



ETH internal peripheral



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1 Article purpose

The purpose of this article is to:

- briefly introduce the Ethernet peripheral and its main features
- indicate the level of security supported by this hardware block
- explain how each instance can be allocated to the two runtime contexts and linked to the corresponding software components
- explain, when necessary, how to configure the Ethernet peripheral.

2 Peripheral overview

The Ethernet peripheral (ETH) is based on Synopsys DesignWare[®] Ethernet GMAC IP, which enables the host to communicate data using the Gigabit Ethernet protocol (IEEE 802.3) at 10, 100 and 1000 Mbps.

The peripheral is composed of three main layers: the gigabit ethernet media access controller (GMAC), the MAC transaction layer (MTL), and the MAC DMA controller (MDC). The driver used to drive the ETH is Stmmac.



2.1 Features

The Ethernet peripheral main features are the following:

- Compliance with IEEE 802.3 specifications
- Support for IEEE 1588-2002 and IEEE 1588-2008 standards for precision networked clock synchronization

IEEE 802.3-az for Energy Efficient Ethernet (EEE)

IEEE 802.3x flow control automatic transmission of zero-quanta pause frame on flow control input de-assertion.

IEEE 802.1Q VLAN tag detection for reception frames

AMBA 2.0 for AHB Master/Slave ports and AMBA 3.0 for AXI Master/Slave ports

- Configurability allowing to support data transfer rates of 10/100/1000 Mbps, 10/100 Mbps only or 1000 Mbps only
- Support for multiple TCP/IP offload functions

Refer to [STM32MP15 reference manuals](#) for the complete features list, and to the software components, introduced below, to see which features are implemented.

2.2 Security support

The ETH is a **non-secure** peripheral.

3 Peripheral usage and associated software

3.1 Boot time

The Ethernet peripheral can be used at boot time by SSBL (by UBoot with tftp protocol for image loading). See [How_to_boot_the_kernel_via_TFTP_from_U-Boot](#) for more details.

3.2 Runtime

3.2.1 Overview

The Ethernet peripheral can be allocated to the Arm[®] Cortex[®]-A7 non-secure core to be controlled in Linux[®] by the NetDev Framework.

3.2.2 Software frameworks

Do	Peri	Software frameworks	Comment
mai Cor tex -A7	Cor tex -A7 no		

Do	Peri	Software frameworks		Comment
main secure (OS- P- TE E)	n- sec ure (Li nux)	Cortex-M4 (STM32Cube)		
Net w o r k i n g	ETH		Linux netdev /ethernet framework	

3.2.3 Peripheral configuration

The configuration is applied by the firmware running in the context to which the peripheral is assigned. The configuration can be done alone via the [STM32CubeMX](#) tool for all internal peripherals, and then manually completed (particularly for external peripherals), according to the information given in the corresponding software framework article. When the Ethernet peripheral is assigned to the Linux®OS, it is configured through the device tree according to the information given in the [Ethernet device tree configuration](#) article.

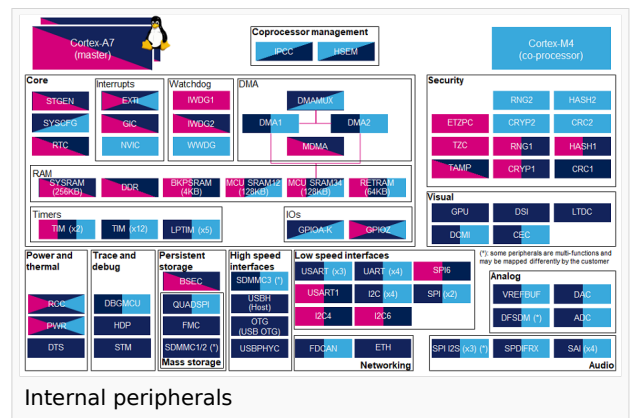
3.2.4 Peripheral assignment

Check boxes illustrate the possible peripheral allocations supported by STM32 MPU Embedded Software:

- means that the peripheral can be assigned () to the given runtime context.
- is used for system peripherals that cannot be unchecked because they are statically connected in the device.

Refer to [How to assign an internal peripheral to a runtime context](#) for more information on how to assign peripherals manually or via [STM32CubeMX](#).

The present chapter describes STMicroelectronics recommendations or choice of implementation. Additional possibilities might be described in [STM32MP15 reference manuals](#).



Do	Peri	Runtime allocation		Comment
main in ter m e d i a n e r a l i n t e r n e t i n g	C o r t e x - A 7 i n t e r n e t i n g			

Do main category	Peripheral	Runtime allocation			Comment
		Cortex-A7 non-secure (Linux)	Cortex-M4 (STM32Cube)		
Network orking	ETH				Assignment (single choice)
		ETH			

4 How to go further



Use this paragraph to add more information and introduce other documentation such as Application Notes (AN)

5 References

Ethernet

Direct Memory Access

Virtual LAN. Network of computers that behave as if they are connected to the same wire even though they may actually be physically located on different segments of a LAN

Advanced High-performance Bus

Second Stage Boot Loader

Open Portable Trusted Execution Environment

Operating System