Industrial Ethernet Protocol Stack: EtherNet/IP

EtherNet/IP is an industrial Ethernet protocol that implements the Common Industrial Protocol (CIP) over Ethernet, using IP, TCP and UDP.

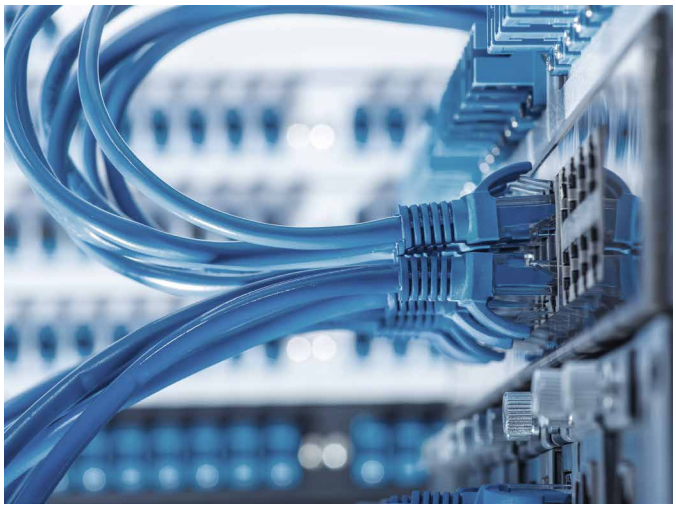
In an EtherNet/IP network, the "Scanner" serves as the controller and typically initiates requests, while the "Adapter" is a device that responds to those requests.

NXP provides EtherNet/IP Adapter protocol software for select NXP SoCs as part of a suite of robust, certifiable industrial Ethernet protocols built on a common software architecture.

EtherNet/IP is often used with the Device Level Ring (DLR) resilience protocol, and NXP's EtherNet/IP software supports DLR Beacon-based Ring Nodes.

Benefits of NXP's EtherNet/IP protocol stack

- Provides a complete EtherNet/IP IO device reference implementation with DLR
- Requires no external RAM
- Handles network protocol on the real-time Arm® Cortex®-M33 core, with inter-core communication to the high-speed real-time Arm Cortex-M7 application core
- Offers low resource consumption (memory and power)
- Ensures excellent conditions for conformance testing
- Integrates with NXP's Industrial Communications Creator (ICC) tool to simplify protocol data structure configuration
- Part of the Industrial Protocol Suite, underpinned by the GOAL Framework, enabling easier application migration across multiple protocols and NXP SoCs



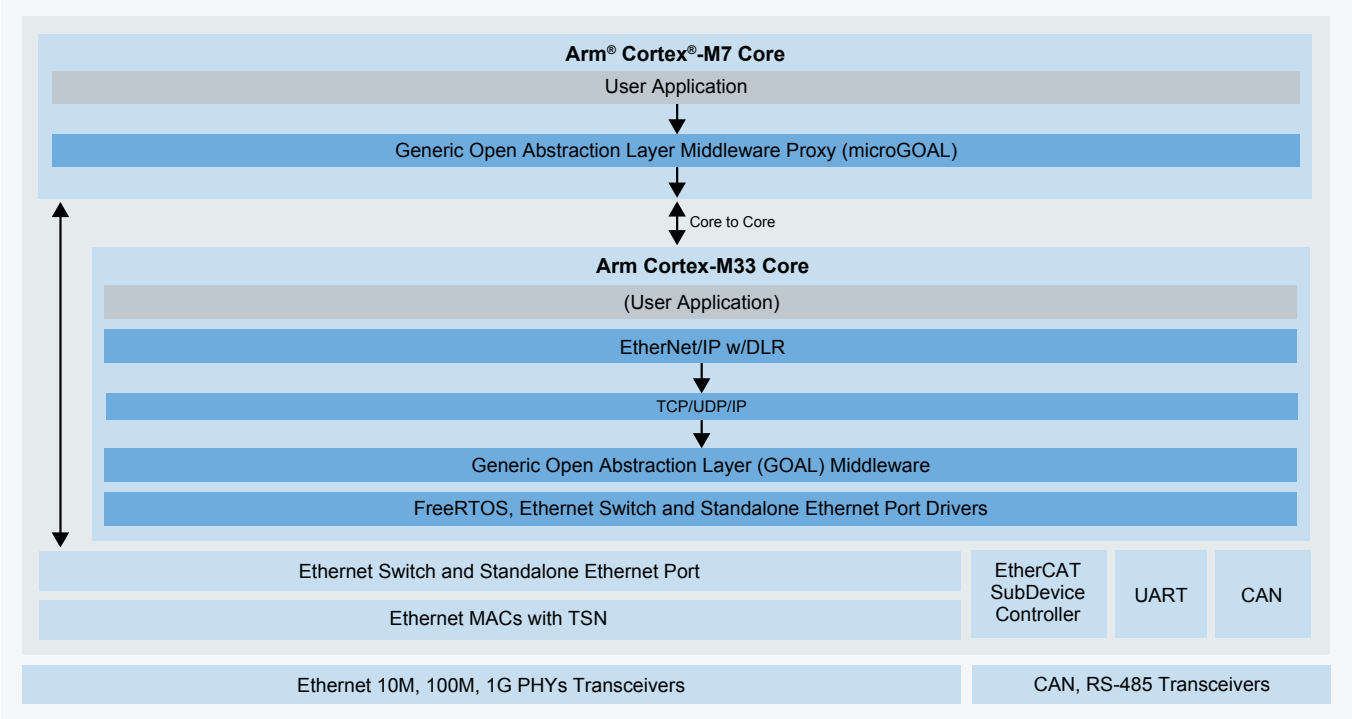
MCUXpresso Developer Experience

Designed to simplify and accelerate embedded system development and optimization, the MCUXpresso ecosystem delivers high-quality, comprehensive enablement for NXP's general-purpose, crossover, and wireless-enabled Arm Cortex-M-based MCUs. It supports easy migration and scalability across MCU families, helping developers streamline workflows and reduce time-to-market.

NXP's EtherNet/IP protocol stack features

- Class 3 Server (Connected Explicit Messages)
- Class 1 I/O (connected) Server (Implicit Messages)
- UCMM (unconnected) Server (Unconnected Explicit Messages)
- Extensible for application and profile objects
- Configurable number of explicit and implicit connections

EtherNet/IP industrial Ethernet protocol block diagram



- Exclusive owner, input only, listen only connection types
- DHCP or static IP address
- 10 Mbit/s, 100 Mbit/s, 1000 Mbit/s Link Speed
- LargeForwardOpen service for connections with data size > 511 bytes
- DLR Beacon-based Ring Node
- DLR Announce-based Ring Node
- Address Conflict Detection (ACD)
- FreeRTOS implementation

NXP enhancements

- Hardware-independent and hardware-dependent components communicate via message queues
- The application interacts only with the hardware-independent layer, simplifying migration to other protocols and NXP SoCs
- Incoming communication from other devices is validated by the stack before reaching the user application
- Evaluation binary images and the Industrial Communications Explorer tool are available on nxp.com

Getting started with EtherCAT:

1. Download the i.MX RT1180 EtherNet/IP binary image.
2. Download the Industrial Communication Explorer evaluation tool.
3. Access the Industrial Networking Protocols Knowledge Base on NXP Community for installation and evaluation instructions.

Additional resources:

1. i.MX RT1180 evaluation kit
2. EtherNet/IP training: i.MX RT1180 setup, integration and industrial networking
3. NXP support and technical community

nxp.com/EtherNetIP

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