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Category	■ FAQ □ SOP	Related OS	
Abstract	EtherCAT introduction		
Keyword	EtherCAT, PCI-1203, ADAM-5000		
Related Product	ADAM-5000/ECAT, PCI-1203		

■ Description

EtherCAT (Ethernet Control Automation Technology) is a high-performance, Ethernet-based fieldbus industrial network system. The protocol is standardized in IEC-61158 and apply to automation applications that need faster and more efficient communications. Short data update times with precise synchronization make EtherCAT suitable for real-time requirements in automation technology.

■ Principle

EtherCAT is a real time, high speed and flexible Ethernet based protocol. In EtherCAT network, master sends an Ethernet frames pass through all of the slave nodes. The standard Ethernet packet or frame is no longer received, interpreted, and copied as process data at every node. Instead, slave devices read the data addressed to them and input data are also inserted in the same time while the telegram passes through the device, processing data "on the fly". Typically the entire network can be addressed with just one frame. In comparison to other Ethernet based communication solutions EtherCAT utilizes the available full duplex bandwidth efficiently.

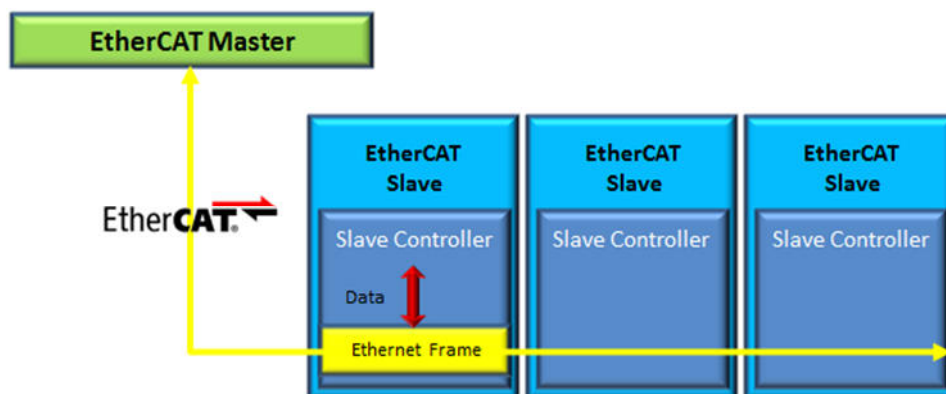


Figure 1.1 EtherCAT Function Principle

■ Protocol

Data exchange are cyclically updated between EtherCAT master and slaves. Data in EtherCAT frames are transported directly within the standard IEEE 802.3 Ethernet frame using Ethertype 0x88a4 and are processed by the EtherCAT Slave Controller on the fly.

Each EtherCAT datagram is a command that consists of a header, data and a working counter.. The datagram header indicates what type of access the master device would like to execute:

- Read, write, read-write
- Access to a specified slave device through direct addressing

- Access to multiple slave devices through logical addressing

Logical addressing is used for the cyclical exchange of process data. The header and data are used to specify the operation that the slave must perform, and the working counter is updated by the slave to let the master to know that a slave has processed the command.

Every EtherCAT datagram ends with a 16 Bit Working Counter (WKC). The Working Counter counts the number of devices that were successfully addressed by this EtherCAT datagram.

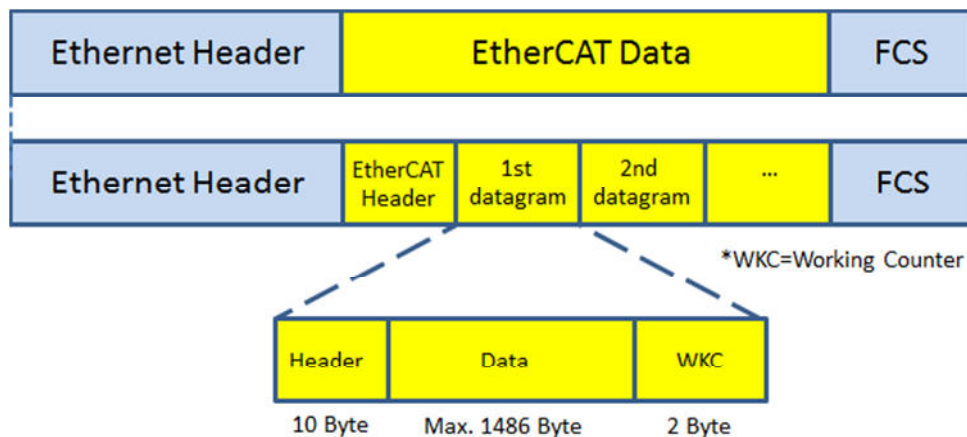


Figure 1.2 EtherCAT Protocol

EtherCAT datagrams are processed before receiving the complete frame. In case data is invalid, the **frame check sum (FCS)** is not valid and the slave will not set data valid for the local application.