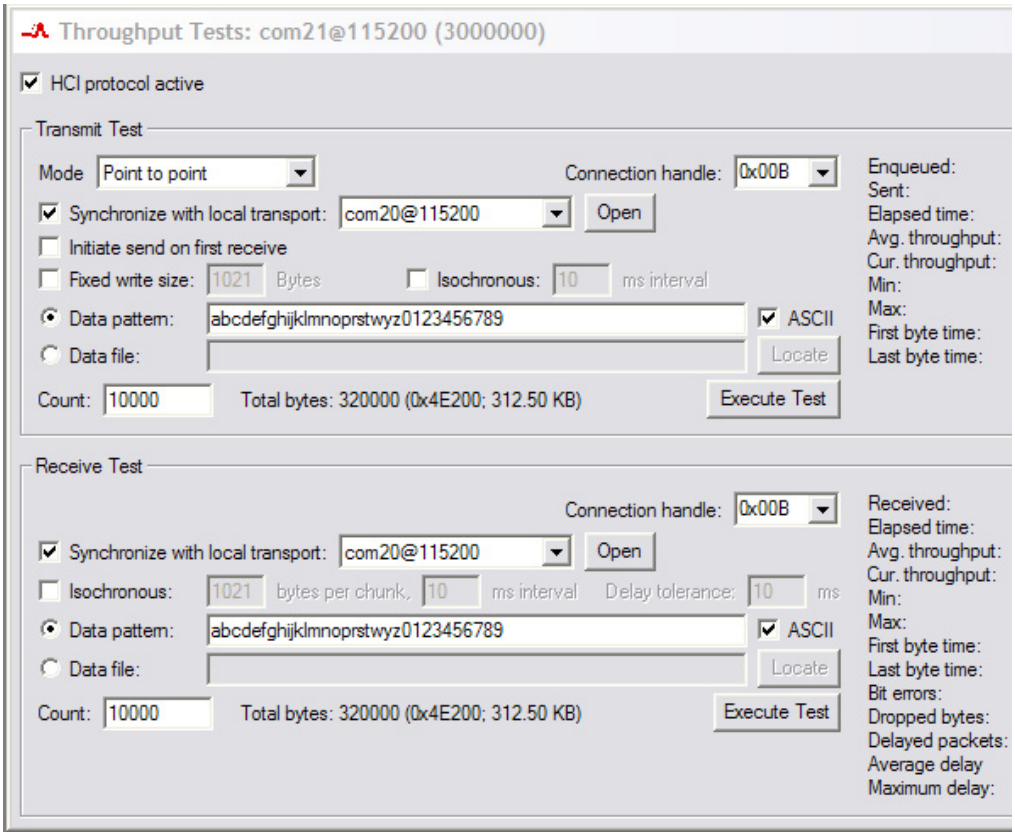
3. In the Throughput Tests window, do the following in both the Transmit Test and Receive Test panes:
   a. Verify that a value is generated for the connection handle.
   b. Select the **Data pattern** option.
   c. If not already selected, select **ASCII**, and then enter the desired data pattern (a typical ASCII data pattern is a string of alphanumeric characters).
   d. In the Count field, enter the number of bytes to be sent, being sure not to exceed the total byte limitations of the host PC.
   e. Select **Synchronize with local transport**, and then select the communications port for Device 2 from the list (in the example screenshot, the communications port for Device 2 is com21@115200).



Note: Clicking the **Execute Test** button in the Transmit Test pane automatically selects the Receive Test settings for the Device 2 communications port (that is, com21@115200 in the above screenshot).

6.3.2 Setting Up Device 2 for Throughput Testing

1. Click **Transport>Throughput Tests...** (keyboard shortcut **CTRL+3**).
2. In the Select Throughput Tests Transport window, choose **UART**, select or type the Device 2 COM port, and then click **OK**.
3. In the Throughput Tests window, do the following in both the Transmit Test and Receive Test panes:
   a. Verify that a value is generated for the connection handle.
   b. Select the **Data pattern** option.
   c. If not already selected, select **ASCII**, and then enter the desired data pattern (a typical ASCII data pattern is a string of alphanumeric characters).
   d. In the Count field, enter the number of bytes to be sent, being sure not to exceed the total byte limitations of the host PC.
   e. Select **Synchronize with local transport**, and then select the communications port for Device 1 from the list (in the example screenshot, the communications port for Device 1 is com20@115200).



Note: Clicking the **Execute Test** button in the Transmit Test pane automatically selects the Receive Test settings for the Device 1 communications port (that is, com20@115200 in the above screenshot).

7 BlueTool Support for Perl Scripts

The BlueTool application Bluetooth support (BTSP) Perl module provides an interface for automating BlueTool operations using Perl scripts. To use BlueTool scripting capabilities, ActivePerl 5.8.4 (or higher) must be installed on the host PC prior to installing BlueTool.

Sample scripts are included with BlueTool installation software. These files are saved to the following folder during BlueTool installation:
\\Broadcom BlueTool\Scripts

During installation, the *BTSP User Guide* is saved to the Broadcom\BlueTool folder. This user guide describes the fundamentals of automating BlueTool with Perl. A PDF file reader is required to view this guide.

Note: ActivePerl software is available from ActiveState at www.activestate.com.

Note: References to general information on using Perl are provided in References.

8 References

This section lists documents and resources that may be useful to understanding the information contained in this document. The information contained in the listed references is optional and is not required to successfully complete the tasks described in this application note. In some cases, links to key third-party web sites are provided.

Document Name	Document Number	Source
Broadcom Documents		
[1] BTSP User's Guide	–	Bundled with the BlueTool software package
[2] Software for Exercising, Testing, Scripting, Debugging, and Programming Devices	BlueTool-QSG1xx-R	community.cypress.com
Other Documents		
[3] ActivePerl Documentation	–	ActiveState Docs @ http://docs.activestate.com
[4] General information on Perl	–	http://www.perl.org http://www.activestate.com http://perl.oreilly.com

Document History Page

Document Title: AN214869 - Over-the-Air Throughput Test Setup for Classic Bluetooth Document Number: 002-14869				
Rev.	**ECN No.**	**Orig. of Change**	**Submission Date**	**Description of Change**
**	-	-	01/12/2015	20734-AN300-R Initial Release
*A	5473359	UTSV	10/11/2016	Added Cypress Part Numbering Scheme. Updated to Cypress template
*B	5882475	AESATMP8	09/13/2017	Updated logo and Copyright.

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