ETH
Ethernet MAC

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Key Features

Automatic CRC and pad generation
Flexible address filtering modes
Support Ethernet frame time stamping

Customer Benefits

› User does not have to take care of CRC calculation and pad insertion
› Auto checking of the destination and source address of receive frame
› Better accuracy to synchronize clocks throughout a network

Highlights

› The Ethernet core supports 10/100 Mbit/s data transfer rates which is compliant with IEEE 802.3
› Allows an external Fast Ethernet PHY interface with RMII/MII
ETH
Automatic CRC and pad generation

- CRC and Pad generation for Transmission frame
  - When the number of bytes received falls **below 60 bytes**, the state machine automatically appends zeros to the Tx frame to make the **data length exactly 46 bytes**.
  - The **Transmit CRC Generator** module calculate the CRC for the Frame Check Sequence (FCS) field before transmission to the TPE module.

![Ethernet Transmission Frame](image)

- Ethernet Core
  - Transmit CRC Generator (CTX)
  - State machine (DA+ SA+ LT+ DATA) < 60 bytes
  - Data = 46 bytes
The Address Filtering (AFM) module performs the destination and source address checking function on all received frames and reports the address filtering status to the Receive Frame Controller module.

The Receive Frame Controller (RFC) module performs frame filtering based on the destination/source address.
If IEEE 1588 time stamping is enabled for the transmit frame, this block takes a snapshot of the system time when the SFD is put onto the transmit MII bus.

The time stamping feature can be used in Precision Time Protocol to synchronize clocks throughout a network of rotary encoders and control stepping motors at required timing.
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System integration

The 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 request 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 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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