



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME :19IT401 COMPUTER NETWORKS
II YEAR /IV SEMESTER

Unit 2-LINK LAYER
Topic 10 :Connecting devices



Connecting devices

Hubs, Routers, Switches

1. Hub is a physical layer device i.e. layer 1.

2. A Hub works on the basis of broadcasting.

3. A Hub is a multiport repeater in which a signal introduced at the input of any port appears at the output of the all available ports.

4. Hub is not an intelligent device that may include amplifier on repeater.

5. At least single network is required to connect.

6. Hub is cheaper as compared to switch and router.

Switch is a data link layer device i.e. layer 2.

Switch works on the basis of MAC address.

A Switch is a tele-communication device which receives a message from any device connected to it and then transmits the message only to the device for which the message is intended.

A Switch is an intelligent device as it passes on the message to the selective device by inspecting the address.

At least single network is required to connect.

Switch is an expensive device than hub.

Router is a network layer device i.e. layer 3.

A router works on the basis of IP address.

A router reads the header of incoming packet and forward it to the port for which it is intended there by determines the route. It can also perform filtering and encapsulation.

A route is more sophisticated and intelligent device as it can read IP address and direct the packets to another network with specified IP address. Moreover routers can built address tables that helps in routing decisions.

Router needs at least two networks to connect.

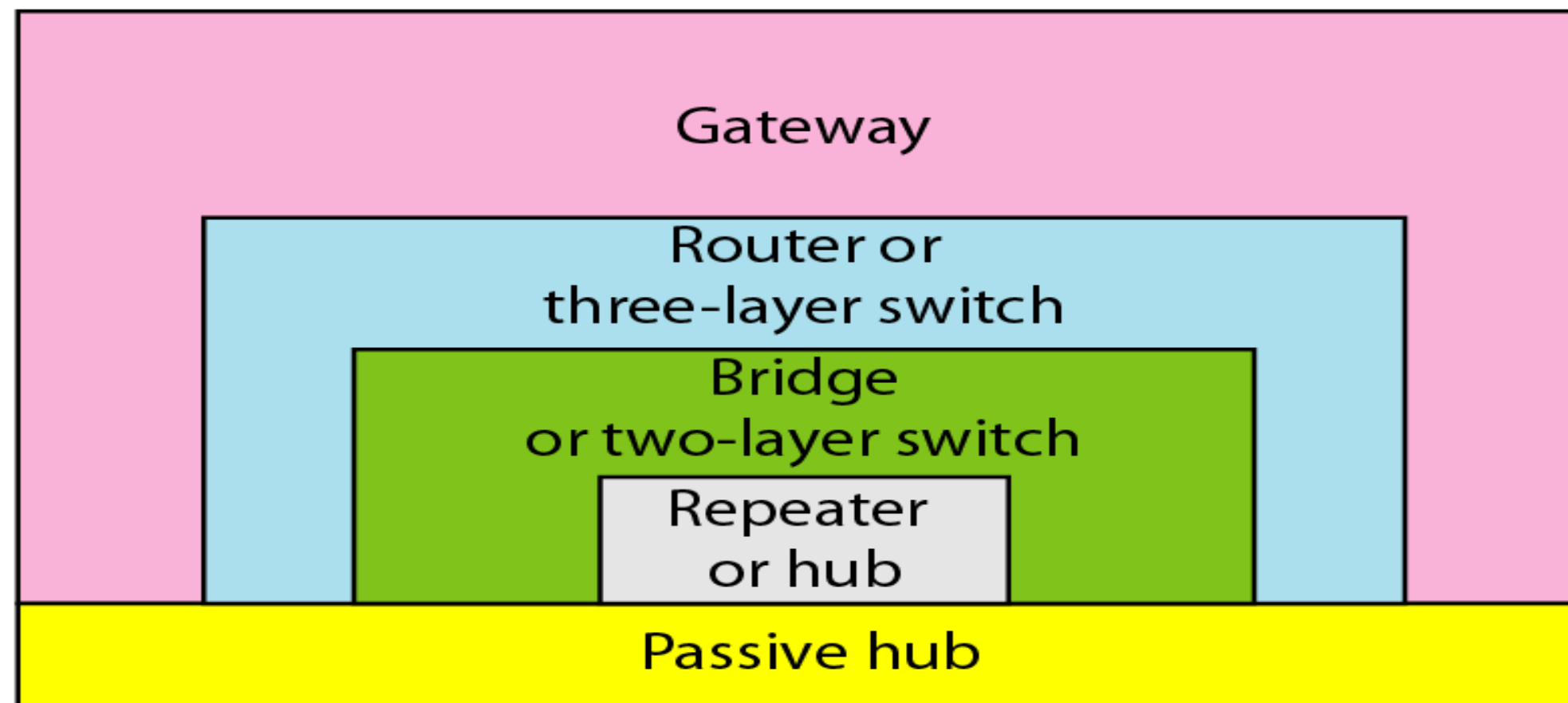
Router is a relatively much more expensive device than hub and switch.



Five categories of connecting devices



Application
Transport
Network
Data link
Physical



Application
Transport
Network
Data link
Physical

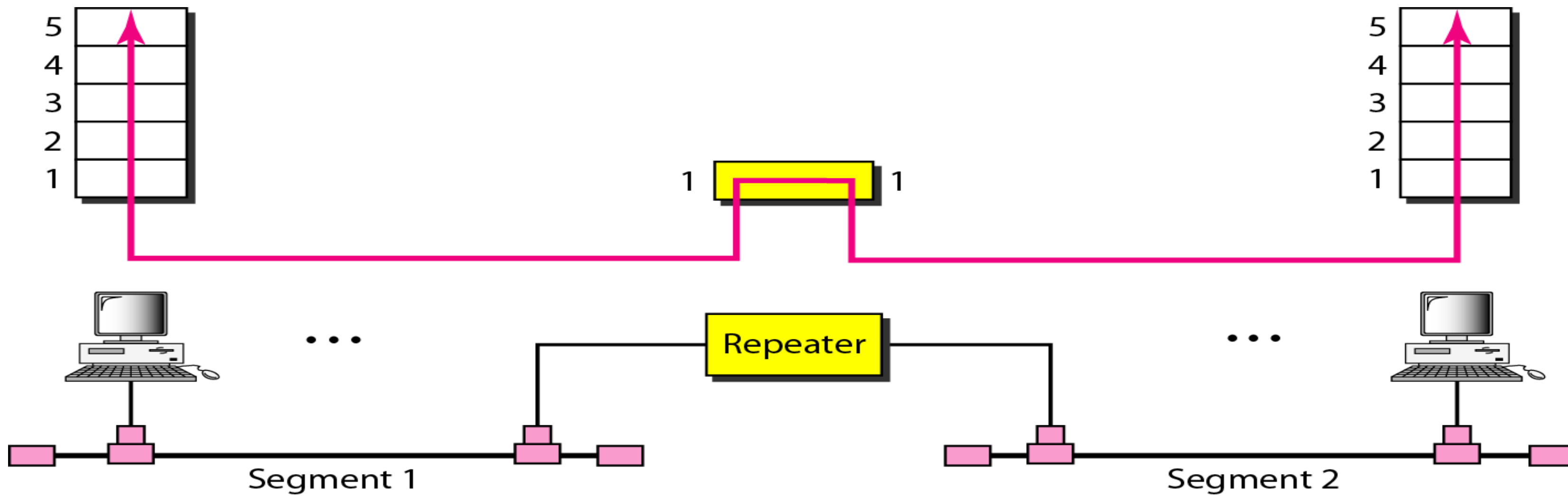


Repeater or hub connects segments of a LAN

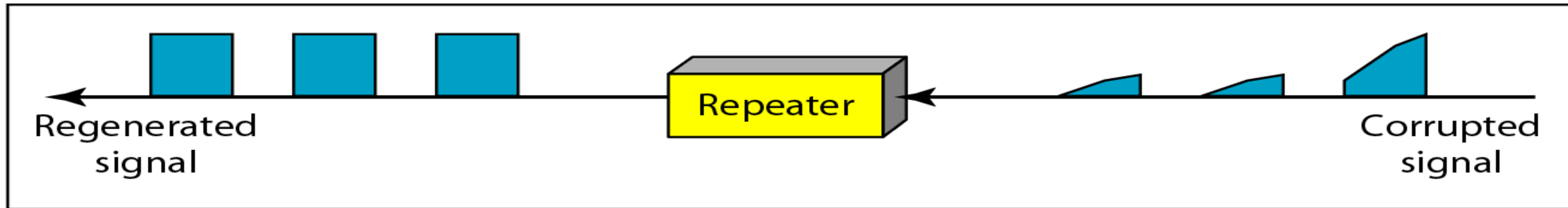
A repeater forwards every frame;
it has no filtering capability.

A repeater is a regenerator,
not an amplifier.

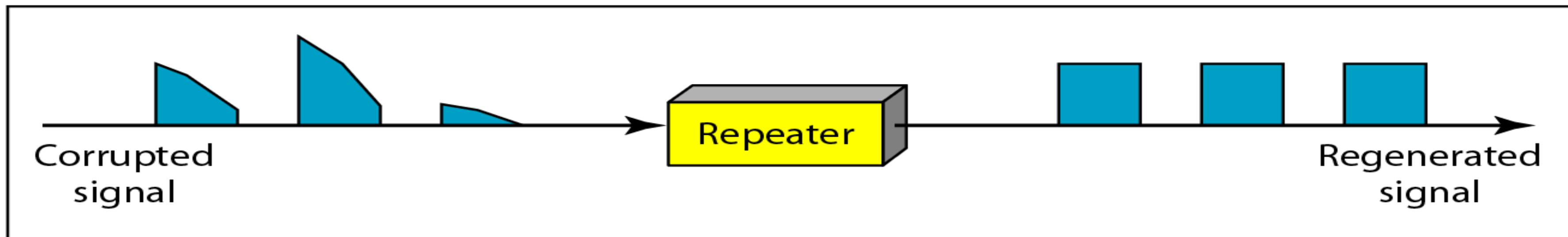
A repeater connecting two segments of a LAN



Function of a repeater

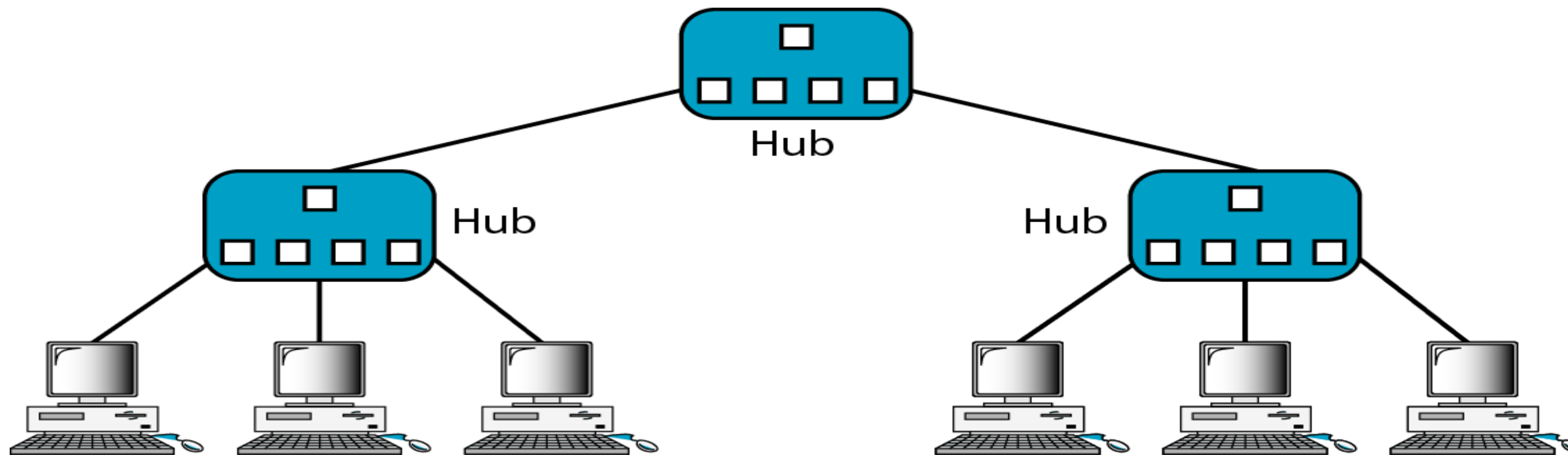


a. Right-to-left transmission.



b. Left-to-right transmission.

A hierarchy of hubs



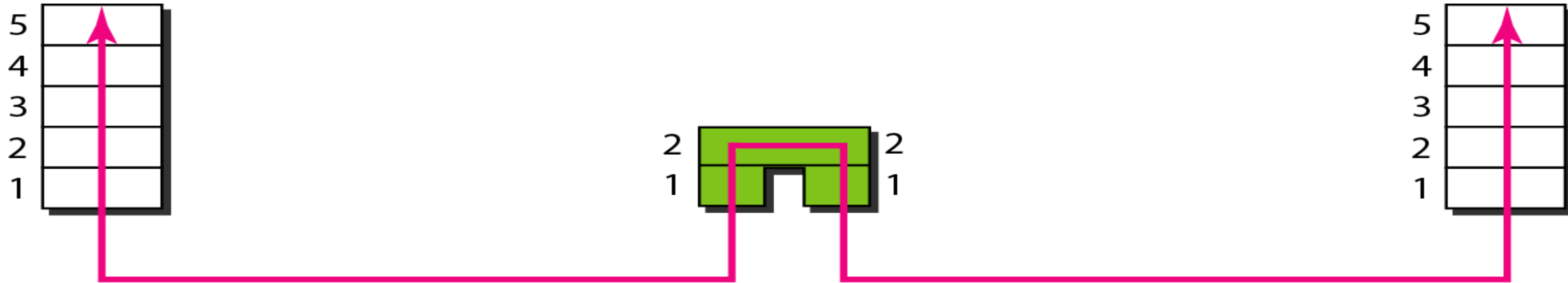


Note

A bridge has a table used in filtering decisions.

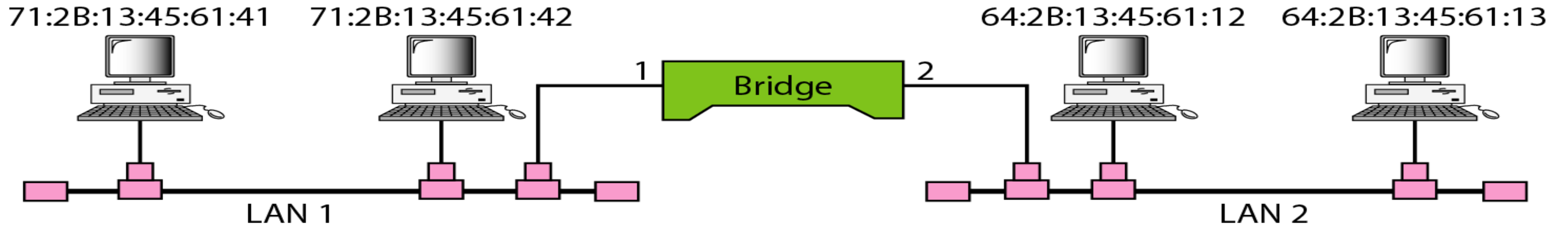


A bridge connecting two LANs



Address	Port
71:2B:13:45:61:41	1
71:2B:13:45:61:42	1
64:2B:13:45:61:12	2
64:2B:13:45:61:13	2

Bridge Table

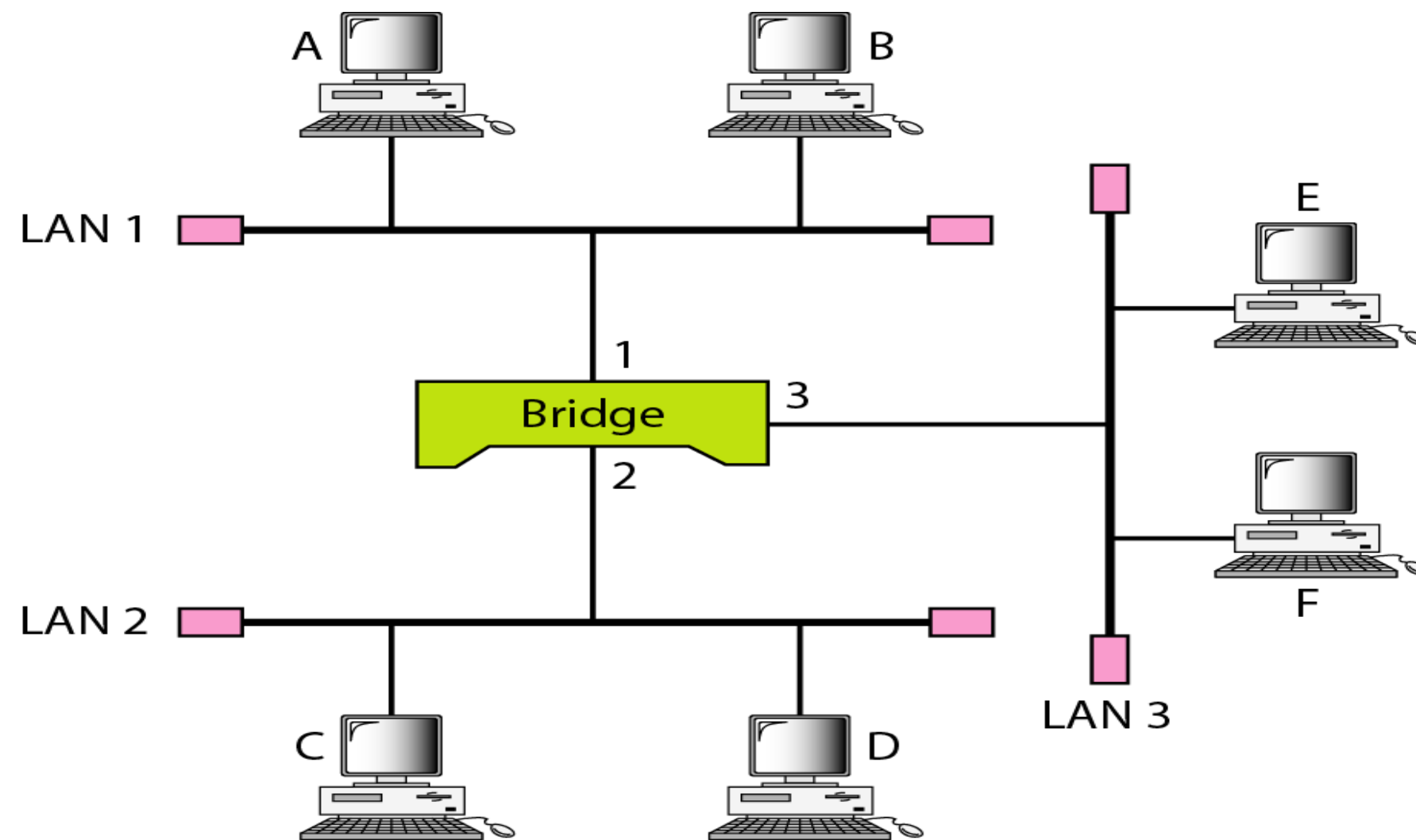




Note

A bridge does not change the physical (MAC) addresses in a frame.

A learning bridge and the process of learning



Address	Port

a. Original

Address	Port
A	1

b. After A sends a frame to D

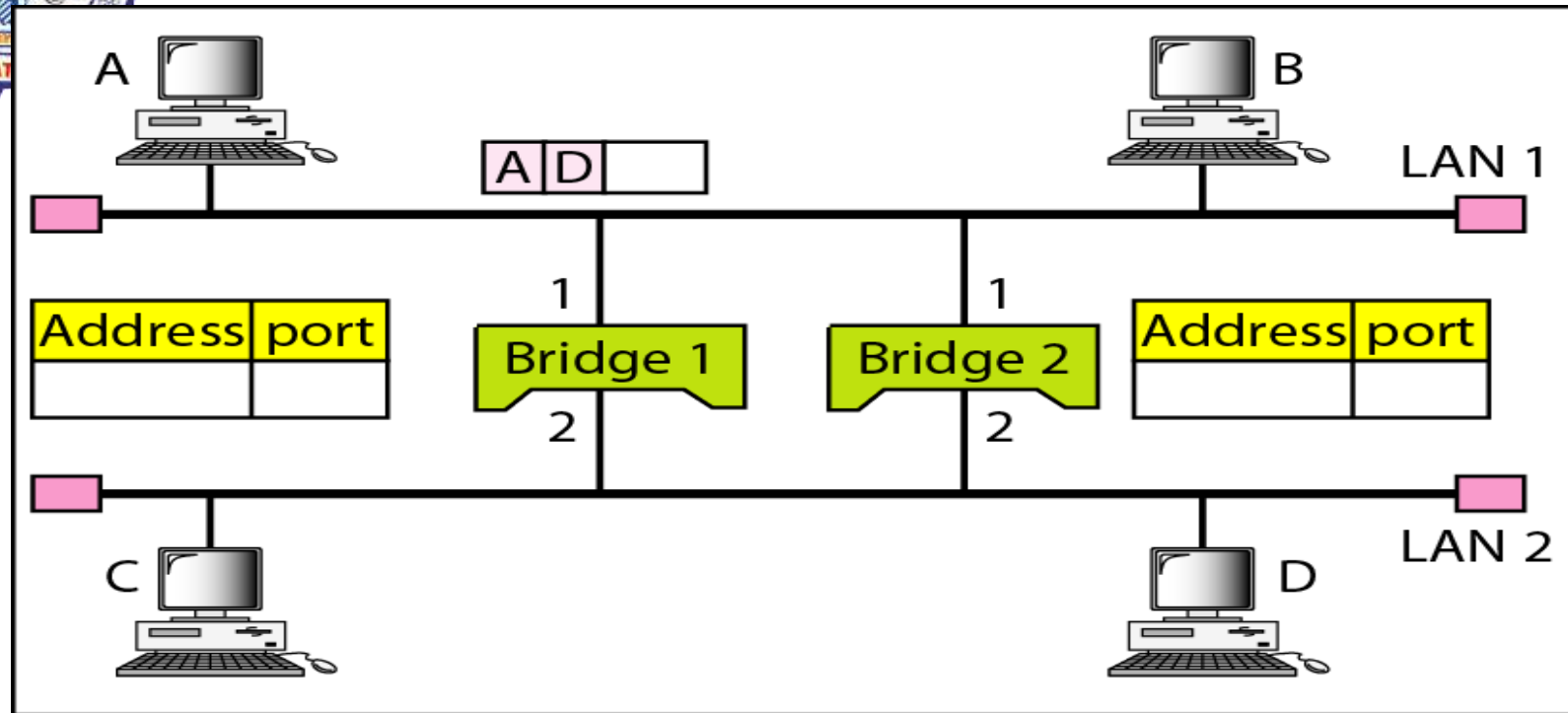
Address	Port
A	1
E	3

c. After E sends a frame to A

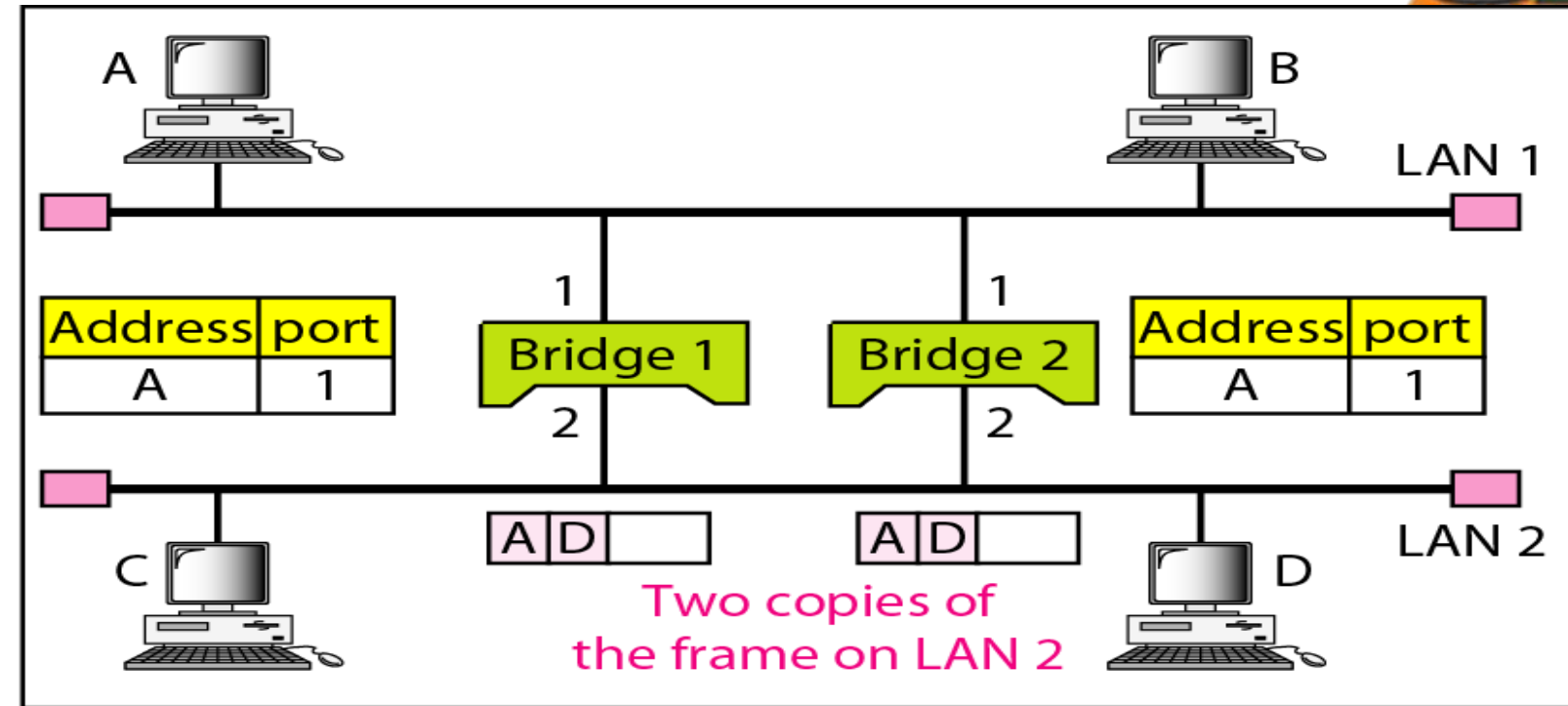
Address	Port
A	1
E	3
B	1

d. After B sends a frame to C

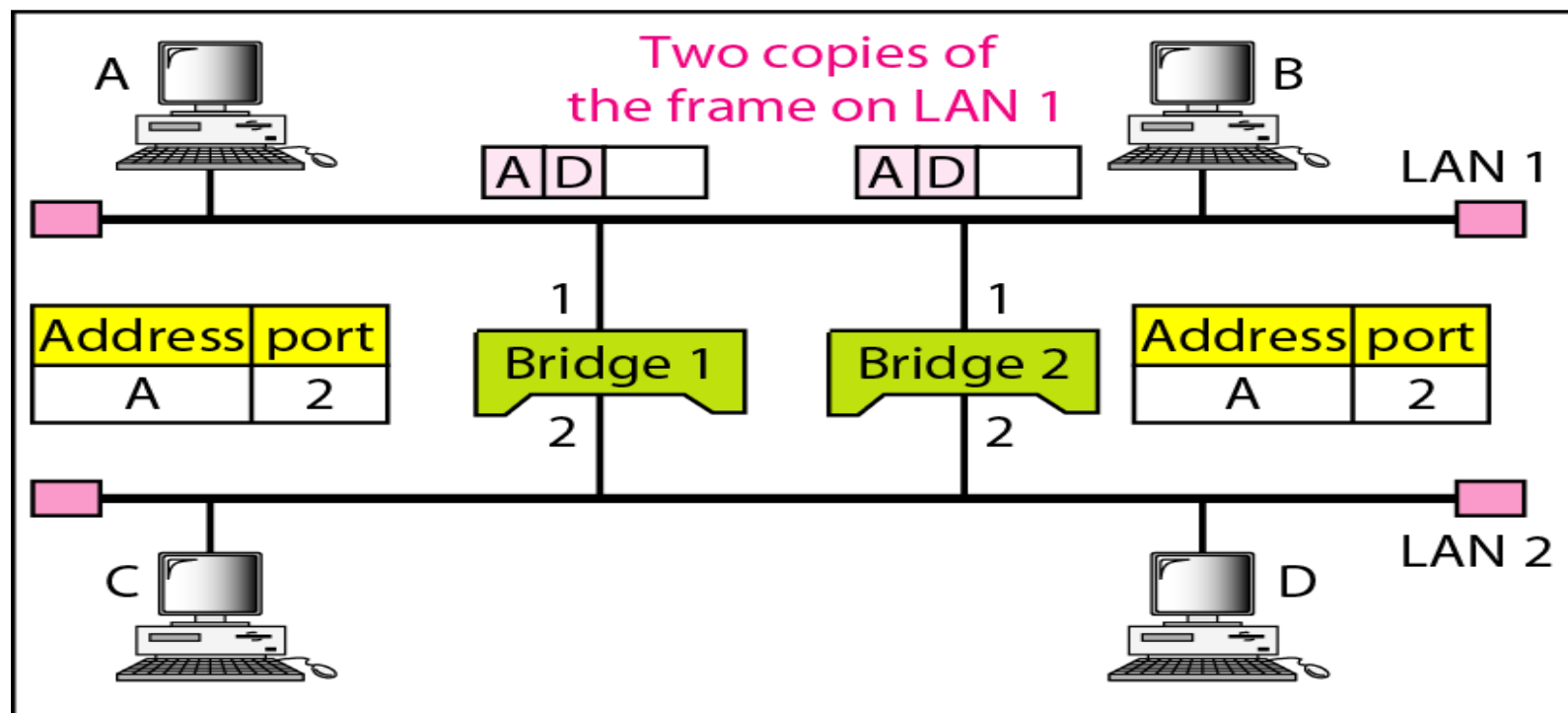
Loop problem in a learning bridge



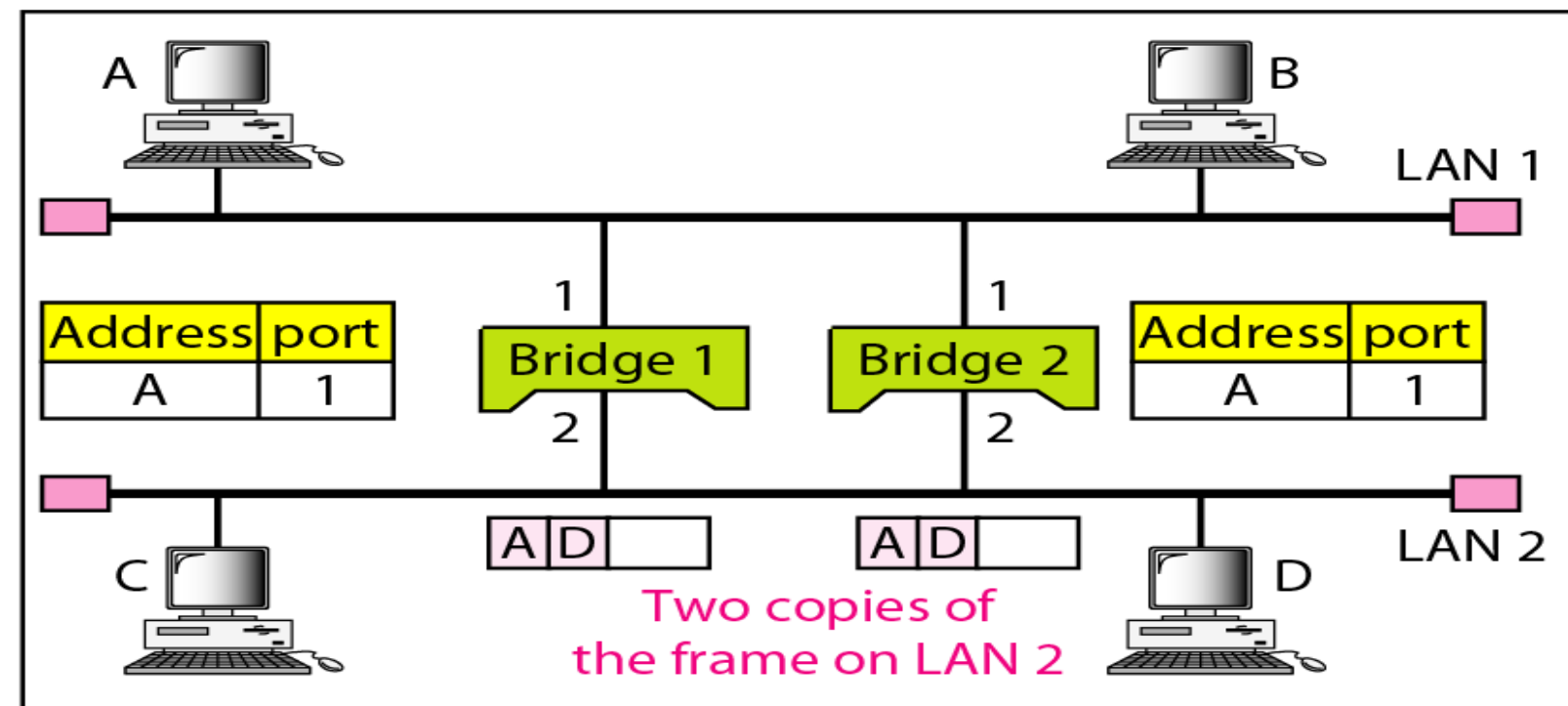
a. Station A sends a frame to station D



b. Both bridges forward the frame

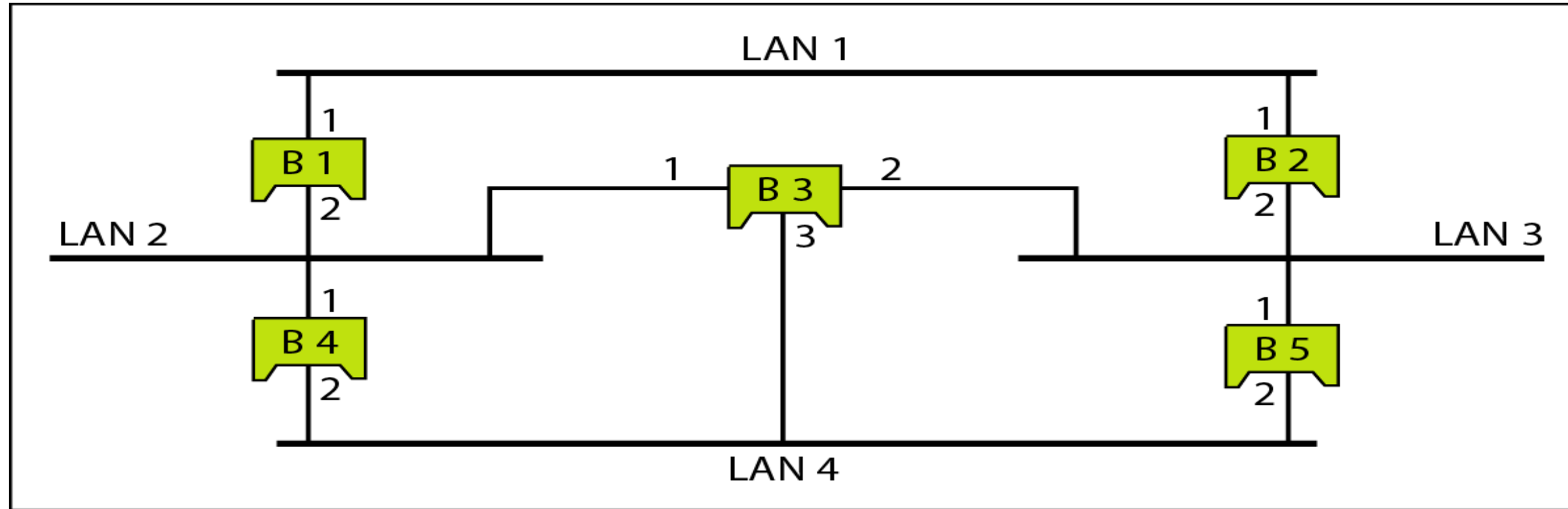


c. Both bridges forward the frame

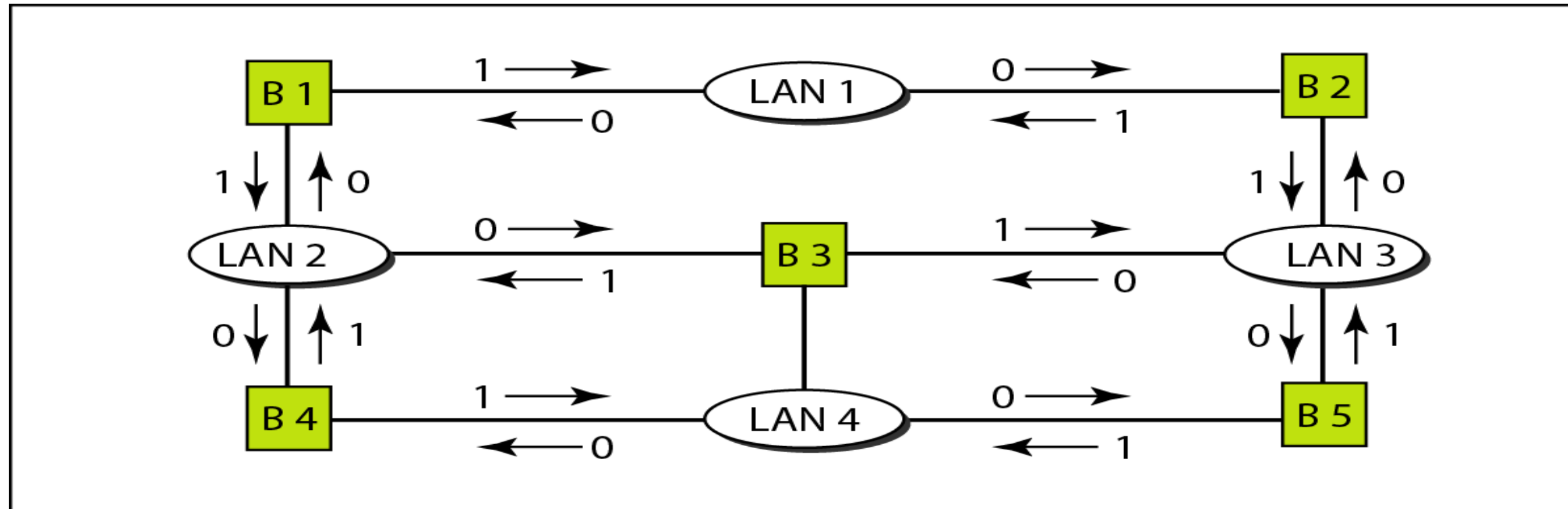


d. Both bridges forward the frame

A system of connected LANs and its graph representation

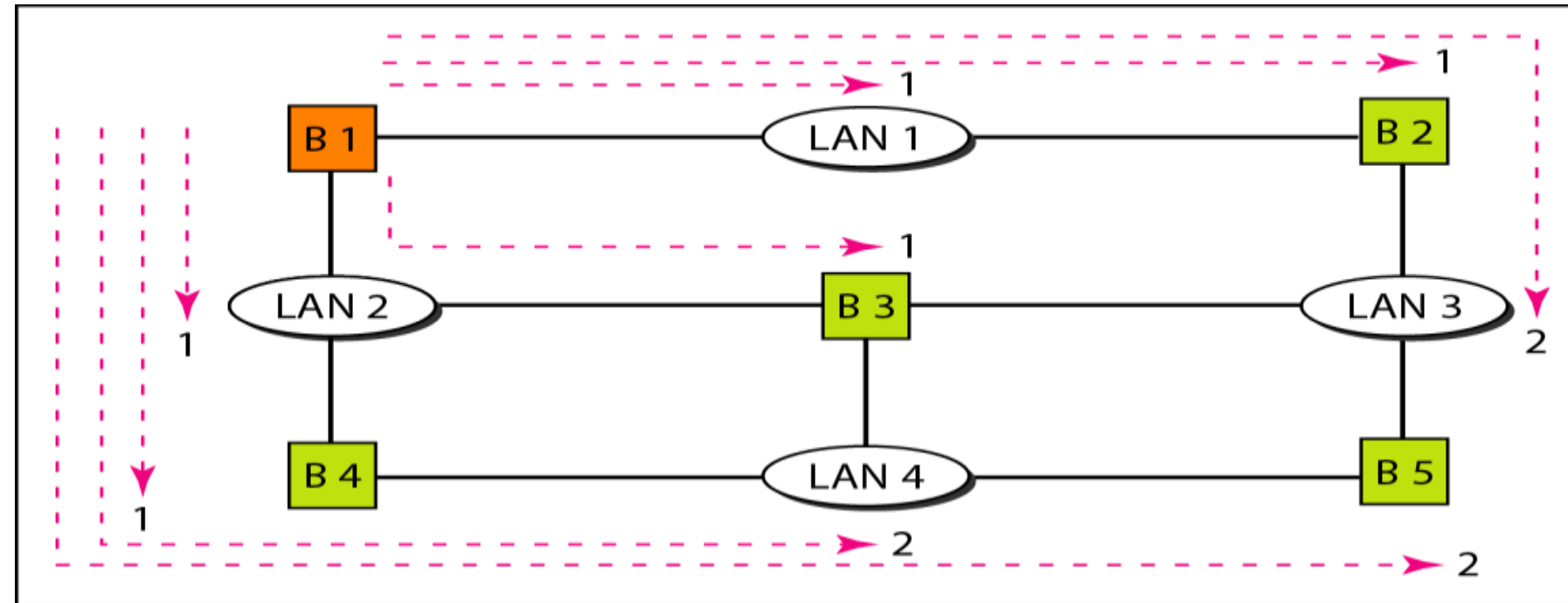


a. Actual system

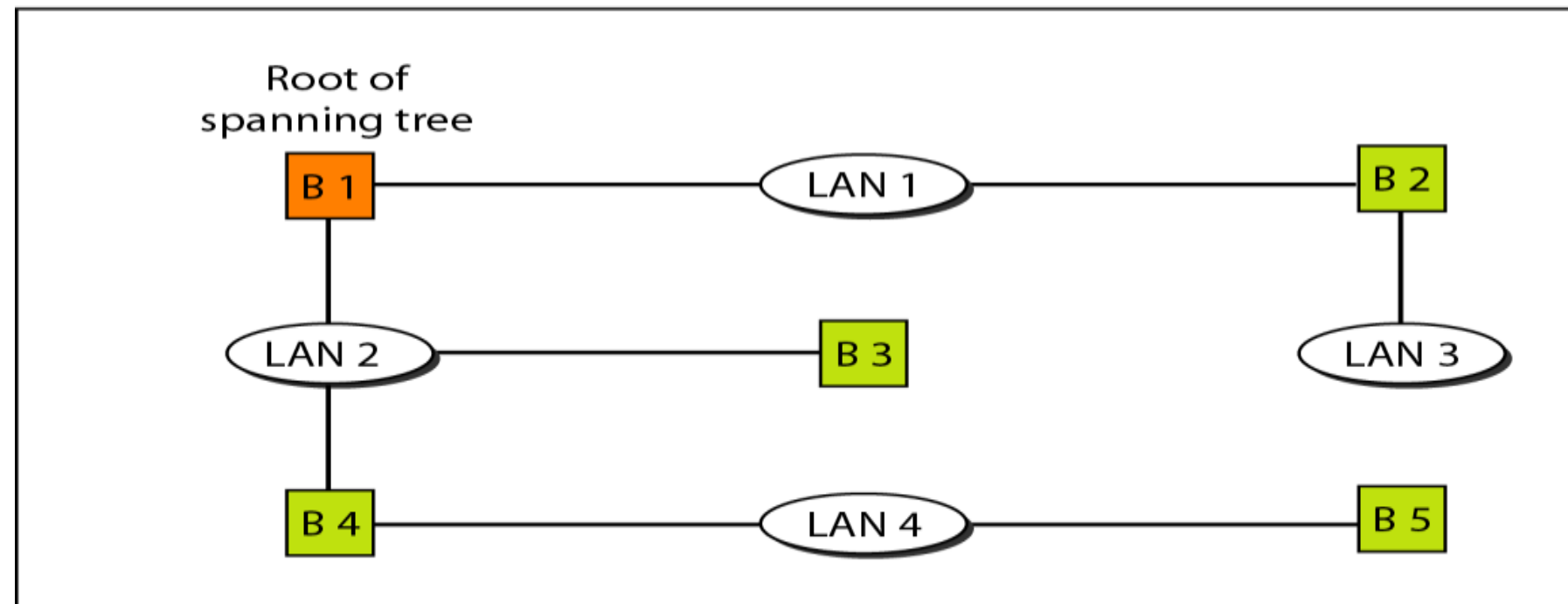


b. Graph representation with cost assigned to each arc

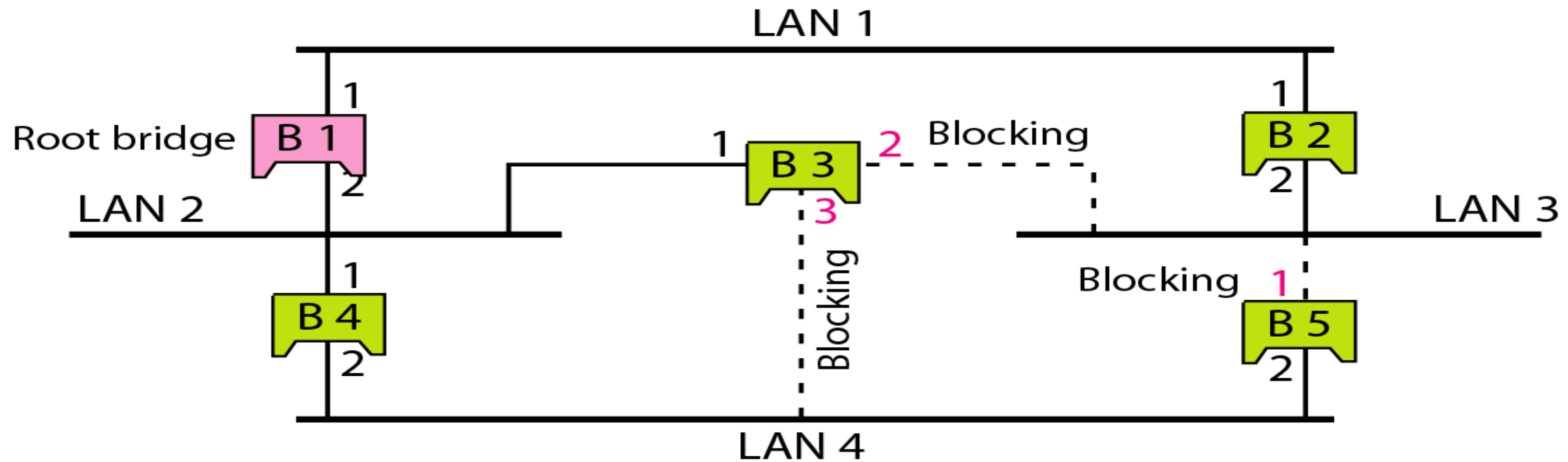
Finding the shortest paths and the spanning tree in a system of bridges



a. Shortest paths



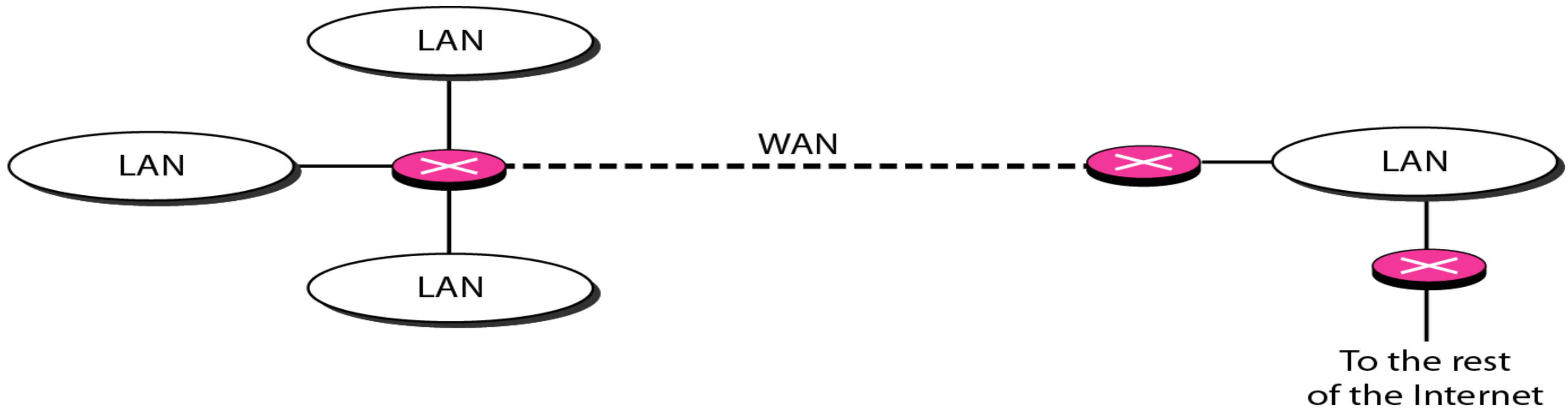
b. Spanning tree



Ports 2 and 3 of bridge B3 are blocking ports (no frame is sent out of these ports). Port 1 of bridge B5 is also a blocking port (no frame is sent out of this port).



Routers connecting independent LANs and WANs





Assessment



- a) List connecting devices
- b) What is the use of switch?
- c) What is the use of router?
- d) What is hub?.





Reference



TEXT BOOKS

Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

REFERENCES

1. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
2. Andrew Tanenbaum, Computer Networks, Fifth Edition, Pearson (5th Edition) Education, 2013.
3. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.
4. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.