Bridges
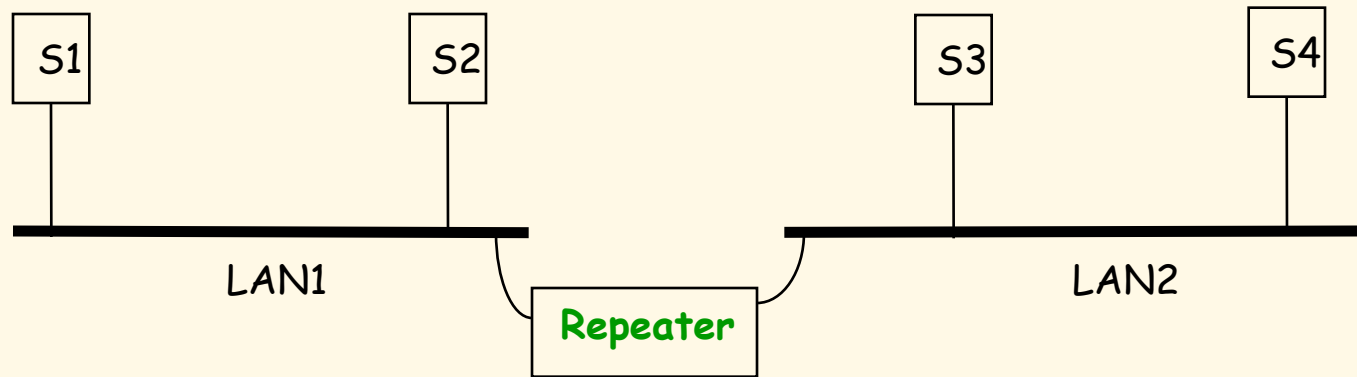
Bridges Outline

- **Repeaters**
- **Bridges**
  - Backward learning
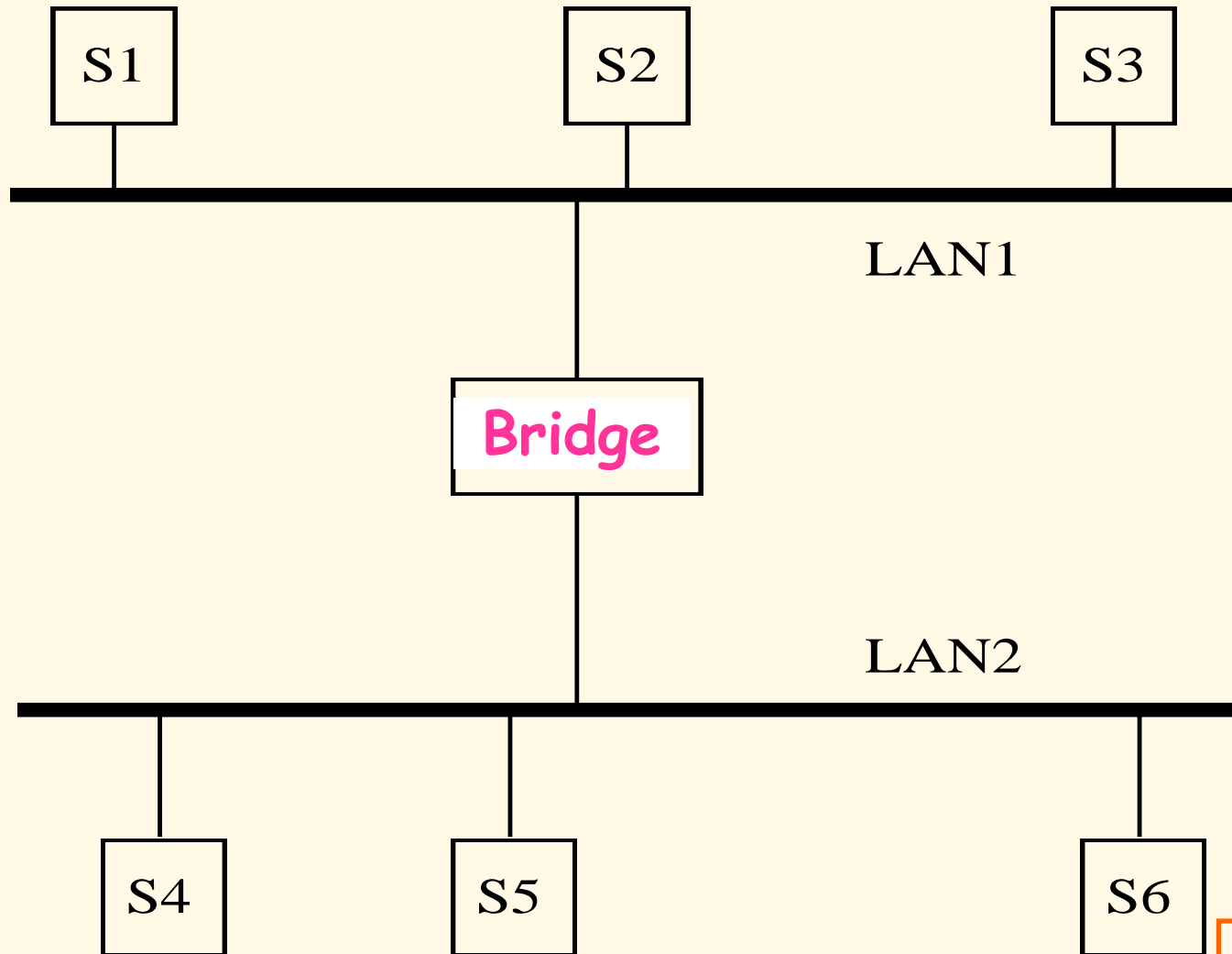- **Bridge Loops**
  - Spanning trees

Repeaters

A **repeater** operates at the physical layer and forwards everything between the two LANs.

LAN1 and LAN2 are in the same **collision domain**.

Bridges

S1 S2 S3

LAN1

Bridge

LAN2

S4 S5 S6

Bridges
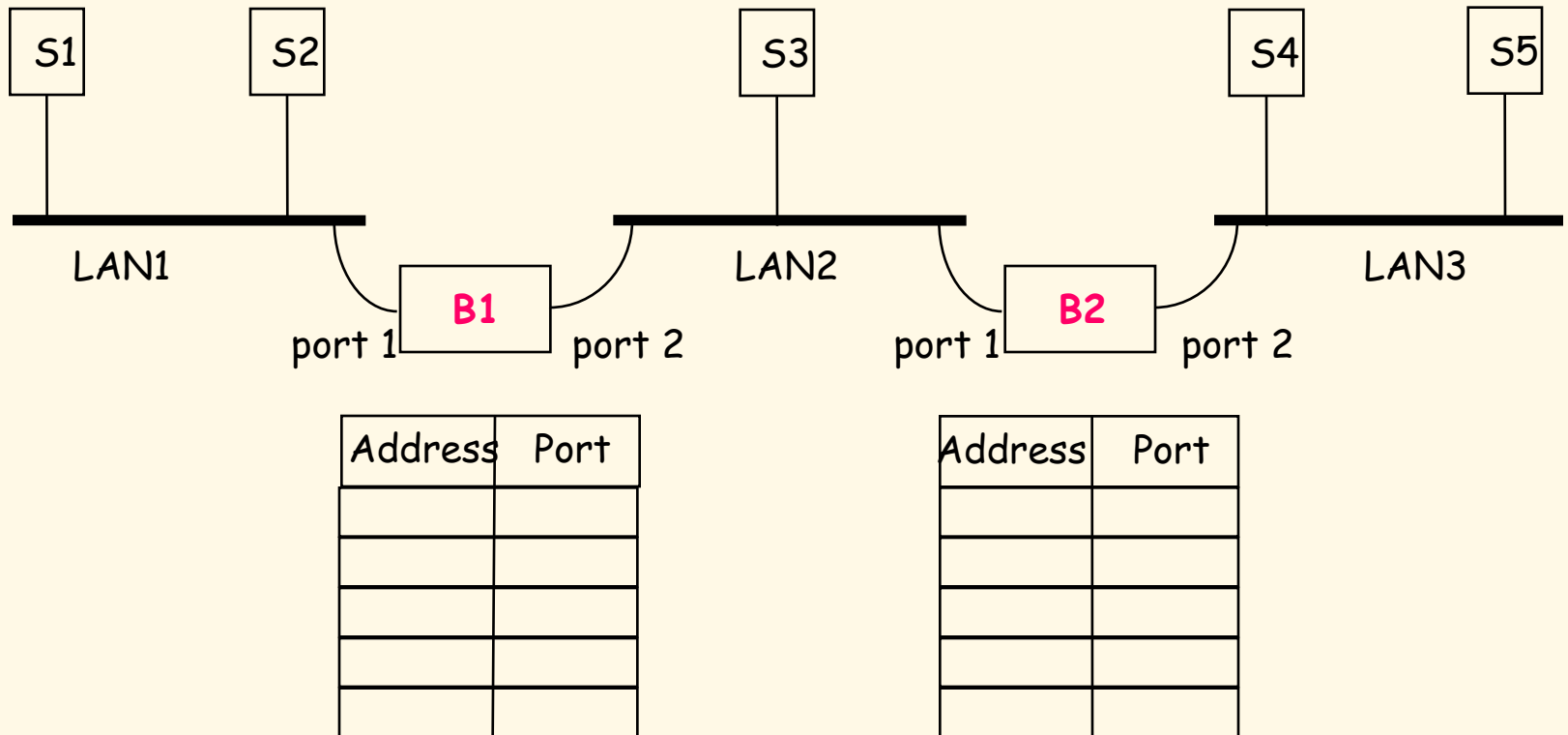
- Operate at the data link layer.

- Bridges use backward learning in recording source address on transmissions.

- Unlike repeaters, bridges will not forward a frame onto another LAN segment if it knows about the location of the destination node.

- *Bridge management gets more complicated when loops are possible in the frame route.*

Bridge

Network

LLC

MAC

Physical

Bridge

MAC | MAC

Physical | Physical

Network

LLC

MAC

Physical
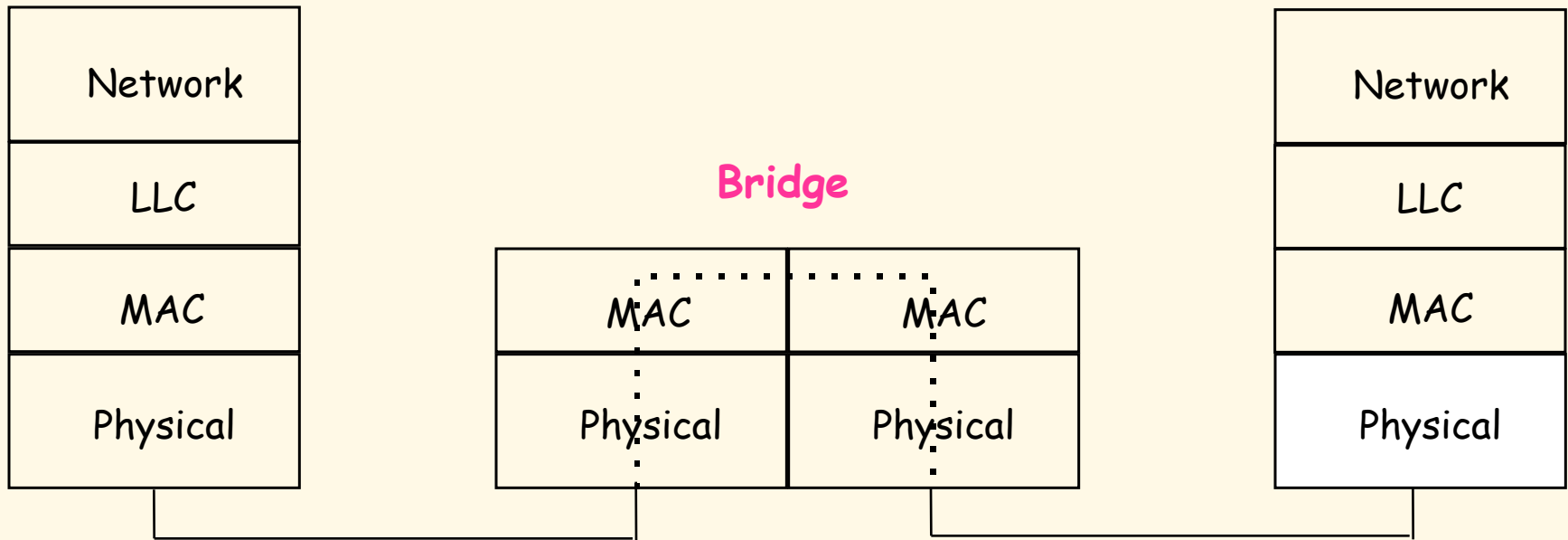
A bridge is a store and forward device that <u>**separates**</u> collision domains.

Bridges

Bridges

S1 → S5
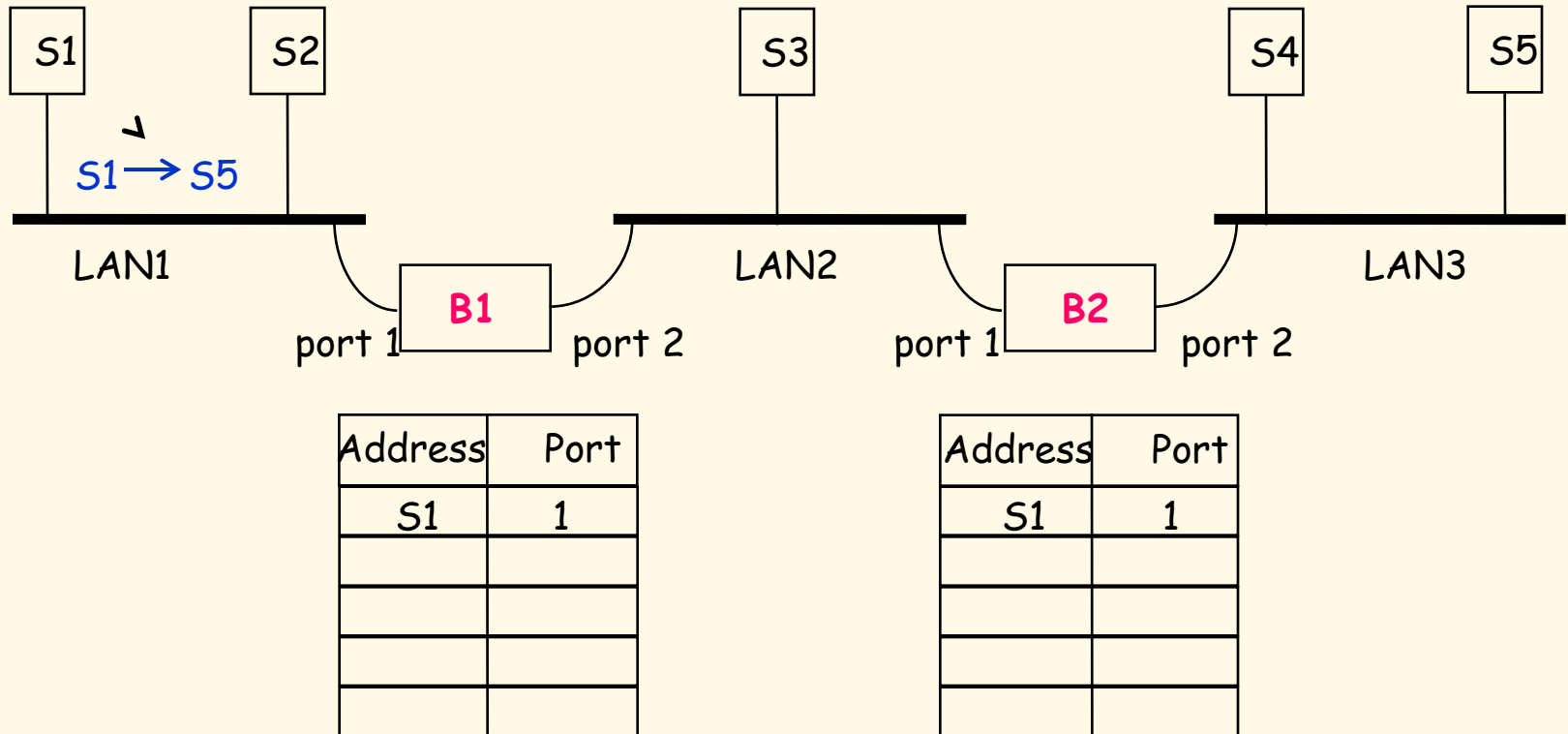
Address	Port
S1	1

Address	Port
S1	1
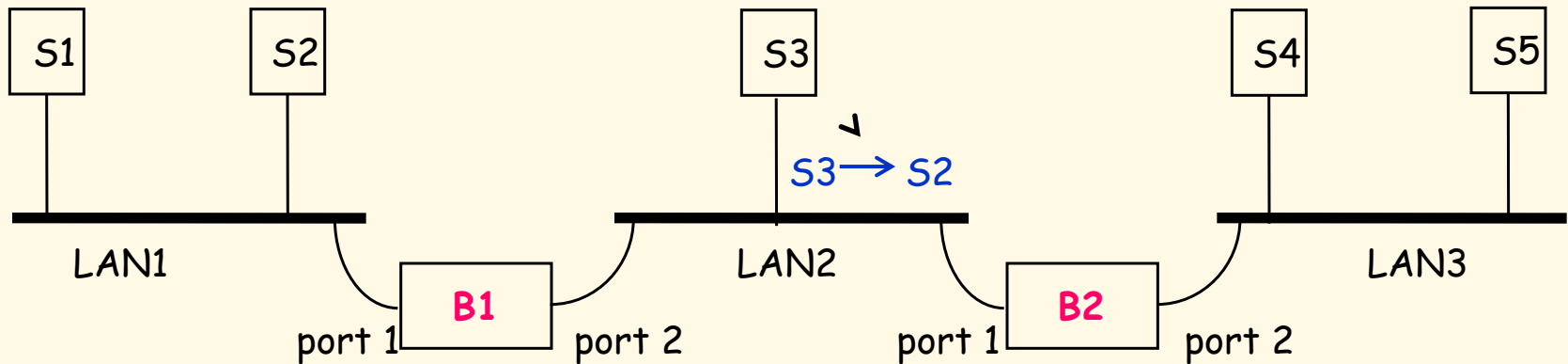
Bridges

Address	Port
S1	1
S3	2

Address	Port
S1	1
S3	1

Bridges

S1   S2   S3   S4   S5

LAN1   LAN2   LAN3

$S4 \longrightarrow S3$

B1
port 1   port 2

B2
port 1   port 2
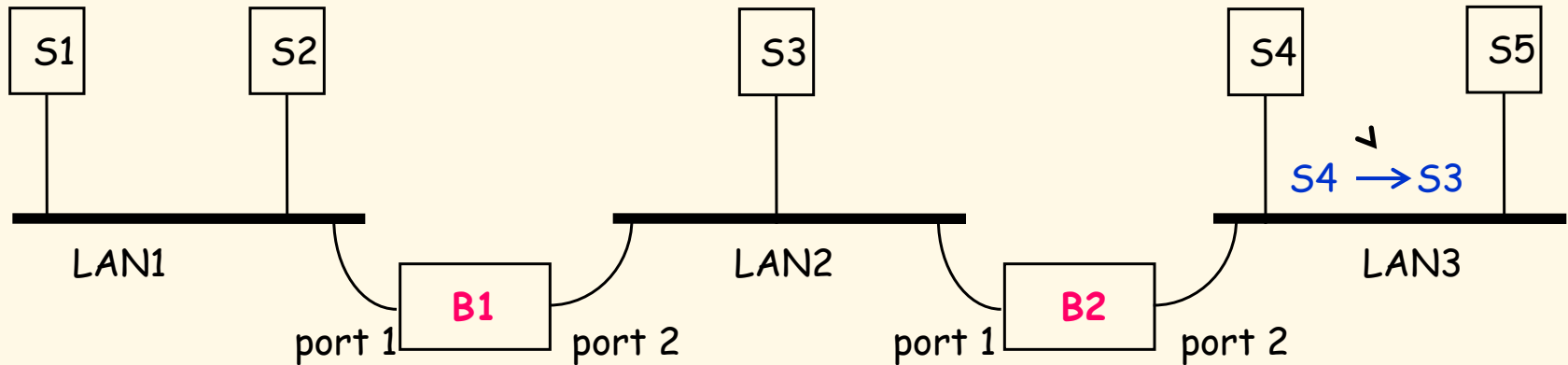
Bridge 1 does not forward the frame to LAN1

Address	Port
S1	1
S3	2
S4	2

Address	Port
S1	1
S3	1
S4	2

Bridges

S1   S2   S3   S4   S5

S2 → S1

LAN1   Bridge1   LAN2   Bridge 2   LAN3

port 1   port 2   port 1   port 2

Bridge 1 does not forward the frame to LAN2

Address	Port
S1	1
S3	2
S4	2
S2	1

Address	Port
S1	1
S3	1
S4	2

Leon-Garcia & Widjaja:
Communication Networks
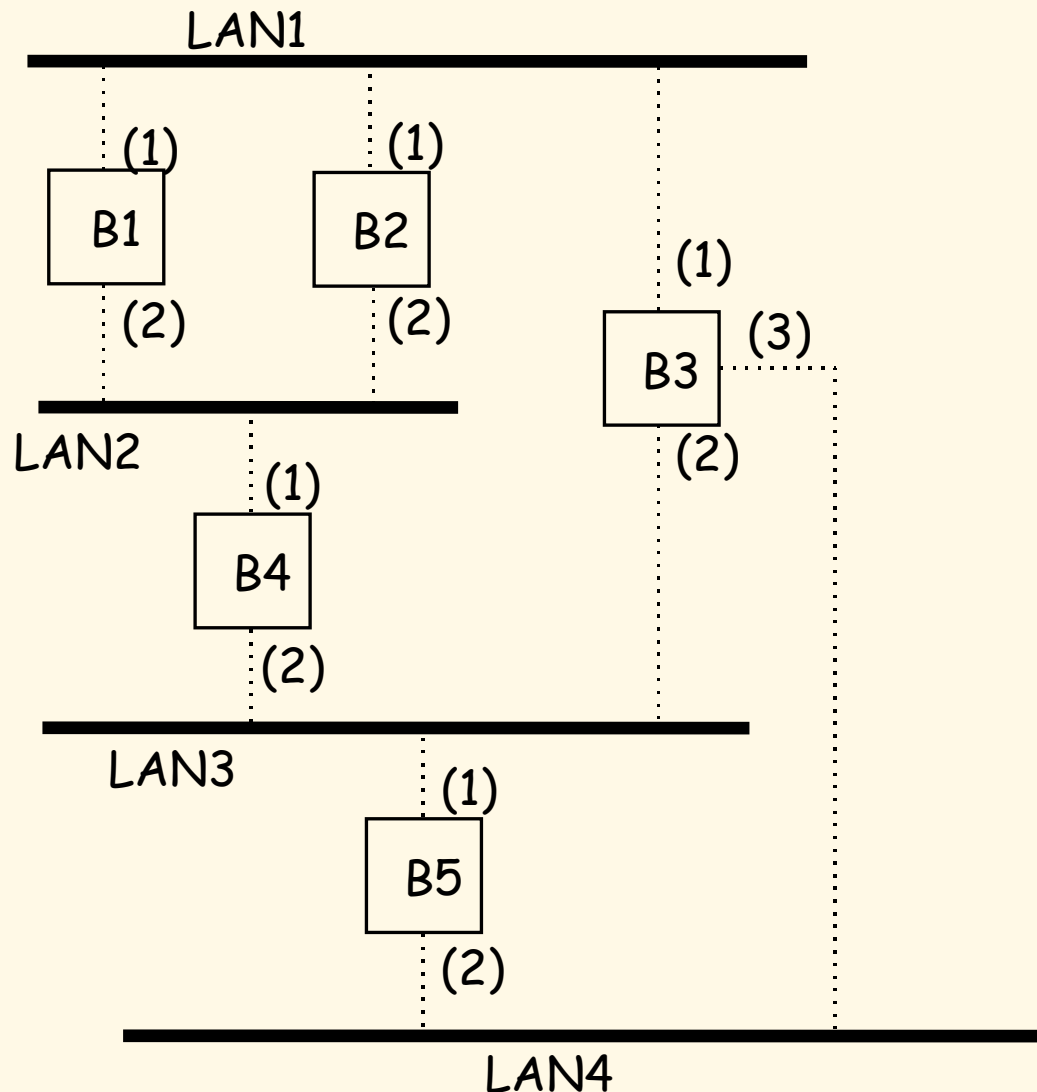
MAN with Bridge Loops

LAN1

B1 (1) (2)

B2 (1) (2)

B3 (1) (3) (2)

LAN2

B4 (1) (2)

LAN3

B5 (1) (2)

LAN4

Leon-Garcia & Widjaja:
Communication Networks

MAN with Bridge Loops

LAN1

D (1) B1 R (1) B2

D (2) (2)

R (1) B3 (3) D

LAN2

R (1) B4 D (2)

(2)

LAN3

R (1) B5

(2)

LAN4

One solution to bridge loops
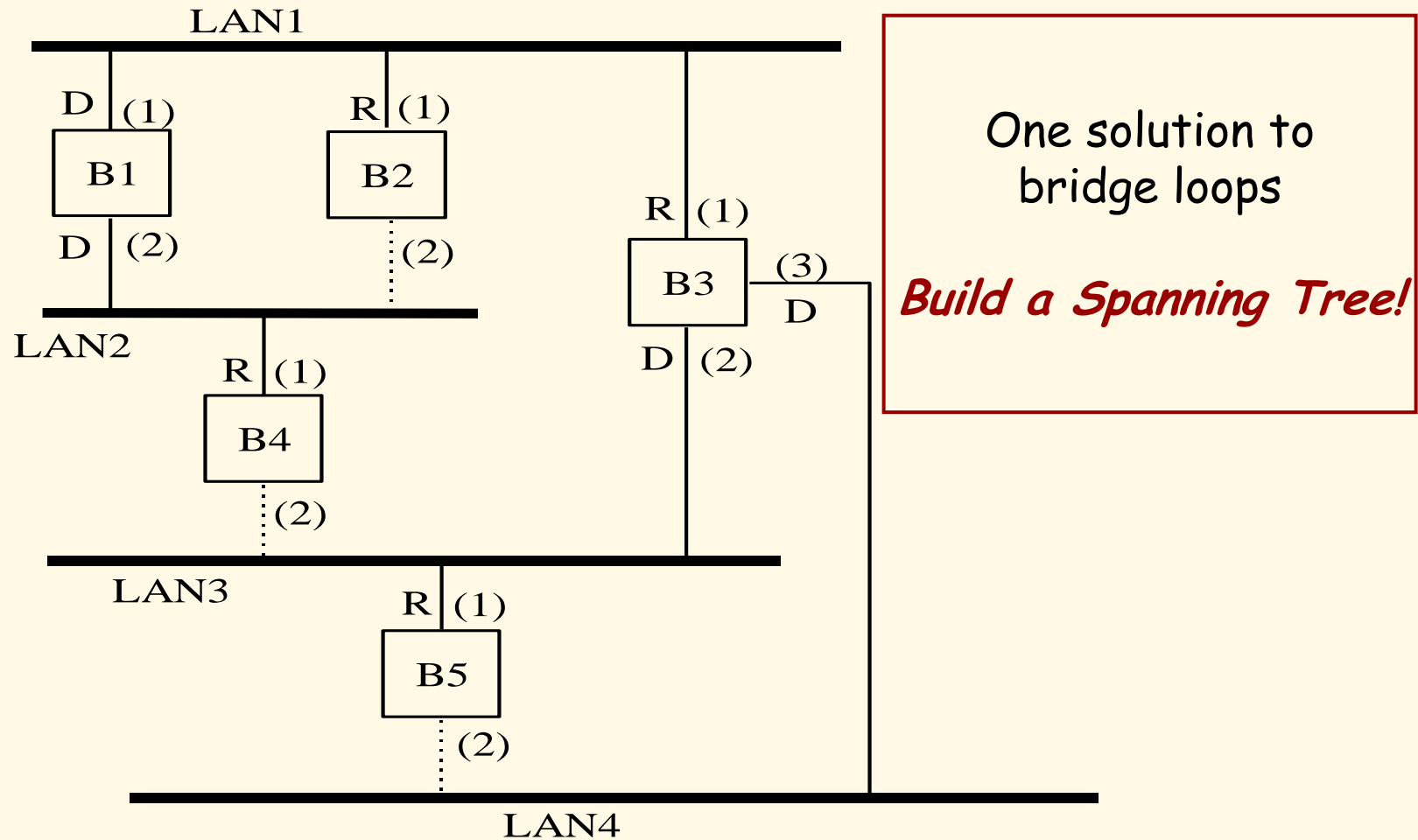
Build a Spanning Tree!

Bridges Summary

- **Repeaters**
- **Bridges**
  - Backward learning
- **Bridge Loops**
  - Spanning trees