

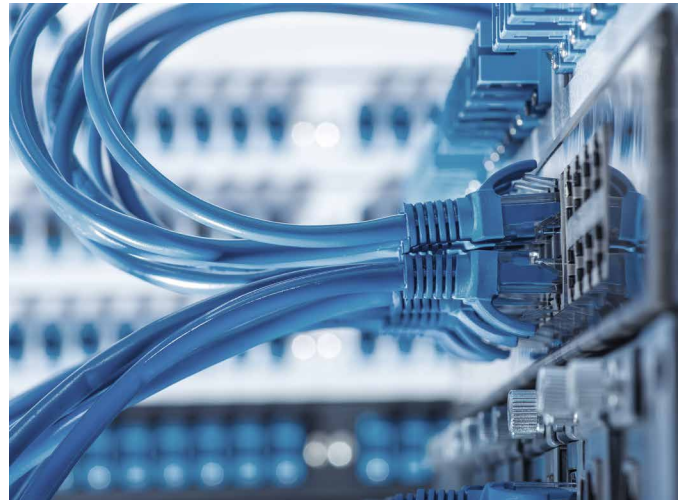
# Industrial Ethernet Protocol Stack: EtherCAT

EtherCAT (Ethernet for Control Automation Technology) is a high-performance Ethernet-based fieldbus system developed by Beckhoff, based on IEC61158.

As part of a suite of robust, certifiable industrial ethernet protocols on a common software architecture, NXP offers [EtherCAT SubDevice protocol software](#) for selected NXP SoCs. An example implementation an IO device using the EtherCAT fieldbus is available as a binary image for evaluation on the [i.MX RT1180 evaluation kit](#). A combination source code/compiled object library is available for integration in an EtherCAT-based end-product based on i.MX RT1180. This software includes a comprehensive set of examples, such as CSP Mode DS402.

## Benefits of NXP's EtherCAT protocol stack

- Provides a complete EtherCAT IO device reference implementation
- 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 EtherCAT protocol stack features

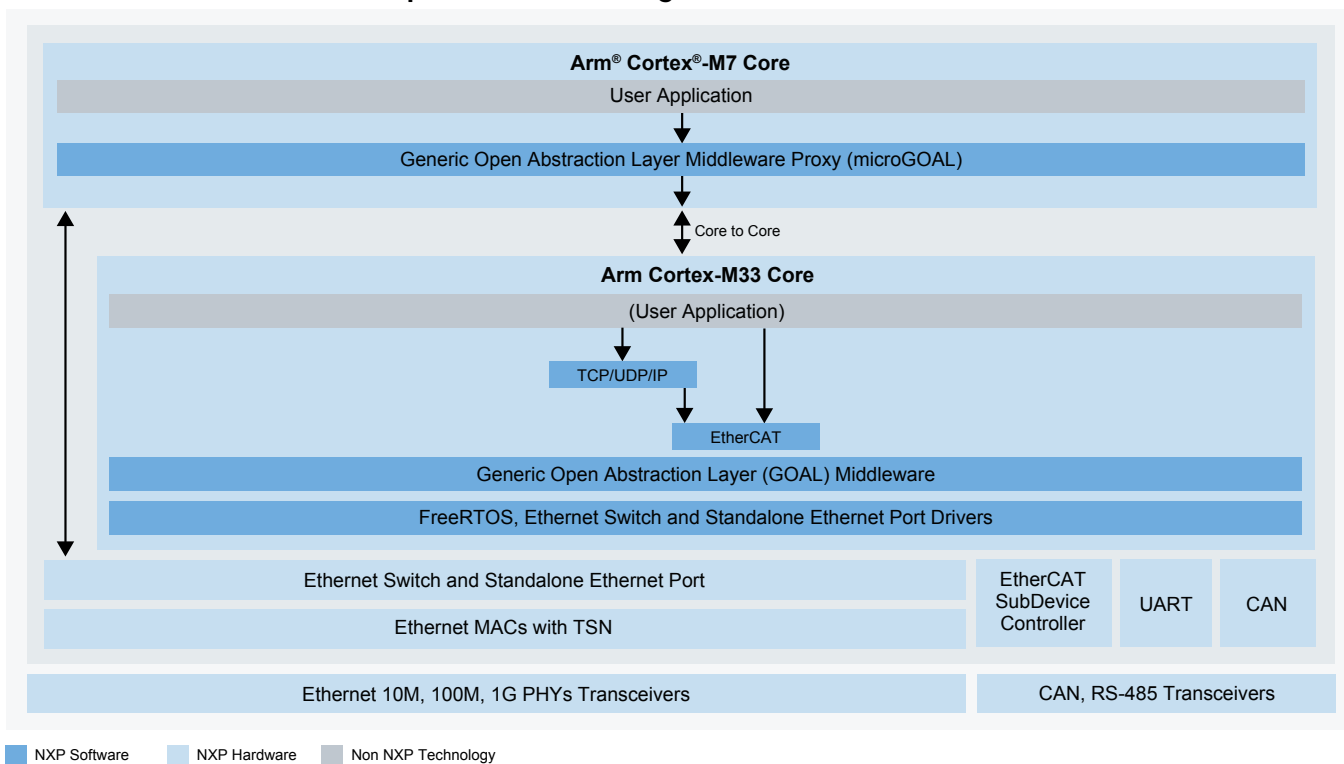
### CANopen over EtherCAT (CoE) with rich options:

- CoE Object Dictionary
- CoE SDO Communication
- SDO Expedited transfer
- Multiple other SDO management capabilities
- CoE Emergency Producer

### File Access over EtherCAT (FoE)

- Supports e.g. firmware update over EtherCAT

## EtherCAT industrial Ethernet protocol block diagram



### Ethernet over EtherCAT (EoE)

- Supports devices requiring standard ethernet access over the EtherCAT Fieldbus

### Other features

- Transmit and Receive PDOs with dynamic PDO mapping
- Clock distribution
- Sync managers
- EEPROM PDI access and emulation

### 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](http://nxp.com)

### Getting started with EtherCAT:

1. Download the [i.MX RT1180 EtherCAT binary evaluation 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. [EtherCAT training](#): i.MX RT1180 setup, integration and industrial networking
3. [NXP support](#) and [technical community](#)

[nxp.com/EtherCAT](http://nxp.com/EtherCAT)

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Document Number: ETHERCATFS REV 0

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