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RTMENT OF INFORMATION TECHNOLOGY

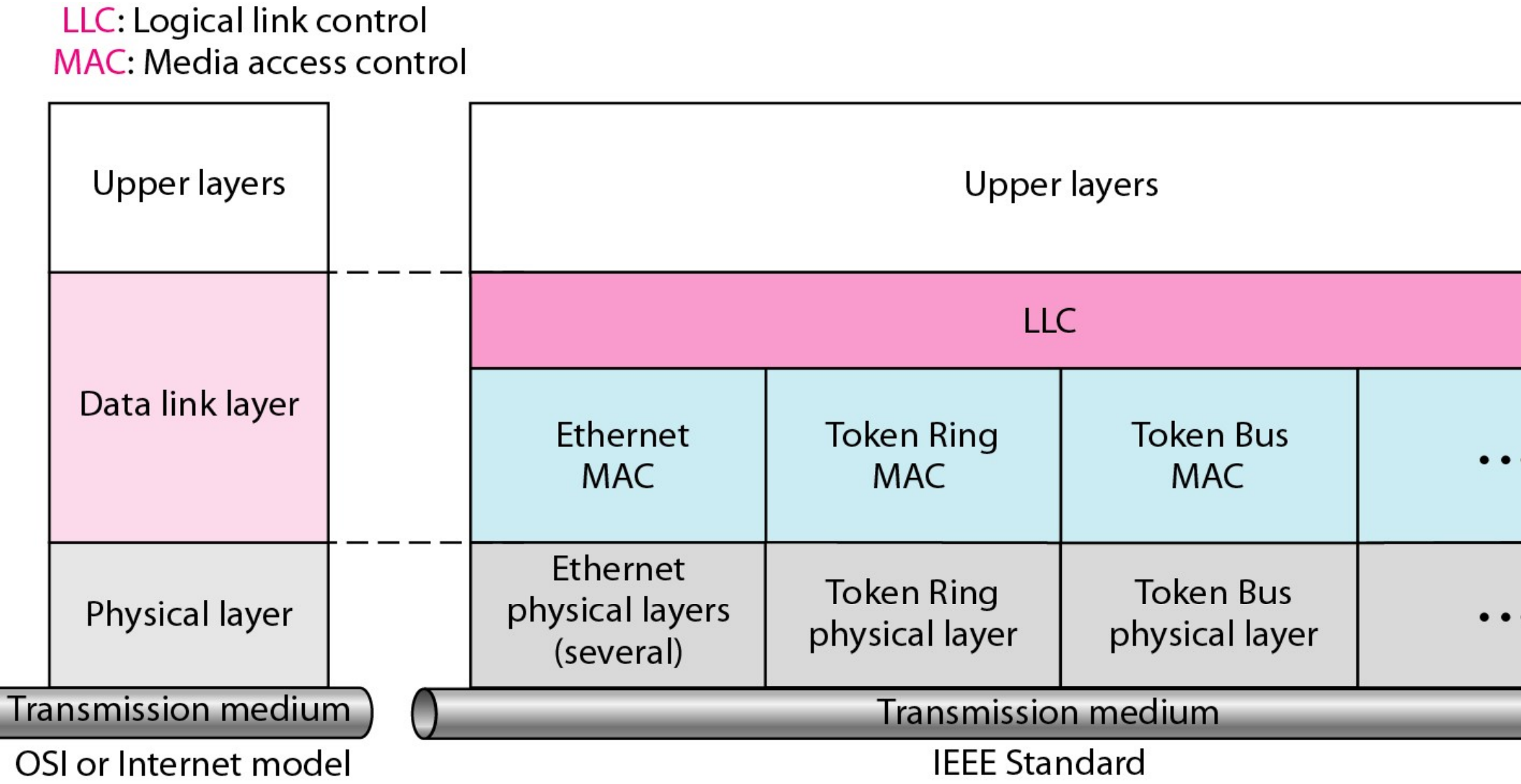
19CSB302 – COMPUTER NETWORKS

III YEAR V SEM

IT 2 – DATA LINK LAYER AND MEDIA ACCESS

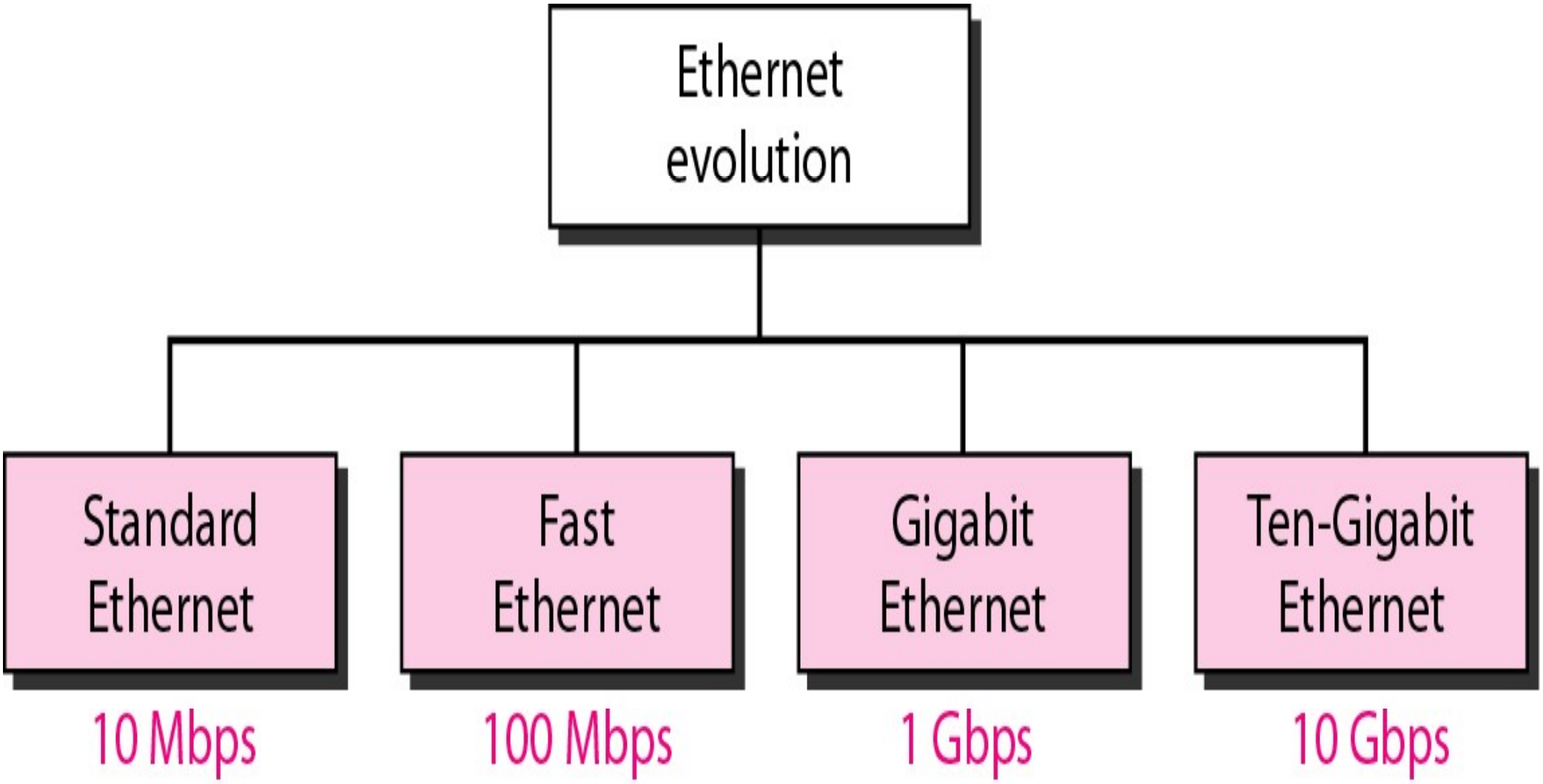
TOPIC 12 –Ethernet (IEEE 802.3)

985, the Computer Society of the IEEE started a project,
ect 802, to set standards to enable intercommuni
ng equipment from a variety of manufacturers. Project
y of specifying functions of the physical layer and th
ayer of major LAN protocols.


LLC: Logical link control
MAC: Media access control
Upper layers
Data link layer
Physical layer
Transmission medium
OSI or Internet model
Upper layers
LLC
Ethernet MAC
Token Ring MAC
Token Bus MAC
Ethernet physical layers (several)
Token Ring physical layer
Token Bus physical layer
Transmission medium
IEEE Standard

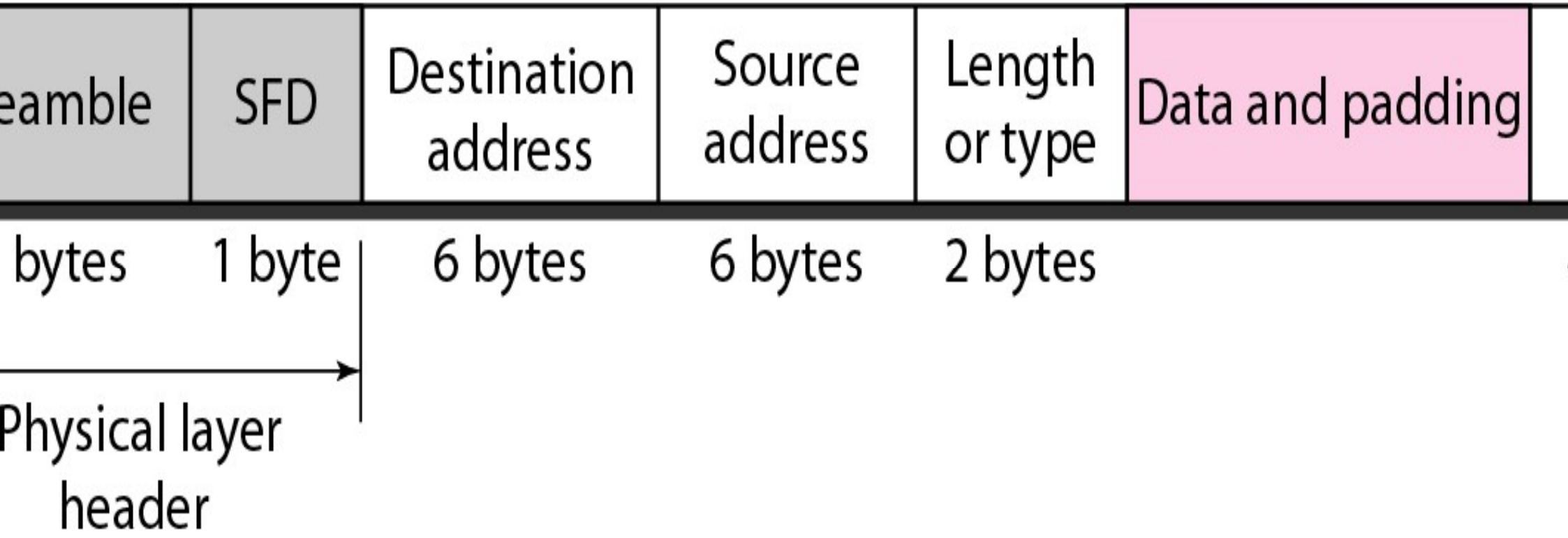
Standard Ethernet

riginal Ethernet was created in 1976 at Xerox's Pal
rch Center (PARC). Since then, it has gone through
tions. We briefly discuss the Standard (or tradit
et in this section.


Ethernet evolution
Standard Ethernet
Fast Ethernet
Gigabit Ethernet
Ten-Gigabit Ethernet
10 Mbps
100 Mbps
1 Gbps
10 Gbps

mble: 56 bits of alternating 1s and 0s.

Start frame delimiter, flag (10101011)



Frame Length & Address

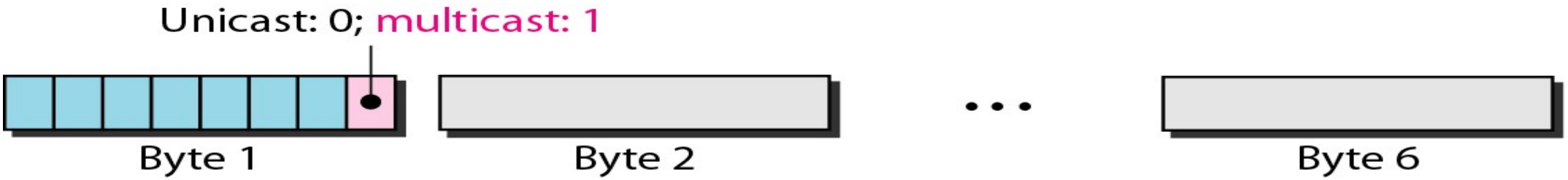
Frame length:

Minimum: 64 bytes (512 bits)

Maximum: 1518 bytes (12,144 bits)

06 : 01 : 02 : 01 : 2C : 4B

6 bytes = 12 hex digits = 48 bits



The least significant bit of the first byte defines the type of address.
If the bit is 0, the address is unicast; otherwise, it is multicast.

The broadcast destination address is a special case of the multicast address in which all bits are 1s.

Example

he type of the following destination addresses:

:10:21:10:1A b. 47:20:1B:2E:08:EE

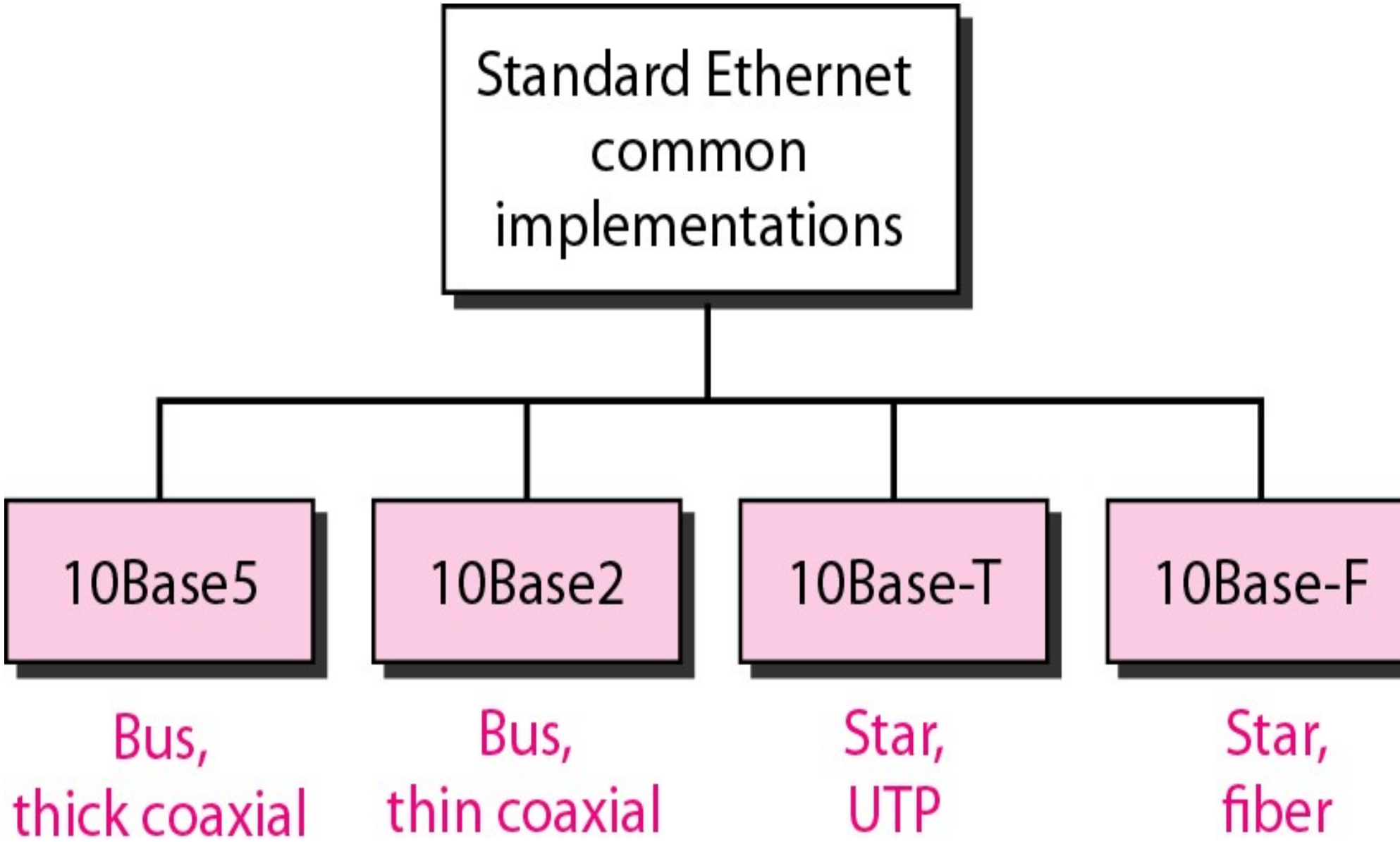
FF:FF:FF:FF

he type of the address, we need to look at the second
mal digit from the left. If it is even, the address is unicas
d, the address is multicast. If all digits are F's, the addre
cast. Therefore, we have the following:

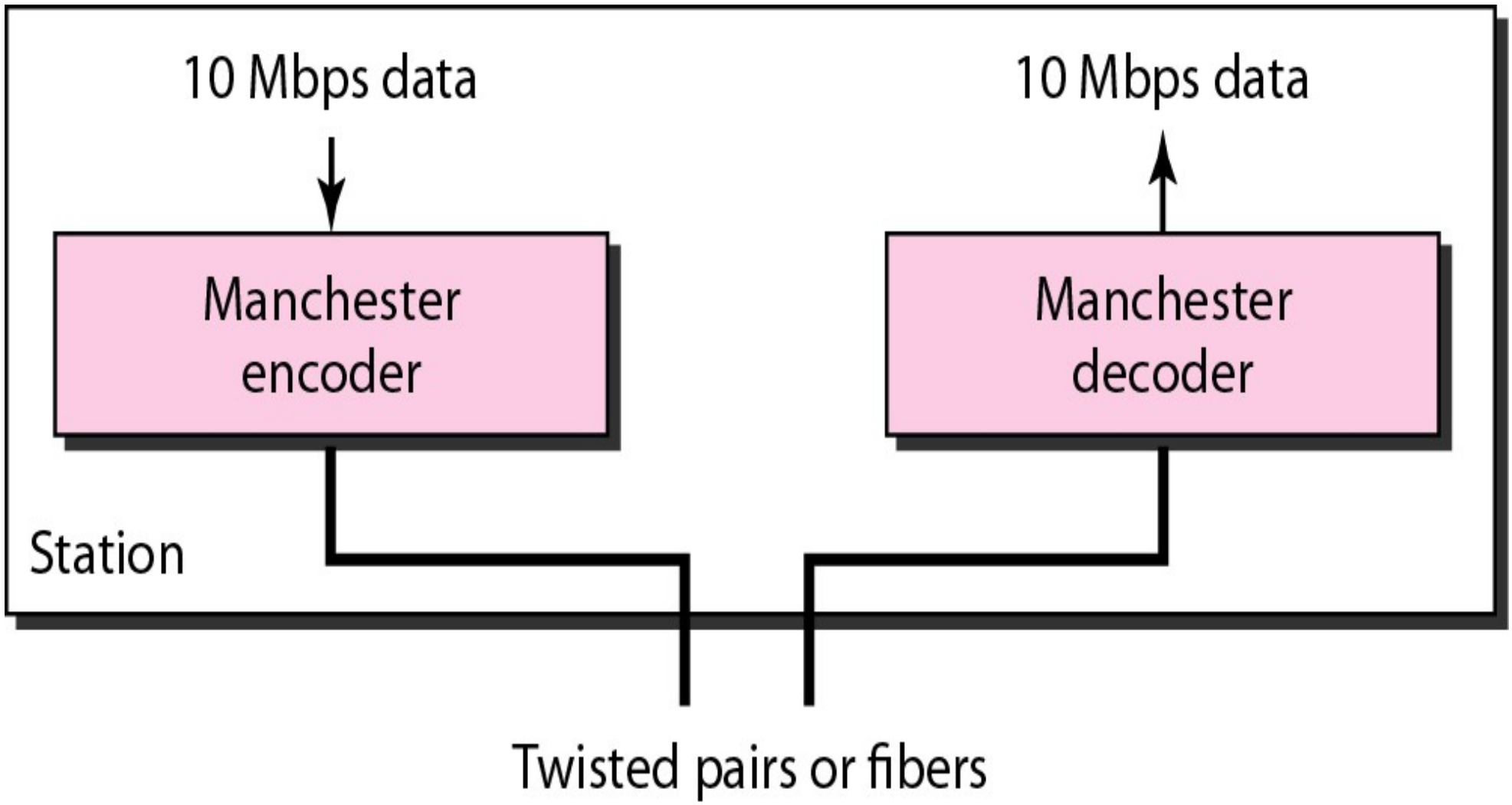
s a unicast address because A in binary is 1010.

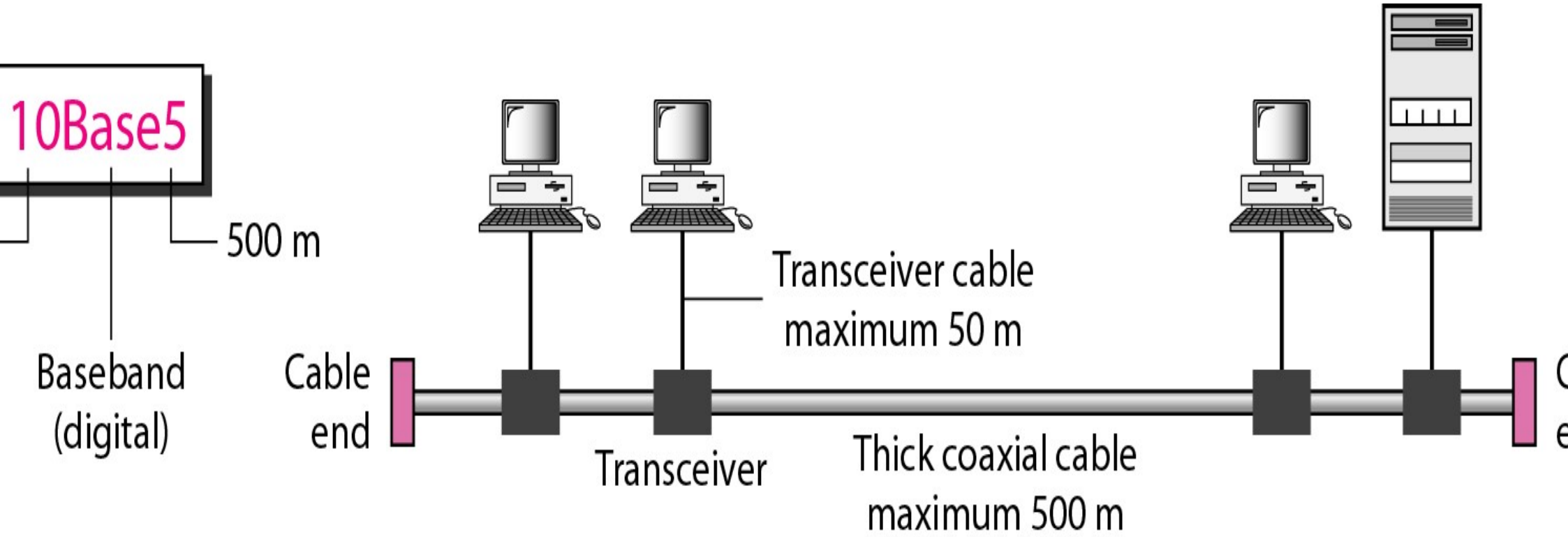
s a multicast address because 7 in binary is 0111.

s a broadcast address because all digits are F's.

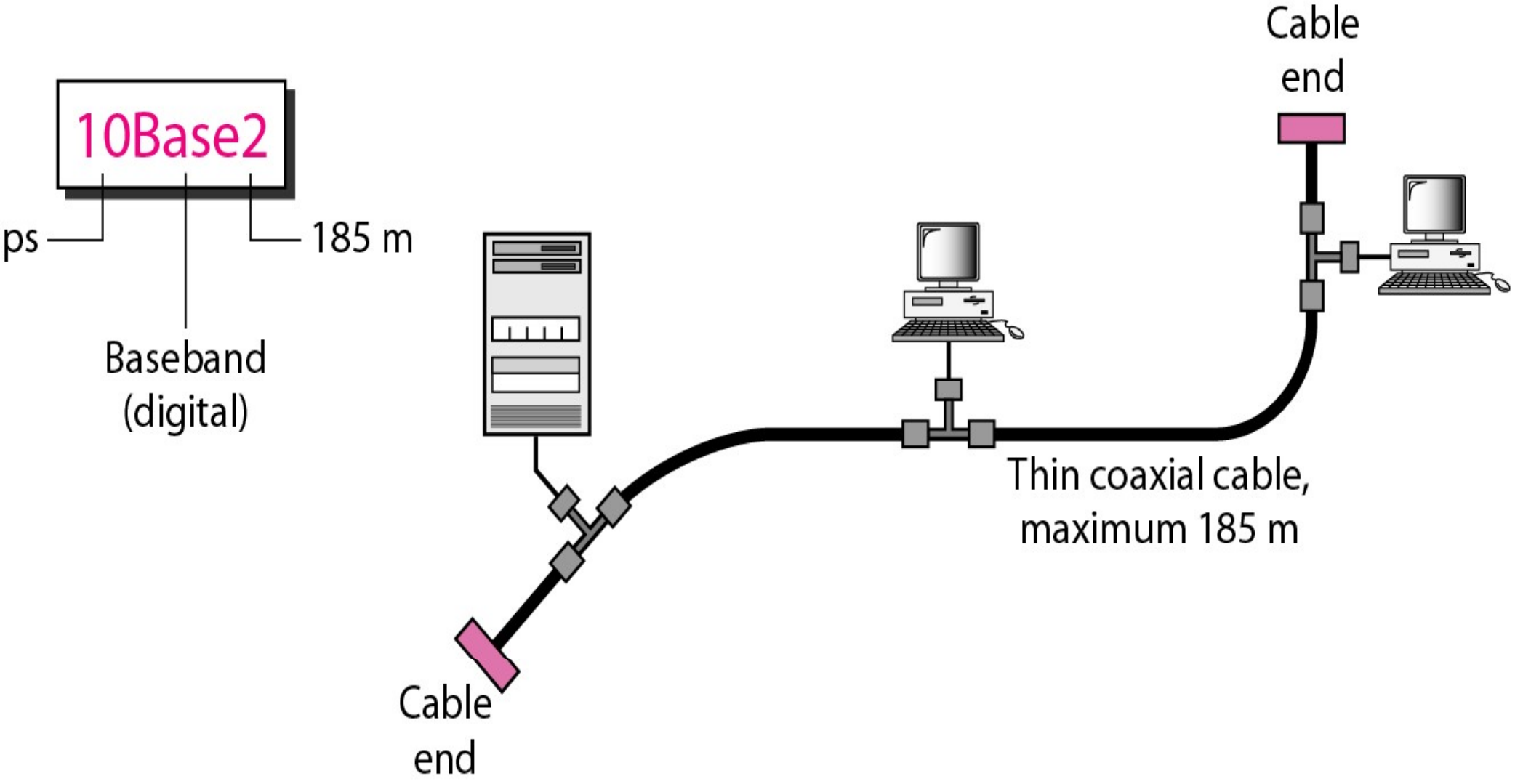

Standard Ethernet common implementations
10Base5
10Base2
10Base-T
10Base-F
Bus, thick coaxial
Bus, thin coaxial
Star, UTP
Star, fiber

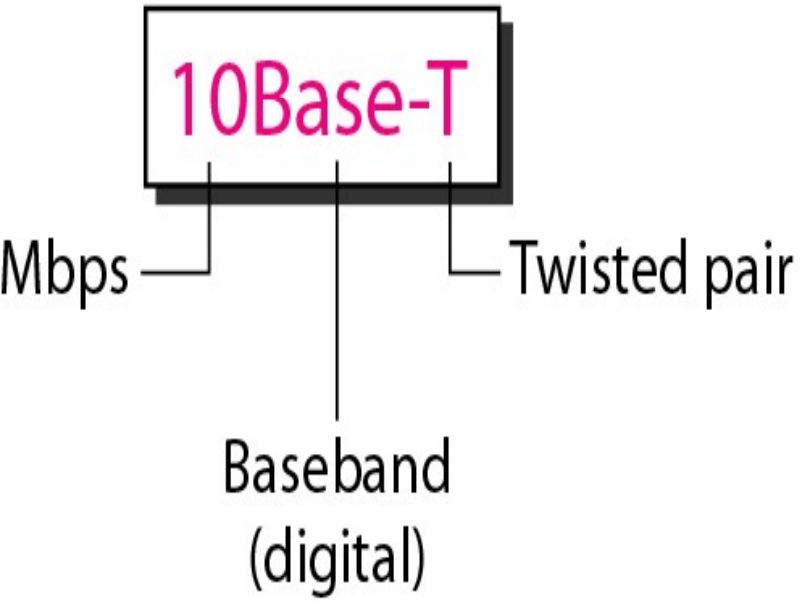
Encoding in a Standard Ethernet implementation

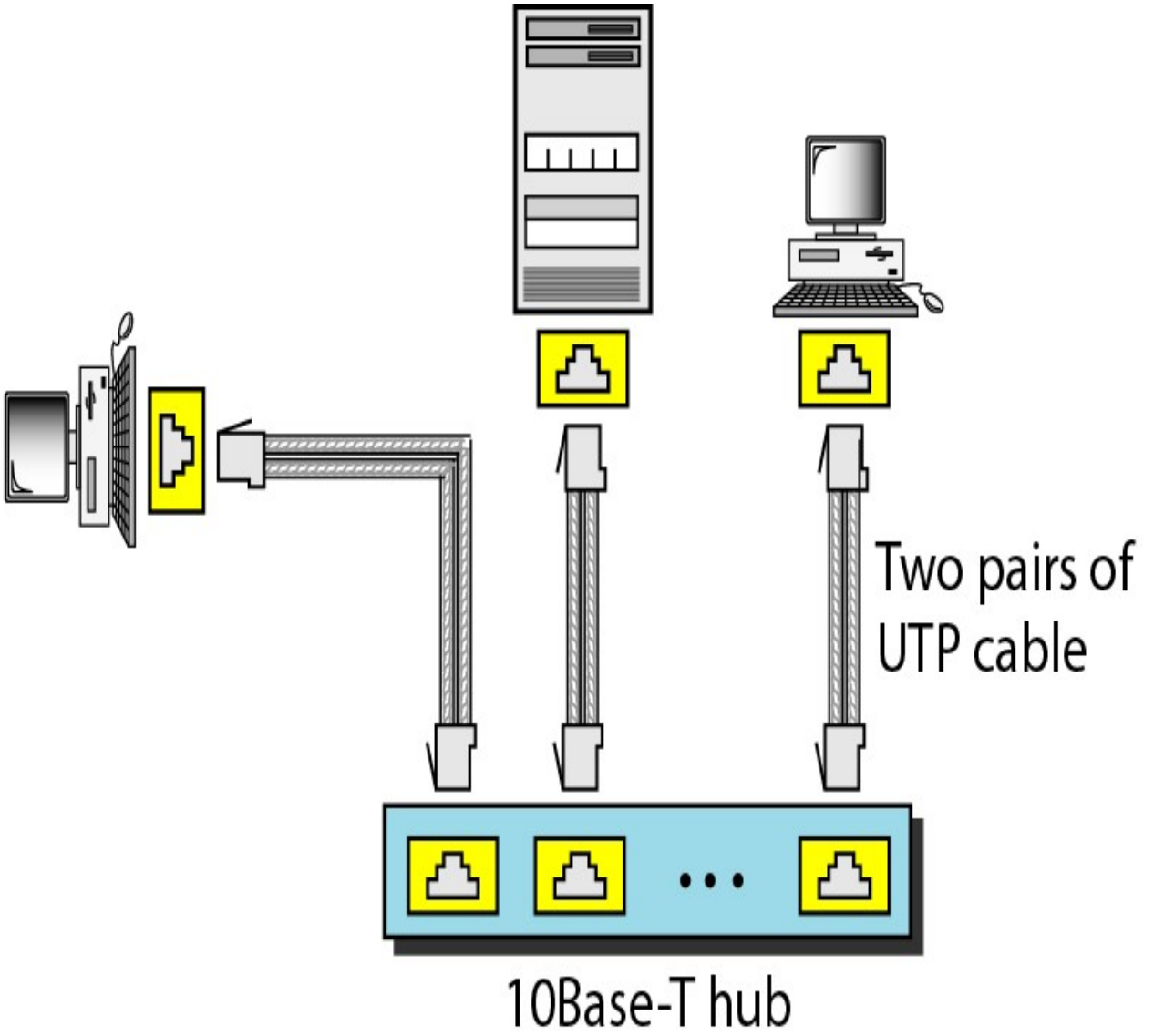



10Base5
500 m
Baseband
(digital)
Cable
end
Transceiver cable
maximum 50 m
Transceiver
Thick coaxial cable
maximum 500 m

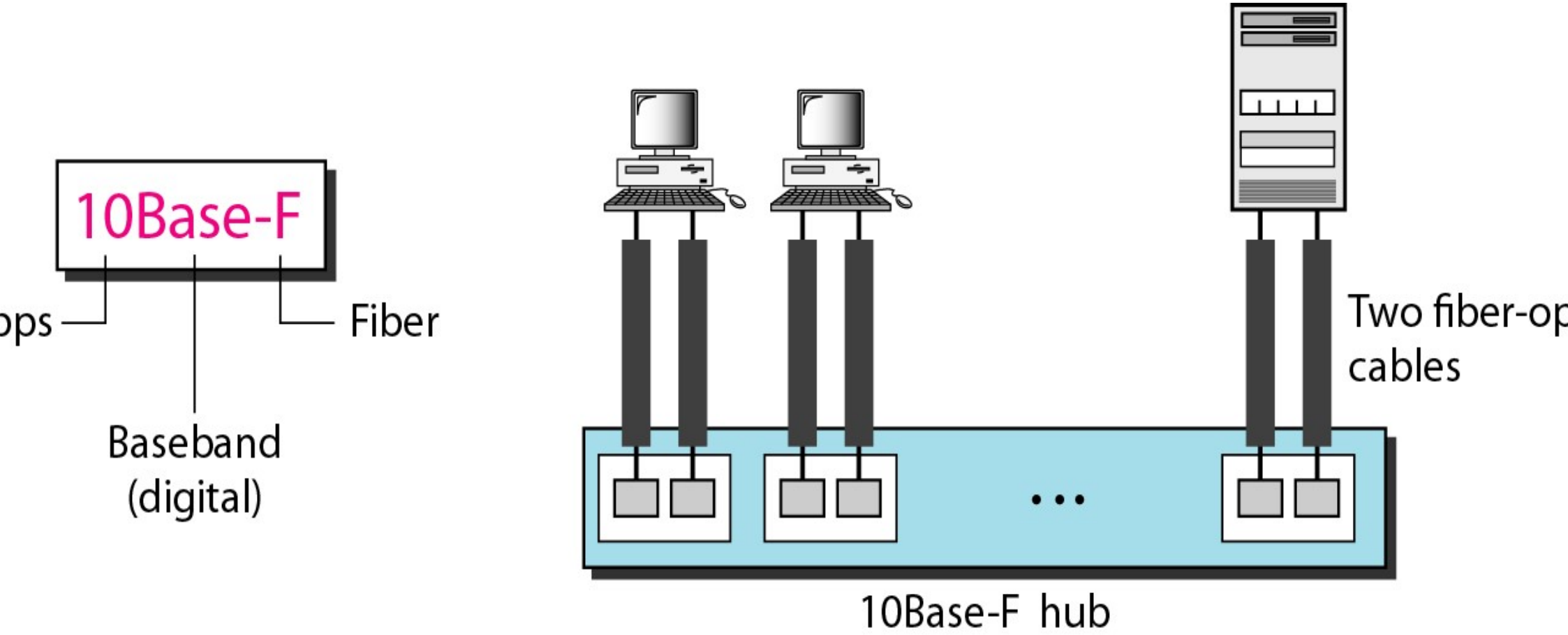
10Base2 implementation




10Base-T
Mbps
Baseband
(digital)
Twisted pair


Two pairs of
UTP cable
10Base-T hub

10Base-F implementation

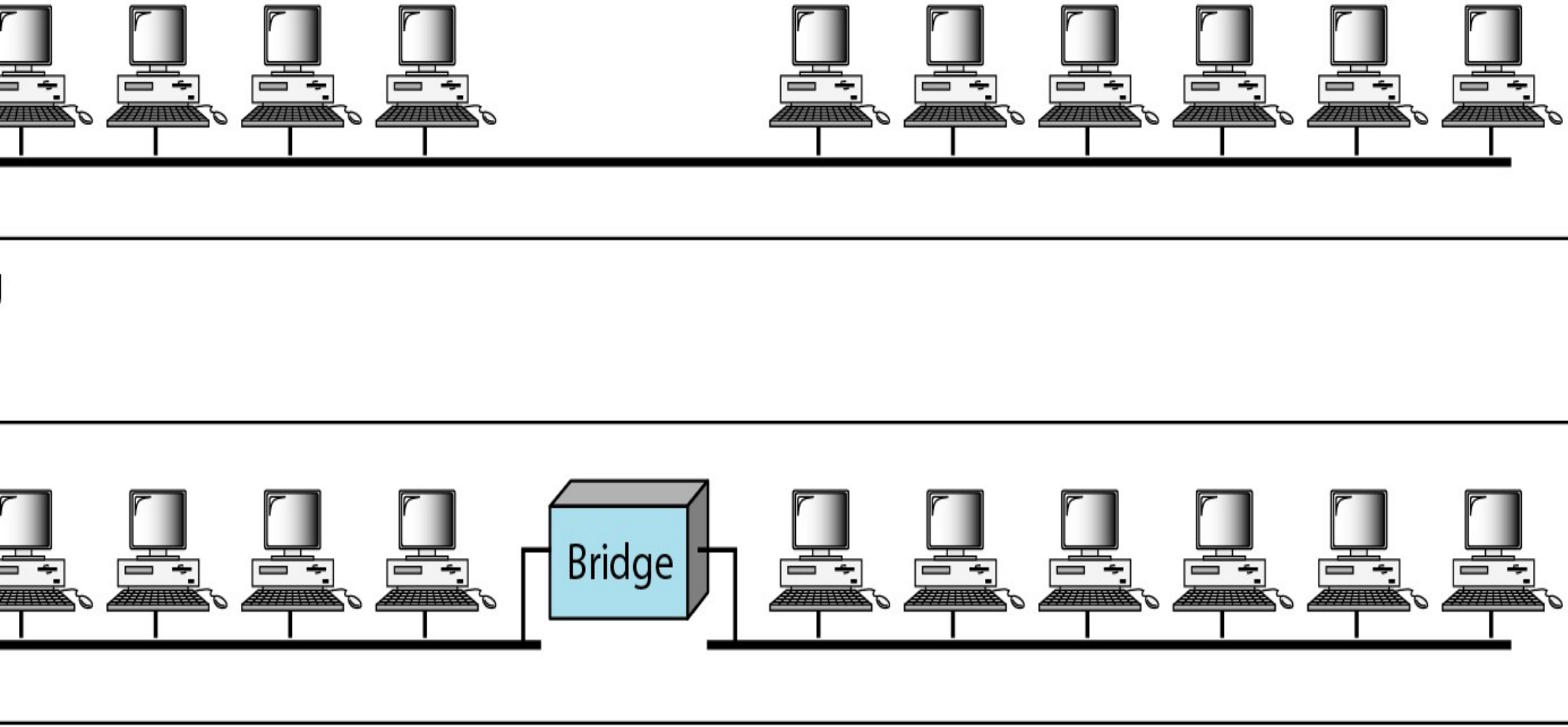


Characteristics	*10Base5*	*10Base2*	*10Base-T*	*10Base-F*
edia	Thick coaxial cable	Thin coaxial cable	2 UTP	2 Fiber
aximum length	500 m	185 m	100 m	2000 m
ne encoding	Manchester	Manchester	Manchester	Manchester

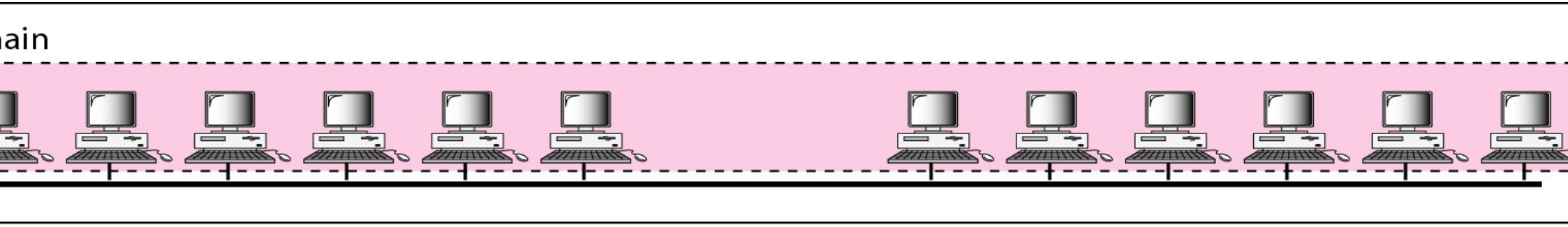
Changes in the Standard

-Mbps Standard Ethernet has gone through several c
moving to the higher data rates. These changes a
the road to the evolution of the Ethernet to b
ible with other high-data-rate LANs.

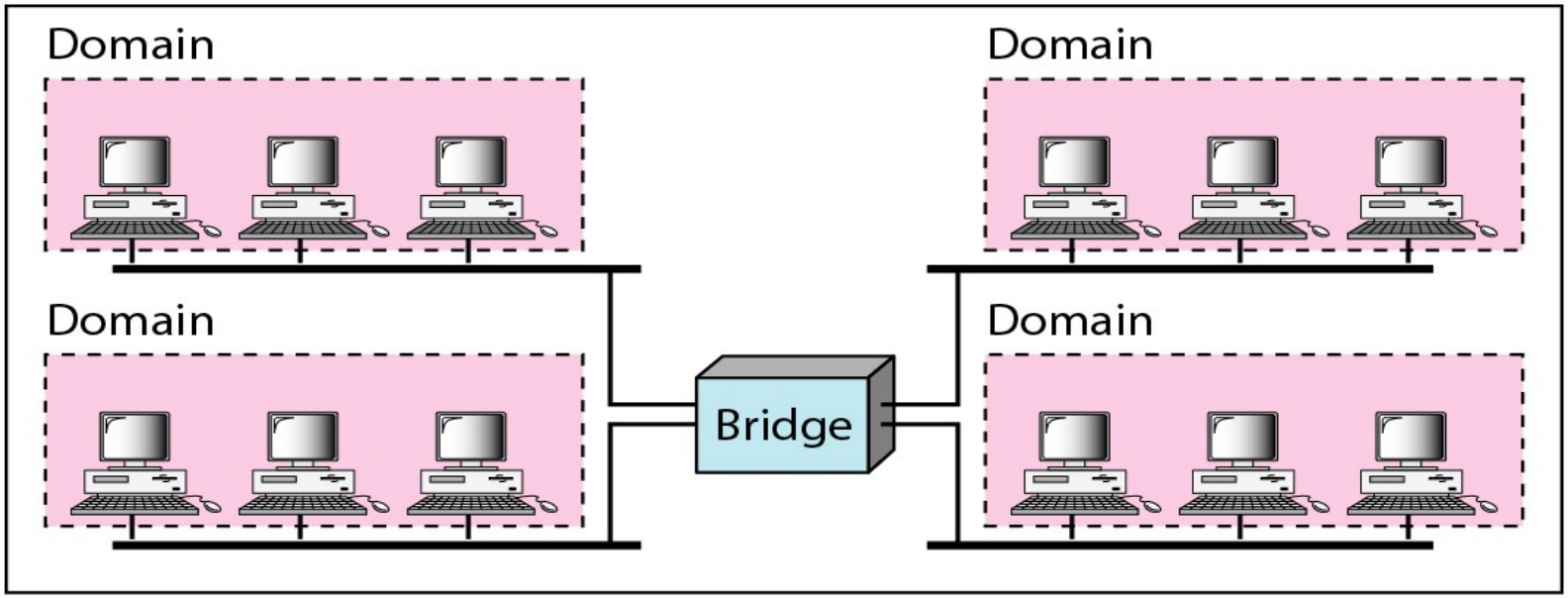
- Bridged Ethernet
- Switched Ethernet
- Full-Duplex Ethernet


Bridge

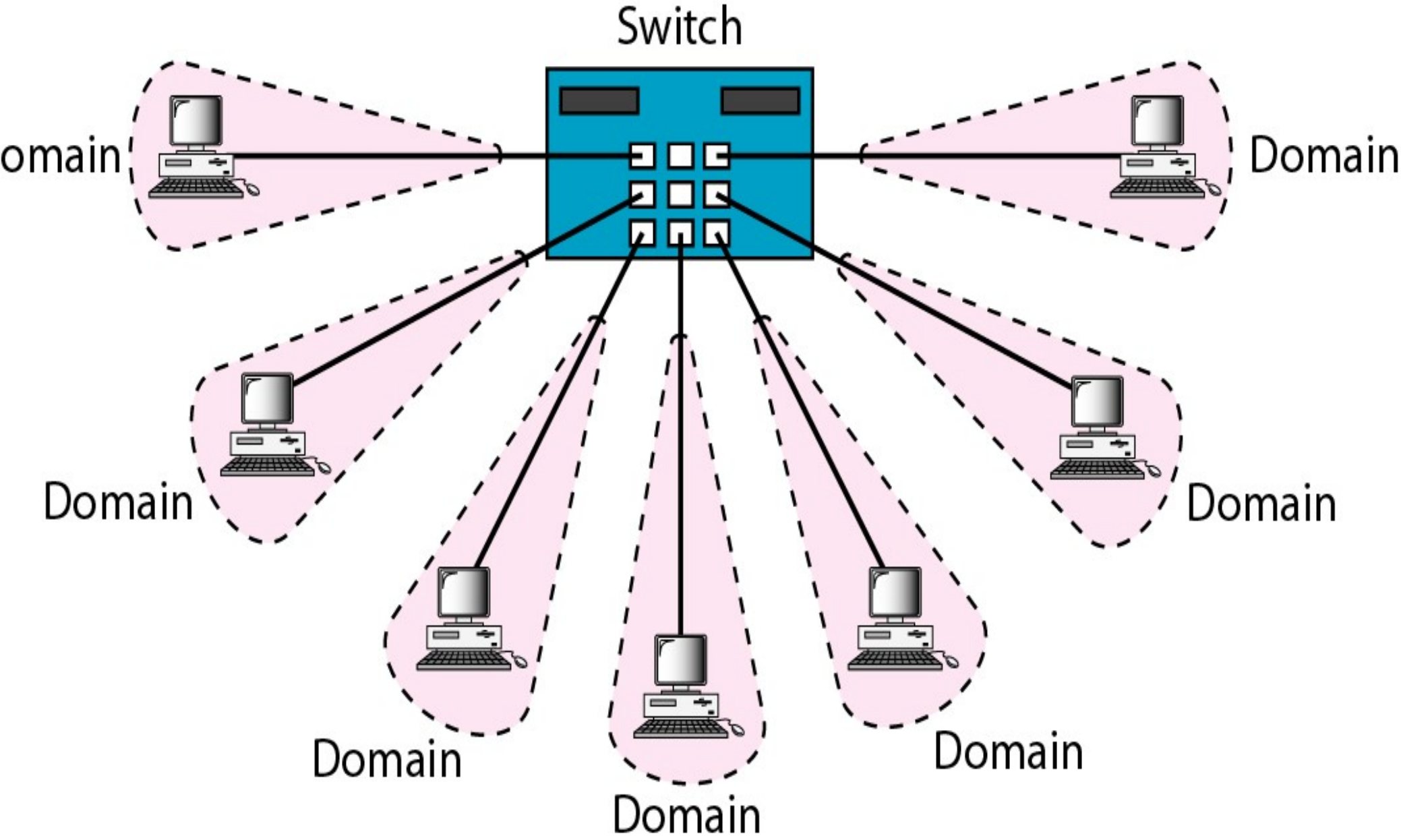
network



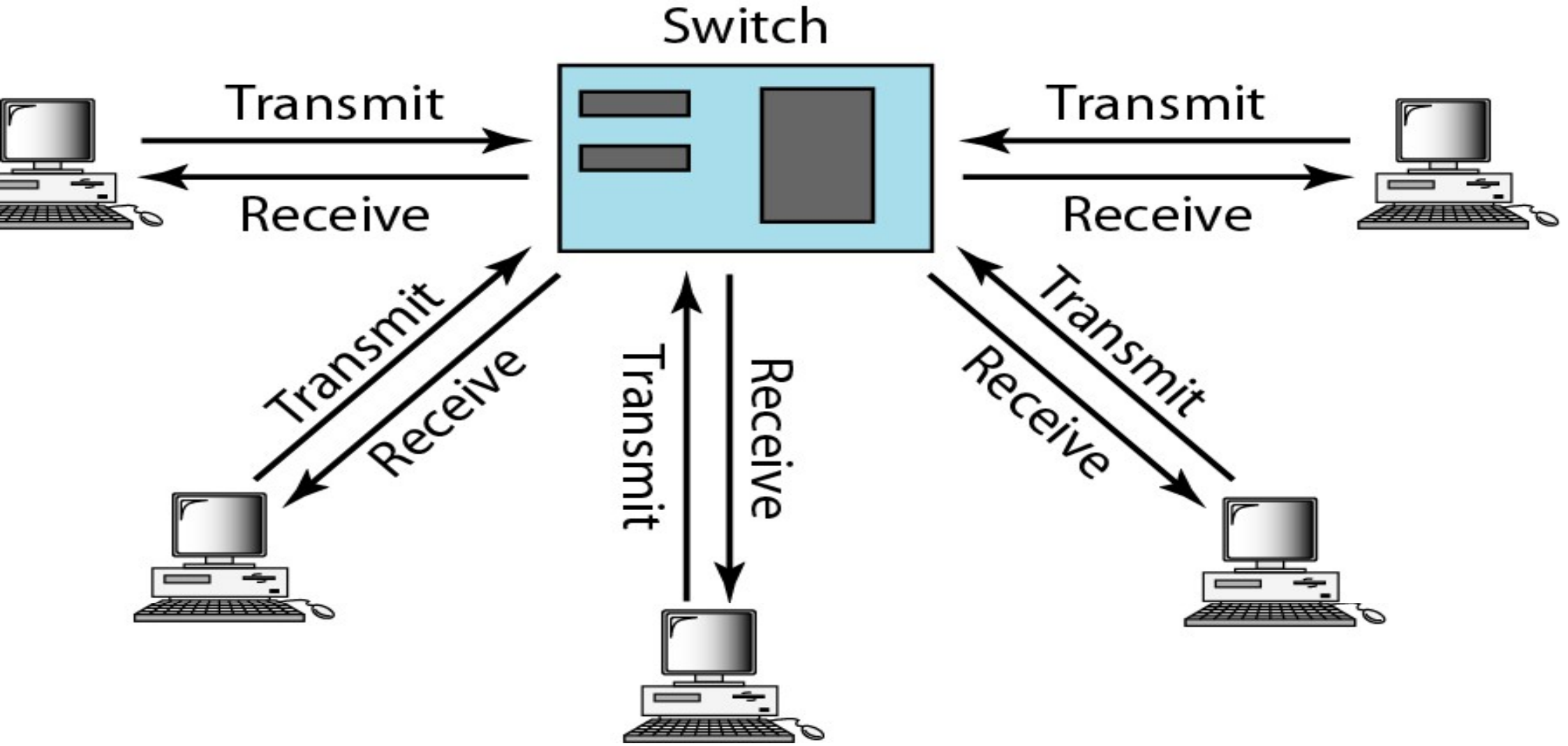
a. Without bridging



b. With bridging

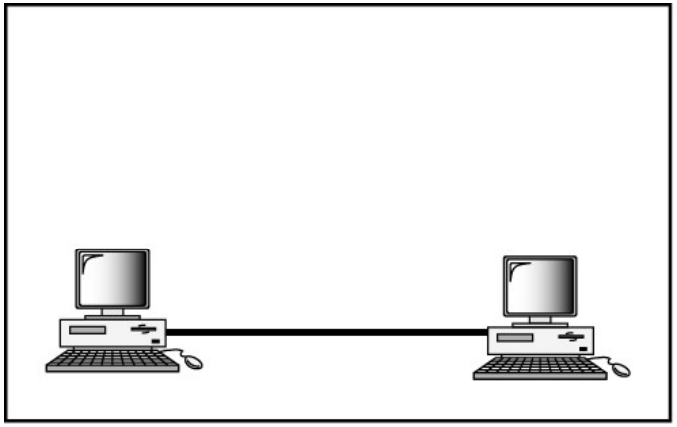

Switch
omain
Domain
Domain
Domain
Domain
Domain
Domain
Domain

Full-duplex switched Ethernet

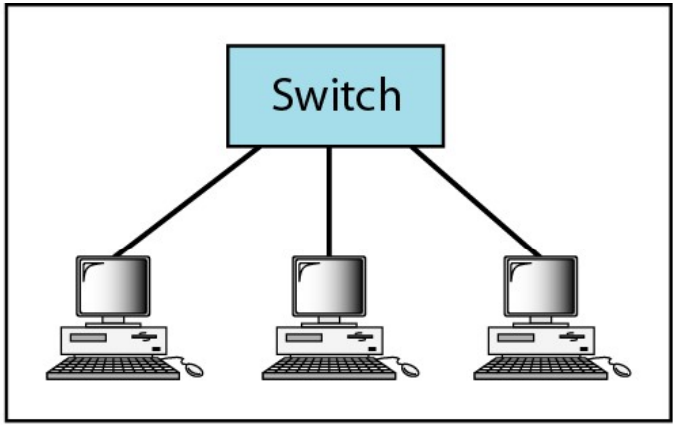


Topology

et was designed to compete with LAN protocols suc
ber Channel. IEEE created Fast Ethernet under the n
t Ethernet is backward-compatible with Standard Ethe
ansmit data 10 times faster at a rate of 100 Mbps.

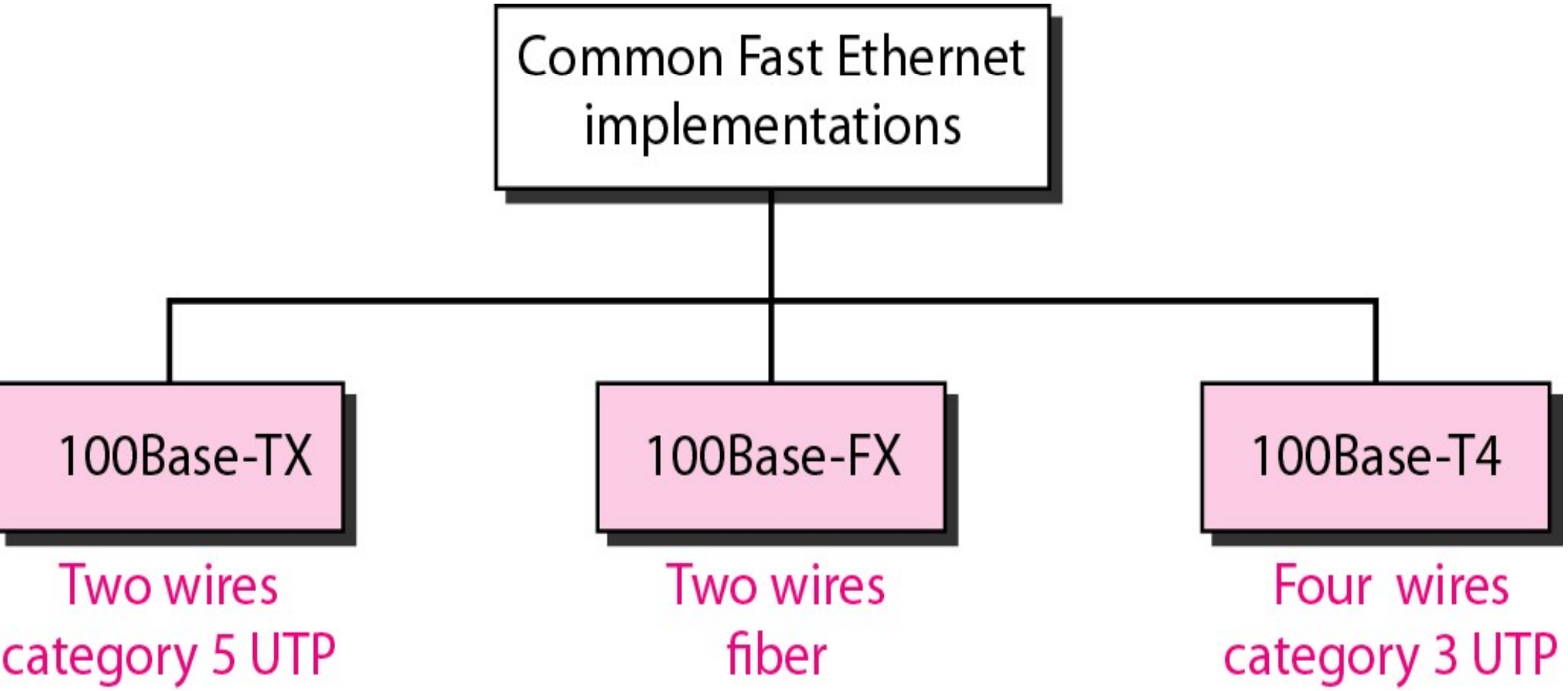


a. Point-to-point



b. Star

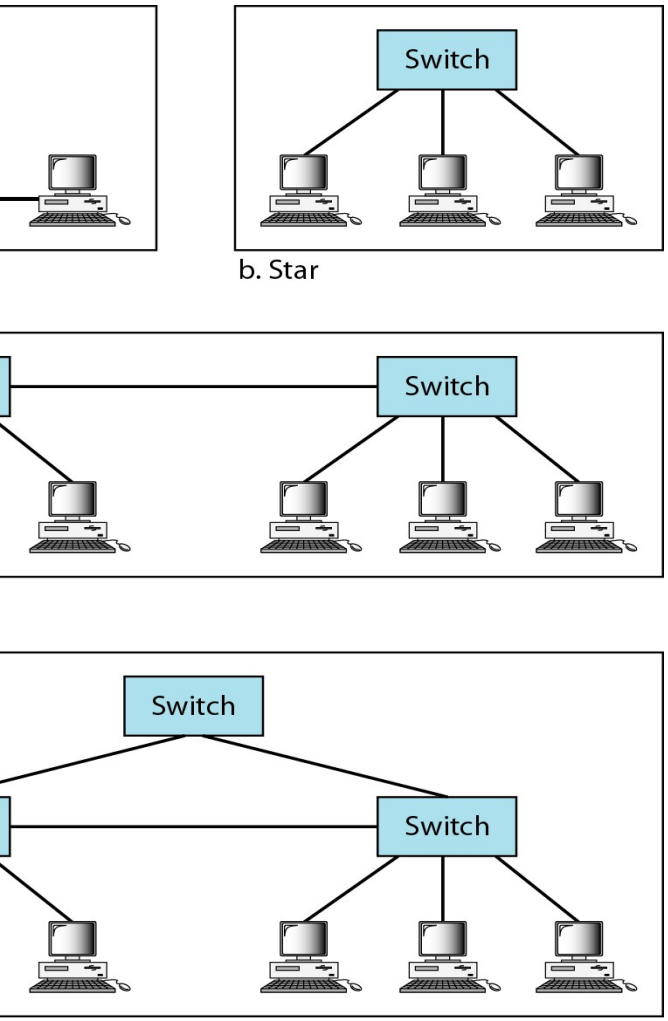
Fast Ethernet implementations

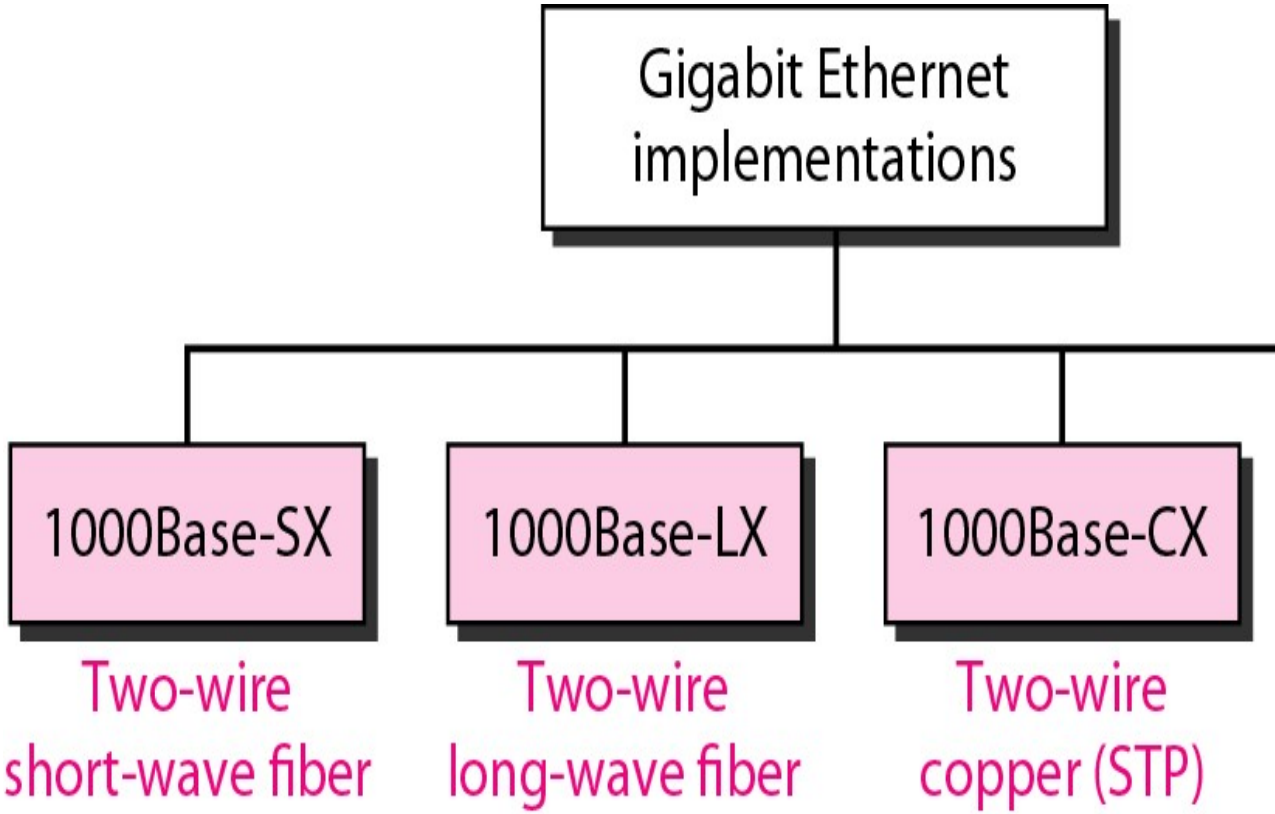


haracteristics	*100Base-TX*	*100Base-FX*	*100Base-T4*
	Cat 5 UTP or STP	Fiber	Cat 4 UTP
er of wires	2	2	4
num length	100 m	100 m	100 m
encoding	4B/5B	4B/5B	
ncoding	MLT-3	NRZ-I	8B/6T

Gigabit Ethernet implementations

need for an even higher data rate resulted in the desig
igabit Ethernet protocol (1000 Mbps). The IEEE commi
the standard 802.3z.





Characteristics	*1000Base-SX*	*1000Base-LX*	*1000Base-CX*	*1000Base-T*
dia	Fiber short-wave	Fiber long-wave	STP	Cat 5 UTP
mber of wires	2	2	2	4
ximum length	550 m	5000 m	25 m	100 m
ck encoding	8B/10B	8B/10B	8B/10B	
e encoding	NRZ	NRZ	NRZ	4D-PAM5

Characteristics	*10GBase-S*	*10GBase-L*	*10GBase-E*
edia	Short-wave 850-nm multimode	Long-wave 1310-nm single mode	Extended 1550-mm single mode
aximum length	300 m	10 km	40 km

ernet frame consists of _____

AC address

P address

efault mask

etwork address

t is start frame delimeter (SFD) in ethernet frame?

0101010

0101011

0000000

1111111

C address is of _____

4 bits

6 bits

2 bits


Thank You