GETH
Gigabit Ethernet

AURIX™ TC4xx Microcontroller

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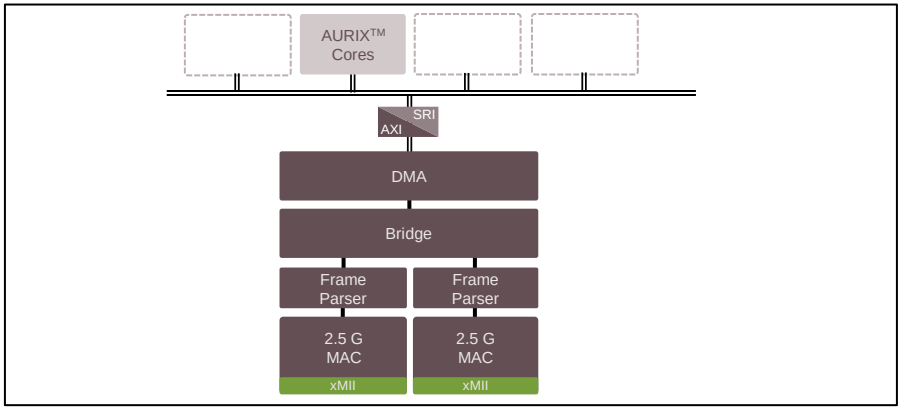


Highlights

- Dual 5 Gbps MAC - 10/100/1000/2500/5000 Mbps IEEE 802.3-2008 Ethernet MAC and MII, RMII, RGMII and SGMII PHY interfaces
- IEEE 802.1Q: Virtual LAN (VLAN)
- IEEE 802.1Qav: Forwarding and Queuing Enhancements for Time-Sensitive Streams
- IEEE 802.1AS: Timing and Synchronization for Time-Sensitive
- IEEE 1588: Precision Time Protocol for precision networked clock synchronization

Key Features

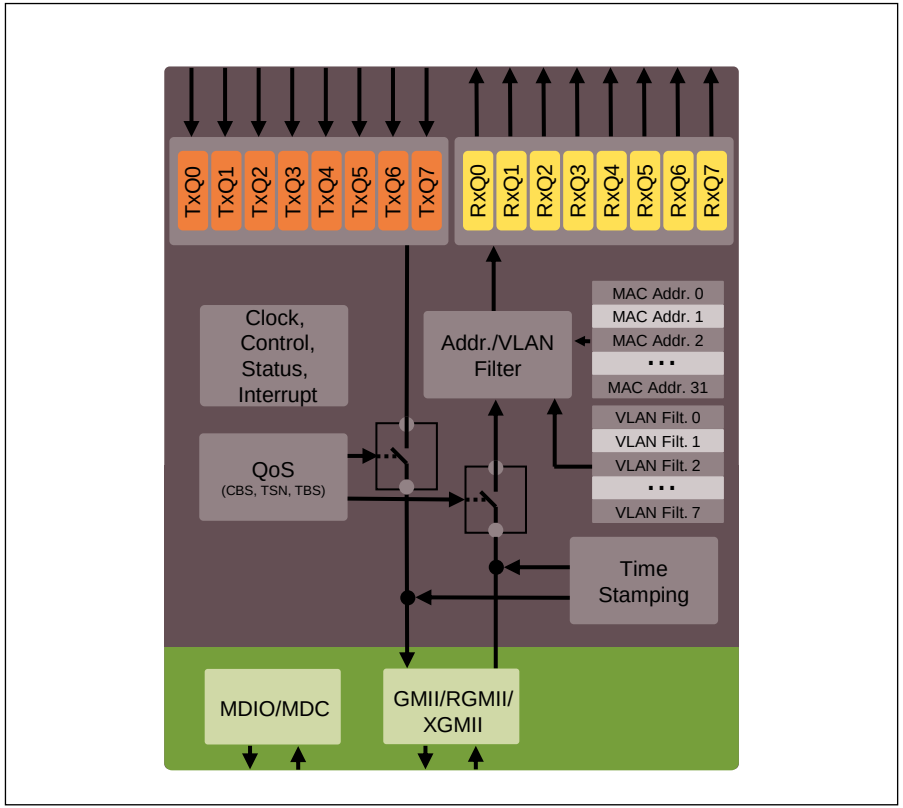
- 2 x up to 5 Gbps MAC
- Advanced Filtering – Flexible Frame Parser
- Bridge
- Tx/Rx DMAs

Customer Benefits

- Communication with up to 5 Gbps on two independent communication nodes, with QoS and TSN support
- Advanced Filtering using the Flexible Frame Parser, or Advanced Filtering based on MAC Address or VLAN Tag (inside 2.5 Gbps MAC)
- Routing of ethernet packaged in hardware
- Reducing the processor's load
- Eight DMA channels provide flexible interaction of application software with GETH Module

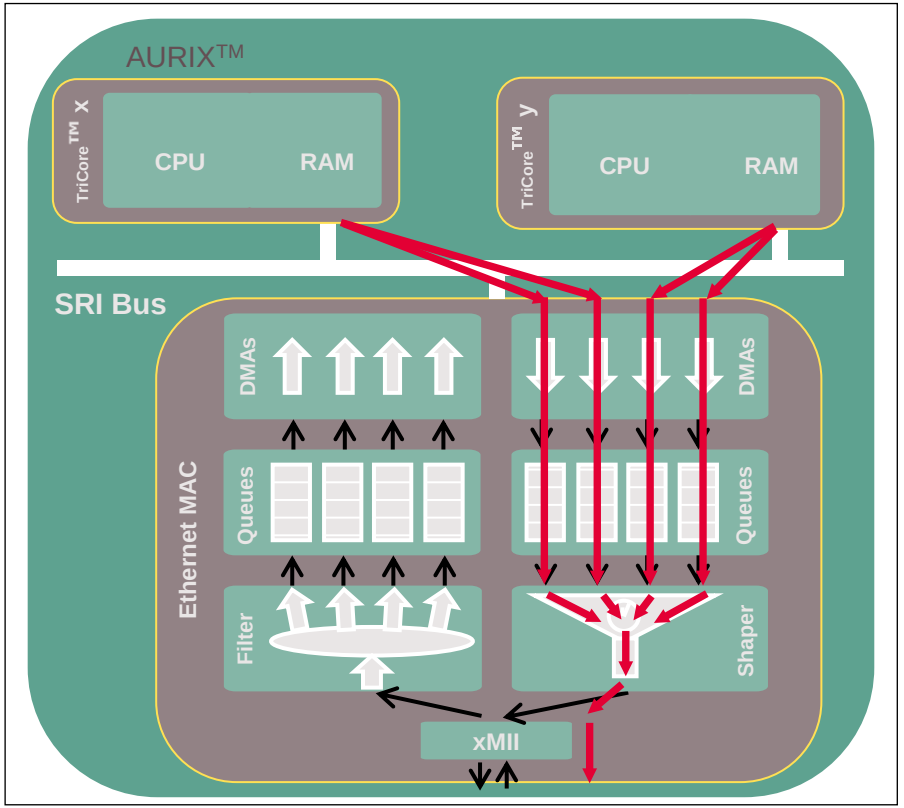
GETH
2 x up to 5 Gbps MAC

- Gigabit Ethernet MAC:
  - Two 5 Gbps MACs available
  - Speed: 10/100/1000 Mbps, 2.5 Gbps, 5 Gbps MII/RGMII/SGMII interface to external PHY
  - MDIO/MDC interface to control ext. PHY
  - QoS:
    - CBS – Credit based shaping (AVB)
    - TBS – Timer based shaping
    - TSN – Time sensitive networking
  - up to 32 MAC Addresses (src./dest. addr.) filter
  - VLAN filtering
  - 8 Transmit Queues
  - 8 Receive Queues



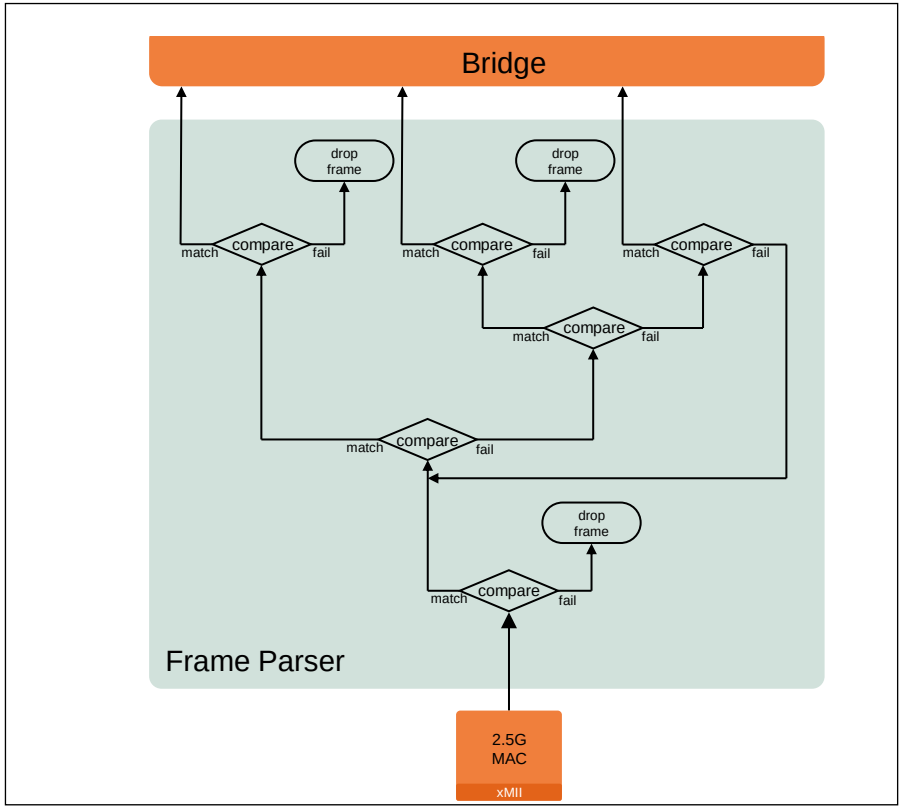
GETH
2 x up to 5 Gbps MAC

- 5 Gbps MAC offers QoS / TSN support
- Shapers for QoS support per MAC
  - Credit Based Shaper
    - IEEE 802.1Q compatible
  - Time Based Shapers
    - For time triggered deterministic traffic
  - Each queue provides both shapers
  - Each shaper can be enabled / disabled individually



GETH
Advanced Filtering – Flexible Frame Parser

- Two Flexible Frame Parser, one per 5 Gbps MAC
- Very versatile frame filtering by evaluation of any parts of the frame and generating a match/fail decision to forward or drop frames
- Programmable binary tree with up to 256 compare nodes
- Each compare node checks up to 32 bit of the incoming frame and creates Match/Fail result
- Frame Parser drops frames or forwards them to desired Bridge Rx Channel / Rx DMA*



*) Bridge in single port operation

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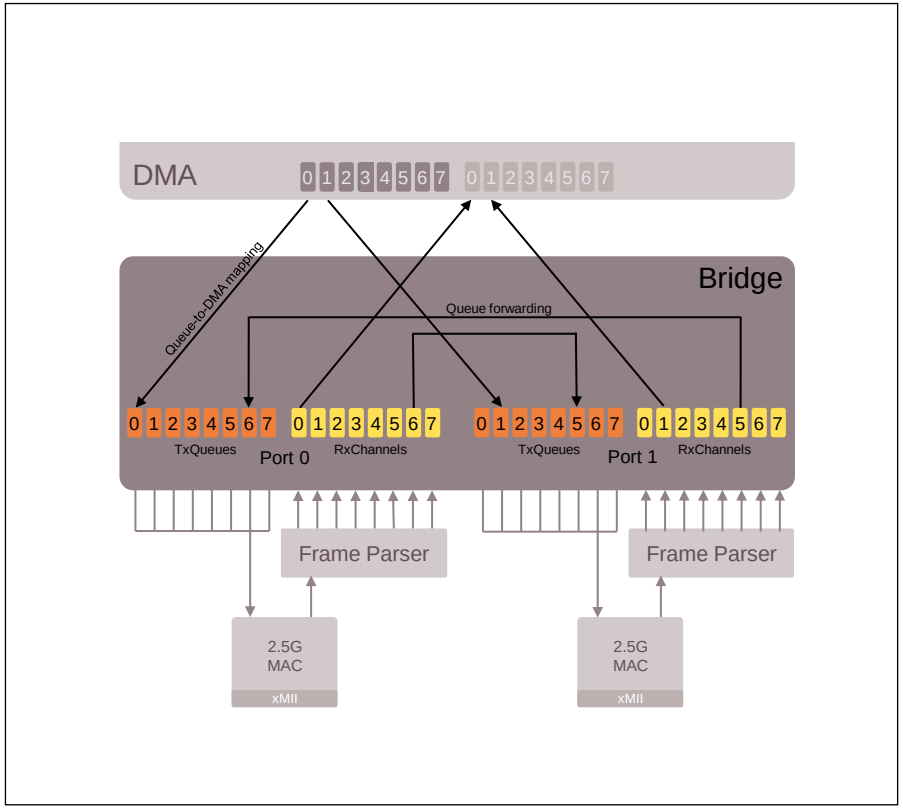
Bridge

- Interconnect of both MACs to each other or to the DMA
- Allows packet forwarding from one MAC to the other without software interaction (no CPU load)

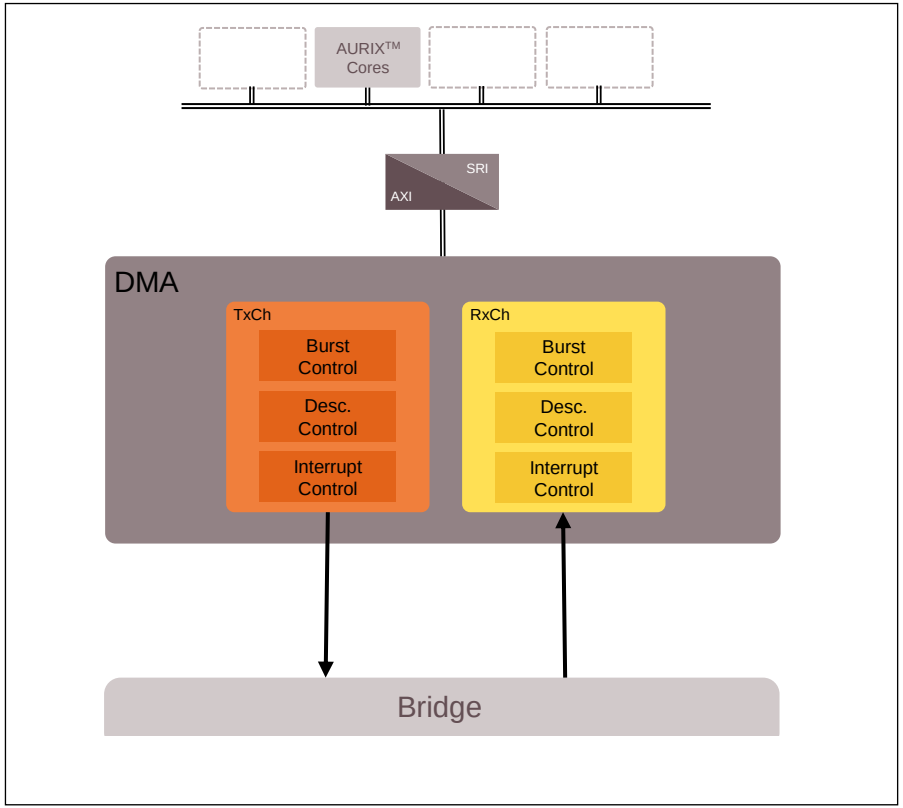
- Dual-ported Bridge between 5 Gbps MAC and DMA
- TxQueue/RxChannel mapping to DMA Channel
- TxQueue/RxChannel forwarding to other Bridge Port



GETH
Tx/Rx DMAs

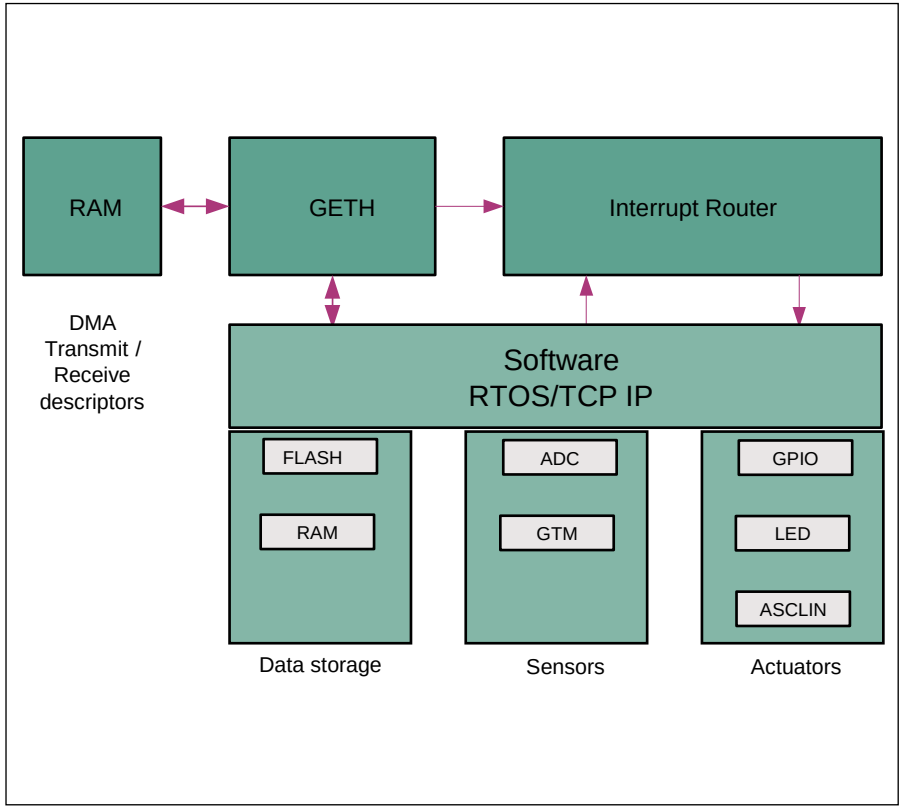
- 8 Tx Channels
- up to 64 K Tx descriptors
  - enhanced Tx descriptor for time-based scheduling
  - Header/Payload split support
  - Status reporting

- 8 Rx Channels
- up to 64 K Rx descriptors
  - up to 16 KB receive buffer size
  - Header/Payload split support
  - Status reporting

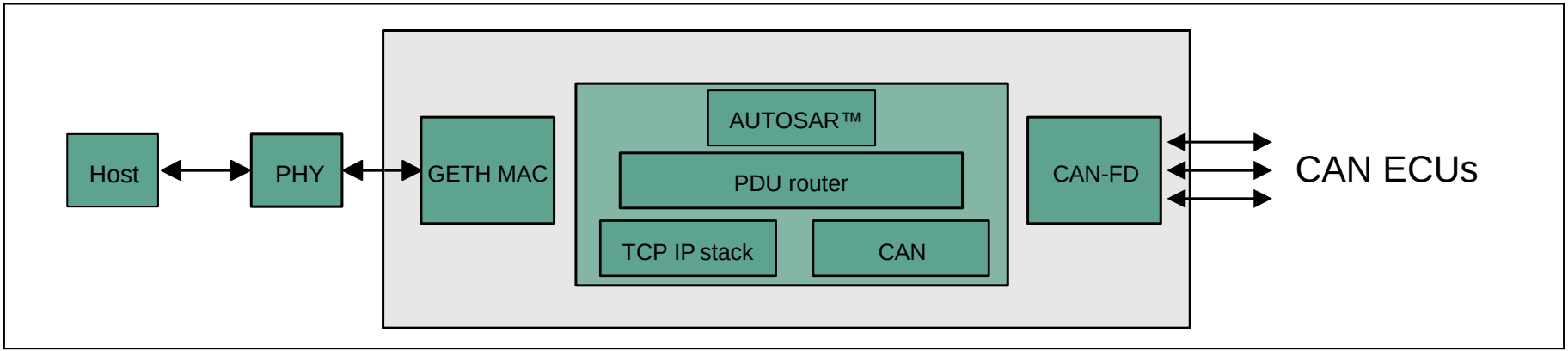


GETH
System integration

- The Gigabit Ethernet MAC can make use of the internal Flash/RAM for data storage and handling
- The internal RAM is used as well for DMA Transmit / Receive descriptors and Ethernet Frame storage
- The Interrupt Router handles all requests coming from the Ethernet, as example a received frame notification
- Combined with the automotive AUTOSAR™ software new applications can be developed: faster ECU Firmware updates, Service oriented communication via SOME/IP or Service and diagnosis via DoIP are just some examples



Application example
Firmware updates of multiple ECUs



Overview

- Firmware updates in cars can make use of Ethernet to exchange data much faster compared to other existing communication interfaces

Advantages

- The Gigabit Ethernet MAC allows with the high-speed data transfer to update multiple ECUs in parallel in a car
- The faster update time saves money at line end programming and in field garage firmware updates

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