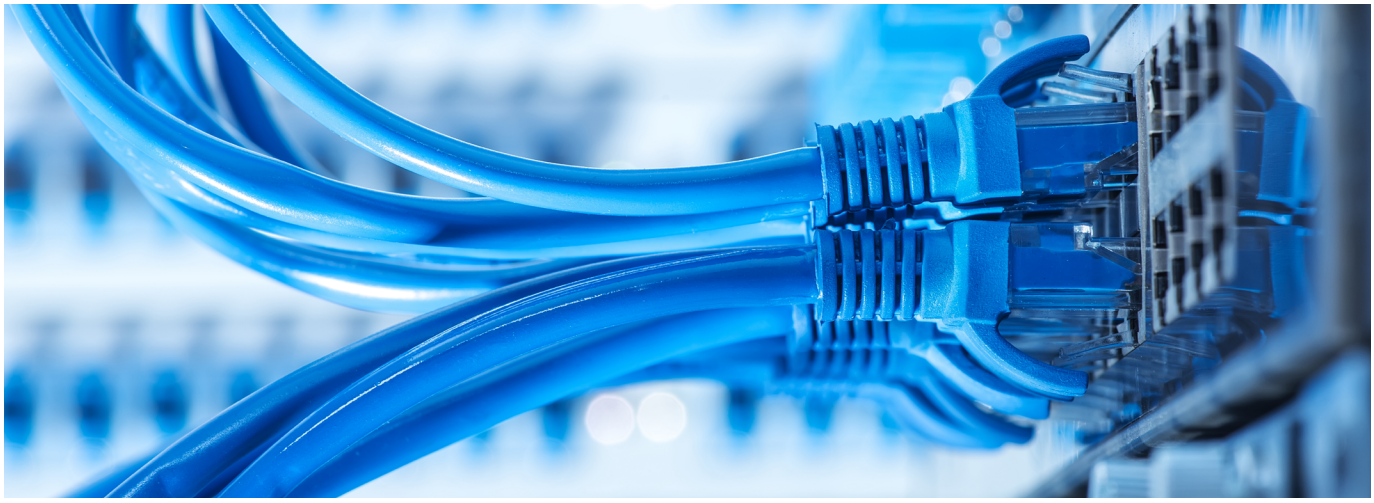
Industrial Ethernet protocol stack: Modbus TCP/IP



Modbus TCP/IP is an Ethernet-based communication protocol widely used in industrial automation to enable data exchange between controllers, sensors and devices, typically using TCP port 502.

It encapsulates standard Modbus RTU frames within TCP/IP packets, enabling faster communication speeds compared with traditional serial networks.

NXP offers a Modbus TCP/IP protocol stack as part of its Industrial protocol suite built on the GOAL framework, enabling easier integration across multiple Industrial Ethernet protocols and NXP SoCs.

The stack is available as a binary evaluation image for applicable evaluation kits, with a combination source code and compiled library for integration into production systems.

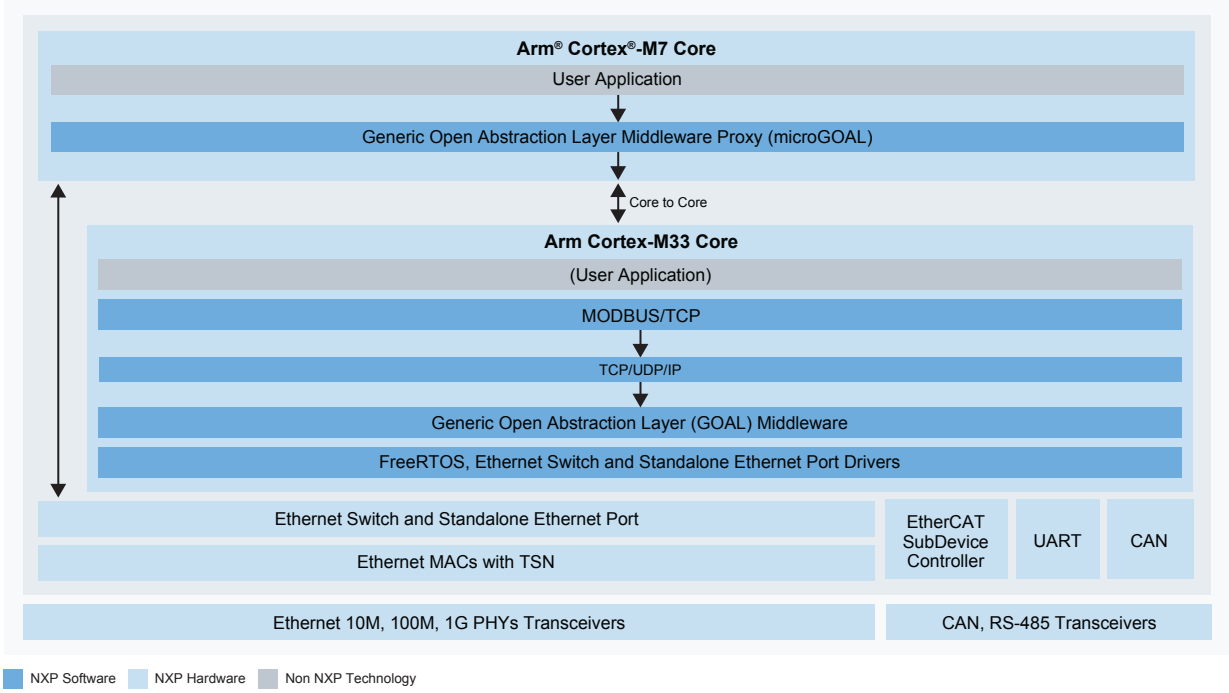
Features supported on NXP's Modbus TCP/IP protocol stack

- Modbus TCP/IP server implementation
- User-programmable data regions for coils, discrete inputs and registers
- Supported link speeds: 10 Mbit/s, 100 Mbit/s and 1000 Mbit/s
- Support for single-port and multi-port devices
- Integration with the Industrial communication creator (ICC) tool for simplified protocol data structure configuration
- Part of the Industrial Protocol Suite built on the GOAL framework

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.

Modbus TCP/IP Industrial Ethernet protocol block diagram



Function codes supported in NXP's Modbus TCP/IP protocol stack

- 0x01—read coils
- 0x02—read discrete inputs
- 0x03—read holding registers
- 0x04—read input registers
- 0x05—write coil
- 0x06—write register
- 0x0F—write multiple coils
- 0x10—write multiple registers

NXP enhancements

- Hardware-independent and hardware-dependent components communicate via message queues
- Applications interact only with the hardware-independent layer, simplifying migration across protocols and NXP SoCs
- Incoming communication is validated by the stack before reaching the user application
- Access evaluation binary images and the Industrial communications explorer tool

Getting started with Modbus TCP/IP

1. Download the relevant evaluation binaries and flash to the board
2. Download the Industrial communication explorer evaluation tool
3. Access the Industrial networking protocols knowledge base on the NXP Community for installation and evaluation instructions

Additional resources

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

nxp.com/modbus

Document Number: INDETHMODBUSFS REV 0