GETH
Gigabit Ethernet MAC

AURIX™ TC3xx Microcontroller Training
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GETH
Gigabit Ethernet MAC

Key Features

- Packet Filtering
- CRC and Pad generation
- Multiple DMA Channels and Queues
- QoS Support

Highlights

- 10/100/1000 Mbps IEEE 802.3-2008 Ethernet MAC and MII, RMII and RGMII 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

Customer Benefits

- Reducing the processor’s load
- Deterministic behavior for automotive applications
The main advantage is the unloading of the CPU SW Stacks by:

- Pre-processing of data traffic in HW (no SW load)
- Three levels of filters:
  - MAC addresses
  - VLAN Tags and PCP
  - Ethernet protocols AVB, PTP, TCP/UDP/IP Unicast and Multicast
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CRC and Pad generation

- CRC and Pad generation for Transmission frame
  - When the number of bytes received falls below 64 bytes, the state machine automatically appends zeros to the Tx frame to make the data length exactly 46 bytes (if no VLAN is used) or 42 bytes (if VLAN tag is used).
  - The Transmit CRC Generator module calculates the CRC for the Frame Check Sequence (FCS) field before transmission to the TPE module.

![Diagram of Ethernet Transmission Frame with CRC and Pad generation](image)
Data traffic separated into 4 queues:
- Up to 4 Tx queues sharing 4 KB FIFO
- Up to 4 Rx queues sharing 8 KB FIFO

Each queue can be connected to any CPU

Time Stamp Unit for IEEE 802.1AS:
- HW unit for IEEE 802.1AS (PTP)
- Required for clock synchronization
- Supports master and slave mode
- Supports 1-step time stamp

All these features ensure a deterministic behavior of the Ethernet traffic
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QoS Support

› Shapers for QoS support
  - 4 Credit Based Shaper
    - IEEE 802.1Q compatible
  - 4 Time Based Shapers
    - For time triggered deterministic traffic
  - Each queue provides both shapers
  - Each shaper can be enabled / disabled individually
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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