

INDUSTRIAL

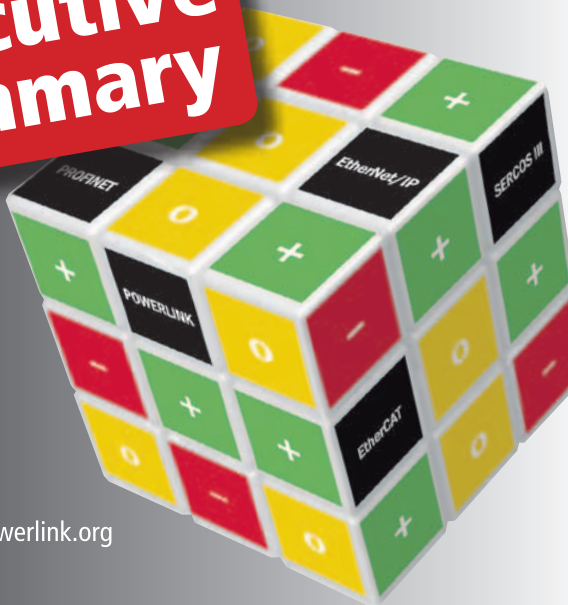


ETHERNET FACTS

SYSTEM COMPARISON

The 5 Major Technologies

**Executive
Summary**



www.ethernet-powerlink.org

Non-Real-Time Technologies

PROFINET is based on standard Ethernet and is predominantly used in Europe. The protocol's main area of application is factory automation without a need for hard real-time performance. Typical cycle times: 5-50 ms. PROFINET IRT is a distinct variant that does indeed accomplish hard real-time. However, it requires special hardware, and implementations are complex.

EtherNet/IP is predominantly used in the American market. This protocol is unfit for hard real-time requirements. A protocol extension, CIP Motion, has therefore been devised to meet demand for axis control solutions in the future.

Criteria	PROFINET RT IRT	POWERLINK	EtherNet/IP	EtherCAT	SERCOS III
Performance	○ +	+	○	+	+
<i>Practical results often don't match theoretical promises.</i>					
Direct cross-traffic	+	+	+	-	+
<i>Direct cross-traffic ensures fast reaction times e.g. for Safety applications.</i>					



The Leading Real-Time Systems

POWERLINK demonstrates the best performance in typical applications, ahead of SERCOS III and EtherCAT, and delivers superior achievements for axis applications. The protocol supports direct cross-traffic, which ensures optimized load relief for the central processing controller. Compared on equal grounds, POWERLINK features the least expensive connection costs. It is the only system that is patent-free and available as an open source solution.

EtherCAT was designed for small applications with low data traffic. EtherCAT Slaves require special ASICs, which defeats compliance with the Ethernet standard. The Master is usually implemented in software. Since it

uses a summation frame method, EtherCAT is more sensitive to interference (EMC). EtherCAT does not support cross-traffic, and is therefore only suitable for architectures based on centralized control architectures. The members of the ETG do not hold any rights to EtherCAT patents or technology.

SERCOS III is also, like EtherCAT, based on a summation frame method. However, it does feature direct cross-traffic capability, which leads to improved performance. The Master is typically a special hardware implementation. For Slave implementations, SERCOS III has opted for an open FPGA technology.



Integrated Safety

openSAFETY is SIL3 certified and has been deployed in series applications since 2008. It is the only Safety protocol that can be used with all Industrial Ethernet solutions. It makes it an ideal choice for communication lines between different machines. Solutions have been demonstrated for PROFINET, EtherNet/IP, POWERLINK, SERCOS III, and Modbus.

PROFIsafe is SIL3 certified and has been in use for a number of years. PROFIsafe is legally restricted to PROFINET and PROFIBUS environments.

CIP Safety constitutes the Safety Layer based on the CIP protocols EtherNet/IP and DeviceNet. CIP Safety has been released for use in applications based on SERCOS III.

Safety over EtherCAT (also called FSoE) is the Safety protocol for EtherCAT. FSoE does not support direct cross-traffic, resulting in a loss of valuable reaction time. License rights to the technology do not lie with the user organization, ETG.

Fieldbus compatibility	CIP Safety	PROFIsafe	openSAFETY	Safety over EtherCAT
Supported protocols	EtherNet/IP SERCOS III	PROFINET	PROFINET POWERLINK EtherNet/IP SERCOS III Modbus	EtherCAT

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