

Advanet Whitepaper

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Open Field Bus EtherCAT®

Rapid and real-time open field bus EtherCAT®

Along with the recent CPU performance improvement, the performance of the equipment is improved. On the other hand, the field bus, which is a communication network of the control system, becomes a bottleneck. In other words, the improvement of the control system performance does not maximize the effect with the introduction of the latest equipment.

Since EtherCAT® has an excellent real-time performance as a field bus, the performance improvement of the overall control system can be expected. In addition, the flexible topology which does not require a specific network switch and hub contributes to wire-saving, and realizes the cost reduction and simple system. The distance between nodes supports up to 100 meters.

The standard management of EtherCAT® is handled by EtherCAT Technology Group. As of 2004, 3,000 companies in the world participate as a member, and many companies are interested in this field bus.



EtherCAT®

EtherCAT® Overview

EtherCAT® is an abbreviation for Ethernet for Control Automation Technology, and an open field bus system developed by Beckhoff Automation (German automation equipment manufacturer) and released in 2003. EtherCAT® is developed for applying Ethernet to the equipment which requires communication at low jitter, excellent hardware in cost performance and data update in short cycle.

EtherCAT® Features

EtherCAT® has a simple wiring configuration with the best architecture for the motion control such as operating principal to realize ultra-high-speed and synchronization with high degree accuracy between nodes using Ethernet.

When transmitting data from master, EtherCAT® allows to pass through Ethernet frame not to the specific slave node but to each slave node, and load data at few nanoseconds.

Data passes all EtherCAT® slaves and returns to

master through all slaves being sent back by the last slave.

Despite Ethernet basis, EtherCAT® allows daisy chain wiring without using network switch, and also the various wiring such as Star or Line using its specific junction slave.

With the built-in high-precision timer, the timing deviation correction and propagation delay time measuring/memorization are possible.

EtherCAT® Advantages

- High-speed Secure of Data Transmission
- Real-time Secure of Data Transmission
- Improvement of Response Rate and Operating Efficiency in the System
- Usability by Flexible Topology
- Availability with Standard Ethernet Cable



EtherCAT® Application with High Performance

- Semiconductor manufacturing machines
- Injection molding machine
- Fast Metal-working machines
- Machine tools
- Textile tools
- Robotics
- Packaging machines
- Engine test benches
- Measurement systems
- Blow molding machine

EtherCAT® Application with Flexible Topology

- Transport system
- Automatic warehouse
- Printing machine
- Press
- Woodworking Machinery
- Bridge seismic isolation system
- Artificial snow machine

Advanet EtherCAT® Master Board

Advanet intelligent EtherCAT® master slave board offers 3 kinds of form factor CompactPCI, PCI Express and XMC. All of them are used for industrial application, and has the features proven by our development experience of the various field bus. EtherCAT® environment is enabled typically by implementing the master stack on Ethernet hardware. Advanet provides EtherCAT® master communications on-board by implementing the Xilinx Zynq® with ARM® Cortex®-A9 on a board to minimize the impact for the host CPU as bus master.

At the hardware replacement, the reconfiguration is usually required when the master stack is installed directly to host hardware. Advanet EtherCAT® master board allows host hardware independent. Since the EtherCAT® master communication is executed on the board, all you have to do is to move the master board to the new hardware.

As EtherCAT® master protocol stack, "EC Master" with ClassA compatible of acontis technologies is installed. Secure cable redundancy and hot connect capability

are supported by EtherCAT® feature pack.

CompactPCI
A3pci1571



PCI Express
AdEXP1572



XMC
AdXMC1573



Advanet EtherCAT® Features

- Low CPU Load EtherCAT® Master Communication
- Secure Cable Redundancy
- Hot Connect Responds to Unexpected Replacement
- Master Board Replaceable on Host Hardware Independent
- Introduction Support Looking into the Future with Various Field Bus Development Experiences
- Rapid Technical Support by Engineer in Japan

About Advanet

Advanet is a leading manufacturer of industrial embedded board computer since 1981, and provides the various products in the industries such as semiconductor, transport infrastructure, health care and communication where high reliability is required. With the development experiences of the various field bus, we can support from the consideration of the introduction to the actual operation start, and also after support.