Industrial Ethernet

Introduction

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Over the past 20 years or so Ethernet has evolved to become the standard network technology for the office and IT environments. The interoperability of components from many different manufacturers has contributed just as much to this development as has the technical performance and simplicity of this technology. This has resulted in a wide range of inexpensive and efficient components and systems, and hence significant benefits for users.

In historical terms, the majority of the Ethernet standards in use today are no longer that new – the technology has indeed matured. A quick overview of the development of Ethernet standards might look something like this:

- 1980 “Ethernet V1.0” standard (DEC, Intel, Xerox)
- 1982 IEEE 802.3 standard: “Yellow Cable Ethernet”
- 1986 “Cheap-Ethernet” (10BASE2)
- 1991 “Ethernet on Twisted-Pair” (10BASE-T)
- 1995 Fast Ethernet (100BASE-T)
- 1998 Gigabit Ethernet
- 2002 10-Gigabit Ethernet

Industrial users have also recognised the advantages of bus technologies and network solutions. For example, the 1990s saw the development of fieldbus standards heavily based on specific manufacturer’s specifications, and thus not compatible with each other. From the point of view of their technical development, these systems are without doubt very stable these days, but the user is restricted to one manufacturer, or at best just a few, when choosing a fieldbus system and its components. Switching to another system always involves high costs. Besides the cost of the hardware itself, the cost of training personnel often plays a role that should not be underestimated.

So why do we need Industrial Ethernet when the established systems still work? There are a number of reasons for this:

- The universality of the technology (vertical integration) enables system interoperability
- Production data is directly accessible in the office environment without the need for interfaces
- Simplified procurement and spare parts inventory
- Common expertise (operation and maintenance) – knowledge of the use of Ethernet networks is generally widespread and can be applied in the factory as well
- A higher speed and greater bandwidth create new options for diverse applications, e.g. transmission of image data or the parallel use of network resources
- The TCP/IP standard used by the Ethernet enables Web interfaces for machines setup and maintenance, for example
- Geared to the future (Web-based technology) – Industrial Ethernet will continue to benefit from new developments in the enormous IT network infrastructure market, and the possibilities for wireless LAN applications are certainly only a start

Industrial Ethernet is evolving into the dominant standard for industrial network technology. The ensuing added value is high for planners and operators of industrial systems. With a universally applicable technical standard as the basis, manufacturers can combine networks and their components.

Although many applications and also the corresponding products can be defined to a large extent by way of communication standards, software solutions and application protocols, there is still the challenge of providing an absolutely reliable physical network structure because 80 % of all errors in an industrial network are caused by contact errors in the broadest sense of the term. Loose plugs, contact problems, moisture, broken wires, EMC problems or connection defects are just some of the more frequent causes of malfunctions. Weidmüller can provide users with long-lasting, maintenance-free electrical connections. With traditional products for switching cabinets but also innovative and standardised components for industrial networks.

Network components from Weidmüller

Both plug & play and managed switches for industry.

Junction box and plug with IP67 class of protection form a perfect team in tough industrial environments.

Stick the patches where you want them!
Use the terminal rail outlets from Weidmüller.

The Weidmüller product portfolio for Industrial Ethernet applications shows that we can be a dependable, high-quality partner for all your requirements even in the age of “open automation”!

In the Industrial Ethernet market, Weidmüller is positioned as a network infrastructure supplier in technology terms. Active and passive components complemented by a range of accessories for management, connection, supply, protection, switching, conversion, amplification, disconnection and communication functions.

The Weidmüller network components show how we focus on one key area of our expertise: connection technology from the control to the field – all from one supplier. What this means for Industrial Ethernet applications is in addition to the purely electromechanical products such as plugs, cables and outlets, Weidmüller can also supply a series of electronic devices necessary for the standardised operation of a multi-service network infrastructure. A comprehensive range of products for industrial applications – all from one supplier. This enables planners and installation personnel to set up a fully equipped network. Weidmüller can also supply proven products such as signal converter conditioners, switch-mode power units, cable devise and terminal markers and a wide selection of tools.

Where do I find the products in the field?

Weidmüller's Industrial Ethernet components are the connecting links between Ethernet-compatible devices from diverse manufacturers for diverse applications. The drawing below illustrates typical applications.

Industrial Ethernet switches from Weidmüller are the distribution points in Ethernet data communications. This is often a managed switch ❶ with channel grouping options in a central position as like a building distribution board, or – typically – plug&play switches in storey distribution racks, machine distribution panels, etc., depending on requirements, e.g. even an inexpensive switch ❸ from the ECO-Line range.

The link between the wiring in the switching cabinet with patch cables ⓬ to the installation or connecting cables ⓭ for tough industrial environment is achieved by way of switching cabinet outlets ⓮. The Weidmüller switching control cabinet outlet is also available with SC plug-in connectors for multimode fibre optic cables ❺.

Cabtite cable entry points ❻ enable cables to be fed through the side panel of the switching cabinet enclosure without the need for a connection at this point. The trouble-free provision of permanent connections between Ethernet cables is achieved with the IE-CCM connection module ❾ in its robust metal enclosure. For those applications that involve frequent movement of the cable, Weidmüller can supply an especially robust cable for carrier systems ⓱.

Routers ⓲ enable the network to be split into subnetworks with independent IP addresses and secure connections to the Internet.

Fibre optic connections are frequently preferred for transmissions over long distances or through environments with strong electromagnetic fields. Again, Weidmüller can supply a range of multimode fibre optic cables ❹ plus protocol-transparent – and hence real-time-compatible – media converters ❷ to convert from copper to glass fibre and back again.

The IP67 mounting flange, ❽ IP67 plugs and couplers, ❼ plus our 8 port IP67 switches ⓫ are ideal for the tough conditions in the field.

Useful accessories such as wall-mounted front panel interface ⓯ with optional locking feature complement the range. Tools, a cable tester ❿, overvoltage protection ⓳ and a GPRS alarm modem ⓰ round off the Weidmüller product portfolio.