

## Delivering the flexibility you need to welcome change

### Build adaptability into your products.

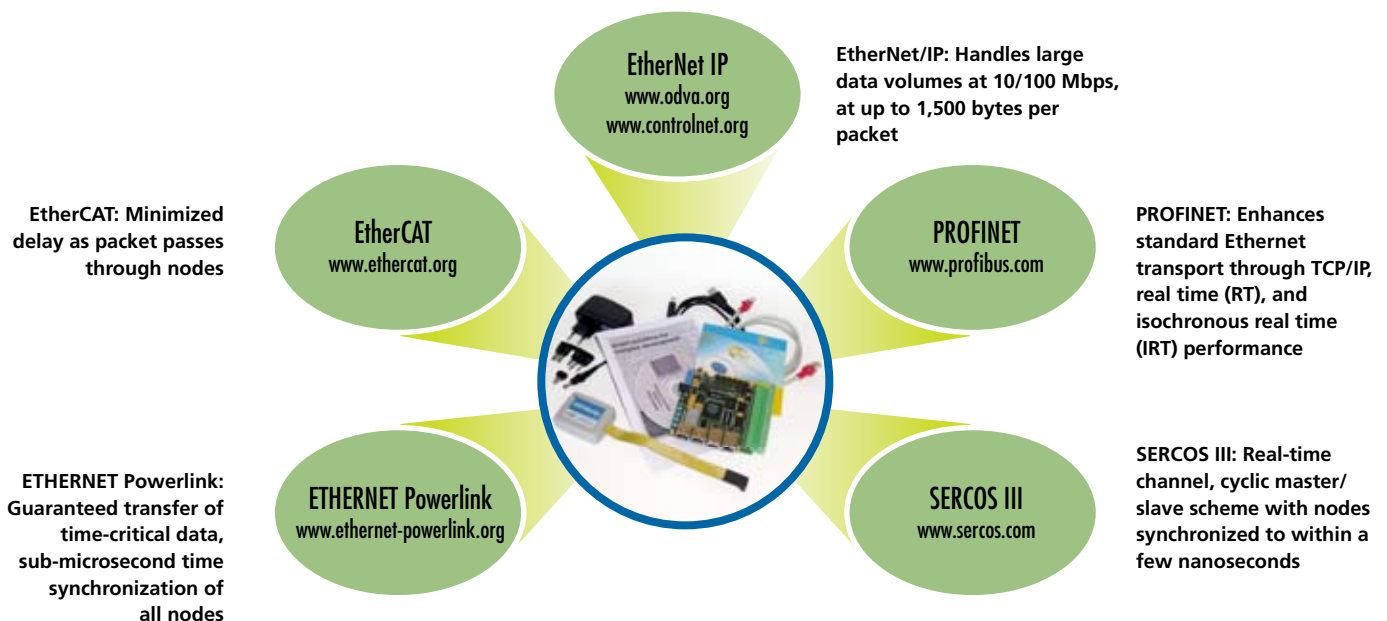
Real-time transmission. Rock-solid reliability. Harsh environments. Low-cost implementation. Considerations like these add up to one conclusion: designing industrial systems is no simple task.

This is where industrial Ethernet standards along with Altera® FPGAs play a vital role. With a single FPGA and Ethernet PHY device, you can easily implement any industrial Ethernet standard into your product. However, how will you cost-effectively support the steadily increasing number of industrial Ethernet standards available? With FPGAs, this is easy — simply reprogram the device's hardware configuration. Altera devices deliver the performance, flexibility, and interoperability to allow you to create reliable multi-standard Ethernet applications for demanding industrial applications.

### Overcome obstacles through dedicated standards

Industrial systems must function under extreme physical conditions, delivering real-time data transmission and reception without fail. What's more, budgets dictate that these applications must be built to last. These complexities have driven the development of dedicated industrial Ethernet standards that provide an array of advantages:

- Increased speed, up to 10/100/1000 Mbps and with a roadmap to 10 G
- Increased distance and overall performance
- Ability to use standard and less costly Ethernet equipment such as access points, switches, cables, and hubs
- Better interoperability



With a single Cyclone® III device-based industrial Ethernet evaluation board, you can implement and evaluate many different Ethernet protocol standards running in a Cyclone FPGA. Each standard requires intellectual property (IP) components from Altera partners. See [www.altera.com/industrial](http://www.altera.com/industrial) for more details.

## Cut cost per node, raise productivity

From programmable logic controller (PLC) interfaces to factory automation, networking infrastructure systems, and more, 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 the ideal solution.

With FPGAs you can design a single hardware platform that can support multiple industrial Ethernet protocols by re-programming the FPGA. You can reconfigure the FPGA during manufacturing or even in the field to accommodate any changes to specifications in the Ethernet standards. There's no need to produce multiple dedicated adapter cards to support different standards. Over time, this drives down the cost per node and increases productivity. FPGA programmability also means that you can design to avoid obsolescence—a key consideration when expecting long system lifecycles.

Altera's low-cost Cyclone FPGA series can support all industrial Ethernet standards via our Nios® embedded processor, offering a low-cost, flexible single-chip solution. All industrial Ethernet solutions require a hardware media access controller (MAC) and a matching software stack. The MAC is implemented on the Cyclone FPGA, while the software stack runs on the Nios II processor. Altera's SOPC Builder automated system integration tool allows you to easily create FPGA-based systems that can integrate processing [such as 32-bit RISC processors or digital signal processing (DSP) IP] and I/O standard interfaces (such as PCI, CAN, or UART) with the industrial Ethernet standard of your choice.

## Want to dig deeper?

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

## What else is on your mind?

### Which software stacks are available for the Cyclone III industrial Ethernet evaluation board?

Software and hardware are available for each of the current industrial design protocols, and can be licensed from their respective vendors. We'll continue to support new protocols as they become available. Here's what we currently support:

- EtherCAT: IP core available from Beckhoff; integrated in SOPC Builder
- EtherNet/IP: Standard MAC; software stack available from IXXAT
- ETHERNET Powerlink: IP core available from B&R; software stack available from IXXAT
- PROFINET: Standard MAC; software stack available from IXXAT
- SERCOS III: IP core available from IGS; software stack available on PCI card from Automata

### How can I support several different protocols within a single FPGA?

You can program the FPGA with several MAC hardware blocks and Nios II processors to support multiple standards at once or multiple identical Ethernet ports from one device. To support a different protocol, you need to program the FPGA with a different or additional MAC hardware block and change or add to the software stack running on the Nios II processor(s). The FPGA configuration and Nios II software are stored in a flash memory device. By re-writing the contents of this flash device during production or in the field, you can easily change the functionality of the FPGA.

### How can I evaluate industrial Ethernet capabilities in an FPGA?

Buy a Cyclone III industrial ethernet evaluation board and obtain an evaluation version of your preferred industrial Ethernet standard. Visit [www.altera.com/industrial](http://www.altera.com/industrial) for details.

### What other IP is available for Altera FPGAs?

There are over 200 IP cores available today. For more information, visit [www.altera.com/products/ip/](http://www.altera.com/products/ip/).

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