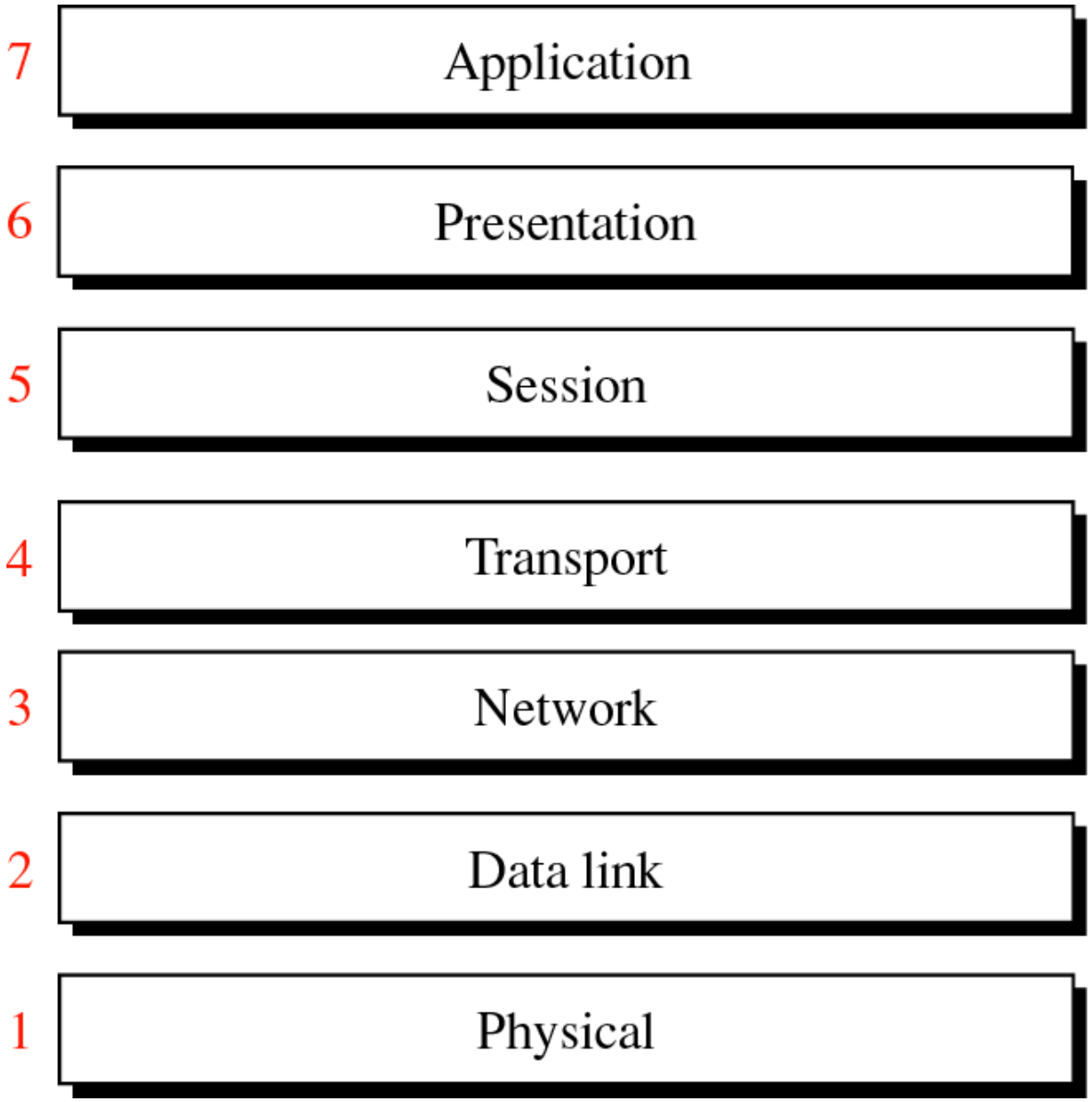
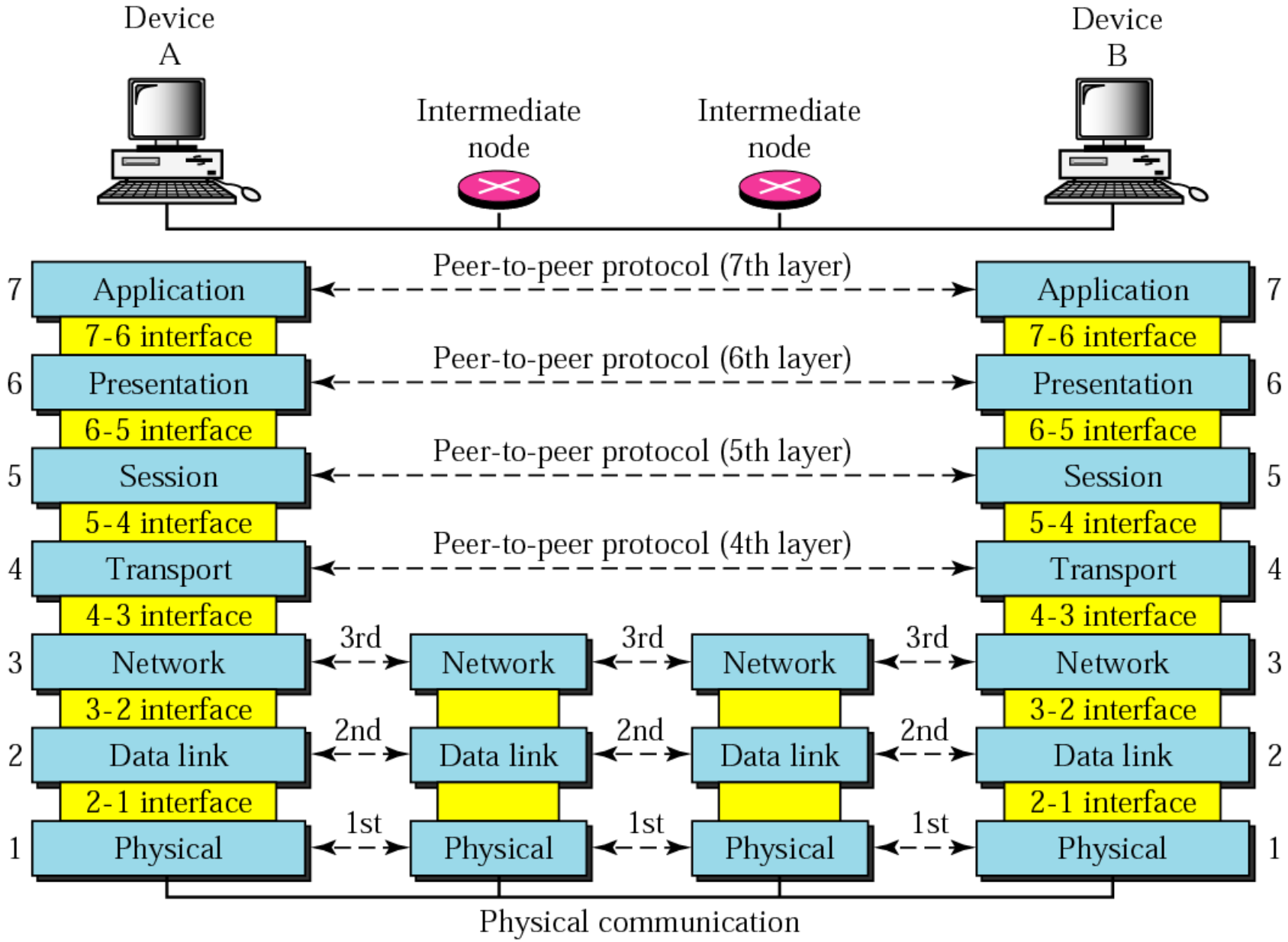
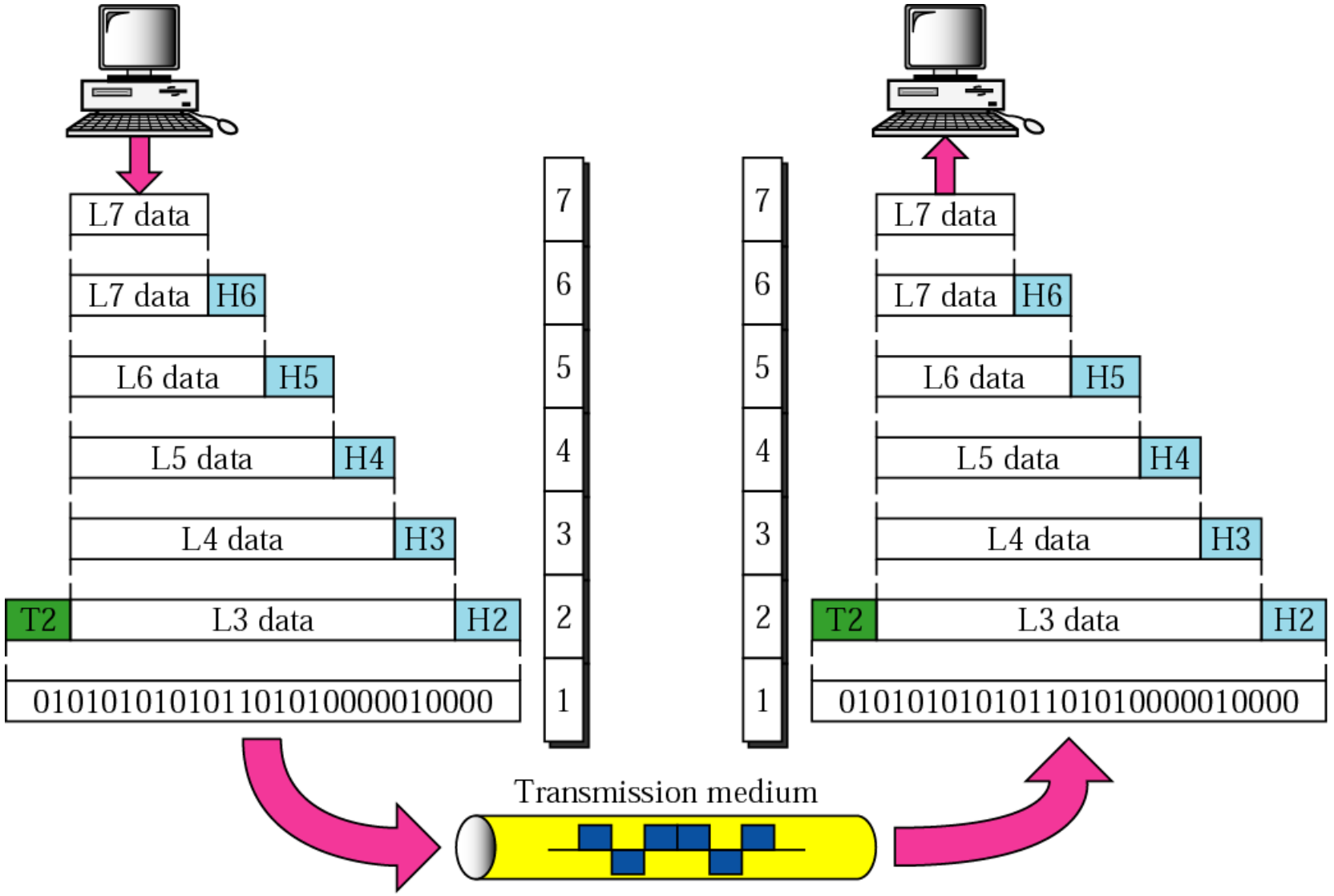
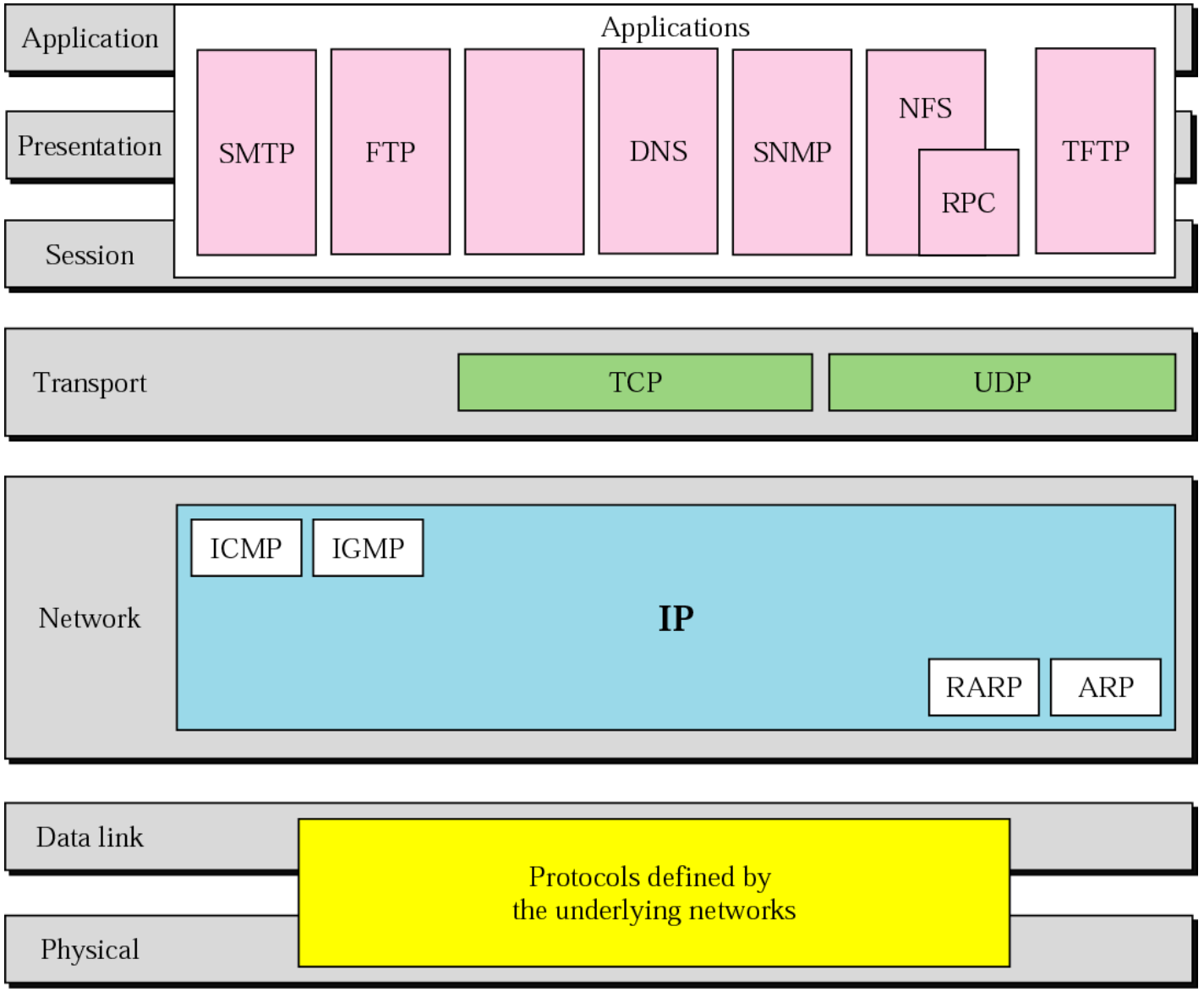
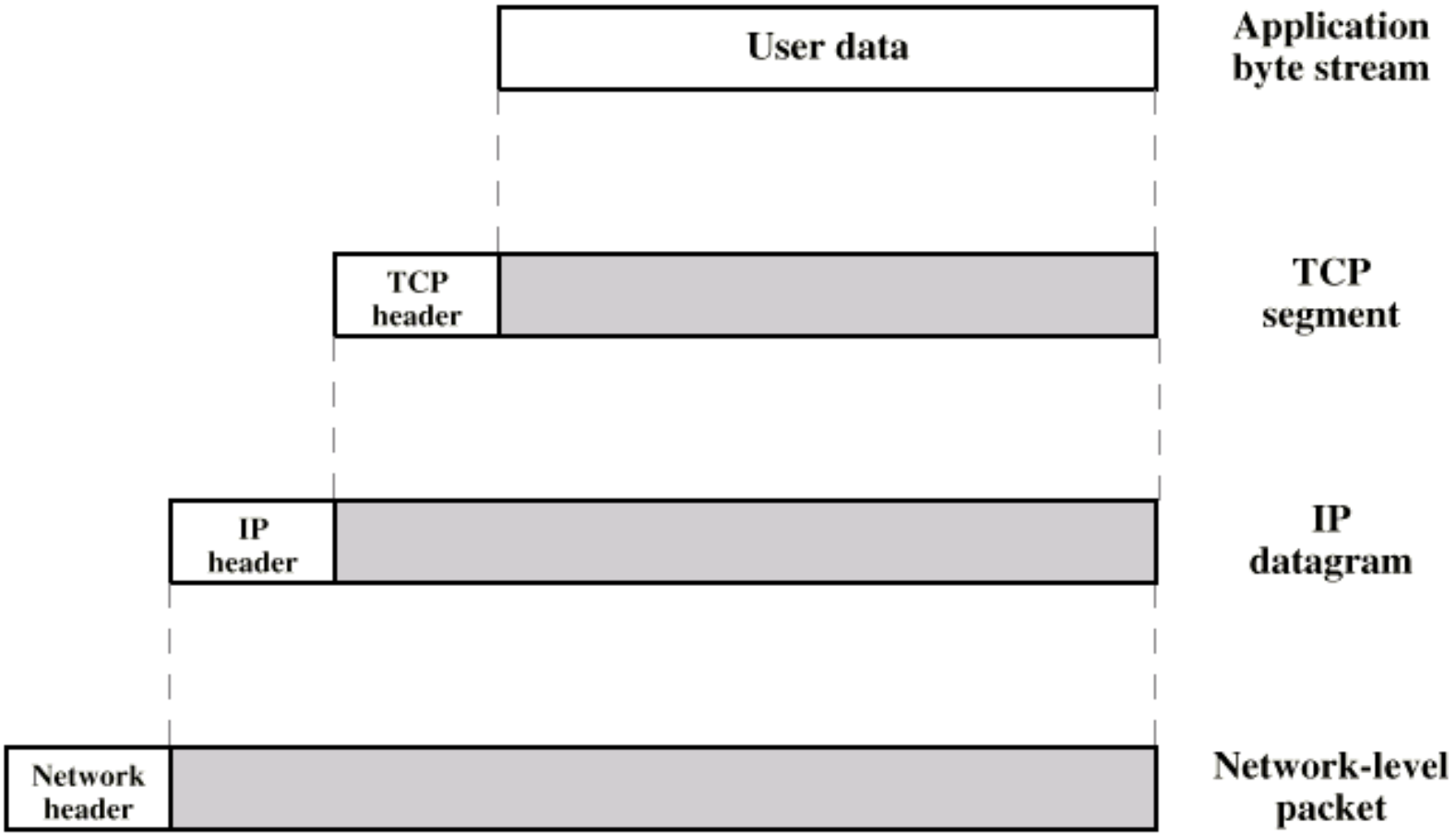
The OSI Model and TCP/IP Protocol Suite


7
Application
6
Presentation
5
Session
4
Transport
3
Network
2
Data link
1
Physical


Device A
Device B
Intermediate node
Intermediate node
Peer-to-peer protocol (7th layer)
Peer-to-peer protocol (6th layer)
Peer-to-peer protocol (5th layer)
Peer-to-peer protocol (4th layer)
7
Application
7-6 interface
6
Presentation
6-5 interface
5
Session
5-4 interface
4
Transport
4-3 interface
3rd
3
Network
3-2 interface
2nd
2
Data link
2-1 interface
1st
1
Physical
Physical communication


L7 data
L7 data
H6
L6 data
H5
L5 data
H4
L4 data
H3
T2
L3 data
H2
01010101010110101010000010000
7
6
5
4
3
2
1
Transmission medium


Application
Presentation
Session
Applications
SMTP
FTP
DNS
SNMP
NFS
RPC
TFTP
Transport
TCP
UDP
Network
ICMP
IGMP
IP
RARP
ARP
Data link
Physical
Protocols defined by
the underlying networks


User data
Application byte stream
TCP header
TCP segment
IP header
IP datagram
Network header
Network-level packet

Physical Layer

- Mengatur masalah kelistrikan dan bentuk fisik media penghantar

Protocol in Physical Layer (TCP/IP or Other)

- RS-232
- T1
- E1
- 10BASE5
- 10BASE2
- 10BASE-FL
- 10BASE-T
- 100BASE-TX
- 100BASE-FX
- 100BASE-T4
- 100BASE-SX/LX
- POTS
- SONET
- DSL
- 802.11a/b/g/n PHY

Protocol in Physical Layer (SS7 – Signaling System 7)

- MTP-1

Protocol in Physical Layer (AppleTalk)

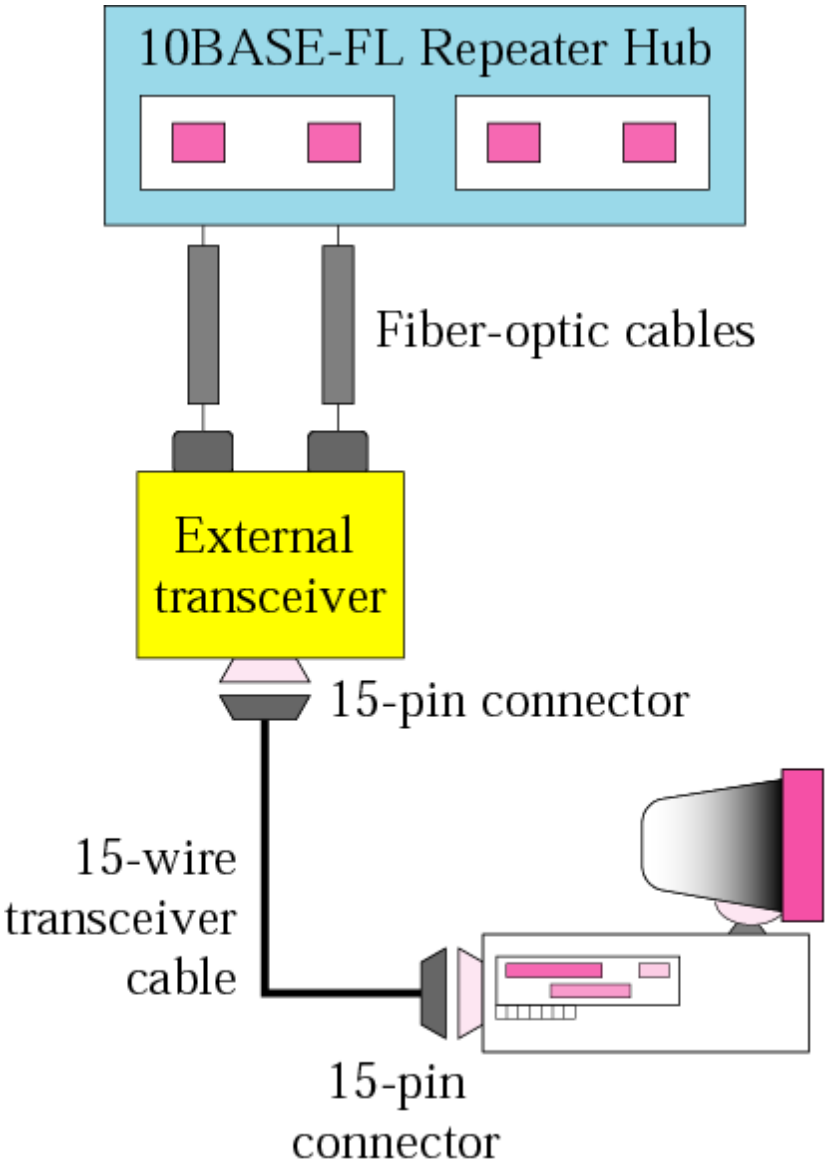
- RS-232
- RS-422
- STP
- PhoneNet

Protocol in Physical Layer (OSI)

- X.25
- X.21bis
- EIA/TIA-232
- EIA/TIA-449
- EIA-530
- G.703

Figure 3-5:d

Ethernet implementation

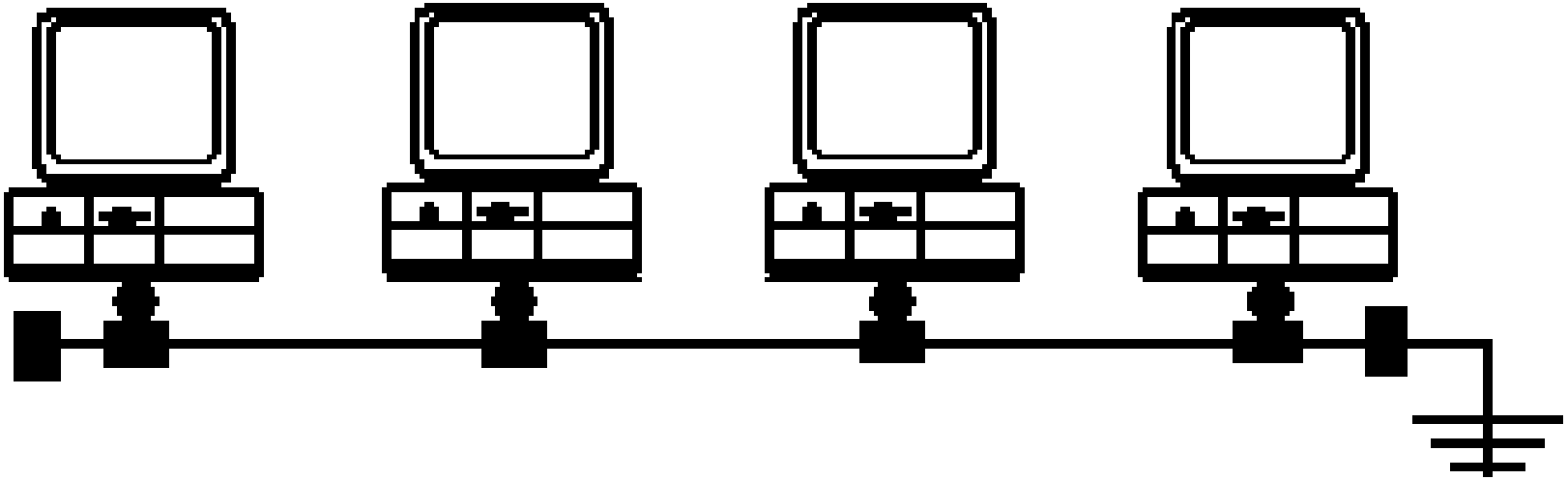


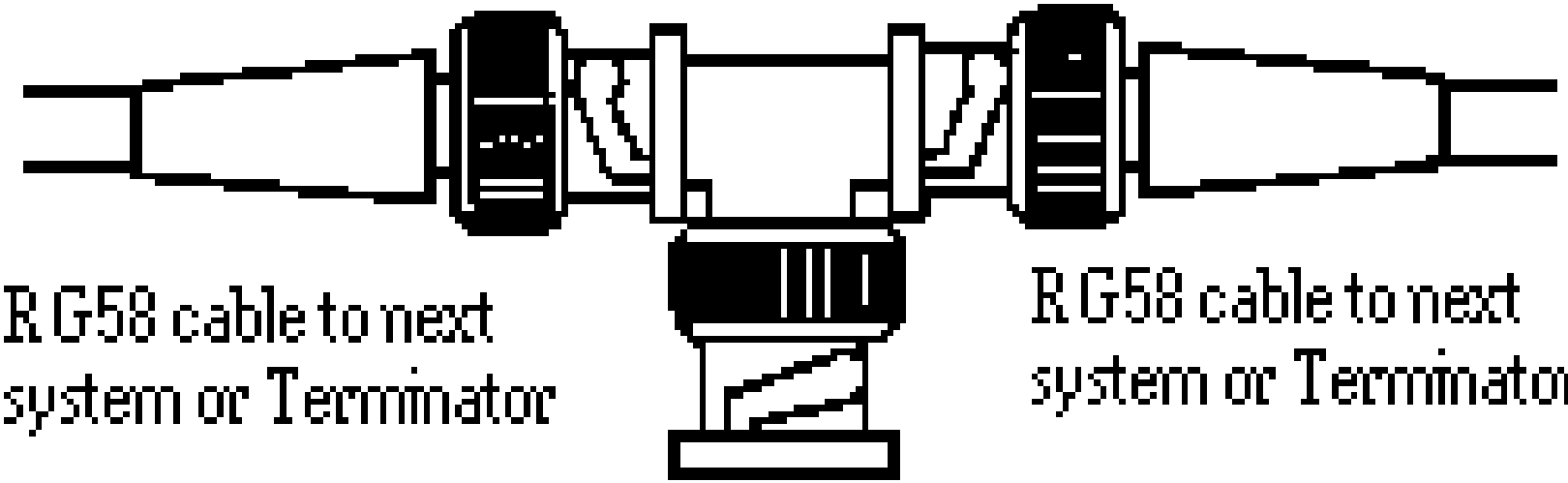
d. 10BASE-FL

10BASE2

- **10BASE2** (***cheapernet***, ***thin ethernet***, ***thinnet*** or ***thinwire***)
- Varian dari Ethernet
- thin coaxial cable **RG-58**
- terminator : **BNC connectors**
- Bandwidth = 10 Mbps
- Practical = 6 Mbps

50 Ohm Terminator





connect to BNC on the netcard

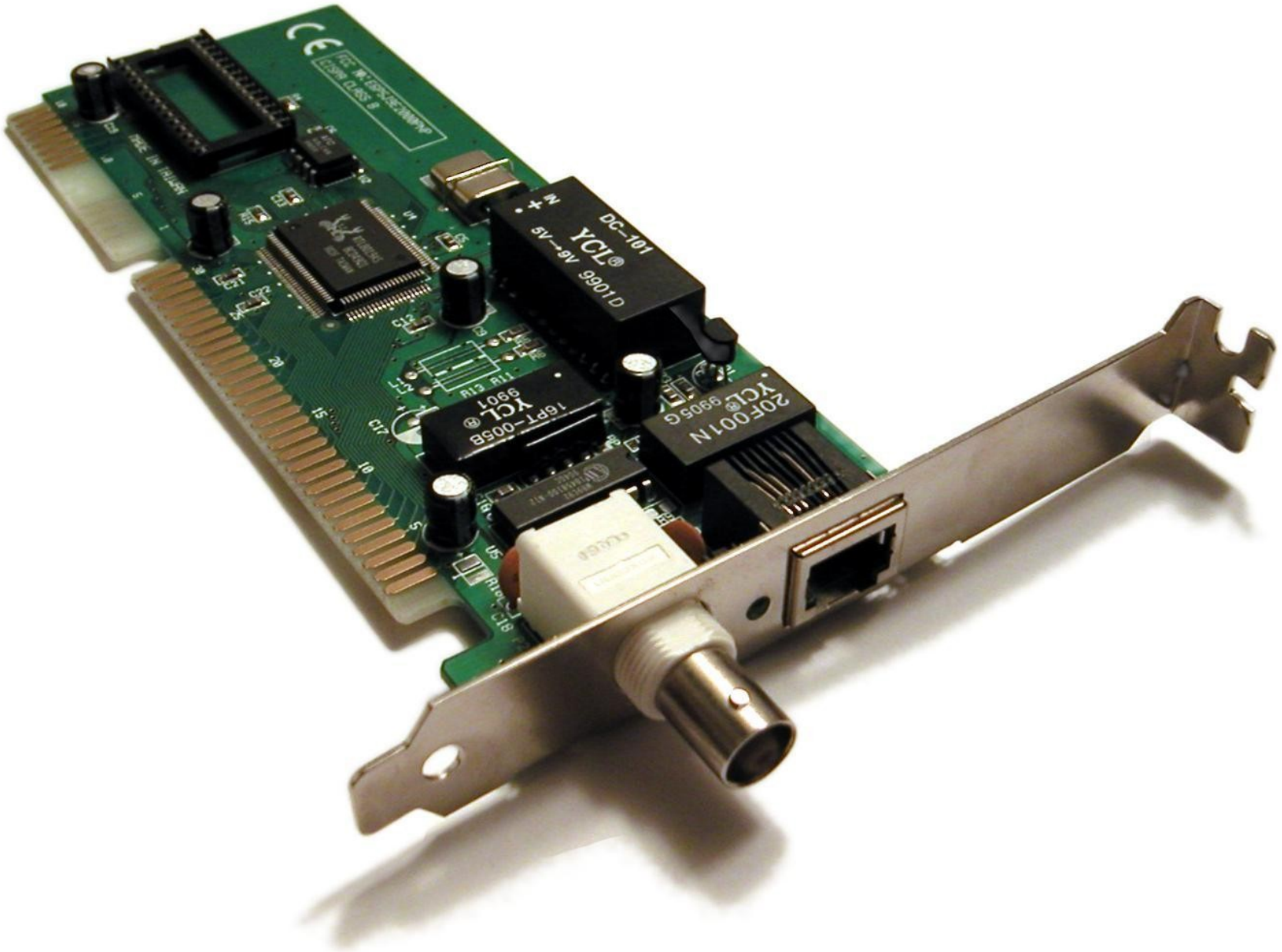
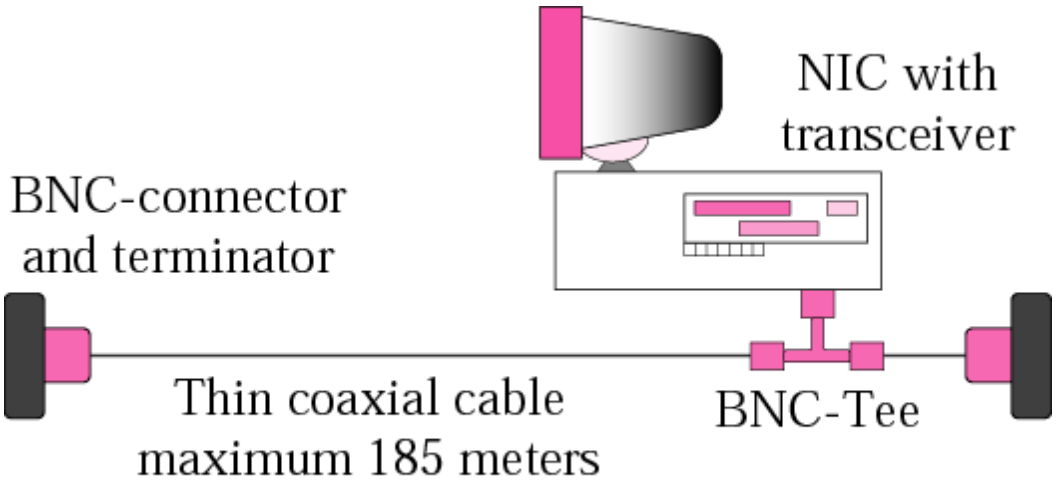
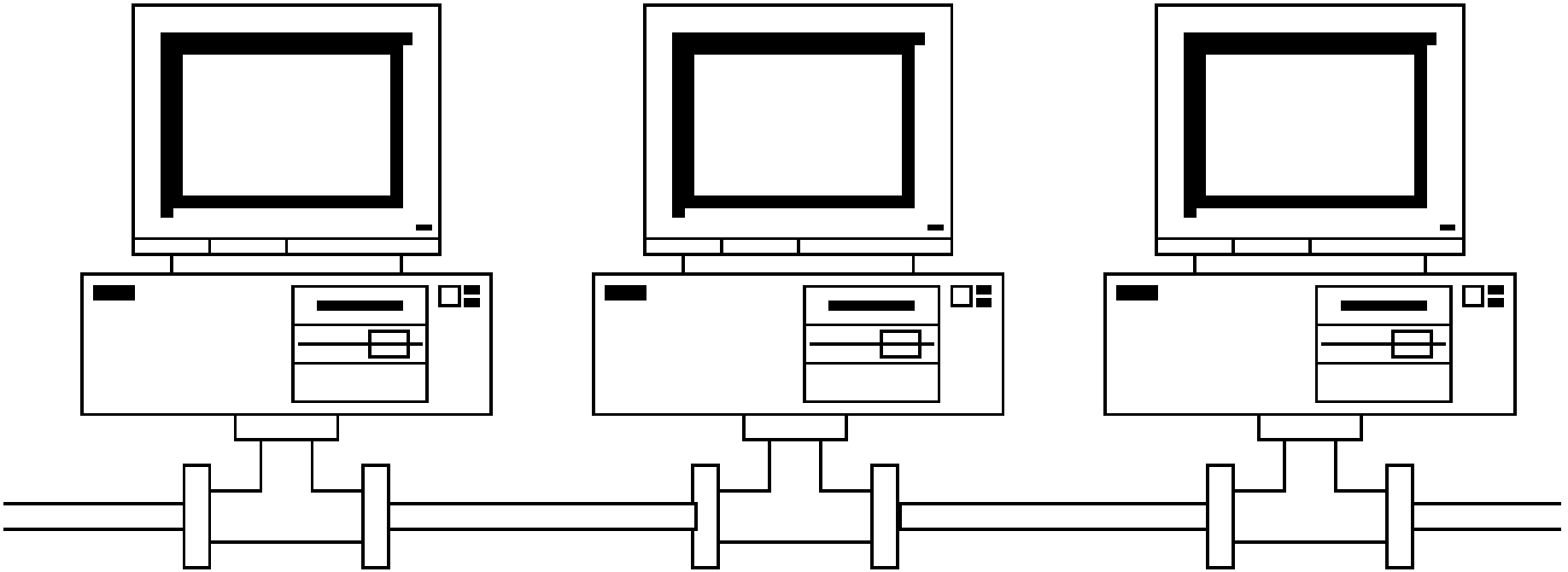

DC-101
YCL
5V~9V 9901D
16PT-005B
YCL
9901
20F001N
YCL 9905G

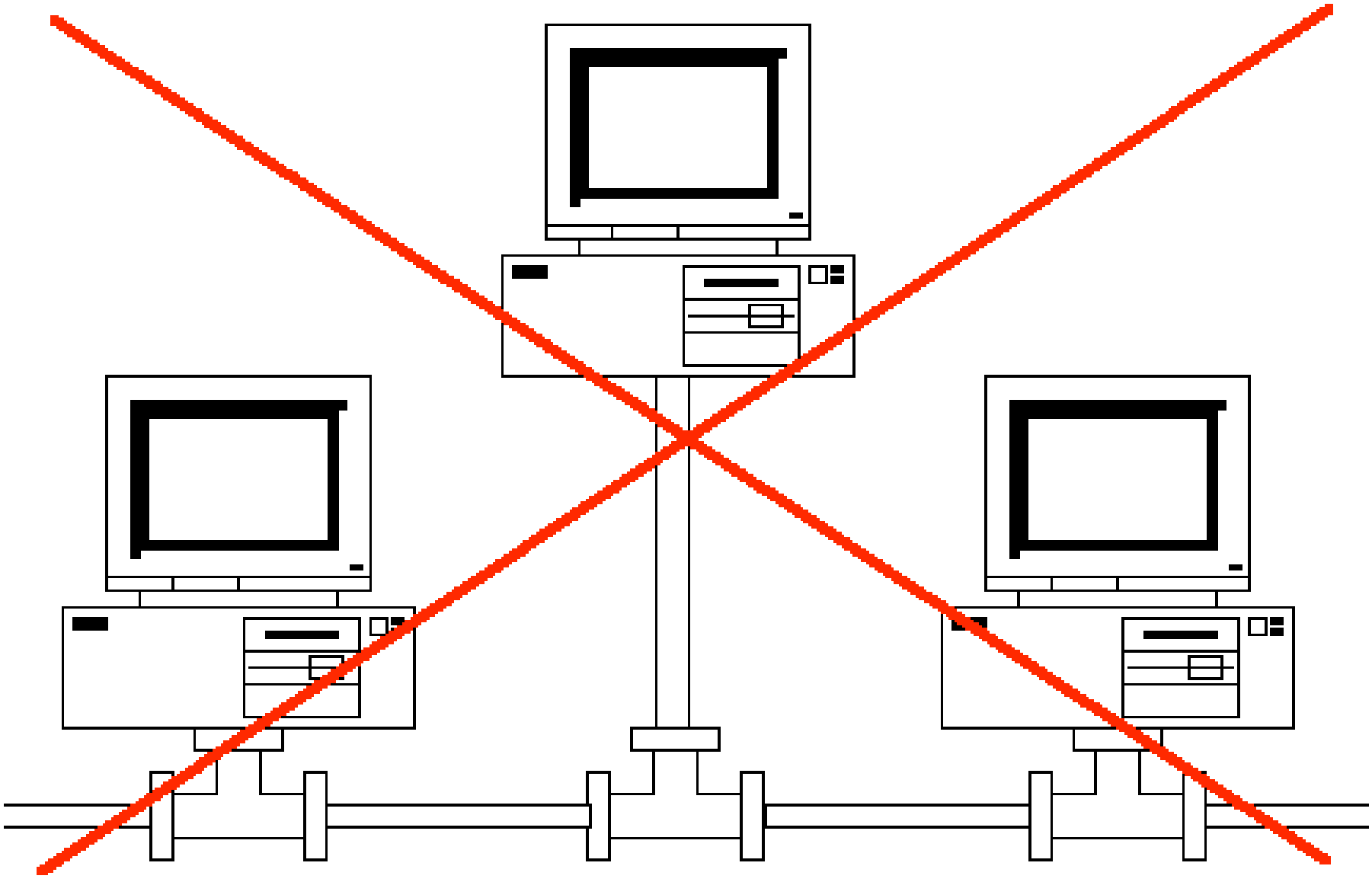
Figure 3-5:b

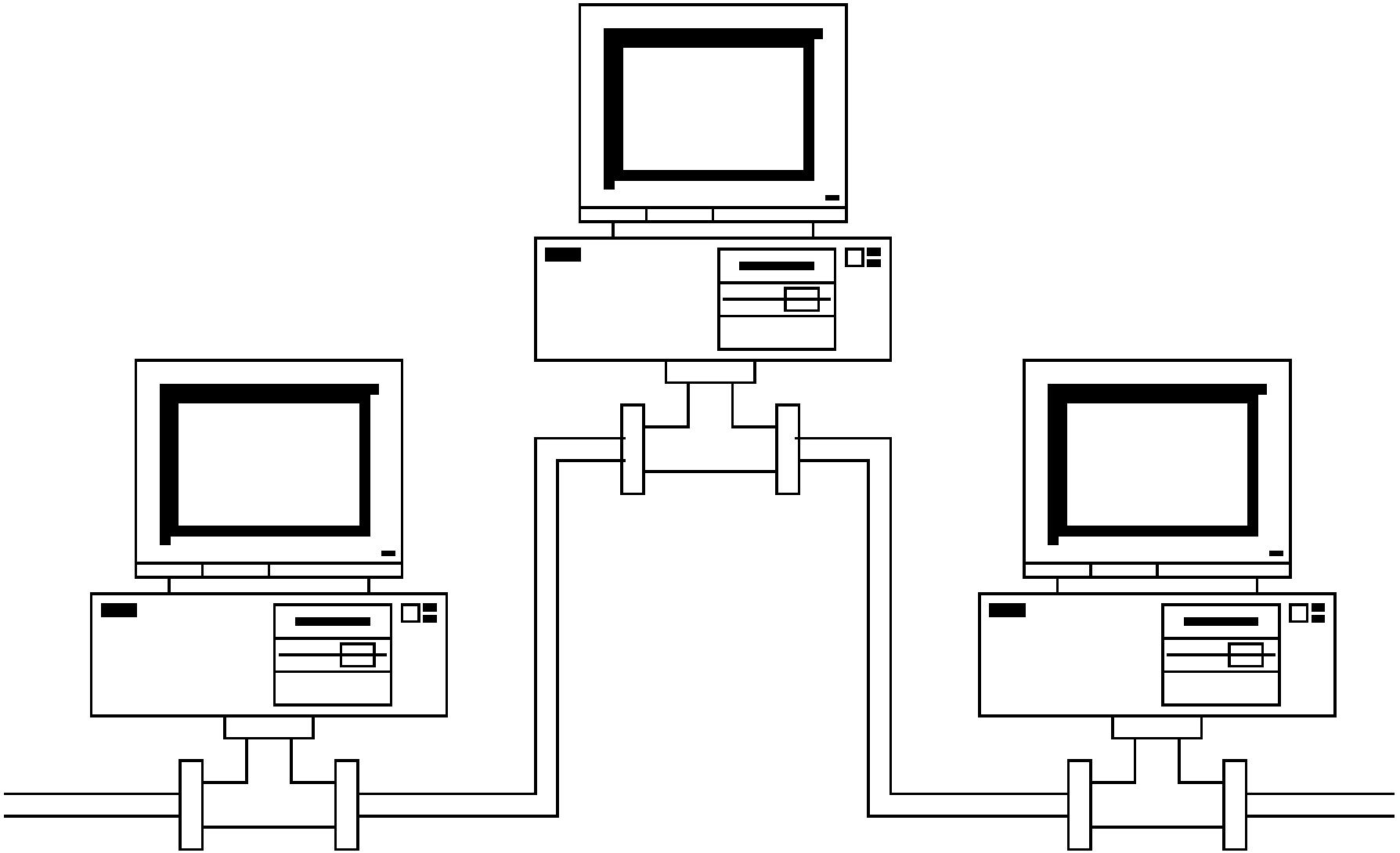
Ethernet implementation

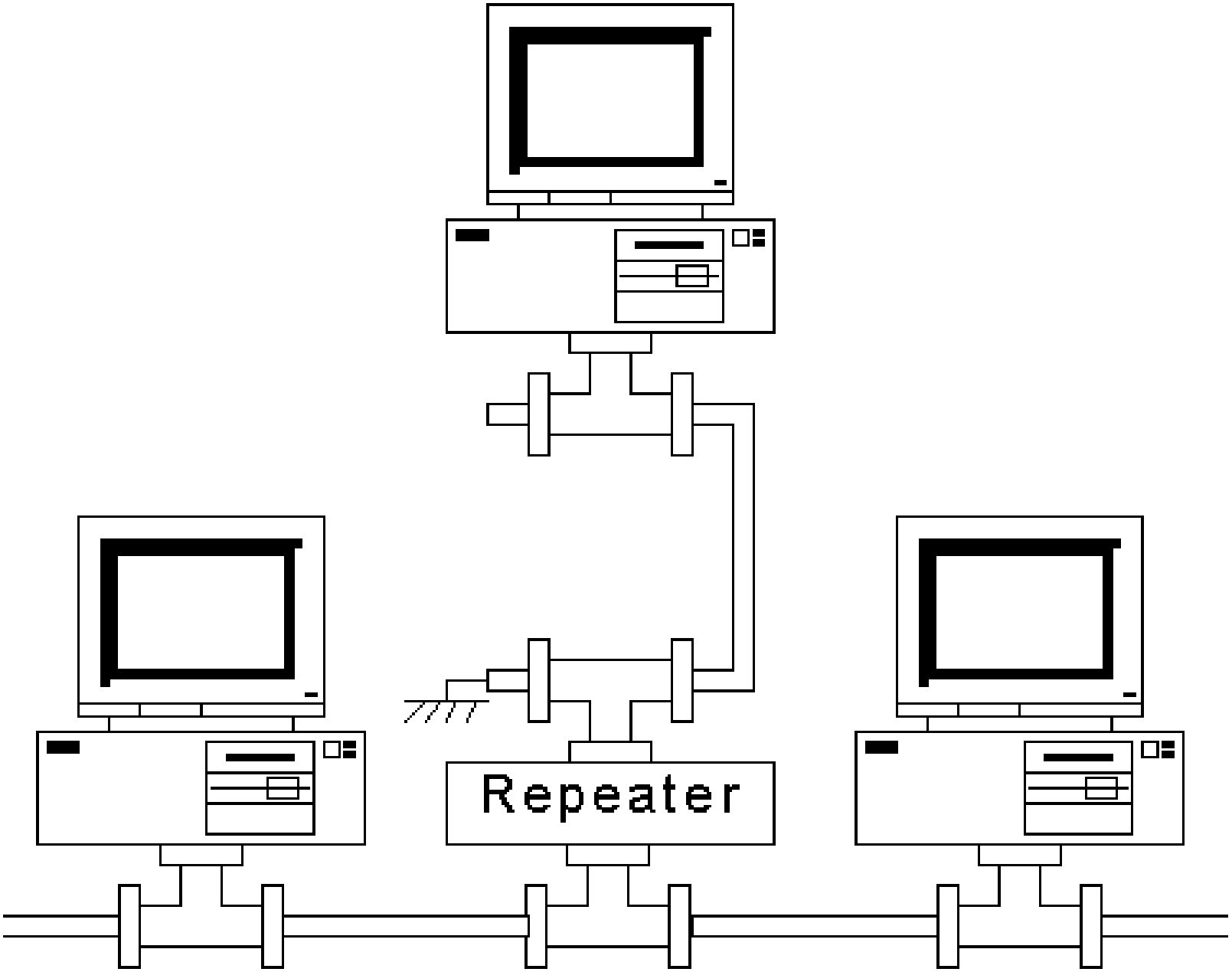


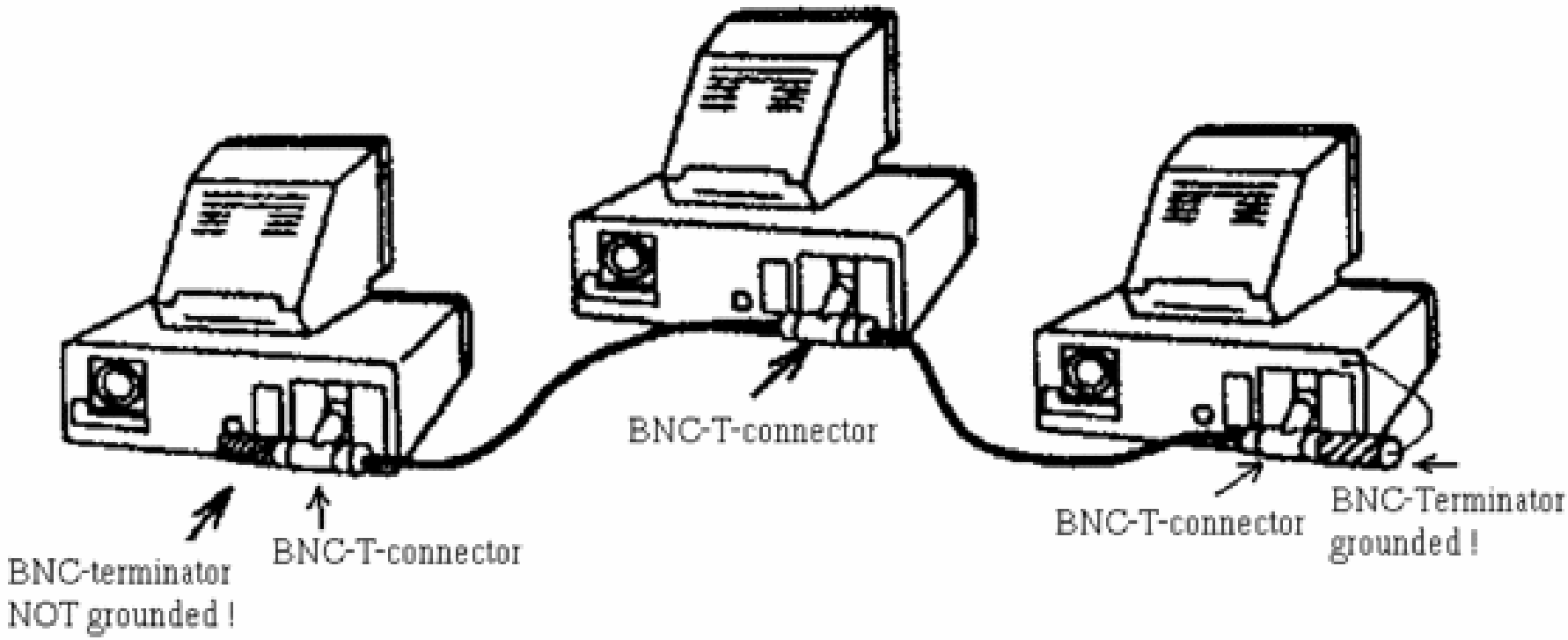
b. 10BASE2





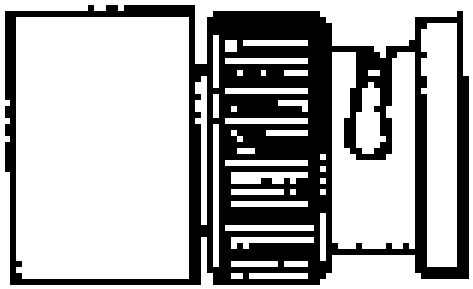



Repeater


BNC-terminator
NOT grounded !
BNC-T-connector
BNC-T-connector
BNC-T-connector
BNC-Terminator
grounded !

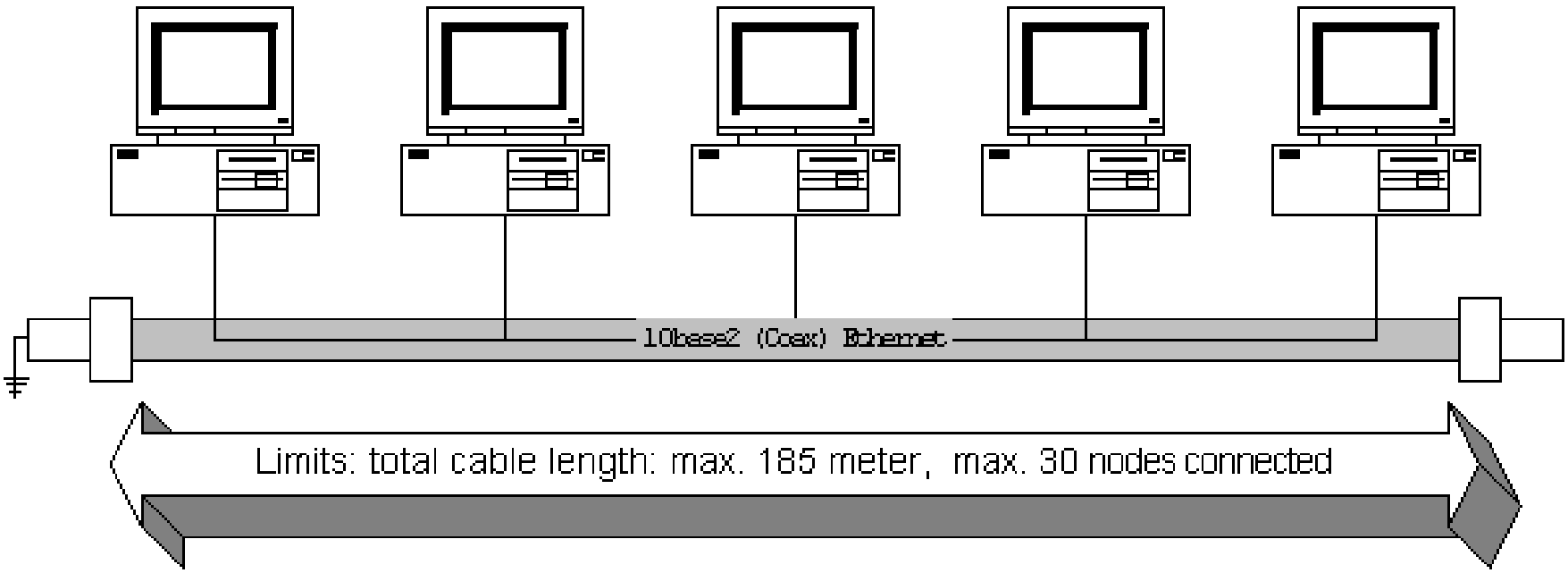
BNC terminators

"Open"
Terminator



"Grounded"
Terminator

with ground wire



www.helwig.com

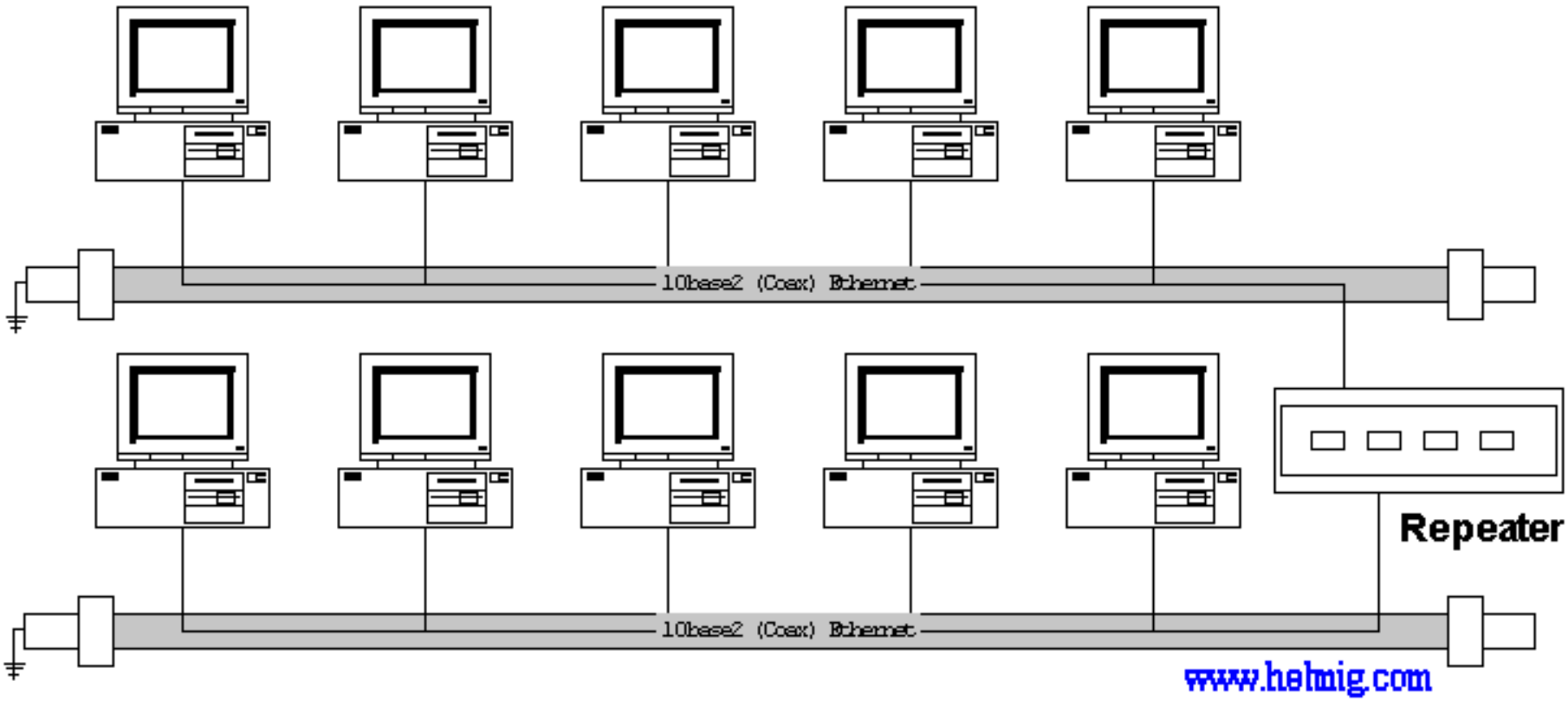
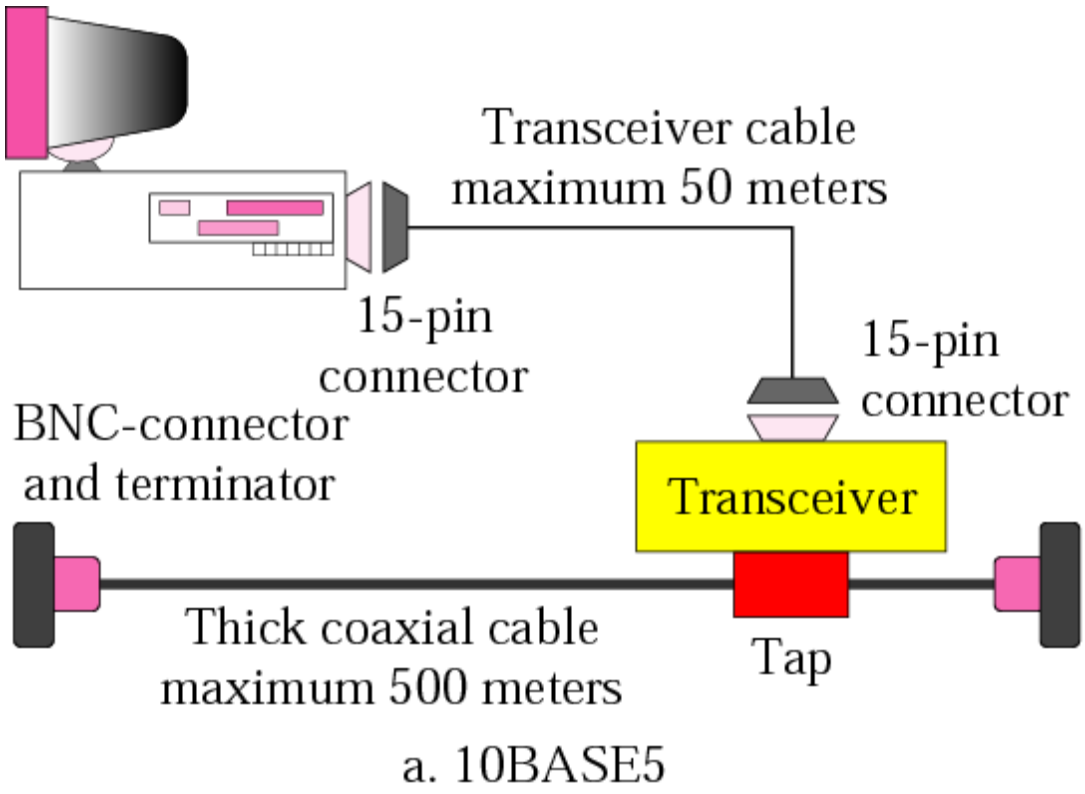

10base2 (Coax) Ethernet
Repeater
10base2 (Coax) Ethernet
www.helmig.com

Figure 3-5:a

Ethernet implementation



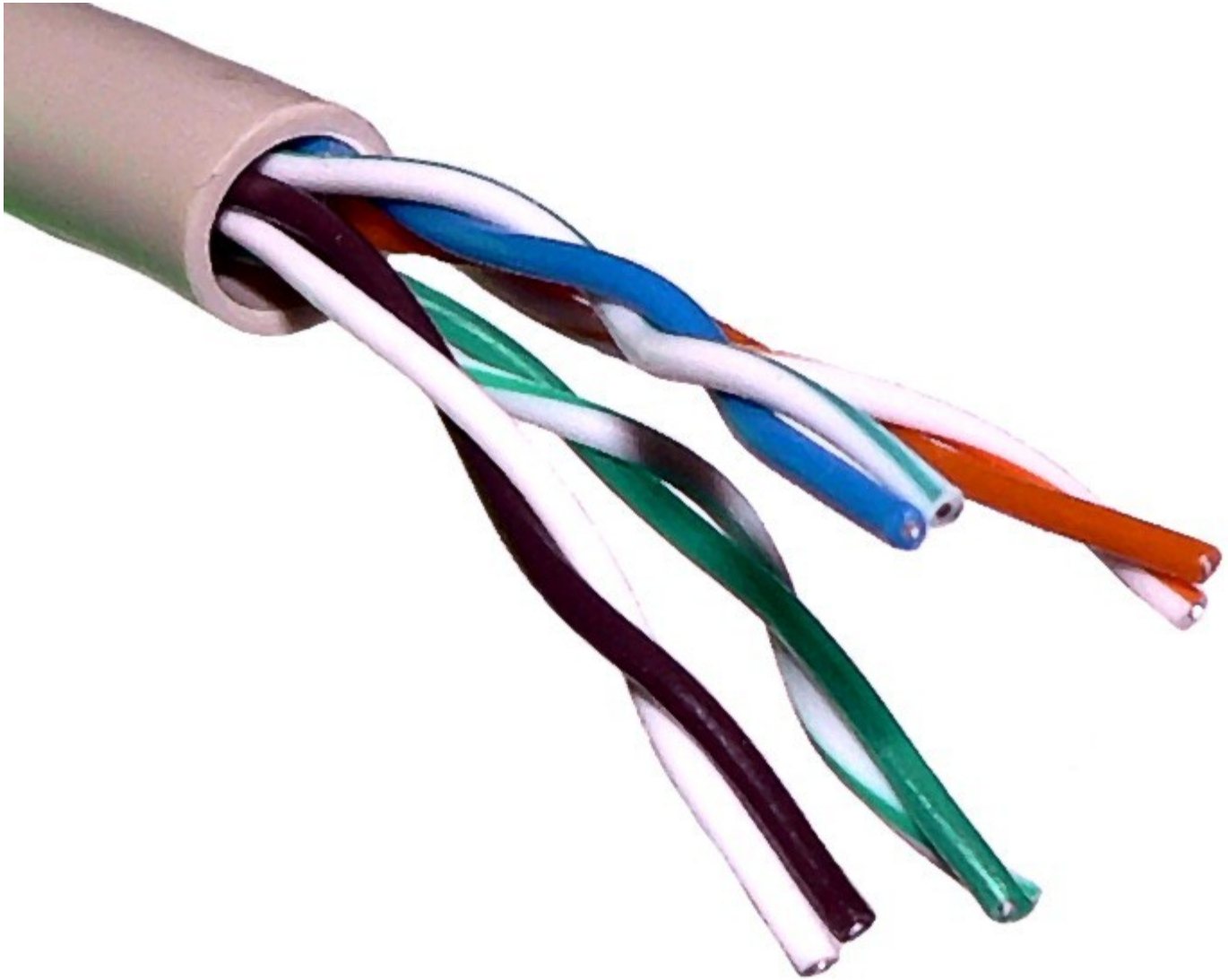
a. 10BASE5

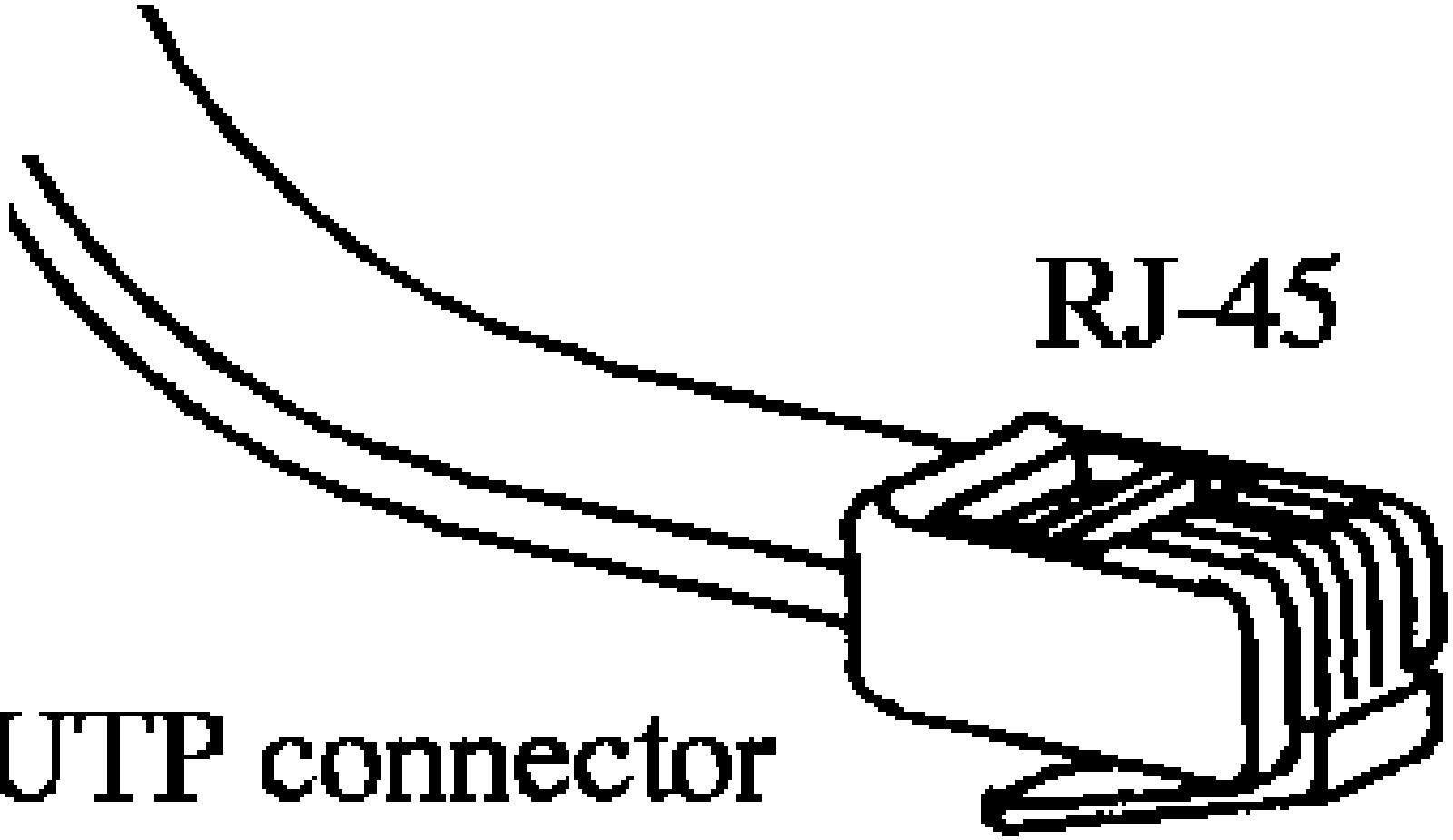
10BASE-T (Ethernet)

- Twisted Pair Ethernet (10baseT), atau "UTP" = Unshielded Twisted Pair",
- Konektor = RJ45

10BASE-T (Ethernet)

- Speed = 10 Mbps
- Max 100 meter





UTP connector

- These Twisted Pair cables connect now each PC to the "hub":


D-Link
DES-1024D
Power
Link/Act
100Mbps

Cisco Catalyst


D-Link
Gigabit Switch

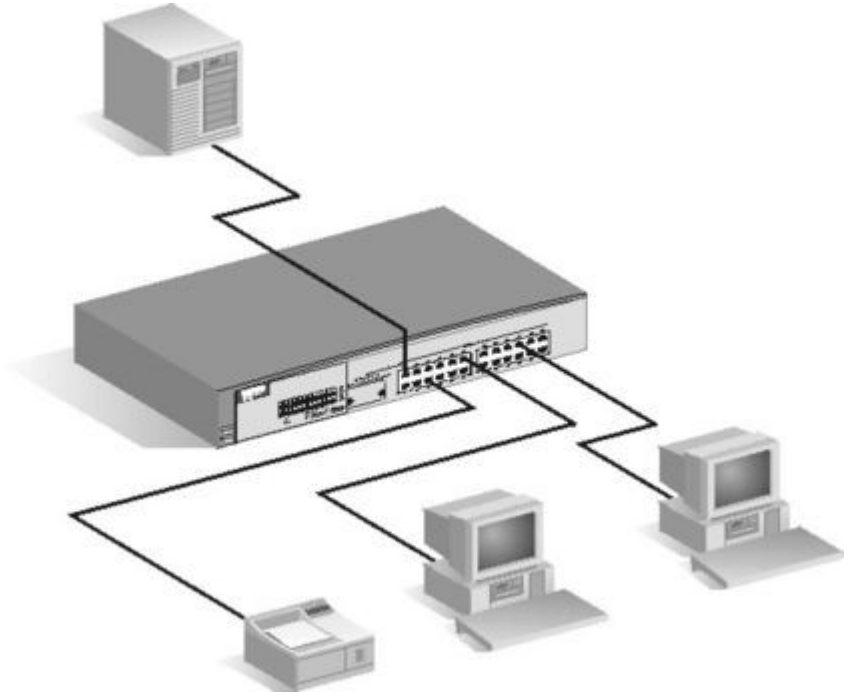
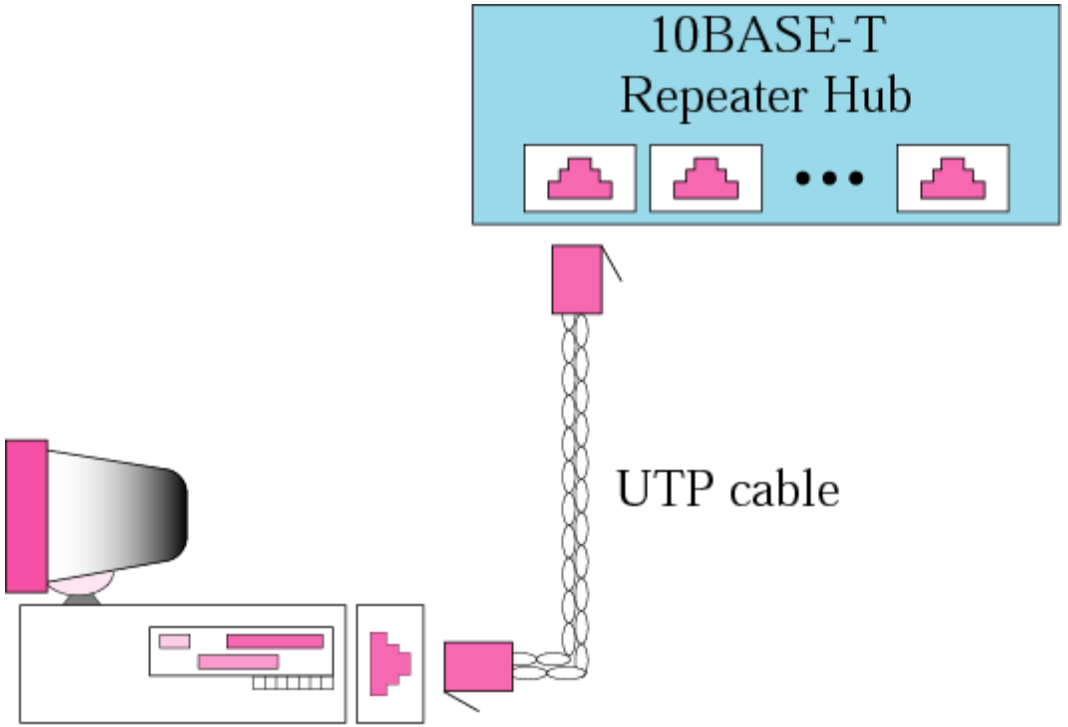
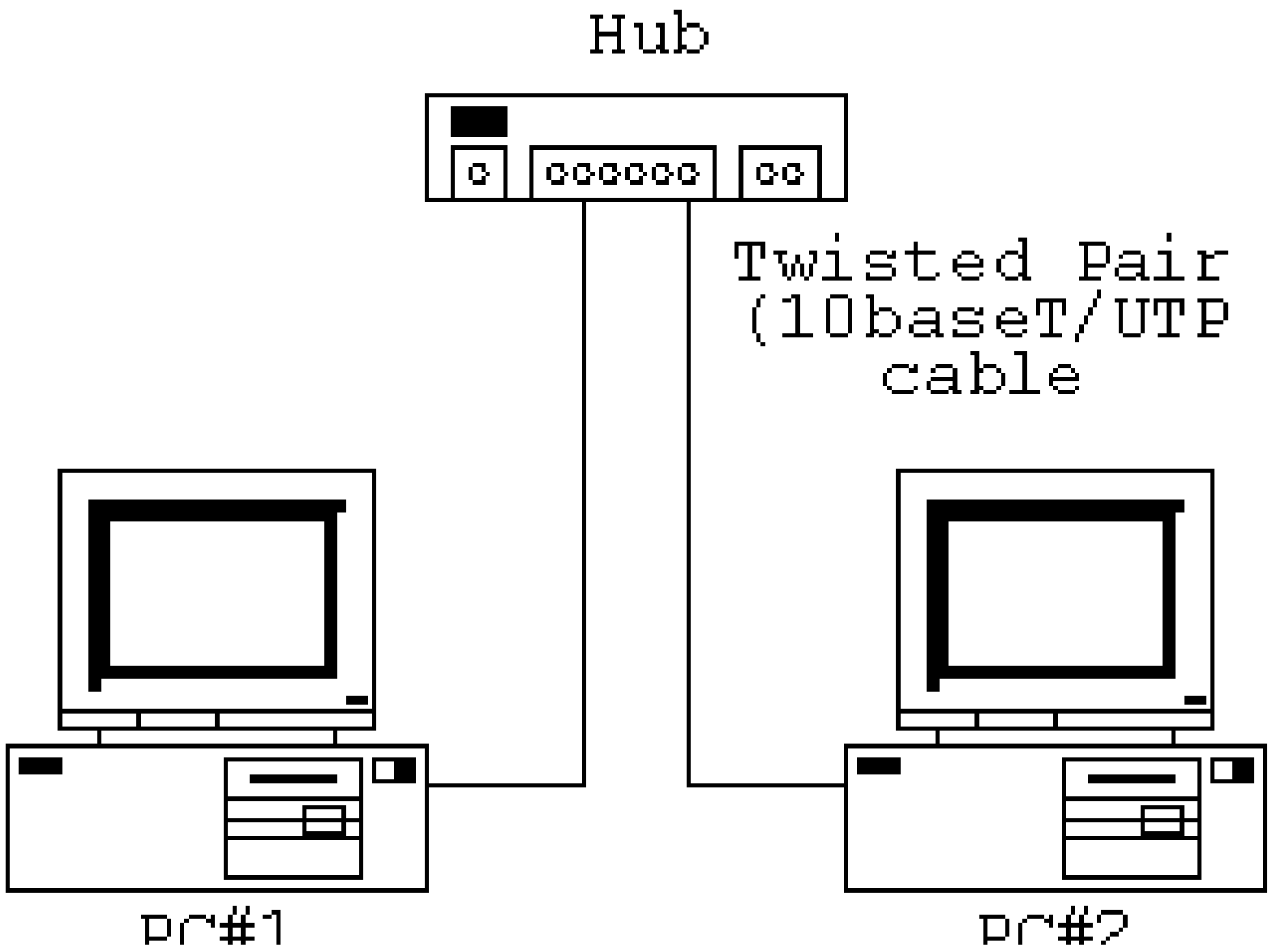


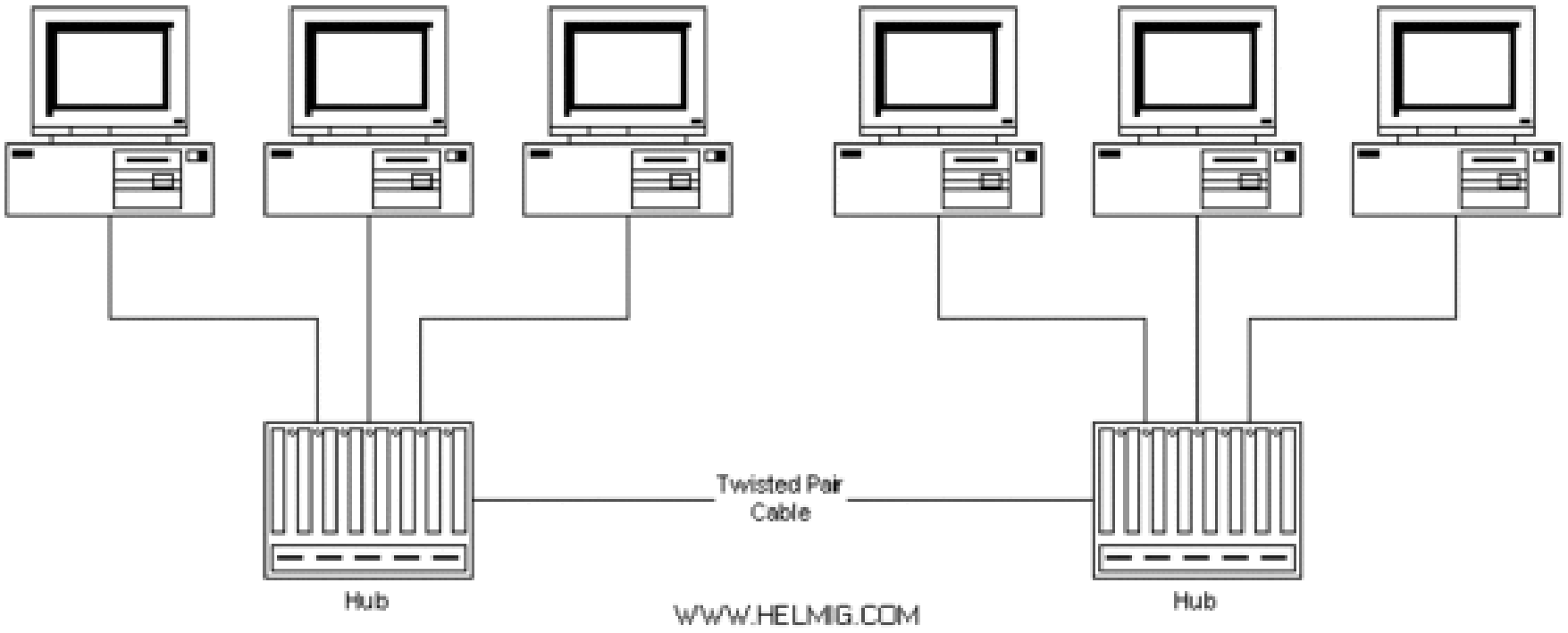
Figure 3-5:c

Ethernet implementation



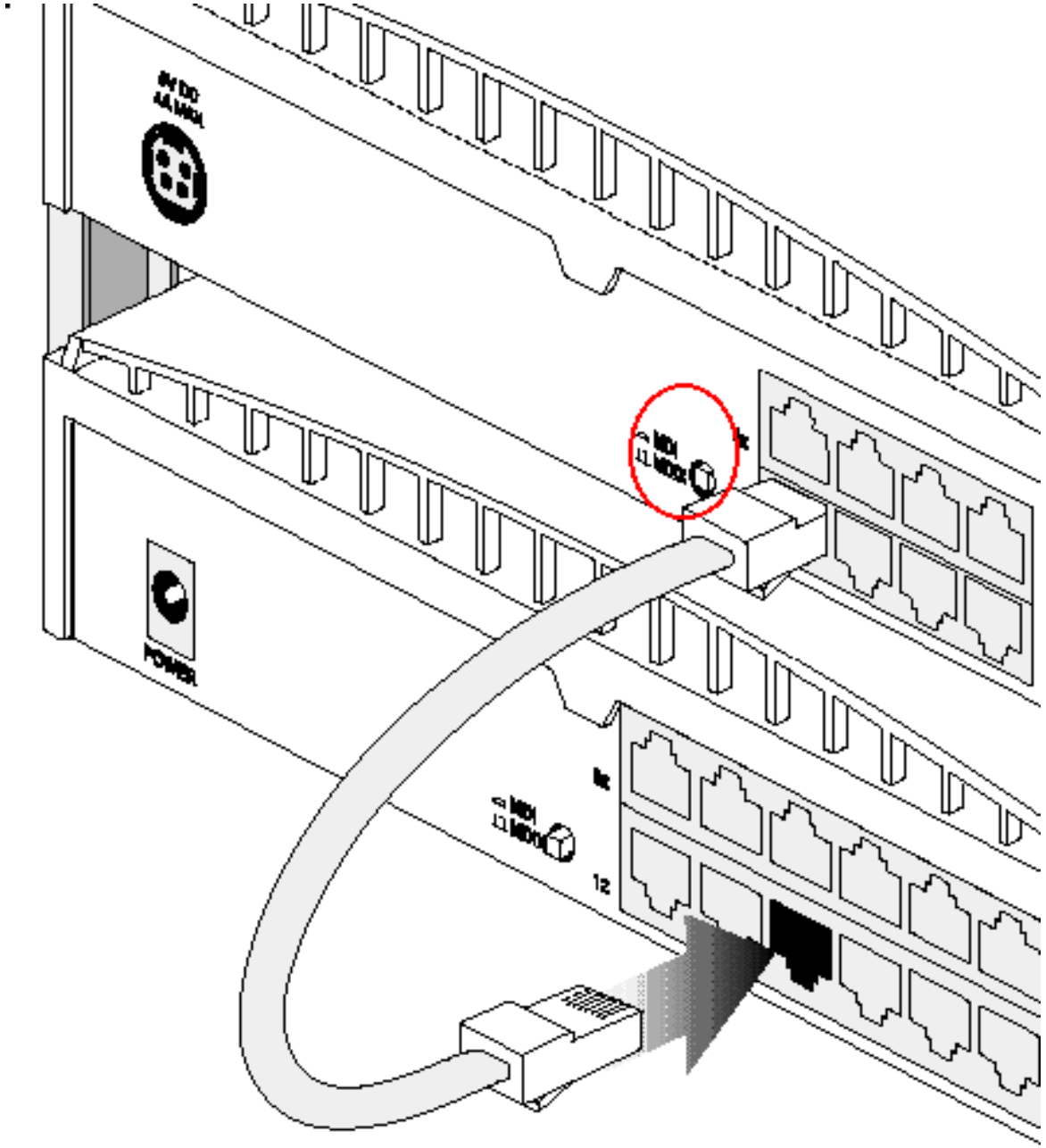
c. 10BASE-T


Hub
Twisted Pair
(10baseT/UTP
cable
PC#1
PC#2

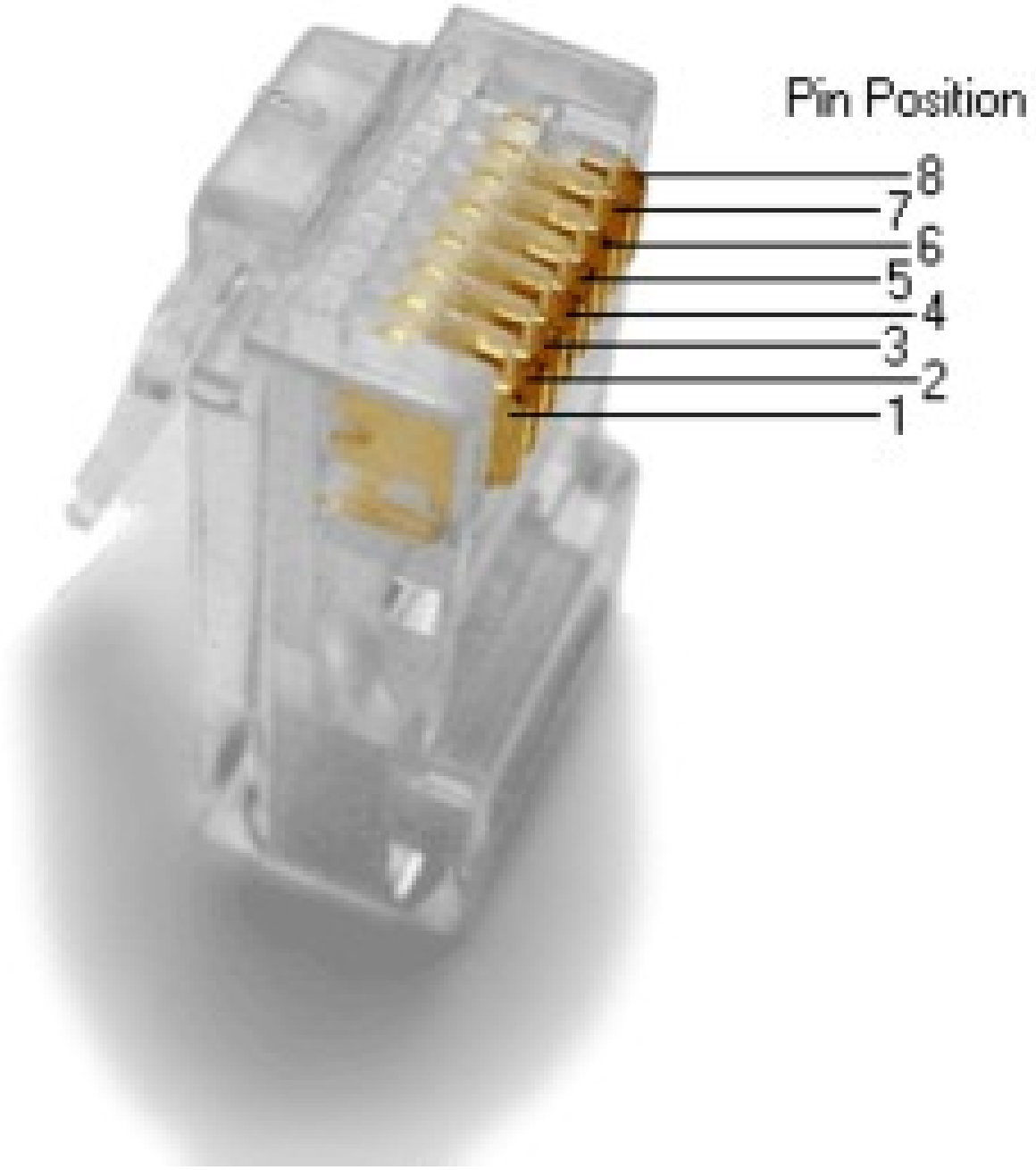

Twisted Pair
Cable
Hub
Hub
WWW.HELMIG.COM

Hub-HUB Cable

- Jika hub menggunakan konektor biasa => kabel cross
- Jika tidak, menggunakan kabel lurus



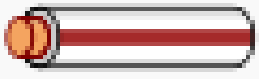
- 10BASE-T = pins 1 and 2 (transmit or TX), and pins 3 and 6 (receive or RX)


Pin Position
8
7
6
5
4
3
2
1

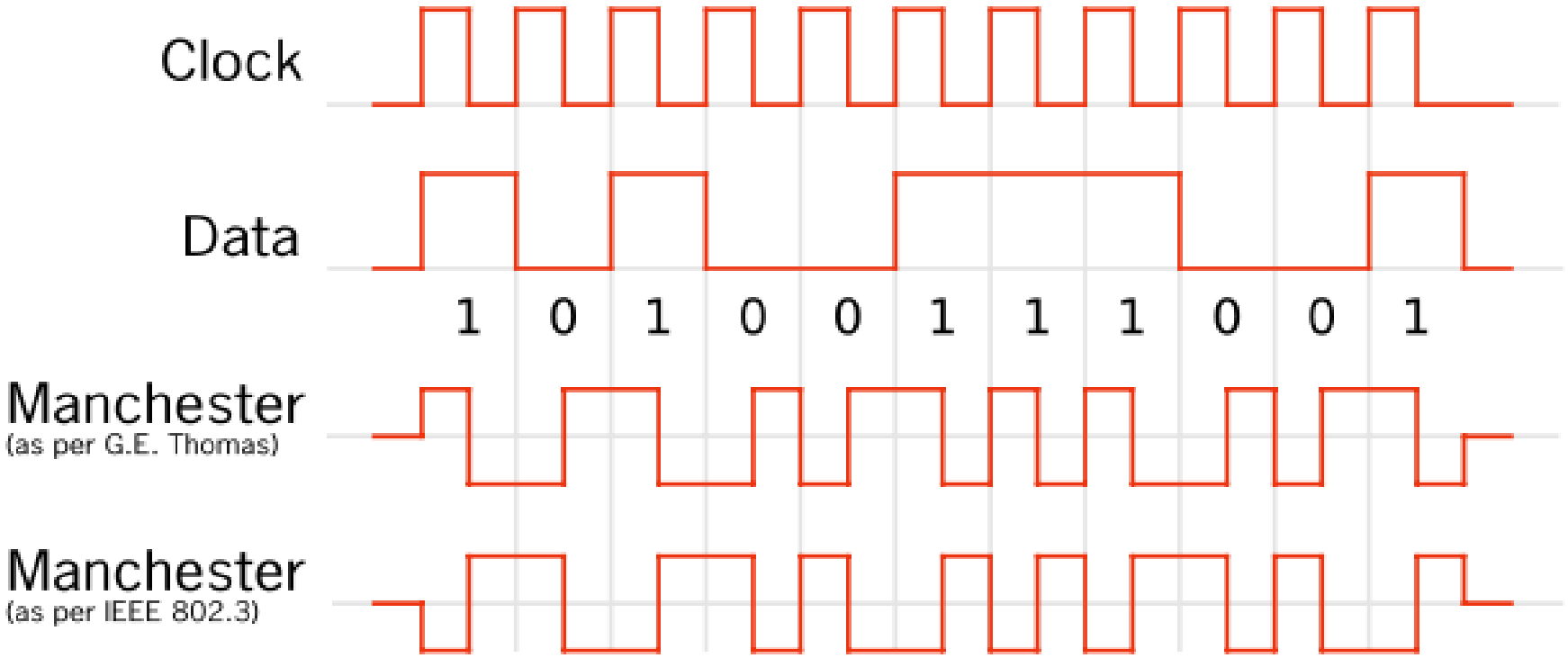
TIA/EIA-568-A T568A Wiring

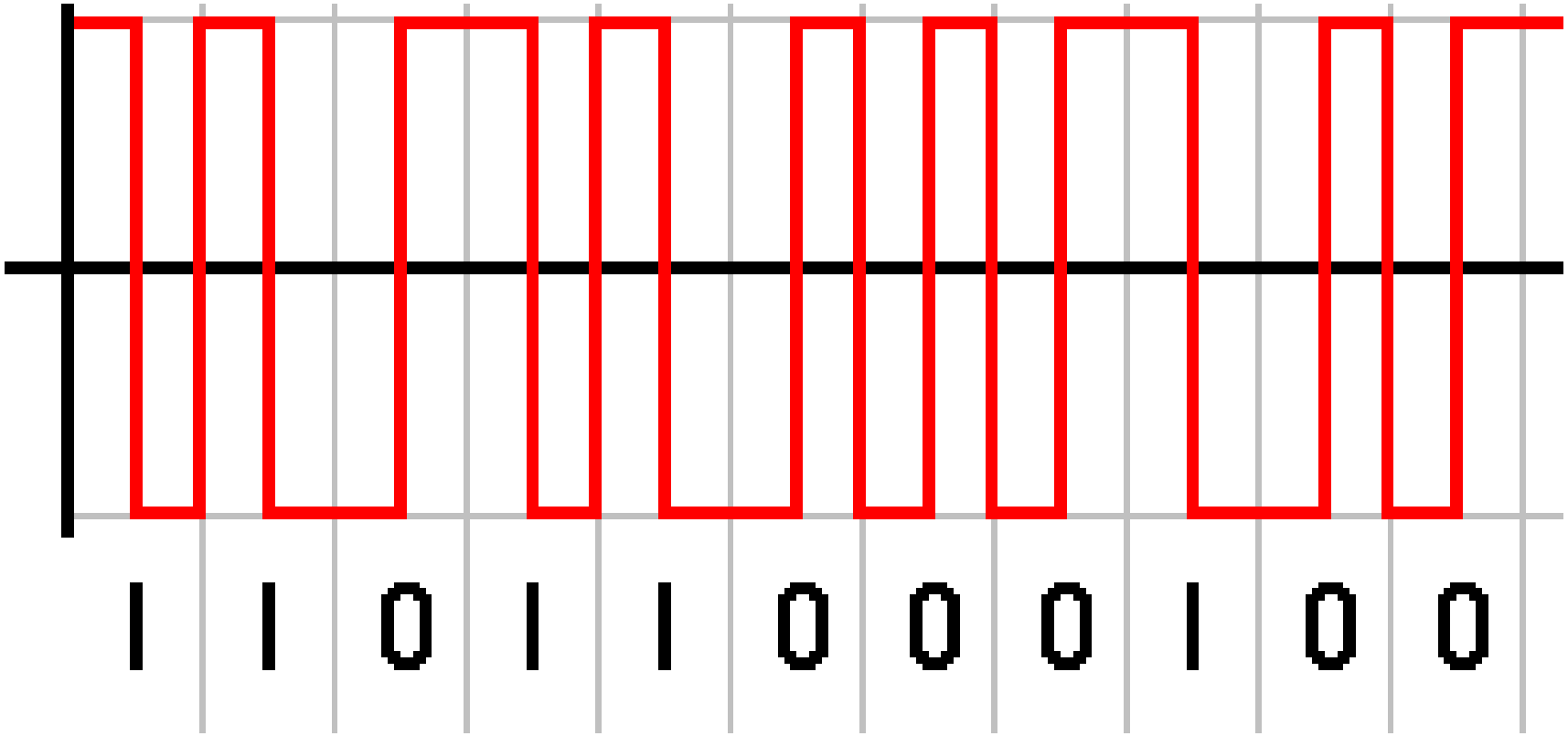
Pin	Pair	Wire	Color
1	3	tip	 white/green
2	3	ring	 green
3	2	tip	 white/orange
4	1	ring	 blue
5	1	tip	 white/blue
6	2	ring	 orange
7	4	tip	 white/brown
8	4	ring	 brown

TIA/EIA-568-B T568B Wiring

Pin	Pair	Wire	Color
1	2	tip	 white/orange
2	2	ring	 orange
3	3	tip	 white/green
4	1	ring	 blue
5	1	tip	 white/blue
6	3	ring	 green
7	4	tip	 white/brown
8	4	ring	 brown

Manchester code

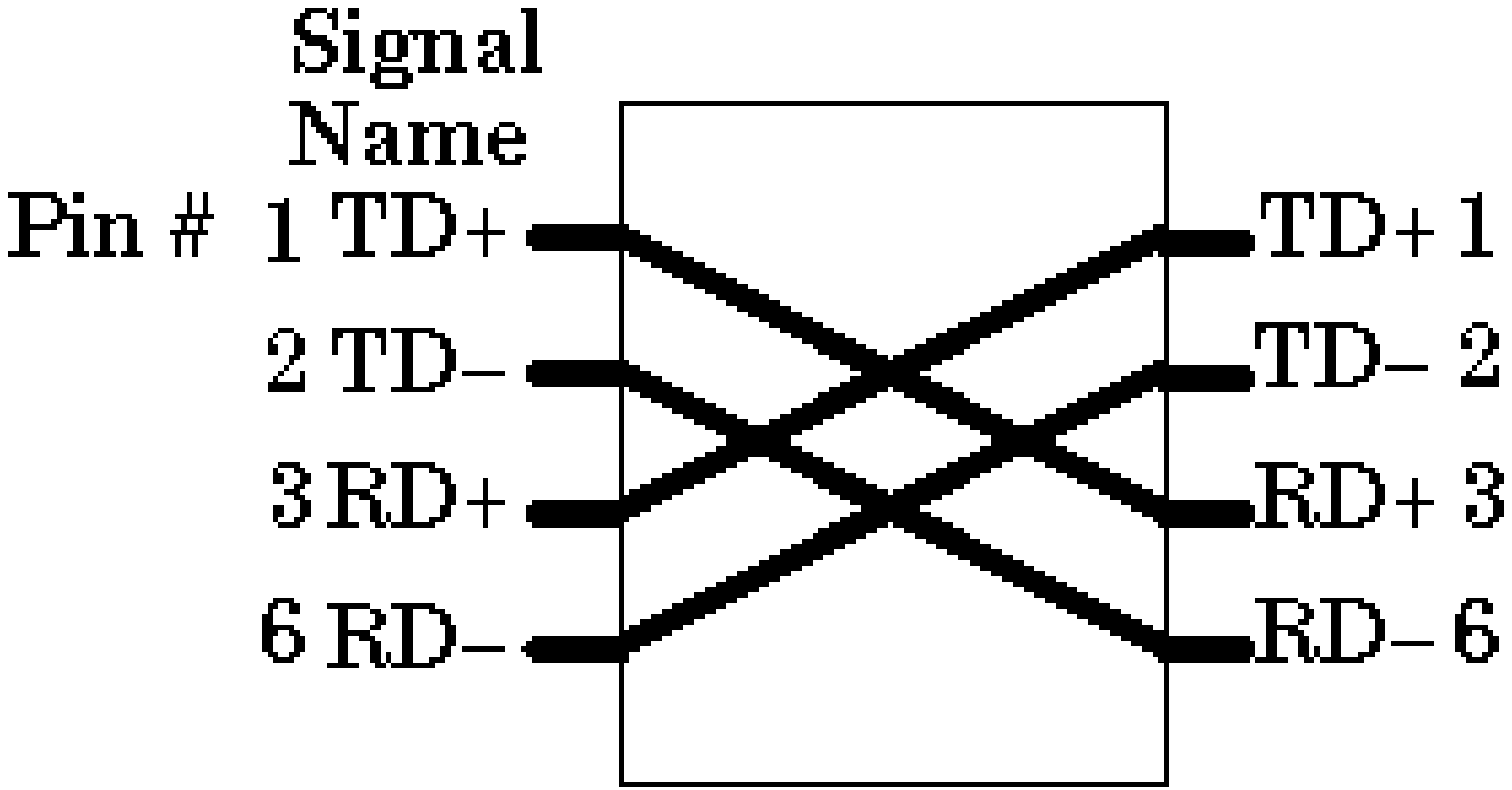

Clock
Data
1 0 1 0 0 1 1 1 0 0 1
Manchester
(as per G.E. Thomas)
Manchester
(as per IEEE 802.3)


1 1 0 1 1 0 0 0 1 0 0

100BASE-TX (Fast Ethernet)

- 100BASE-TX prinsip = 10BASE-T
- (100 Mbps)
- Different LAN card
- Different HUB
- Different Swicth

100BASE-TX



100BASE-T4

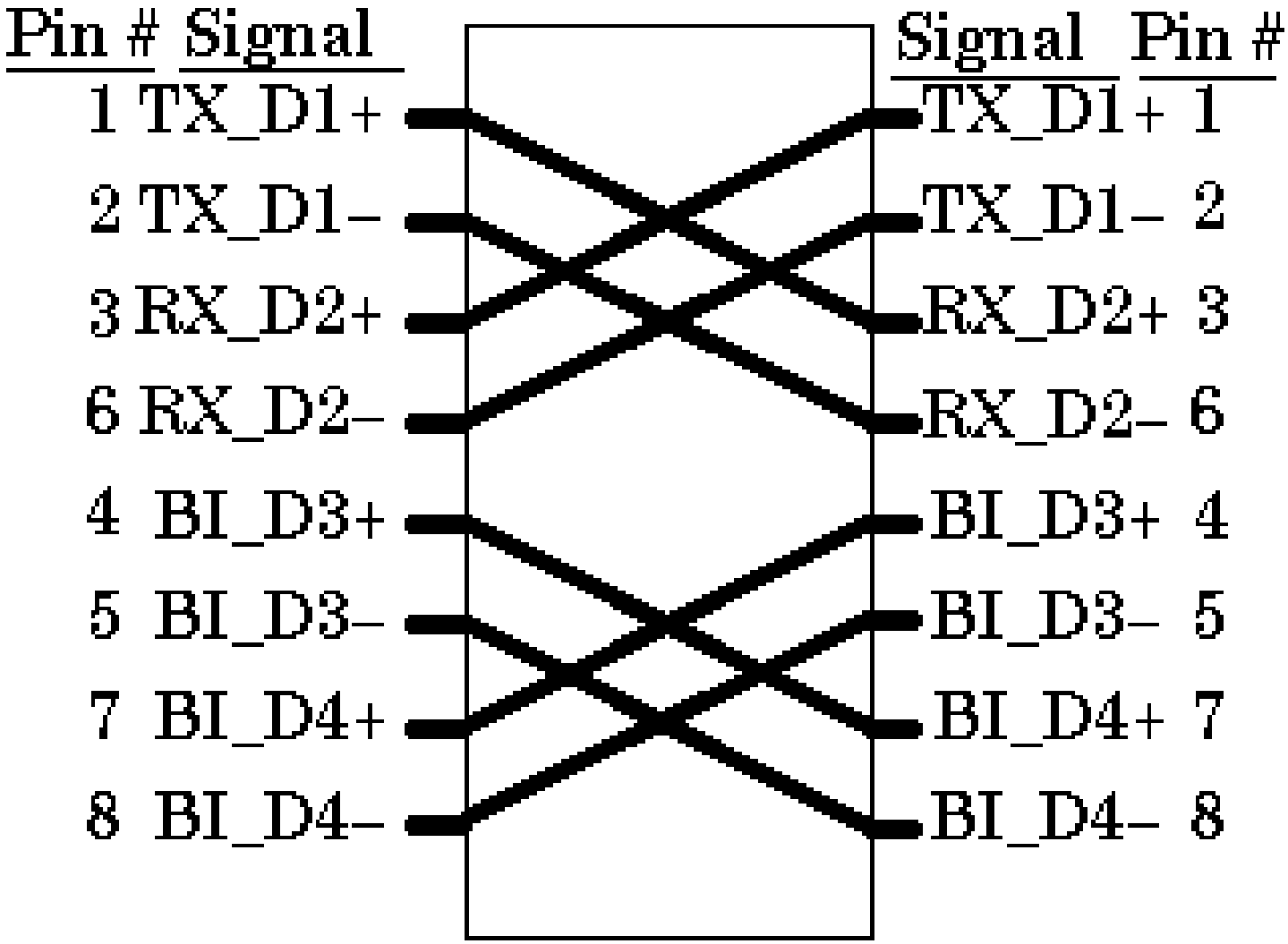
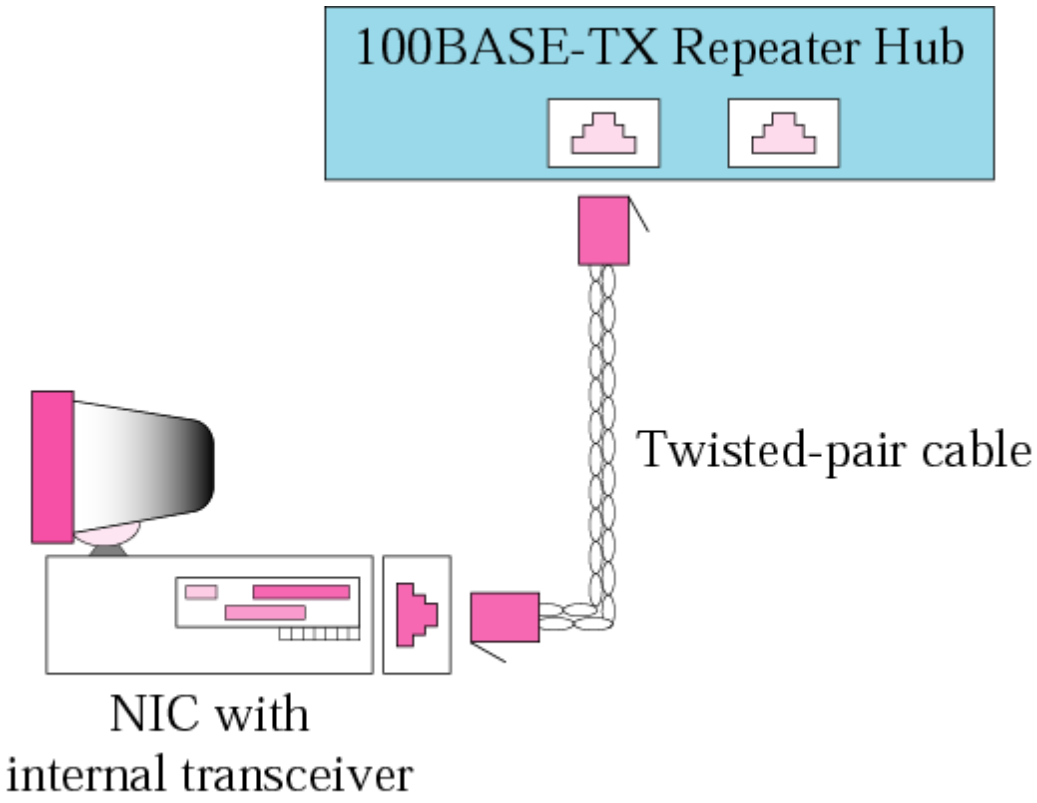

Pin # Signal
1 TX_D1+
2 TX_D1–
3 RX_D2+
6 RX_D2–
4 BI_D3+
5 BI_D3–
7 BI_D4+
8 BI_D4–
Signal Pin #
TX_D1+ 1
TX_D1– 2
RX_D2+ 3
RX_D2– 6
BI_D3+ 4
BI_D3– 5
BI_D4+ 7
BI_D4– 8

Figure 3-6:a

Fast Ethernet implementation



a. 100BASE-TX

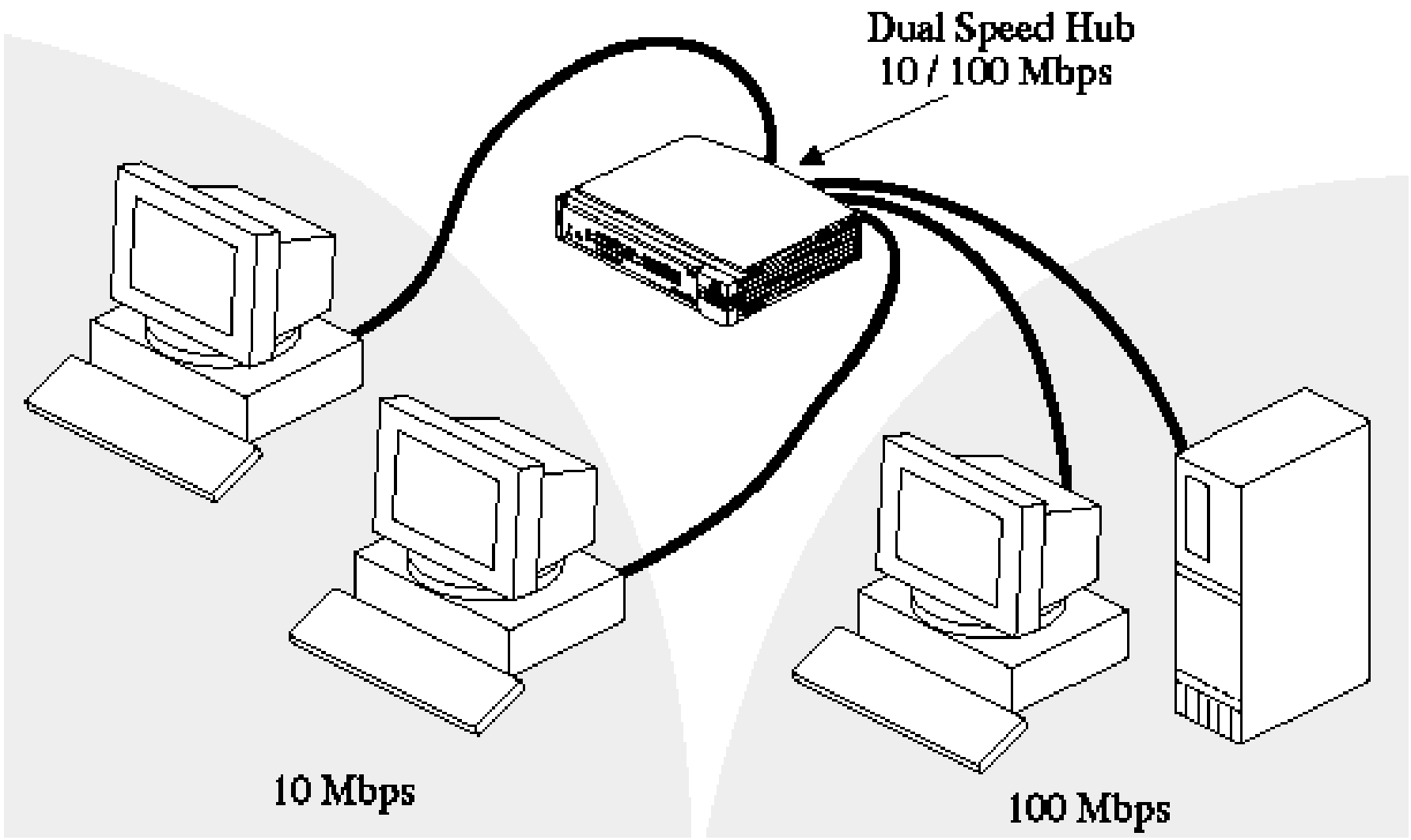
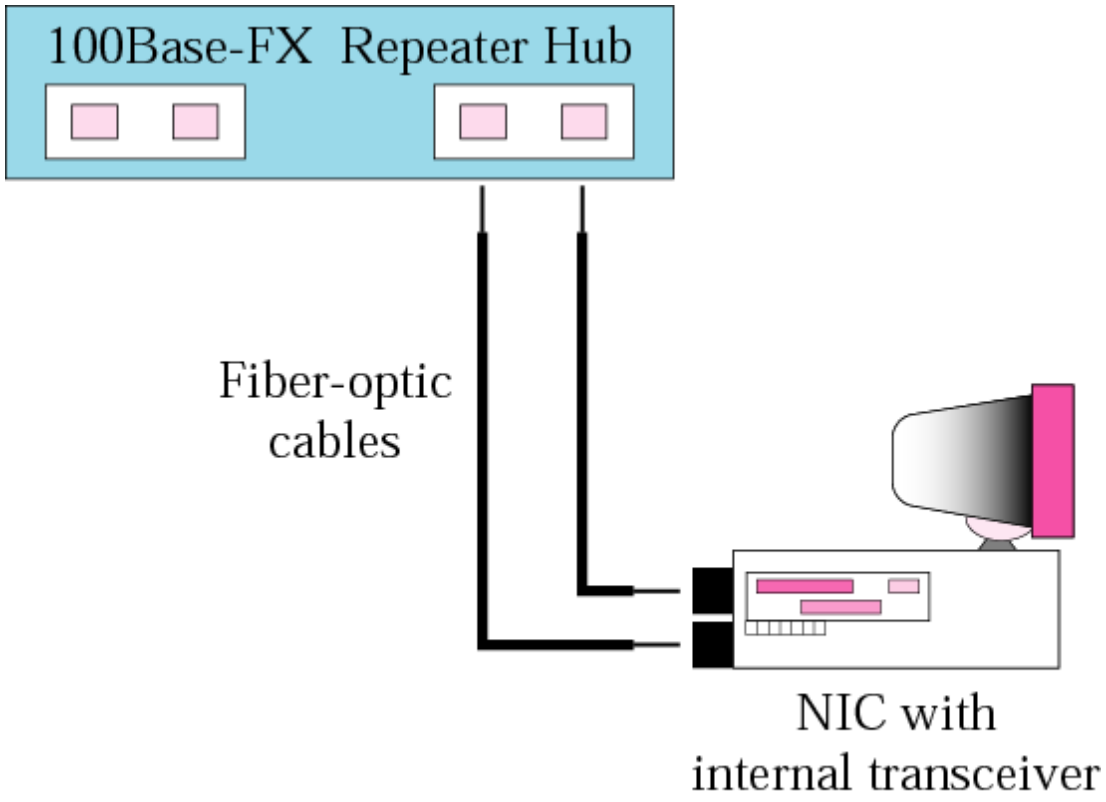

Dual Speed Hub
10 / 100 Mbps
10 Mbps
100 Mbps

Figure 3-6:b

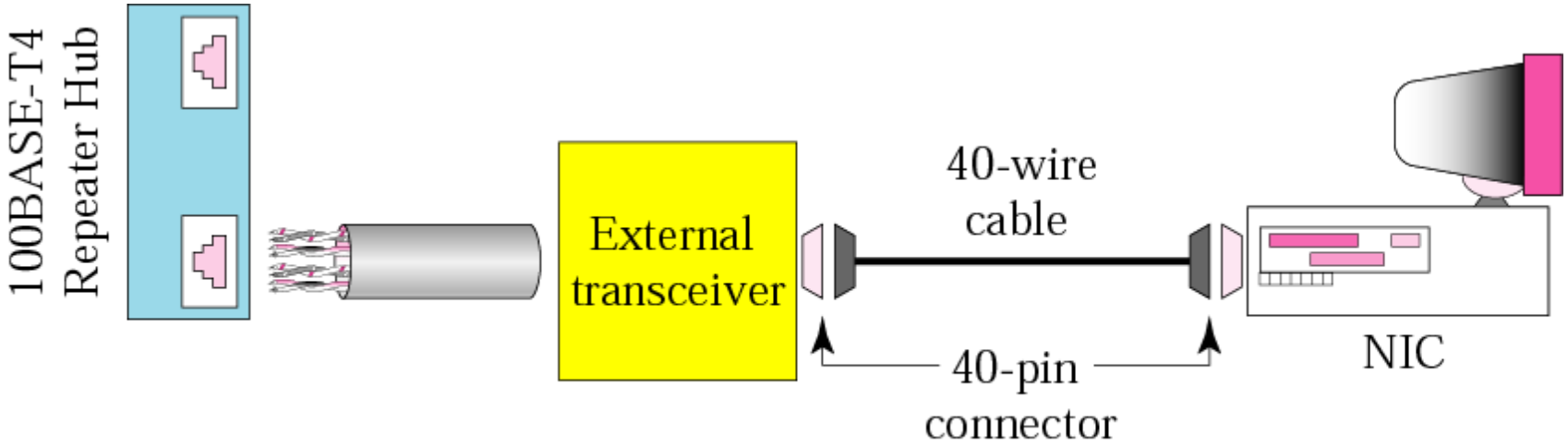
Fast Ethernet implementation



b. 100BASE-FX

Figure 3-6:c

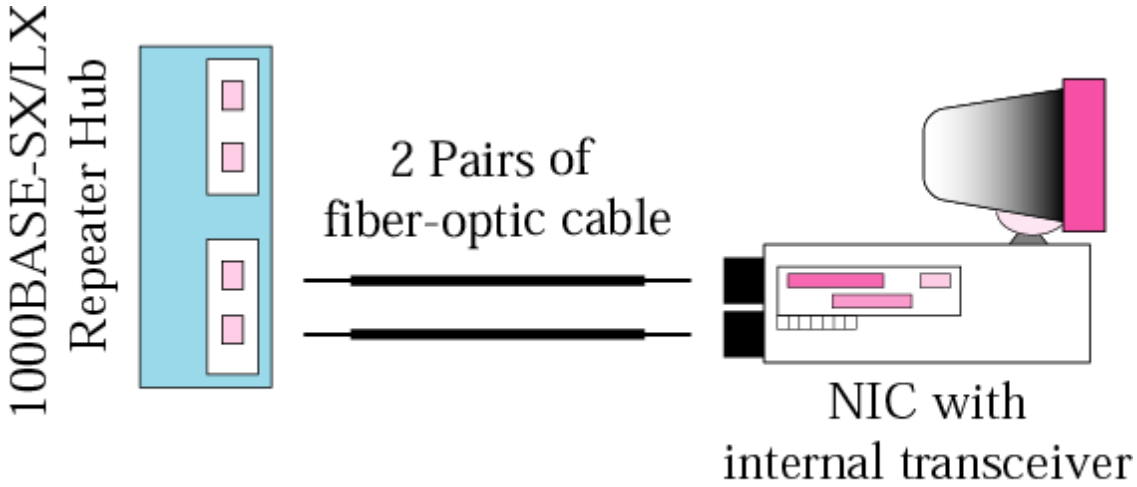
Fast Ethernet implementation



c. 100BASE-T4

Figure 3-7:a

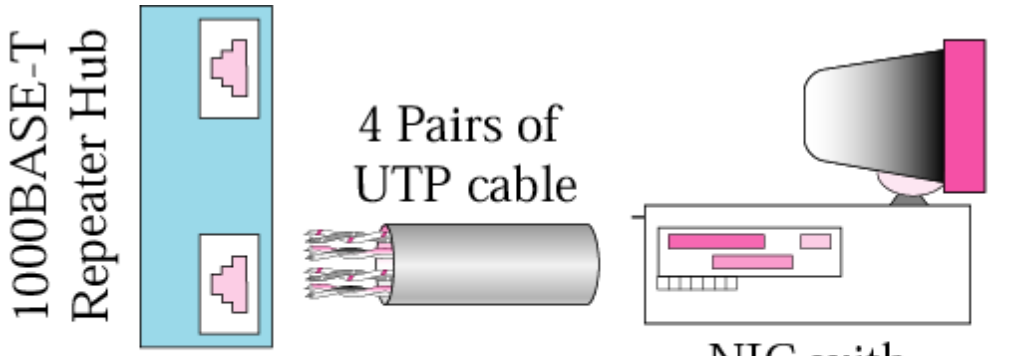
Gigabit Ethernet implementation



a. 1000BASE-SX/LX

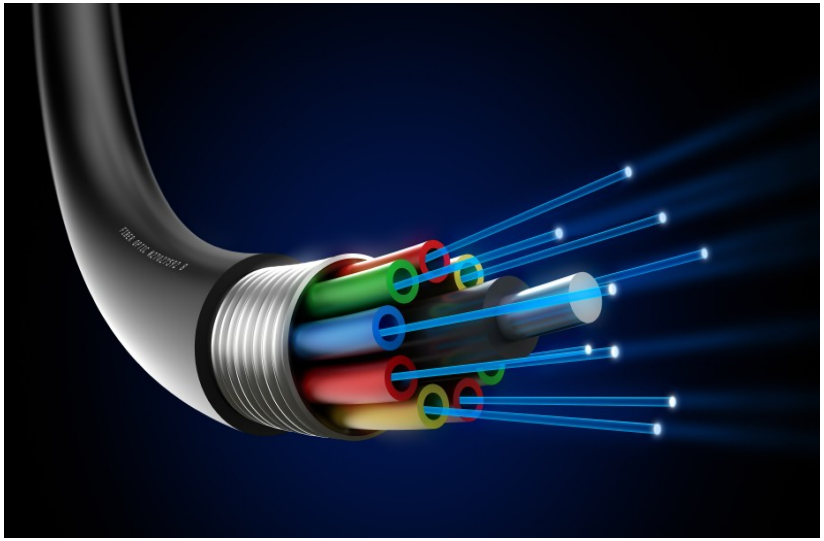
Figure 3-7:b

Gigabit Ethernet implementation



b. 1000BASE-T

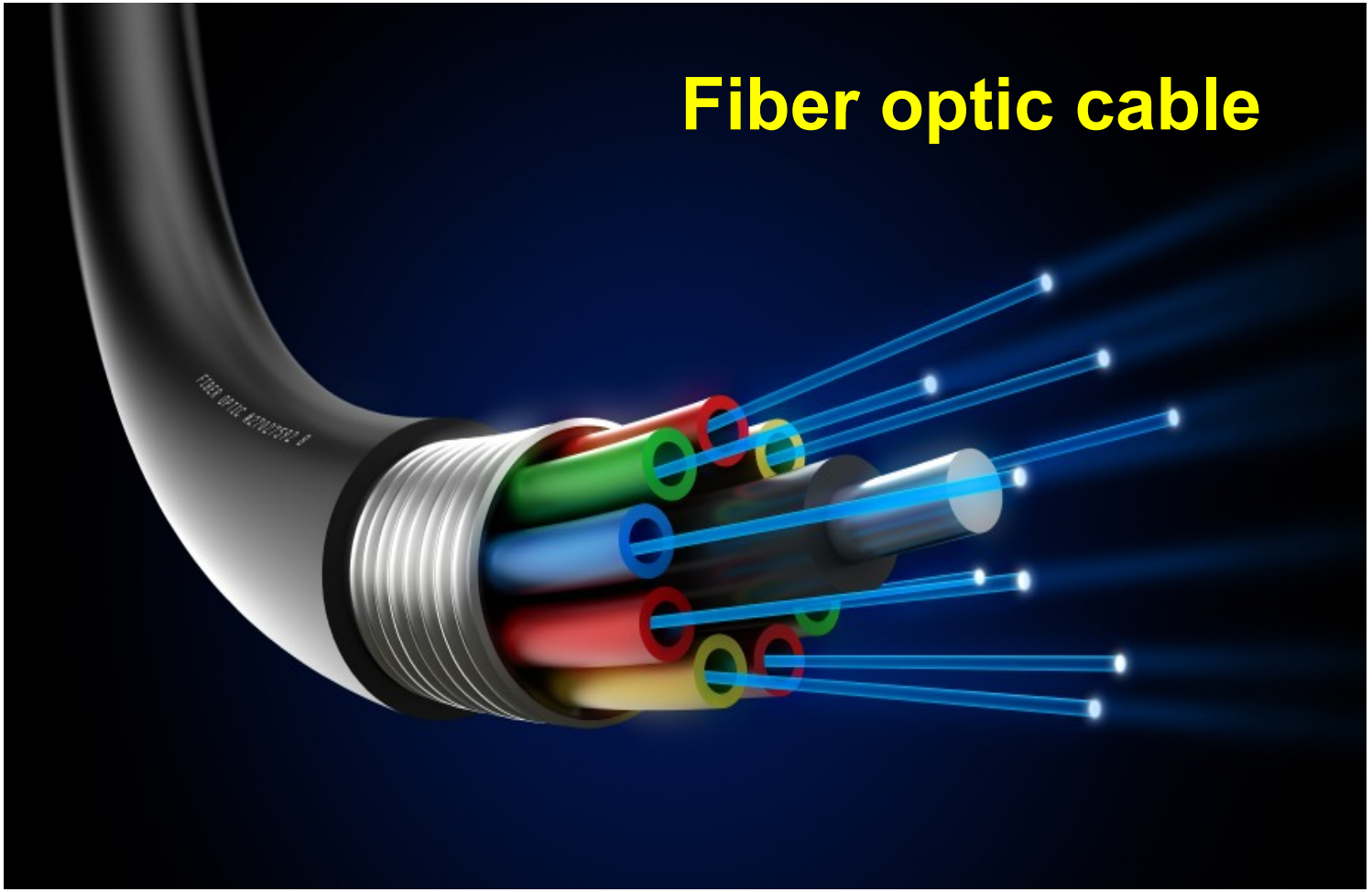
Next week:
802.11 Physical Layer
Fiber Optics




P05-683410A
02
http://www.pcarenahungary.com


wifi
g
D-Link


LINKSYS
2.4GHz +5GHz


Fiber optic cable

Keuntungan Fiber Optik

- Kapasitas yang sangat besar : 10Gbps
- Anti cross talk
- Tahan terhadap interferensi statis
  - Petir
  - Motor listrik
  - Lampu
- Tahan terhadap cuaca, temperatur dll