

High Speed Ethernet

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IEEE 802.3 100-Mbps Specifications (Fast Ethernet)

IEEE 802.3 100BASE-T Physical Layer Medium Alternatives

	100BASE-TX		100BASE-FX	100BASE-T4
Transmission Medium	2 pair, STP	2 pair, Category 5 UTP	2 optical fibers	4 pair, Category 3, 4, or 5 UTP
Signaling Technique	MLT-3	MLT-3	4B5B, NRZI	8B6T, NRZ
Data Rate	100 Mbps	100 Mbps	100 Mbps	100 Mbps
Maximum Segment Length	100 m	100 m	100 m	100 m
Network Span	200 m	200 m	400 m	200 m

- All of the 100BASE-T options use the IEEE 802.3 MAC protocol and frame format.
- 100BASE-X - uses two physical links between nodes: one for transmission and one for reception
- 100BASE-T4 dictates the use of four twisted-pair lines between nodes, with the data transmission making use of three pairs in one direction at a time
- All use a star topology

Full duplex operation

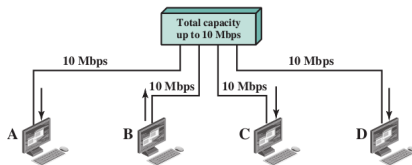
- Traditional Ethernet is half duplex
- If a 100-Mbps Ethernet ran in full-duplex mode, the theoretical transfer rate becomes 200 Mbps
- To operate in full duplex mode
 - — the attached stations must have full duplex adapter cards
 - — central point in the star wire cannot be a simple multiport repeater but rather must be a switching hub
 - — there are no collisions and CSMA/CD is no longer required
 - — the same 802.3 MAC frame format is used and the attached stations can continue to execute the CSMA/CD algorithm (there will be no collisions to detect)

Mixed configuration

- Possible to support a mixture of existing 10-Mbps LANs and newer 100-Mbps LANs.
- the 100-Mbps technology can be used as a backbone LAN to support a number of 10-Mbps hubs.
- — Many of the stations attach to 10-Mbps hubs using the 10BASE-T standard.
- — These hubs can be connected to switching hubs, conforming to 100BASE-T

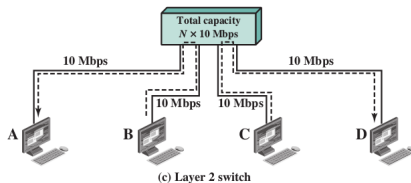
Gigabit Ethernet

- Gigabit Ethernet retains the previous CSMA/CD protocol Ethernet format
- It enhances CSMA/CD for a shared medium hub:
 - — Carrier extension: extends MAC frames to at least 4096 bits (from 512 bits). This is so that frame transmission time $>$ propagation time
 - — Frame bursting: Multiple short frames can be transmitted consecutively, up to a limit, without relinquishing control for CSMA/CD between frames. This is to avoid the overhead of carrier extension

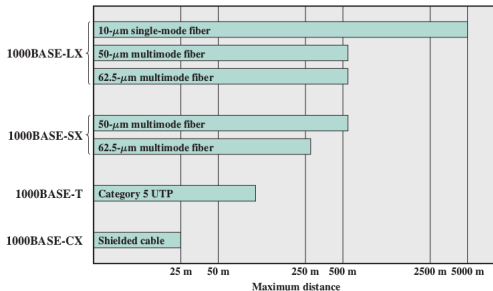


Gigabit Ethernet

- For a switching hub, the carrier extension and frame bursting features are not needed. Why?

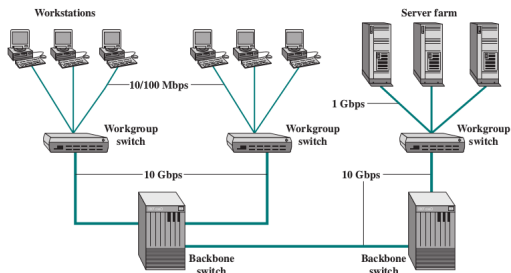


Gigabit Ethernet - Physical Layer



10 Gbps Ethernet

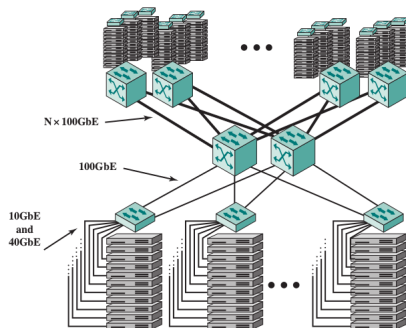
Example 10-Gigabit Ethernet configuration



Spans distances from 300m to 40km

40 Gbps and 100 Gbps Ethernet

Example 100-Gbps Ethernet Configuration for Massive Blade Server Site



Spans distances up to 40km