

Technical appendix

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Network infrastructure micro-site

Visit our network infrastructure micro-site at

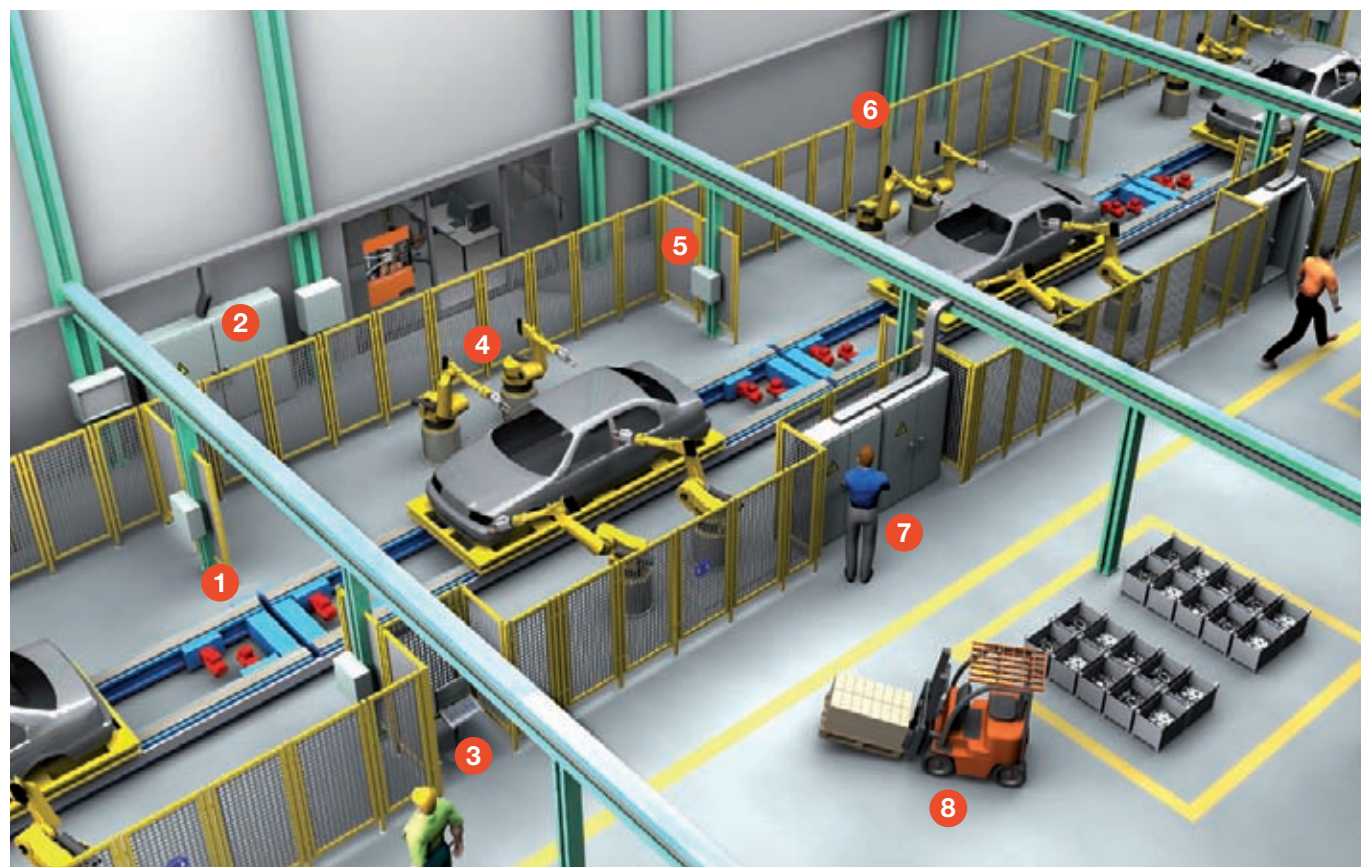
<http://networkcomponents.weidmueller.com>

- Videos on applications for network components
- Downloading current product brochures
- The Weidmüller screen saver
- Audio podcasts
- Current schedules
- Direct contact form

The micro-site is updated continuously and is available in German, English and Spanish. We look forward to your mouse click!

3D factory workshop

Our factory workshop is found at our micro-site. Click on the various sections of the assembly line to learn more about the application fields for our products. The 3D factory workshop is an interactive experience, with 3-D product animations, drawings and films.



1 Materials handling

- IE-line connector line, in IP67 with **STEADYTEC®** technology

5 Sub-distribution board

- Sturdy junction boxes in die-cast aluminium housing, for implementing Ethernet in the harshest IP67 industrial environments.

2 Switchgear cabinet in the facility / Power distribution

- FrontCom® Micro IP 65 service interface
- Managed switches with fast ring redundancy and multiple connection options (copper and fibre-optic)

6 Cable conduit

- Cabling of machine workshops, with installation or connection conductors using copper or fibre-optic cable

3 Human Machine Interface

- Rugged unmanaged switches with Fast Ethernet and Gigabit Ethernet ports

7 Robotics switchgear cabinet

- Reliable connection for your installation cable with mounting-rail outlets
- RJ45 Gigabit connector

4 Robots

- Sturdy connection with the M12 connection system

8 Forklift

- Industrial Wireless access point / Client / Bridge to connect mobile devices into Ethernet networks.

Online product catalogue

If you have questions about the specifications and details of our products, perhaps even outside normal business hours,

then our online catalogue at

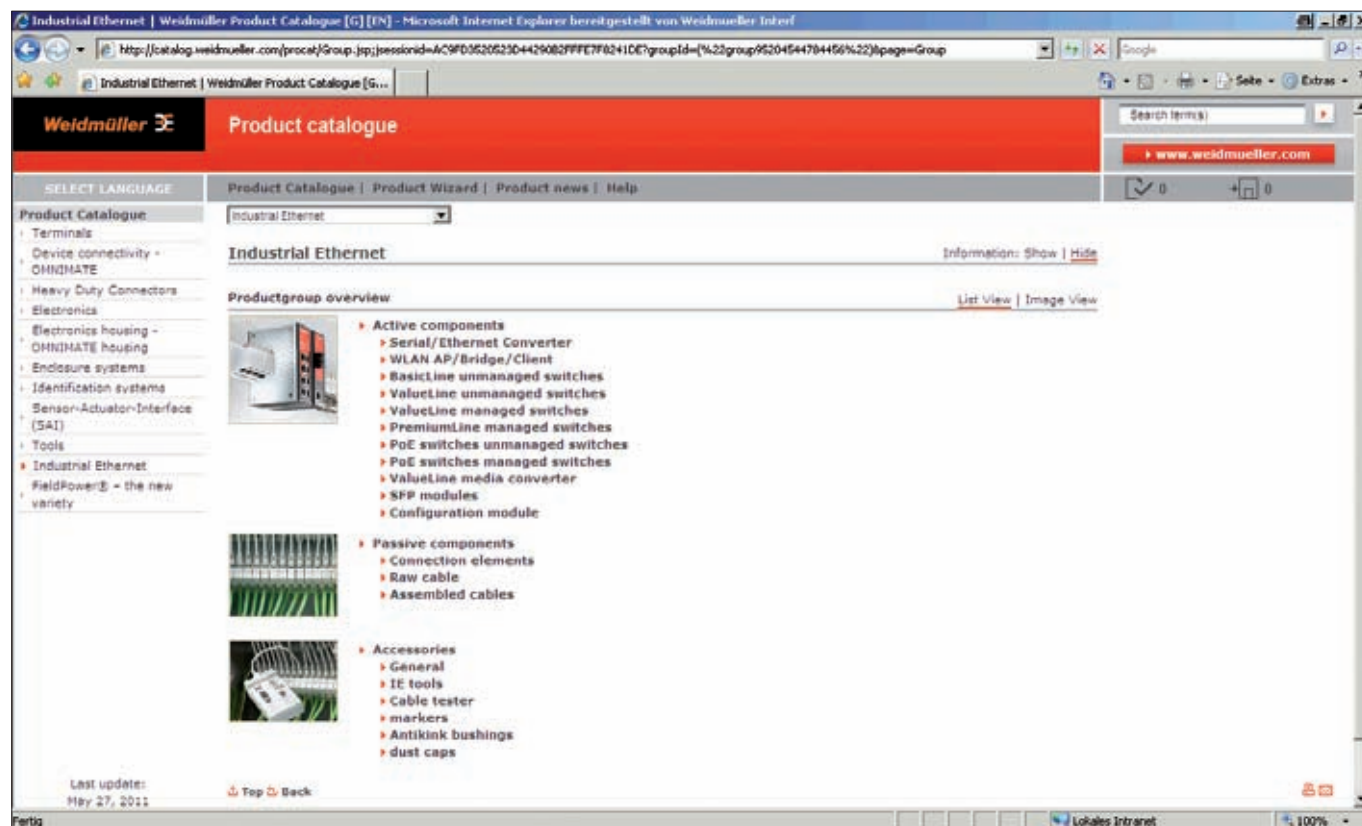
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– open 24 hours a day, 365 days a year – is the perfect source of information. Besides product features and part numbers, it contains extensive additional information on all product groups. For further information, offers and your personal contact, simply consult the Weidmüller website at

www.weidmueller.com



With one-click selection for the product data sheet of your choice.



Cable configurator

The cable configurator allows you to configure your specific cable with comfort, speed and simplicity. Just select, request order – and ready.

Make your selection from the list of available cables (material for cable sheathing, category, colour, ...). Then choose the connector for the right and left cable end. Then choose the cable length. Configurations which are not possible are marked in red, so that it is not possible to create an unsupported or wrong configuration.

A variety of cables and connectors are available from our Industrial Ethernet product line. These selections include category 5 or 7 cable, with PVC sheathing, in PUR, and of course PROFINET-specific cable. A number of versions are available on the plug side of the RJ45, including: IP20, an extra-strong IP67 PushPull (V4) versions, bayonet (V1) and RockStar® HDC (V5). The fibre-optic cable is configured similarly: simply choose the fibre-optic (MM/SM) and the desired connector in order to build your customised cable. IP67 versions are also available here.

After you have made your selection, there are several available options:

- Bring up the data sheet for the assembled cable
- Export the information in Excel or CSV format
- Save the configuration
- Create additional cables or load previous cables
- Place the assembled cable in the shopping cart for a request for quote or order.



The cable configurator is your quickest path to finding the specific industrial Ethernet cable which you need.



Whether you are looking for a fibre-optic or copper cable, the configurator will find it for you.

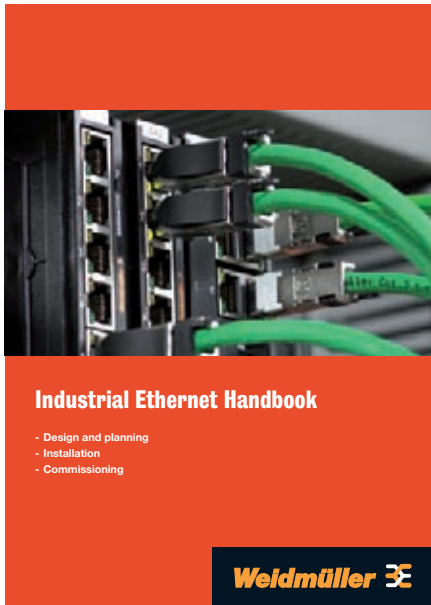
Best service

Practical Guidelines for Industrial Ethernet

Are you an electrical engineer, installer or contractor in search of assistance, tricks and checklists for working on Industrial Ethernet? Our practical guidelines provide detailed descriptions for the installation and implementation of industrial networks.

- You'll find helpful tips and recommendations for selecting the proper components and for documenting your network
- Real-world practical advice for assembling copper and fibre-optic cables
- Pointers to the current standards and regulations in the industrial networking sector
- Simple network implementation, including tips for operation and security
- Maintenance tips for preventing crashes
- ...and much more!

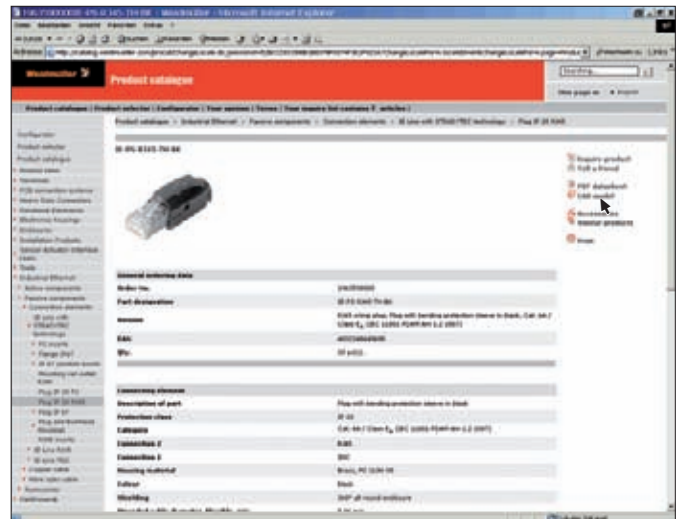
Please ask your personal sales representative about these practical guidelines.



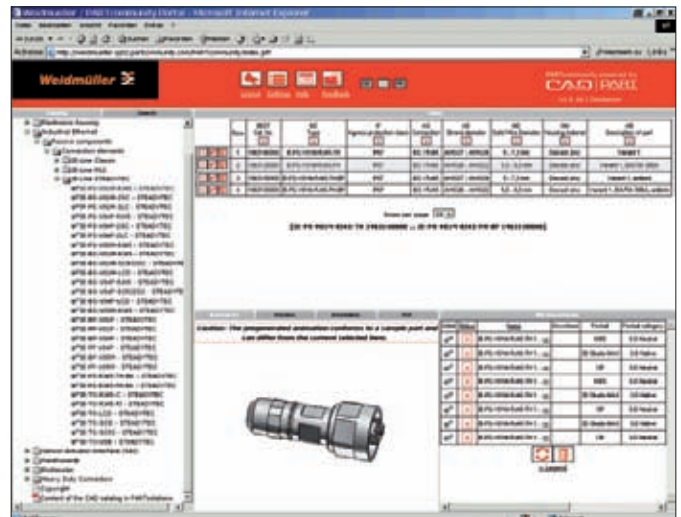
3-D data

Do you require 3-D models of your components so you can design them into your application? And precisely in your own CAD format?

The parts are located in our Online Catalogue with a direct link to the Partserver (www.partserver.com). You can then input your product, CAD format and e-mail address, and you will quickly receive an e-mail with your 3-D model as an attachment.



You can also login at the web site <http://Weidmüller.sp02.partcommunity.com/> to view and download 3-D files.



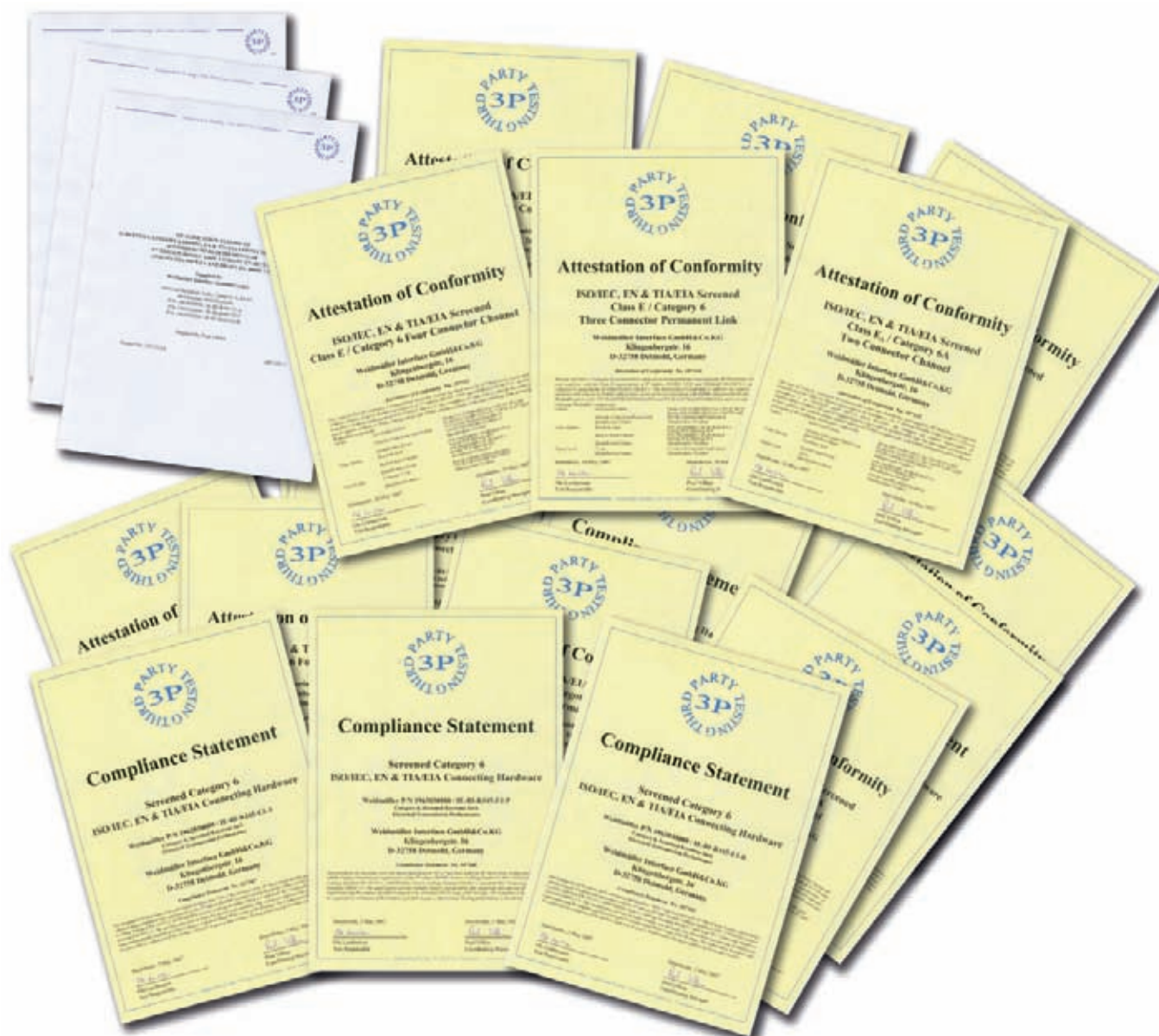
... and what more can Weidmüller do for you?

Certificates

Do you want to prove to your customer that you have installed only the best components? The GHMT (Society for High-frequency Measuring Technology) and the 3P (Third Party Testing) are independent testing institutes and recognised specialists for industrial cabling. The institutes support the industry by means of test certifications for communication cables, connection hardware, patch cords and permanent links and channels.

Their other primary functions are brand testing, safety testing, quality analyses, and error analyses.

By means of these proven certificates, we can assure you of our high quality and performance expectations. Please ask your personal sales partner if you would like to see a copy of our certifications. You can also download the individual certificates from our online catalogue.



Glossary

Interest in Industrial Ethernet has produced an entirely new dictionary with specialist terms. Some of the most important terms are briefly explained here.

4B/5B

A block encoding system for FDDI and ATM. In 4B/5B encoding, all data is divided into 4-bit units (a nibble) and converted to 5-bit units (symbols) by reference to a matrix.

100BaseFX

100 Mbps Fast Ethernet, based on 4B/5B encoding with fibre optics.

100BaseSX

100 Mbps Fast Ethernet system, identical to operations in the 100BaseFx, but 850 nm fibre-optic technology is used.

100BaseTX

100 Mbps Fast Ethernet system based on 4B/5B encoding and transmission via two copper cables.

100BaseX

This term is used to describe Fast Ethernet technologies based on the 4B/5B encoding. Includes 100BaseTX and 100BaseFX systems.

802.3.IEEE

The CSMA/CD group is the oldest working group in the 802 project. It defines the norms according to the CSMA/CD access procedures proposed by the DIX-group. This working group focuses on discussing high-speed protocols.

AUI

Stands for "Attachment Unit Interface". Interface between the transceiver and the network board.

Auto-negotiation

Auto-negotiation means automatic recognition of the opposite end's functions. By using RJ45 plugs for the different protocols, from 10Base-T to 100Base-T, a compatibility problem occurs which is solved due automatic recognition of the opposite end. Using the auto-negotiation procedure, repeaters or terminal equipment can determine what functions the other end has, so that different devices can be configured automatically.

Bandwidth

Bandwidth states how much information can flow within a set period from one location to the other. Units: Bps, Kbps, Mbps, Gbps.

Baud

Baud is the unit of step speed. A step always lasts for a pre-set time e. g. 1 bit, 1_character. If you multiply the number of bits per state with the baud rate you obtain the transmission speed. Only if the number of states is exactly two (i.e. encoding was carried out at a state of exactly 1 bit), is the baud rate exactly the same as the bit rate.

Bit

Bit is an artificial word made up of binary and digit and constitutes the smallest unit of digital information, either a 0 or a 1.

Bitrate

Bitrate is also referred to as transmission speed, transmission rate or data rate. It is the number of bits that are transmitted per unit of time (typically one second). The bitrate is stated in Bps (bits per second) or in the appropriate powers of 10 as Kbps, Mbps and Gbps. In American English the abbreviation Bps is used.

Blowfish

In the digital information age, the handling of sensitive data is becoming ever more important. Therefore, we have incorporated Blowfish, a symmetrical encryption algorithm, into the software of our routers in order to guarantee a secure link between a pair of Weidmüller routers.

Bridge

According to their OSI definition, bridges connect sub-network protocols on layer 2 of the OSI reference model.

Broadcast

A broadcast transmission is a simultaneous transmission from one point to all network stations.

Bus

Buses are connection systems for electronic and electrical components. The topology of a bus is always a physical medium which the individual components are connected to and which is terminated at both ends. Transmission on a bus can be done bit or byte parallel, as in the PC-bus, or serially, as for networks in bus topology.

Category 5

Signifies compliance to features specified in EIA/TIA-568-5. With category 5 (cat. 5) components, networks can be set up that are suitable for all twisted-pair cable Ethernet transmission systems up to 100 Mbps, including 10Base-T and 100Base-TX.

Category 5e

The cat. 5e-cable is an extended version of cat. 5 for use in 1000-Base-T networks or for long-distance 100-Base-T network connections (350 m, compared with 100 m for cat. 5). It must fulfil the EIA/TIA 568A-5 specification.

Category 6

A Cat.6 twisted-pair cable is sufficient for Gigabit Ethernet, with a 250-MHz performance. This is an extension of the CAT5e cable.

Category 7

Cat.7 cable is suitable for operating frequencies up to 600 MHz. It is made with four individually-shielded core pairs, all within another shielding.

Collision

Collision is when two or more stations transmit at the same time in a joint data channel – e.g. a semi-duplex Ethernet or a shared Ethernet. This means that the data transmitted are worthless because they overlay. By overlaying both signals, the signal level increases to what is known as the collision level. This aborts the transmission to both stations.

Collision domain

A collision domain is a segment of a CSMA/CD network. In 802.3 Ethernet networks all terminal equipment is on a physical Ethernet segment, also including equipment that is interconnected via a repeater, on the same collision domain. In contrast to repeaters that do not affect the collision domain, bridges and routers separate the collision domains.

CRC

CRC is an error correction method that creates checksums based on binary numbers by calculating the sums of data groups prior to transmission. CRC is based on the division of polynomials. The principal is that during cyclical block checking, the bits to be monitored are successively fed into a feedback shift register. The length and the number and position of the feedback from the register are stated according to each procedure. The checksum procedure detects individual errors reliably and multiple errors with a high degree of probability.

Crossover-cable

A crossover-cable is a special patch cable where the transmitter and receiver lines at one end have been swapped. Crossover-cables are used to connect two pieces of terminal equipment (computers) or two infrastructure components (switches). Modern switches, because of their auto-crossing function, make connecting normal patch cables with one another possible.

CSMA/CD

An access procedure where several network stations have access to the transmission medium. In the CSMA-system the transmitting station listens to the channel (carrier sensing) before it transmits. A station can then only transmit if the transmission medium has not yet been occupied by another station. If the transmission medium is occupied, the station waits till it is free and can transmit. Because of the signalling times it is still possible for two devices to transmit at the same time. To avoid data loss in this type of collision, both transmitters have to detect the collision (collision detect) and after a randomly-selected waiting time send each of their data packets again. CSMA/CD is a widespread standard process in 10-MBit-networks with hubs. In Industrial Ethernet networks the CSMA/CD system is only used rarely nowadays, because of high demands on network performance.

DCE

(Data Communication Equipment)

Any facility that can relay data between data terminal equipment. DCEs are part of the infrastructure and not terminal equipment.

DHCP

DHCP (Dynamic Host Configuration Protocol) enables a specially configured server to allocate dynamic IP addresses and other network parameters to the computers in a network.

Glossary

DNS Server

On the Internet, computers are addressed using their numeric IP address (e.g., 211.163.5.38). The DNS server maintains the structure of the domain name system (DNS). It administers and updates the logical names which are associated with the IP addresses. The name server converts less-accessible dotted-decimal-notation numbers into domain addresses. It then makes this information available to DNS clients on request. A network may include an unlimited number of name servers. Since DNS servers must have built-in redundancy, a server implementation consists of two servers: the primary (PNS) and secondary (SNS) name server. If the primary name server is down, the secondary name server, running in parallel, takes over.

DTE

(Data Terminal Equipment) data terminal unit: Every device in the network where a communications route starts or finishes. A station (computer or host) in the network that can transmit or receive data.

DynDNS

DynDNS stands for dynamic domain name system. DNS is responsible for resolving host names to IP addresses. Services such as DynDNS were developed for users using a DSL connection with dynamic IP addresses. DynDNS enables the registration of a dynamic (changeable) IP address to a host name. For this to work, a DSL router must support it or a DynDNS client must be installed on a PC.

Error Detection

The error detection code is a detection code (CRC or checksum) used where errors are identified but not corrected as in ECC.

Ethernet

Ethernet is computer networking technology for local networks (LANs). It refers to cable types and signalling for the bit transfer layer (physical layer), packet formats and protocols for checking media access (media access control, MAC) / link layer of the OSI model. Ethernet is standardised to a large extent in the IEEE norm 802.3.

Fast Ethernet

Nowadays a very widespread version of the Ethernet with 100 Mbps over twisted pair cable according to category 5 or higher. The maximum range is 100 m.

Fibre-optic cables

A type of cable with fibre-optics or plastic core that transmits digital signals in the form of light pulses. (Wave lengths 850 nm in 10BaseFL and 100BaseSX or 1300 nm in 100BaseFX).

Flow Control

This is a function to modify transmission to the capacity of the receiver. Flow control regulates transmission between the transmitter and receiver by causing the transmitter only to send as much data as the receiver can deal with. The different types of Ethernet have different flow control systems. In credit systems (FO cable) the receiver relays to the transmitter the number of data packets that can be transmitted without confirmation. Duplex connections use the PAUSE signal for flow control and back pressure is used in semi-duplex systems to control the data rate.

Forwarding

The process whereby frames are relayed from one port to another in the switch.

Frame

A frame is a data transmission frame on the link layer (layer 2 in the OSI model), which includes the header and trailer information that the bits transmission layer requires for transmission. All frame formats together form the start delimiter of a frame, the destination and source address (destination and source address), the data itself of course and an errorchecking device (a frame check sequence). A maximum of 1500 bytes, with VPN-information of 1524 bytes of payload data per packet are possible in the Ethernet.

Full Duplex Operation

In full duplex operation or duplex operation both communications partners can communicate bi-directionally at the same time.

Gigabit Ethernet

A version of the Ethernet operating at a data transmission rate of 1000 Mbps.

Hub

A hub is data communications facility (DCE) that makes it possible to connect three or more devices in a star topology. Modern Ethernet installations hardly use hubs any more but use switches for this purpose because of the higher network output that occurs as a result and the probable transmission times.

IEEE

Association of American Engineers dealing with norm issues.

IGMP snooping

A switch equipped with IGMP (Internet Group Multicast Protocol) snooping can check whether join requests for a multicast group occur behind the ports. If this is the case, the port concerned is accepted in the forward table for this group. This reduces the load on the network because the switch does not flood all ports with multicast traffic.

Jabber

The jabber messaging protocol is a method in Ethernet networks that prevents a station from occupying the transmission medium for longer than permitted. The jabber function is an element of the IEEE 802.3 standard and provides an interrupt mechanism with which a MAU (Medium Attachment Unit) is interrupted during the transmission process when this transmits data on the cable for longer than 30 ms, or the standard defined packet length of 1518 bytes is exceeded. SQE (Signal Quality Error) signals are sent to the terminal equipment at the same time as the interruption and these cause the terminal equipment to terminate the data transfer. An error function in which a network component continuously sends meaningless signals to the network is also known as a jabber.

LAN

(Local Area Network) local network e.g. within a building.

Link Integrity Test

This test ensures that the Ethernet link is connected properly and that the signals are transmitted correctly. This is a helpful extra but does not guarantee that the link functions perfectly.

Link Layer

The link layer in the OSI reference model.

Link Pulse

The NLP pulse is a recognition pulse that is transmitted from 10Base-T-stations to 100Base-T stations for auto-negotiation. The NLP is a periodic pulse with an interval of 16 +/- 8ms.

LLDP - Link Layer Discovery Protocol

LLDP is a layer-2 protocol in compliance with the IEEE-802.1AB standard. It defines the possibilities for exchanging information with neighbouring devices. Information is periodically sent from supported devices to all devices on the network. Neighbouring devices which support LLDP are then able to receive this data independently.

M12 d-coded

M12, d-coded is a 4-pole plug-in connector variation for Industrial Ethernet according to ISO IEC 61076-2-101. It carries out data transmissions according to Cat.5 and guarantees class of protection IP 67.

MAC Address

The MAC address is the six byte long hardware address that uniquely identifies a node in the network. The MAC address is hard-coded onto a chip and cannot be manipulated. MAC addresses are assigned according to a particular key that includes unique adapter recognition, identification of the manufacturer and an ID for operating and managing.

Manchester Encoding

Signal encoding where the binary information is shown by the sign of a change in voltage within the bit time. This means that transmitters and receivers are very easy to synchronise, as the transfer in the middle of the bit time produces a reliable frequency. The first half of the bit time includes representing the complementary bit value to be transmitted, the second half represents the bit value (specified for IEEE 802.3 Ethernet and used in 10 Mbit networks).

MDI

The Physical Medium Attachment (PMA) and the Medium Dependent Interface (MDI) both form the actual transceiver (MAU) for the 802.3 standard. The MDI is the physical (electrical, optical) and mechanical interface up to the medium. In the different 802.3-types the interface has a different structure.

MDI-X

MDI stands for Medium Dependent Interface and refers to an Ethernet connection. Auto MDI/MDIX (autocrossing) makes the automatic modification of the transmitting and receiving line of a port possible, i.e. the connected Ethernet cable (crossed/uncrossed) and the configuration of the opposite station (MDI/MDIX) are recognised automatically and its own port is configured appropriately. So all auto MDI/MDIX ports can be used as uplink port.

Media converters

Media converters connect different types of cable to one another and the structure and maintain the functions of the network. In its simplest form a media converter is a quadrupole in the form of a box or network adapter card with a power supply. It modifies different cables – coaxial cables, TP-cables and FO cables – and different plugs to fit one another. In this way media converters can for example be used to modify 100Base-TX to 100Base-FX or to convert monomode fibres to multimode fibres. By using media converters the boundaries of network extension can be increased for example by using fibre-optic routes, on the other hand existing networks can be inexpensively integrated into new network concepts. The Weidmüller range includes media converters on copper-based 10Base-T or 100Base-TX on fibre-optic transmission and vice versa.

Multicast

Multicast is a type of transmission from a single point to several subscribers at the same time (group).

NIC

A network adapter board is a circuit board or another hardware component that connects the network directly with the terminal equipment. It can be a plug-in board for the bus system in the terminal equipment. The network adapter board is the physical interface to the communications network. It includes the appropriate jacks for connection to the physical medium.

OLE

Object Linking and Embedding (OLE) is an interface developed by Microsoft to link and embed data across different applications. In this way external, but OLE-compatible, texts, graphics or tables can be embedded in other OLE applications. Linking OLE-compatible data is carried out via a link to the appropriate file. The original file remains untouched. During embedding, a copy of the file is inserted into the document.

OSI

OSI are internationally-agreed standards which open systems should work with and define the rules for implementing these norms. Communications systems are a combination of network hardware and network and systems software in a group of networked devices that permit free exchange of information between these devices on the basis of joint protocol agreements and interfaces, independently of the type of these devices or how they are equipped. Systems that implement OSI protocols are an example of this. The OSI standards are freely available and not protected by licences.

Packet

A data packet is a defined arrangement of characters as part of the data network, that are treated as a unit in transmission services with data packet transmission. As well as the payload data, data packets also include control information for addressing, sequence of transmission, flow control and error adjustment at all protocol levels. A data packet can be of a predetermined or variable length, but a maximum length is specified. If the whole destination address is included in each data packet, it is called a datagramme. On the other hand in a virtual connection only the first data packet has the whole address, whereas in the following data packets an assignment is made to the appropriate connection.

Patch cable

In the floor distribution point the patch cable creates a flexible connection between floor distribution point and the horizontal wiring. Patch cables are FO cables or copper cables and are also called jumper cords. Patch cables should be very flexible, have a tight bending radius and if possible should max the fixed cable. Patch cables are taken into account in the ISO/IEC 11801 and EN 50173 standards, but are not included in the transmission features specified for the link classes. This should be changed when the cable standards are revised. The patch cable should then, at a length of up to 5 m, be part of a new definition, the channel specification and included in all the transmission features. The jumper cord and a connection cable, also 5 m long, will then be taken into account in this specification.

PAUSE

A single frame is sent via the full-duplex mode to the available stations, to signify that transmissions are to be reduced.

PHY

Physical Layer device. This term is mostly used for a transceiver in Fast and Gigabit Ethernet.

Physical Layer

The Physical Layer (PHY) is the top sublayer or physical layer consisting of the PMD-sublayer and the PHY-sublayer. The PHY-sublayer is underneath the MAC layer and encodes, decodes and synchronises the station with the transmission frequency and the regeneration of the transmission frequency.

Point-to-Point Technology

A type of connection where a connection is generated between two pieces of terminal equipment. Point-to-Point connections occur in the networked environment, in radio broadcasting in beam radio and in the service area. In networks, where point-to-point connections are concerned, instead of a user network interface, an interface to a central facility in the network can also be operated. The connection permanent or on demand.

Port

Connector on a hardware unit. Usually an input/output channel on the computer or other hardware unit such as modem, router, hub or multiplexer.

Port Mirroring

Port mirroring means that the data traffic of a switch port can be mirrored, in order to detect errors or to measure throughput, onto another port to which a management station can be connected.

PPPoE

The PPoE (Point to Point Protocol over Ethernet) was developed in order to connect components and LANs to the Internet. It takes advantage of the divided Ethernet environment together with the trusted and secure dialup-access user model from PPP. It allows individual PCs to establish PPP sessions to various target networks simultaneously. A LAN and multiple components can also establish multiple simultaneous PPP sessions for connection to various target networks.

Promiscuous Mode

The Promiscuous Mode is a particular receiver mode for network equipment. In this mode the device reads all the incoming data traffic sent to the network interface that has been switched to this mode and transmits the data to be processed to the operating system. Normally this device would only process packets directed to itself, which is done for example in Ethernet networks by evaluating the MAC address.

Propagation Delay

The delay is the time that the signal requires to go from one point in a transmission channel to another. Depending on the transmission medium, the delay is the speed of light, as in satellite transmission, or less when transmitting in data cables and FO cables. It does not depend on the speed of light and depends mostly on the dielectric constant of the medium or in FO cables on the refraction.

Protocol

A data transmission protocol establishes the rules for the exchange of information in the form of a directory. This includes all formats, parameters and specifications for a complete, perfect and effective transmission of data. Protocols include conventions on data formats, times and how errors are treated when exchanging data between computers. A protocol is a convention on setting up connections, monitoring connections and terminating connections. Different protocols are necessary in a data connection. Protocols can be assigned to each layer of the reference model. There are communication protocols for the bottom four layers of the reference model and higher protocols for control and data provisioning and its application.

Quality of Service (QoS)

QoS are all procedures that influence the flow of data in LANs and WANs so that the service arrives at the receiver in a particular quality. The ITU has developed a hierarchical QoS model, which takes both the technical aspects of the service into account and the availability and handling of the terminal equipment. The ITU defined three QoS classes on this basis.

Rapid Spanning Tree

The IEEE Standard Rapid Spanning Tree protocol (RSTP, IEEE 802.3w) is – apart from RapidRing™ – another option to provide redundancy in a network. The RSTP makes a structure similar to the network possible. In this way multi-redundancy can be achieved. Using RSTP in a network is not as simple as using RapidRing™, but RSTP does have a lot of interesting options.

Remote Management

Remote Management of a switch from every network station equipped with Telnet or web browsers. Remote Management assumes that each switch has its own IP address.

RJ45

The advantages of the RJ45 slot system are its compactness and simplicity. It is using for horizontal wiring and wiring work places. The RJ45 slot system is an eight pole miniature slot system for use in connections with SDP and UTP cables. The plug's eight contacts have serial numbers and are protected from corrosion and mechanical stress with a thin gold layer. The contact points are situated between guide rails the cable is connected with insulation piercing. On the side opposite to the contact side, the RJ45 plug has a fluke that locks the slot when sticking it into a RJ45 jack.

SC-plug-in connection

The SC-plug is a small polarised push/pull plug with high packing density. This LWL-plug is square and can be used for multimode fibres and monomode fibres. Typical insertion loss is at 0.2 dB to 0.4 dB, operating loss in monomode fibres at 50 dB and multimode fibres at least 40 dB. If monomode fibres with skew angle coupler are used instead of oval coupler, the operating loss increases to at least 70 dB. In the duplex type, as a SC-Duplex plug, the plug must be used where there is fibre-optic wiring to the terminal equipment. It is also increasingly used in new installations and in FCS and ATM applications.

Segment

The term segment has many meanings. In networks a segment is a network section delimited by bridges, routers or switches. Where LANs are concerned, a LAN segment or a collision domain is referred to. In token ring networks the transmission section between two neighbouring data stations is meant. In the TCP specifications, a segment describes a single information unit on the communication network.

Semi-duplex operation

The semi-duplex procedure allows bidirectional use of a single transmission line. The interfaces however can only either transmit or receive at any given time.

Slot time

This is an important Ethernet value. The slot time is twice the speed of the signal propagation time between the two networks that are farthest away from one another and the minimum packet length of 64 bytes or 512 bits. At a frequency clock speed of 10 Mbps, or a frequency clock cycle of a 100 ns, this produces a slot time of 51.2 µs. At 100 Mbps the frequency is 10 ns, so therefore the slot time for the same packet length is 51.2 µs. The greater the slot time, the poorer the Ethernet performance.

SNMP

The SNMP protocol means that central network management for many network components is possible. SNMP's main objectives are to decrease the complexity of the management functions, to extend the protocol and to be independent of any network components. The SNMP protocol supports monitoring, controlling and administration of networks. According to the SNMP architecture model a network is divided into network management stations (NMS) and network components. The network management stations carry out applications to monitor and control the network components. The network components have management agents, which carry out management functions.

Spanning Tree Protocol

-> see Rapid Spanning Tree.

ST connector

This LWL-plug (IEC-SC 86B) specified by AT&T is suitable for both monomode fibres and multimode fibres. The ST-plug is a commonly-available plug, used in LANs. It uses a bayonet lock as its locking system. In this LWL-plug the FO cables is guided through a ceramic or metal ferrule with a pin diameter of 2.5 mm and is prevented from twisting by a metal pin. The ceramic ferrule has been grounded to make its contact area convex. A spring means that there is constant contact to the front of the fibres to be connected.

Star topology

In star topology the transmission stations are connected in a star shape to a central node. Star topologies can only exchange data indirectly via the central node. There is a difference between active and passive star systems. In the former, the middle node is a computer that takes over relaying the messages. Its capacity determines the performance of the network. For example: private exchanges. Passive systems only have one node in the middle that combines the routes. This node does not have any exchange role, its purpose is signal regeneration. Passive star systems can for example be operated with TDMA, CSMA/CD or token access procedures.

Straight-through

A type of cable where the cable connections at both ends are the same. This type of cable is mostly used to connect devices such as switches with the station. Straight-through is the normal way of wiring cables – in contrast to crossover cables.

Station

Each hardware component in a network and the terminal equipment connected to the network. Server, router, telephone, fax machine etc and all communication devices connected with a network adapter (NIC).

Switching Hub

Switches are network components that have switching functions. These switching functions can also take place as exchange functions in long-distance networks and in local networks. In long-distance networks the local exchanges have local switches and the remote exchanges have central switches.

Topology

The configuration of the network nodes and connections is called the physical topology. The logical connections of network nodes possible are referred to as the logical topology. This states which node pairs can communicate with one another and whether they have a direct physical connection. The physical and logical topology does not have to be identical in networks. As a rule network topologies can be divided into two classes, where in the first class connections from one node to the next one are set up and in the second class all network nodes are directly connected to the transmission medium. The most well-known network topologies are ring topology, bus topology, tree topology and star topology. There is also meshed topology in long-distance networks

Transceiver

Transceiver is a compound word made up of transmitter and receiver and signifying a transmitting/receiving device. The transceiver implements network access of a station to the Ethernet and is sometimes called a MAU.

Trunking

The term trunking occurs in Ethernet networks but also in private exchanges and in mobile communication. In large Ethernet networks trunking is the parallel switching of several Ethernet links. The transmission via the parallel links is used to scale the bandwidth and is activated by the spanning tree algorithm. As the spanning tree protocol is unsuitable for granular bandwidth scaling, this technology has been standardised in the IEEE 802.3ad working group and called "Aggregation of multiple link segments".

Twisted-Pair Cable

A twisted-pair cable is a symmetrical copper cable consisting of two wires that are twisted together. The conductors consist of insulated copper conductors. In contrast to asymmetrical cables, such as coaxial cables, symmetrical cables do not have reference potential. The advantage is that wires can be arranged to prevent interference between the lines.

VLAN

Virtual networks or virtual LANs (VLAN) are a technological concept for implementing logical work groups within a network. This type of network is implemented using LAN-switching or virtual routing on the link layer or on the network layer.

Webserver

A web server is a server programme that provides files via HTTP protocol. These files are usually websites, pictures and style sheets. It makes no difference to the webserver what type of files it supplies. Each time a web site is requested (for example by clicking a link), the browser sends an HTTP query to a web server. This web server can then send the site requested back. The standard ports for the web server are 80 HTTP protocol and 443 for HTTPS, the encrypted HTTP (for example with SSL). Usually all page requests are saved in a log file, from where - by using log file analysis - different statistics on access can be generated. However these do not give the full picture, as HTTP is a connectionless protocol.

