

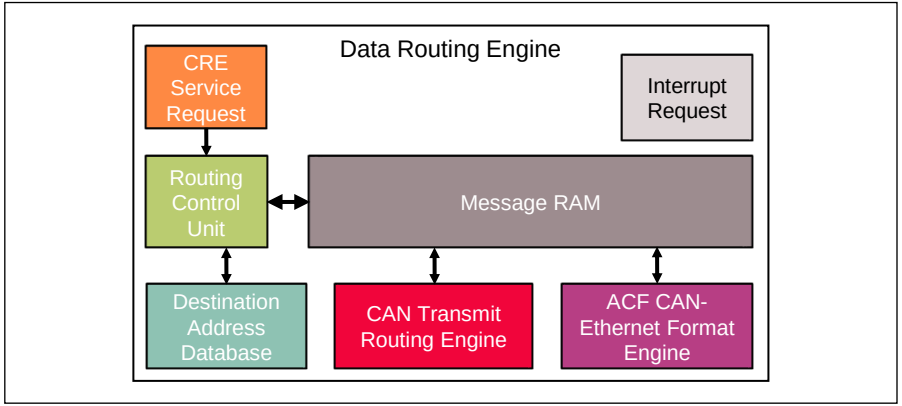
DRE
Data Routing Engine

AURIX™ TC4xx Microcontroller

V1.0.0 2024-09

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DRE
Data Routing Engine



Highlights

- The Data Routing Engine (DRE) is a hardware accelerator used to route CAN frames to Ethernet and vice-versa
- In addition, DRE assists CAN Routing Engine (an extension to MCMCAN module) in performing CAN to CAN and CAN to memory routing

Key Features

Routing of CAN frames to or from Ethernet IEEE 1722 ACF frames

Routing of CAN frames between different MCMCAN modules

Routing of CAN frames to configurable memory address location

Customer Benefits

- Accelerates the data routing between different communication modules and protocol translation between different message formats
- Offloads the CPU(s) while the routing is performed by the dedicated hardware module

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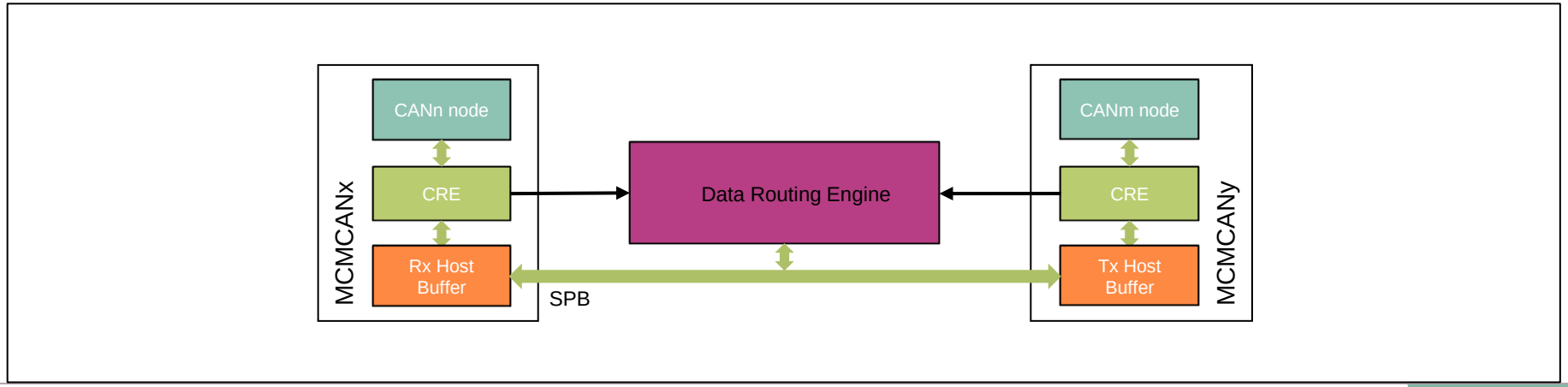
DRE
Routing of CAN frames to or from Ethernet IEEE 1722 ACF frames

- The Data Routing Engine is aligned to the AVTP Control frame format defined by IEEE 1722-2016
  - Supports Non-Time-Synchronous Control Format header (NTSCF)
  - Supports Abbreviated CAN/CAN FD message type (ACF_CAN_BRIEF)
- Support of different Ethernet transmit trigger modes
  - Frame count transmit mode
  - Buffer fill level-based transmit mode
  - Time-Triggered transmit mode
  - Software-triggered transmit mode
- Optional user configuration for Ethernet 802.3 MAC header and 802.1Q Tag field corresponding to ACF frames contained in Layer 2 Ethernet frame
- Filtering of CAN frames tunneled over Ethernet
  - Classical ID filter mode

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DRE
Routing of CAN frames between different MCMCAN modules

- Assists CAN Routing Engine (CRE) to perform CAN frames transfer between CAN interfaces belonging to the different MCMCAN modules
- CRE triggers the DRE module once there is a pending CAN frame in the Rx Host Buffer waiting to be routed to the CAN interface belonging to the different MCMCAN module
- DRE acts as a SPB master and performs the routing of the CAN frame from the Rx Host Buffer of the source CAN interface to the Tx Host Buffer of the destination CAN interface



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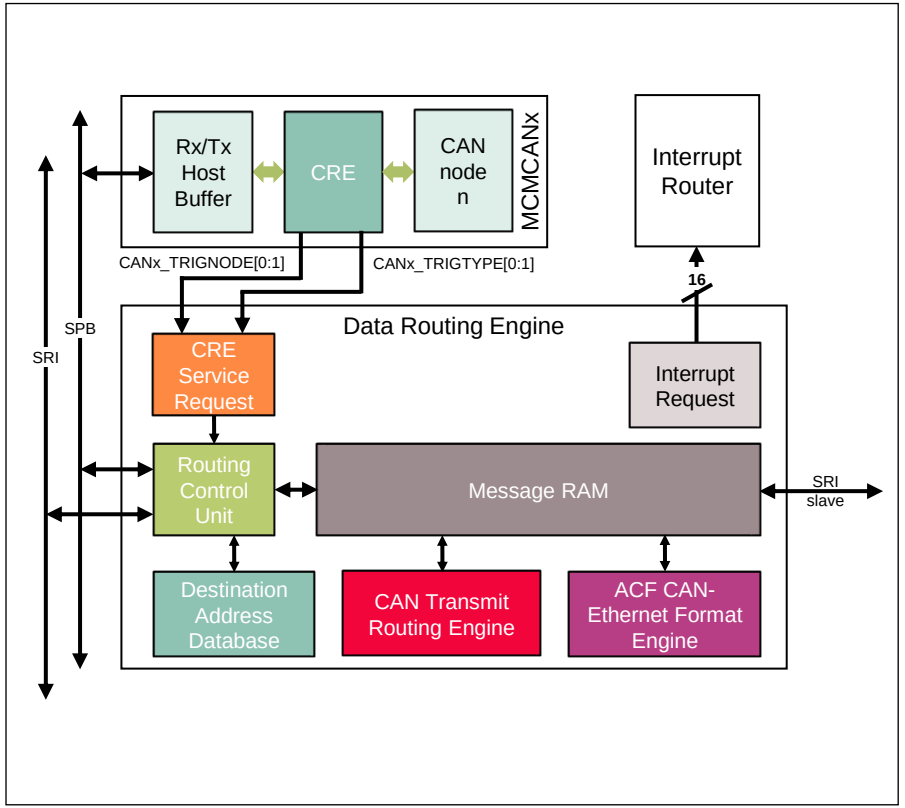
DRE
Routing of CAN frames to configurable memory address location

- Assists CAN Routing Engine (CRE) to perform routing of received CAN frame from a CAN interface to a configurable internal memory address location
- Up to 28 different destination memory regions can be defined by the user
- The user can create a circular list of virtual CAN buffers in the destination memory
  - Automatic memory address increment and wrap around
  - User configured watermark interrupt generation for CPU notification
- Each virtual CAN buffer contains up to three elements:
  - Destination memory status information (optional)
  - Timing header (intrusion detection and timestamp information) (optional)
  - CAN frame with the respective payload data

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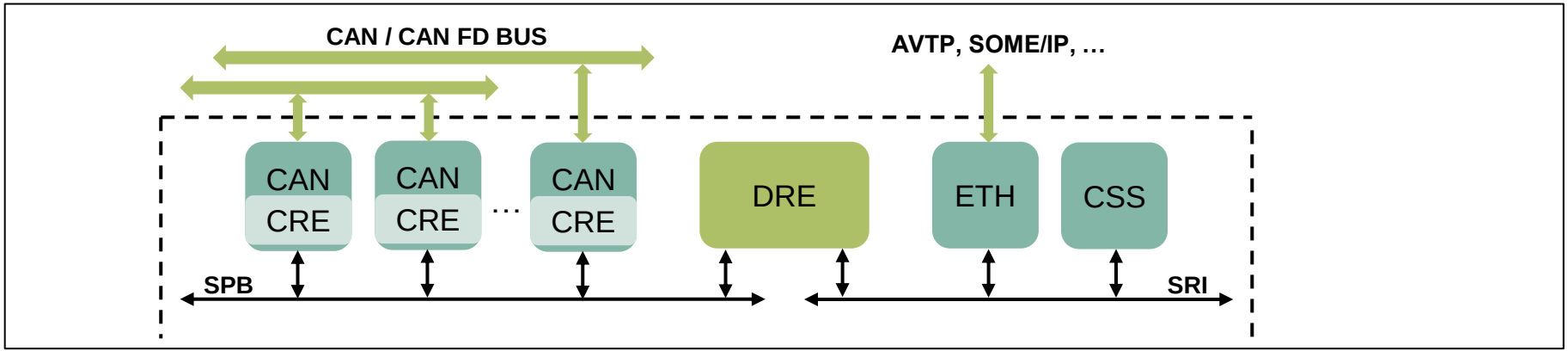
DRE
System integration

- SPB master:
  allows the DRE to fetch and route CAN frames from/to respective MCMCAN modules
- SRI master:
  allows the DRE to fetch and route CAN/Ethernet frames from/to internal memory location accessible by the SRI bus
- SRI slave:
  allows direct access for application software to monitor Message RAM
- Interface to CRE sub-module:
  direct trigger signals remove the need for the CPU intervention in the routing operation
- Interrupt Router:
  schedules service requests coming from various DRE interrupt sources



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Application example
Gateway



Overview

- This application example shows typical usage of DRE module in gateway domain
- DRE module extends the gateway capabilities of the AURIX™ devices by performing protocol translation and data routing without CPU intervention

Advantages

- Accelerated data routing and protocol translation
- CPU offloading
- Supports the user in protocol translation to other Ethernet-based protocols than AVTP (e.g. SOME/IP) with CAN to memory routing capability

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