
Ethernet Technologies

Ethernet II Frame:

7 bytes	1 byte	6 bytes	6 bytes	2 bytes	64-1500 bytes	4 bytes
Preamble	Start of Frame Delimiter	Destination Address	Source Address	Type	Data	FCS Frame Check Sequence

802.3 Frame:

7 bytes	1 byte	6 bytes	6 bytes	2 bytes	46-1500 bytes	4 bytes
Preamble	Start of Frame Delimiter	Destination Address	Source Address	Length	802.3 Header and Data	FCS Frame Check Sequence

Preamble – Synchronization. They give components in the network time to detect the presence of a signal and read the signal before the frame data arrives.

Start of Frame (SOF) – Start of Frame sequence

Destination and Source Addresses – Physical or MAC addresses. The source address is always a unicast address, the destination address can be unicast, multicast, broadcast.

Length – Indicates the number of bytes of data that follow this field.

Type – Specifies the upper layer protocol to receive the data.

Data – User or application data. Ethernet II expects a minimum of 46 bytes of data.

If the 802.3 frame does not have a minimum of 64 bytes, padded bytes are added to make 64.

Frame Sequence Check (FCS) – CRC value is used to check for damaged frames. This value is recalculated at the destination network adapter. If the value is different from what is transmitted, the receiving network adapter assumes that an error has occurred during transmission and discards the frame.

Ethernet Cabling:

Type	10Base5	10BaseT	100BaseFl	100BaseTX	100BaseFX	1000BaseT
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Media	Thick Coax RG-8, RG-11	UTP Cat 3, 4, 5+ 4 Pair cable, Uses 2 pair	62.2/125 micron multi- mode fiber	UTP Cat 5+ 4 Pair cable, Uses 2 pair	62.2/125 micron multi- mode or single mode fiber	UTP Cat 5+ 4 Pair cable, Uses 2 pair
Max Segment Length	500 Meters	100 Meters	2000 Meters	100 Meters	400/2000 Meters (full/half duplex) 10,000 Meters (single mode)	100 Meters
Physical Topology	Bus	Star, Extended Star	Star	Star	Star	Star
Logical Topology	Bus	Bus	Bus	Bus	Bus	Bus
Transfer Rate	10Mbps	10Mbps	100Mbps	100Mbps	100Mbps	1000Mbps

EIA/TIA Horizontal Cabling:

(Using CAT5 cabling in an Ethernet network)

3 Meters – 90 Meters – 6 Meters

3 Meters: Work area patch cable. From computer to wall	90 Meters: What is considered the Horizontal Cabling. From wall outlet to the patch panel in the MDF or IDF (Server Room).	6 Meters: The patch cable that cross connects a patch panel
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Collision Domains - A collision domain is defined as a network segment that shares bandwidth with all other devices on the same network segment. When two hosts on the same network segment transmit at the same time, the resulting digital signals will fragment or collide, hence the term collision domain. It's important to know that a collision domain is found only in an Ethernet half-duplex network

Broadcast Domain - A broadcast domain is defined as all devices on a network segment that hear broadcasts sent on that segment.

All devices plugged into a **hub** are in the same collision domain and the same broadcast domain.

All devices plugged into a **switch** are in separate collision domains but the same broadcast domain. Although, you can buy special hardware to break up broadcast domains in a switch, or use a switch capable of creating VLANs. VLANs breakup broadcast domains.

Hubs and **Repeaters** extend collision and broadcast domains.

Switches, Bridges and **Routers** break up collision domains.

Routers (and Switches using VLANs) break up broadcast domains.

Device	OSI Layer	Filtering	Breaks up Collision Domains	Extends Collision Domains	Breakups Broadcast Domains	Extends Broadcast Domains
Hubs	1	No		X		X
Repeaters	1	No		X		X
Bridges	2	Yes	X			X
Switches	2	Yes	X			X
Switches using VLANs	2	Yes	X		X	
Routers	3	Yes	X		X	