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10Base2 - 10Mbit/s BASEband 200(185)m/segment

Ethernet topology based on coaxial wiring with a transfer rate of 10Mbit/s.
10Base2 is more commonly known as Cheapernet or thin Ethernet. Its wiring consists of coaxial cables with impedance of 50 Ohm in a thin a flexible design, whereby the individual stations are connection in a bus-type system. The beginning and the end of each section must be equipped with terminal resistors of 50 Ohm.

The transceivers are integrated in network cards, so that the bus must be routed directly to each workstation, where it is terminated by means of BNC T adapters. The attenuation of the cable and the often numerous plug-type connections limit the range of a 10Base2 segment to max. 185 m and 30 connections. Between two stations, not more than four repeaters might be installed.

The disadvantage of the physical bus topologies of Ethernets is due to the fact that a disruption in the cabling, e.g. a disconnected adapter, results in the shutdown of the entire network segment.

10Base5 - 10Mbit/s BASEband 500m/segment

10Base5 is the original Ethernet specification. In this case, the wiring consists of coaxial bus cables with an impedance of 50 Ohm and a max. permitted length of 500m (yellow cable). Due to the coaxial technology with two conductors (core and shield), both 10Base5 and 10Base2 allow only for half-duplex operation. The network stations are connected by means of external transceivers that receive the signal through vampire connectors directly from the bus cable without interrupting the cable by plug adapters or similar devices. The data is made available by the receiver through a 15-pin D-SUB adapter in a separate packets of send, receive and collision information. The terminal device is connected by means of an 8-wire TP cable of max. 50m in length. Maximum four repeaters are permitted between any two stations. This rule however only applies to repeaters in series. In the case of tree-type networks, an unlimited number of repeaters can thus be integrated.
Due to the use of a relatively high-quality cable without interruptions from connectors, these networks have the advantage that they allow for long segments and a large number of possible tie-ins per segment (max. 100).

The rather thick and hard to bend yellow cable and the additional costs for external transceivers are however considerable disadvantages of 10Base5 and have contributed to the popularity of 10Base2 systems.

10BaseT - 10Mbit/s BASEband twisted pair

With the definition of 10BaseT, the physical and the logical topology were separated. The cabling originates from a hub that provides the central active component. A category 3 cable of 100 Ohm with at least two pairs of wires is required, in which data is sent on separated send and receive wires. The connectors are 8-pin RJ45-type adapters in which the pairs are assigned to pins 1/2 and 3/6. The maximum length of a segment (= connection from the hub to the terminal device) is limited to 100m. 10BaseT technology was first introduced in the US, as it permitted the use of standard telephone wires for networking purposes. For Germany, this advantage was irrelevant, as the national telephone system was based on star-shape 4-conductor cables that did not conform to the requirements of category 3.
With 10BaseT, interruptions in cables or disconnected adapters, which in all other physical bus structures result in the complete shutdown of the affected segment, only affect the respective workstation.

100BaseT4 - 100Mbit/s BASEband twisted 4 pairs

100BaseT4 is specified as an Ethernet transmission with 100Mbit/s. Similar to 10BaseT, the system is based on a star structure with a central hub. Also here, category 3 cables with impedance of 100 Ohm and RJ45 adapters are used in a system of max. 100m length. The ten times greater data transfer rate of 100mbit/s combined with the category 3 bandwidth of 25 MHz is mainly achieved by the use of all four available conductors. With 100BaseT4, three pairs are always used simultaneously in each data direction.

100BaseTX - 100Mbit/s BASEband twisted 2 pairs

100BaseTX describes a 100Mbit/s data transfer with 2 wire pairs over a network with category 5 components. Cable, RJ45 wall sockets, patch panels, etc. must be dimensioned for a transmission frequency of at least 100MHz.

Terminal resistor

For coaxial network topologies such as 10Base5 or 10Base2, each network segment must be equipped with terminal resistors (terminators) at both ends. The resistance of the terminator must corresponds to the cable impedance. For 10Base5 and 10Base2, the resistance must thus be 50 Ohm.

Administrator

Person with unlimited access to all features of a local network; responsible for the administration and maintenance of the network. Among other tasks, the administrator assigns IP addresses within the network and must ensure that they are unique.

AUI - Attachment Unit Interface

Interface for the connection of an external Ethernet transceiver.

The data is made available by the receiver through a 15-pin D-SUB adapter in separate packets of send, receive and collision information. The terminal device is connected by means of an 8-wire TP cable of max. 50m in length.

In the past, the AUI interface was mainly used to connect terminal devices to 10Base5-transceivers (yellow cable), they are today increasingly applied for the connection of FOC transceivers (fiber-optic technology) and similar devices.

BNC - Bayonet Neill Concelmann

The BNC adapter is a bayonet locking connector for the linking of two coaxial cables. BNC adapters are used in 10Base2 networks for the physical linking of RG-58 cables (Cheapernet).

Bridge

Bridges connect subnetworks and determine, based on the Ethernet address, which packets are to pass the bridge and which are to be refused. The respective information is retrieved from the bridge tables. Depending

on the bridge type, this data must be manually entered by the administrator or is generated dynamically by the bridge.

See also Router

Broadcast

A broadcast is an all-call to all network stations. A typical broadcast application is the ARP request. However, other protocols - such as RIP - use broadcasts, too.

Broadcasts are not sent through routers or bridges.

Bus system

In a bus system, several terminal devices share a common data line (bus line). Since only one terminal device may use the line at any one time, bus systems require a protocol that controls the access rights to the line. Traditional bus systems are the Ethernet topologies 10Base2 and 10Base5.

Cheapernet

Alternative name for an Ethernet based on 10Base2.

Client

Workstations or applications that establish connections to servers to employ the respective services. The best known client is the web browser that connects to a web server. Basically all Internet services such as e-mail, FTP, Telnet, socket, etc. apply the client/server architecture.

The client is thereby the "caller", while the server expects the "calls" to answer them.

Com-Server

Small terminal devices in TCP/IP-Ethernet networks, providing interfaces for serial devices and digital I/O ports via the network. Com-Servers can be used as servers or clients respectively.

Ethernet

Ethernet is the currently most commonly used technology for local networks. There are three different Ethernet topologies: 10Base2, 10Base5 and 10BaseT; the transfer rate of Ethernets is 10 Mbit/s.

Ethernet address

Unchangeable physical address of a network component in an Ethernet.

Fast Ethernet

A fast Ethernet is basically an upgrade of a 10BaseT topology from 10Mbit/s to 100Mbit/s.

See also 100BaseT4 and 100BaseTX

Hub

A hub, also referred to as a star coupler, allows for the connection of multiple network stations in a star configuration. Data packets received at a port are forwarded to all other ports.
Apart from hubs for 10BaseT (10Mbit/s) and 100BaseTX (100Mbit/s), there are also autosensing hubs that automatically detect whether a connected terminal device operates at 10Mbit/s or 100Mbit/s. By means of autosensing hubs, it is thus possible to integrate older 10BaseT devices into new 100BaseT networks.

IP - Internet Protocol

Protocol that allows users to communicate with partners in other networks.

IP address

The IP address is a 32-bit numerical code that uniquely identifies each network station in the intranet or the Internet. It consists of a network code (net ID) and a host code (host ID).

ISDN - Integrated Services Digital Network

ISDN is the new standard of the telecommunications technology and has replaced the analog telephone network in Germany and other countries. ISDN integrates a number of services such as telephone, fax but also video conferencing and data transfer into one system. Therefore, ISDN is suitable for the transfer of voice, text, graphics and other digital data from one terminal device to an other.
Through the S0 interface of a basic connection, ISDN provides two basic channels (B channels) at 64kbit/s each and a control channel (D channel) at 16kbit/s. The digital connection to the end user has thus a combined transfer rate of 144kbit/s (2B+D). The two B channels can be used simultaneously for two different services at a bit rate of 64kbit/s.

LAN - Local Area Network

Local network within a defined area, using a fast transmission medium such as Ethernet

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Repeater

In local networks, repeaters are used to connect two Ethernet segments in order to expand the network across several sections. Repeaters forward data packets from one network segment to the next, by "boosting" the electrical signals according to the standards, whereby the content of the packets remains unchanged. When a repeater detects a physical error in one of the segments, the respective segment is disconnected ("partitioned"). The partitioning is automatically removed as soon as the error has been eliminated.
Maximum four repeaters are permitted between any two stations. This rule however only applies to repeaters in series. In the case of tree-type networks, an unlimited number of repeaters can thus be integrated.

Router

Routers are used to connect networks of different type. In contrast to bridges, the decision on which data packets are to be forwarded is not based on Ethernet address but on IP address instead.

See also Bridge

Server

Workstations or applications that accept connections established by clients and make the requested services available to them. The best known server is the web server that provides data to a web browser. Basically all Internet services such as e-mail, FTP, Telnet, sockets, etc. apply the client/server architecture.

The server expects "calls" to answer them, while the client is the "caller".

STP - Shielded Twisted Pair

Shielded data cable containing twisted pair wires.

See also Twisted pair

Switch

Similar to a hub, a switch allows for the connection of several workstations in a star configuration. Switches combine the functions of a hub with those of a bridge: A switch is able to "memorize" the Ethernet address of a network station connected to a port and thus only forwards data packets destined for this address to the respective station. This does not apply to broadcast messages that are forwarded to all ports. (Switches and bridges differ in this regard, as bridges generally don't forward broadcast messages).
In addition to switches for 100BaseTX (100Mbit/s) networks, there are also autosensing switches that automatically detect whether a connected terminal device operates at 10Mbit/s or 100Mbit/s. Autosensing switches thus allow for the integration of older 10BaseT devices into new 100BaseT networks.

TCP - Transmission Control Protocol

TCP is used in conjunction with IP and, firstly establishes the connection of the station during the data transfer, while it also checks the integrity of the data and sequence of the packets.

Transceiver

The term transceiver is a combination of transmitter and receiver. A transceiver implements the physical network access of a station to the Ethernet. In the modern 10Base2 and 10BaseT Ethernet topologies, it is integrated in the network card. Only in 10Base5 (*see also* AUI connection) Ethernets is the transceiver connected directly to the network cable as an external component.

Twisted pair

Data cable containing twisted pair wires. The twisting of pairs of wires greatly reduces crosstalk between the wire pairs in the cable. Twisted pair cables are available as unshielded UTP cables (unshielded twisted pair) and shielded STP cables (shielded twisted pair).

Twisted pair cables are mainly used in network technology and are classified according to their maximum transmission frequencies. Today, there are basically only two types used:
- Category 3 cables cater for a maximum transmission frequency of 25MHz, which is sufficient for use in 10BaseT and 100BaseT4 networks.
- Category 5 cables have a maximum transmission frequency of 100MHz and are therefore suitable for all modern network topologies.

UTP - Unshielded Twisted Pair

Not shielded cable containing twisted pair wires.

See also Twisted pair