



Industrial Ecosystem to Support Multi-standard Protocols on the Industrial Networking Kit (INK)

Industrial Networking Solutions

Build flexible design integration into your products

Real-time transmission. Deterministic response time. Rock-solid reliability. Harsh operating environments. Compatibility with legacy fieldbus traffic. Low-cost implementation. Product longevity. These many demands complicate the design of embedded industrial systems.

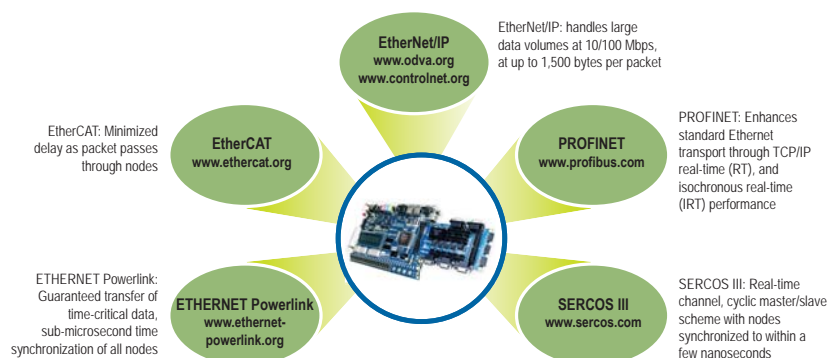
Altera® FPGAs deliver the performance, flexibility, integration, and interoperability that equip you to create reliable multi-standard Ethernet applications for demanding industrial markets. In particular, our industrial-grade Cyclone® series FPGAs, along with intellectual property (IP) cores, play a vital role in an industrial networking ecosystem. With a single FPGA and Ethernet PHY devices, you can easily implement any Industrial Ethernet standard into your product and reprogram the FPGA to adapt to changing or emerging networking standards.

Overcome Obstacles Through Dedicated Standards

Industrial systems must function under extreme physical conditions and deliver real-time data transmission and deterministic response without fail. Factories, equipment manufacturers, and system integrators have acknowledged that Industrial Ethernet provides many advantages over existing fieldbus implementations such as the following:

- Increased speed up to 10/100/1000 megabits per second (Mbps), with a roadmap to 10G
- Transmission over longer distances
- Increase in overall performance
- Improved platform interoperability
- Use of standard and less costly Ethernet equipment such as access points, switches, cables, and hubs

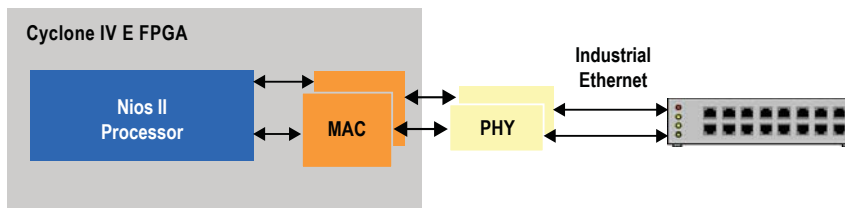
Figure 1. Evaluate Ethernet Protocols on a Single FPGA Platform



Flexible Design Integration Cuts Cost and Raises Productivity

From programmable logic controllers (PLC) in factory automation to applications in motor, motion, and intelligent drive control, HMI displays, I/O modules, machine vision, and video surveillance, the types of industrial applications that can benefit from Industrial Ethernet technology continue to grow. What these diverse applications have in common is the need for flexibility and interoperability, which makes FPGAs ideal for your industrial networking and embedded system needs.

Figure 2. Flexibility and Design Integration on a Cyclone IV FPGA



With a Cyclone III or IV FPGA, you can design a single hardware platform that can support multiple Industrial Ethernet protocols. Reconfigure the FPGA during manufacturing or even in the field to accommodate any changes in Ethernet specifications. There's no need to produce multiple dedicated adapter cards to support different standards. Coupled with the long life cycle of FPGAs, this will, over time, drive down your total cost of ownership (TCO) and increase productivity. For more information on Altera Cyclone products, please visit the [Cyclone products](#) page.

Industrial Networking Partner Ecosystem

To evaluate the Industrial Ethernet IP that best suits your needs, you will first need a development kit like the new Cyclone IV E INK. You can review the evaluation IP versions on the [Industrial Networking Partner Program](#) page on the Altera website and request the preferred evaluation IP solutions and software stack from the respective partners to run on the INK. (Refer to Table 1 for a list of partners and solutions.)

Table 1. Industrial Ethernet Solution Providers

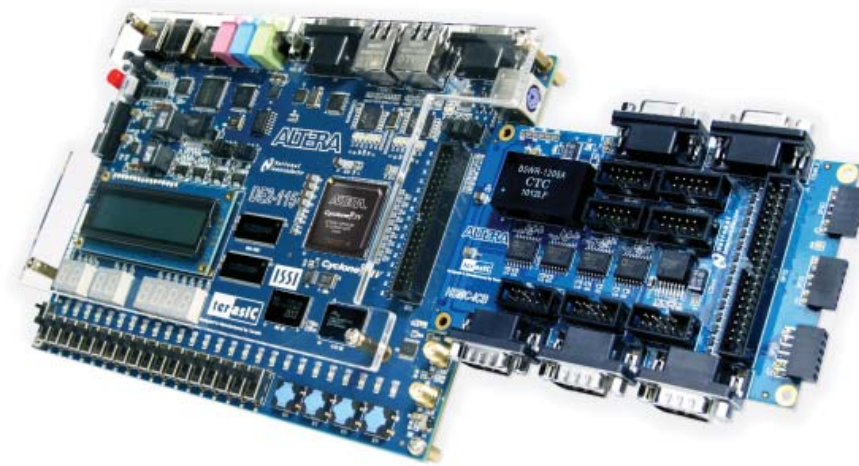
Partners	EtherNet/IP	EtherCAT	ETHERNET Powerlink	PROFINET	Modbus TCP	SERCOS III
IXXAT	✓	✓	✓	✓	✓	✓
Softing	✓	✓		✓	✓	
Beckhoff		✓				
Automata						✓

To support any one protocol, program the FPGA with the appropriate media access control (MAC) hardware block and run the matching software stack on the Nios® II processor. To support a different protocol, simply reprogram the FPGA with the new MAC IP and change the software stack. The FPGA configuration and Nios II software can be stored in a flash memory device. You can easily change the protocol by rewriting the contents of the flash device during production or in the field. You can also store multiple FPGA configurations in a single flash memory (to support dynamic switching) and program the FPGA with the desired protocol standard in order to support multiple standards from a single device.

Industrial Networking Kit

With the Cyclone IV E INK as the development platform, you can evaluate many different Industrial Ethernet protocol standards and implement your entire design on one FPGA platform.

Figure 3. Terasic's INK Featuring Altera's Cyclone IV E FPGA



Key features in the INK package include:

- Dual 10/100/1000 Mbps Ethernet ports
- 128-MB SDRAM, 8-MB flash, and 2-MB SRAM memories
- Switches and user-definable push buttons
- 16 x 2 LCD module and programmable LEDs
- USB, audio, and video features
- ICB-HSMC board supporting CAN, RS-485, RS-232, and GPIO interfaces
- CD set for the INK system and Quartus® II software
- Quick Start Guide and access to evaluation IP from Altera partners

You can purchase a Cyclone IV E INK through your local distributor or directly from ink.terasic.com. Once you have the INK, please visit the [Industrial Networking Partner Program](http://www.altera.com/industrial) page on www.altera.com/industrial to learn more about the Ethernet protocols that are available from our partners. Altera and partners also offer over 200 IP cores today. For more information, visit www.altera.com/products/ip/.

Want to Dig Deeper?

To learn more about Altera's industrial solutions, visit us at www.altera.com/industrial, or contact your local sales representative.

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