



# Bridge & Switch

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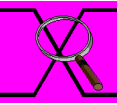
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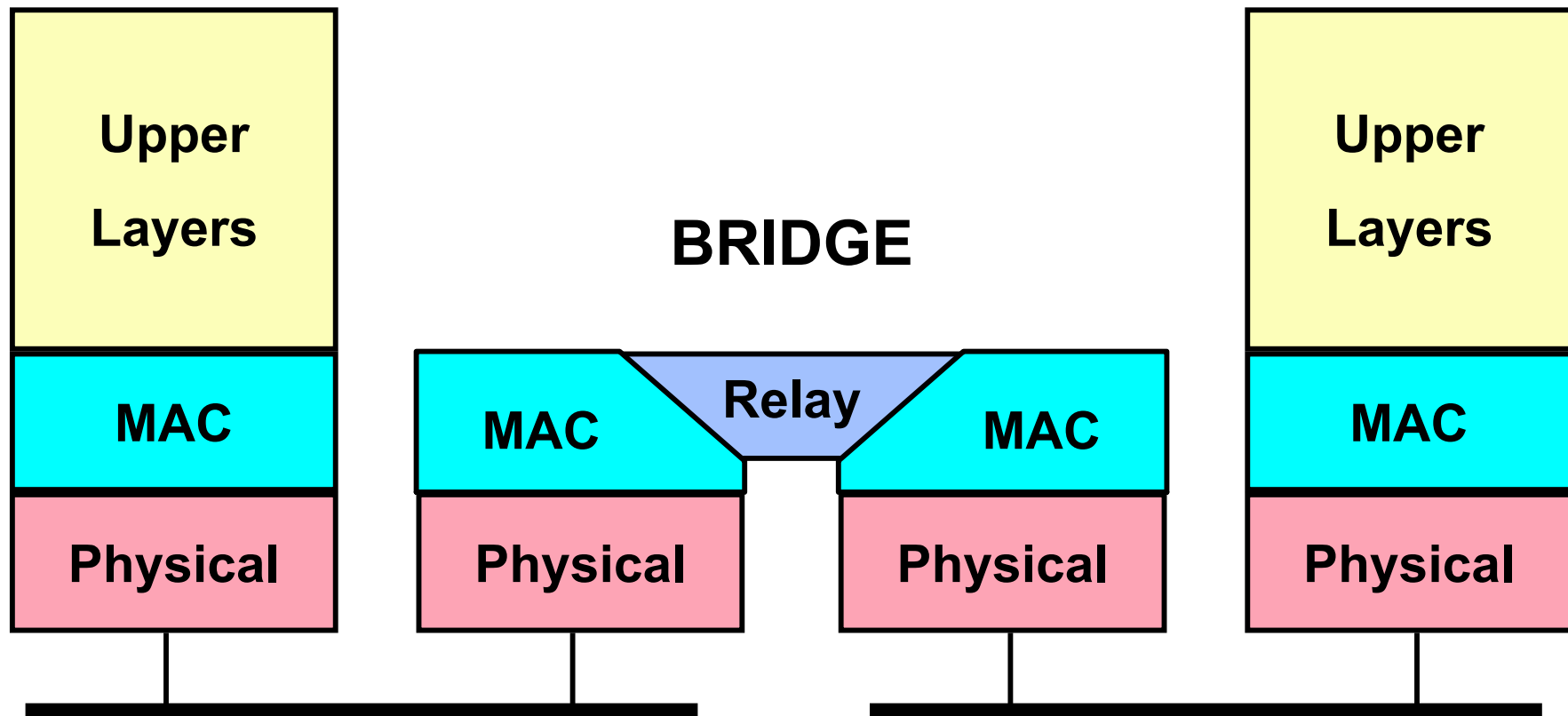


# Bridge

- Called also MAC Bridge
  - operate at layer 2
  - use simple forwarding algorithm
    - forwarding technique based on MAC destination address
  - are normally used for local connections

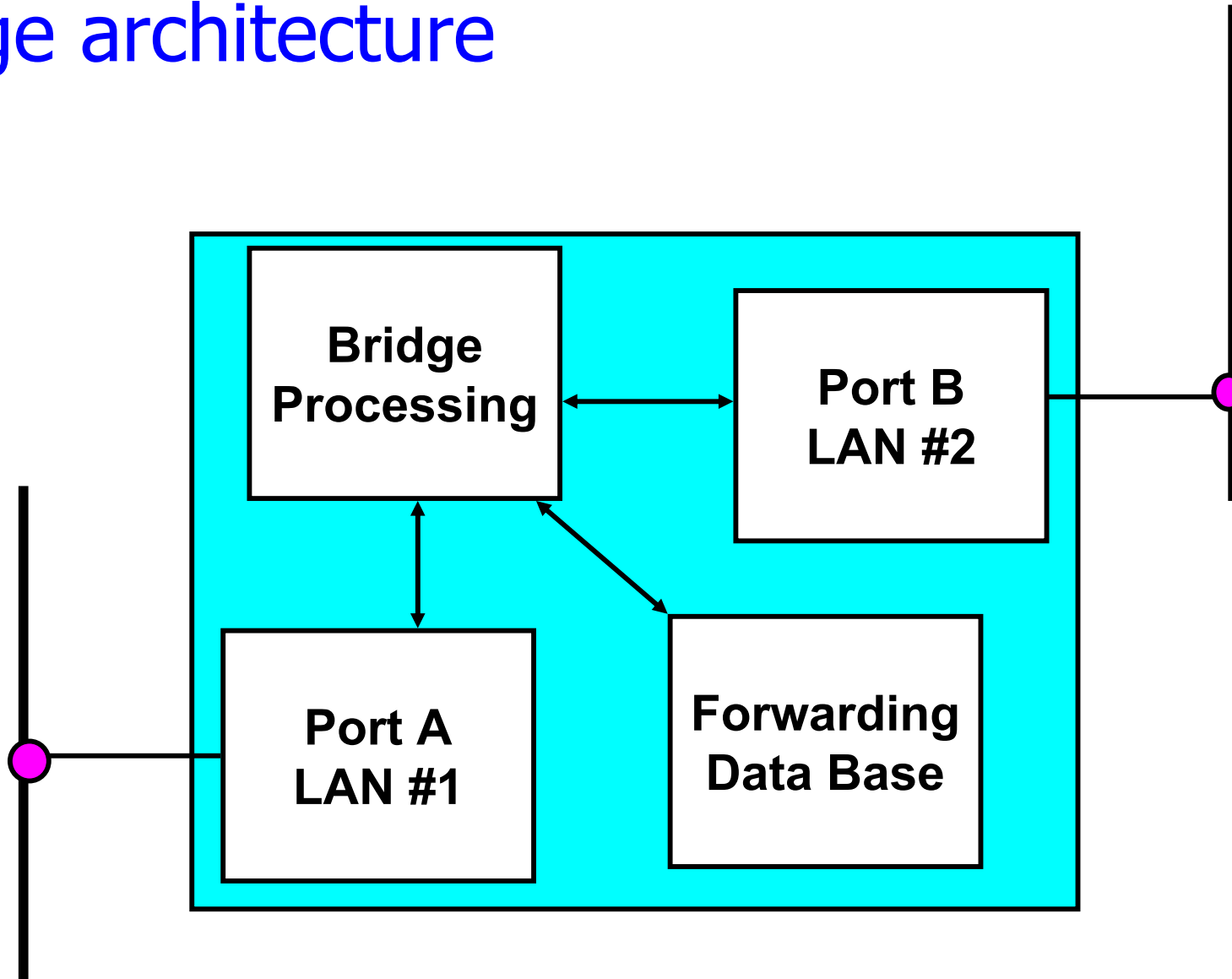


# Bridge model





# Bridge architecture





# Forwarding

- Forwarding table is calculated by:
  - backward learning
  - looking the Source MAC address
- Backward learning
  - work only over LAN with tree topology
  - other topologies are transformed to tree topology by spanning tree algorithm
- Spanning tree algorithm operate periodically (any second)
  - decide which port set to forwarding state and which port set to blocking state

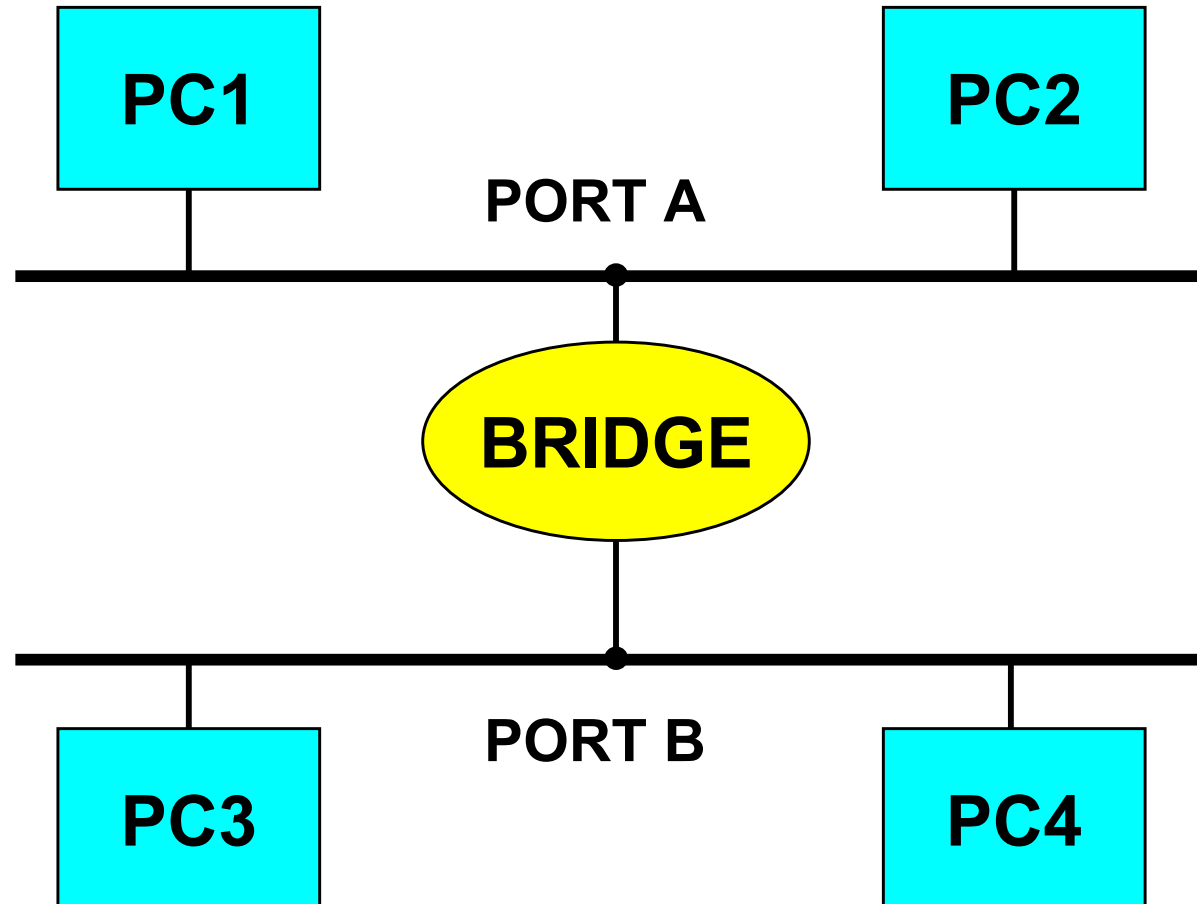


# Transparent Bridge

- IEEE standardized the bridge functions by 802.1D standard
- The bridge 802.1D work in transparent mode, for this reason are also called transparent bridge:
  - are derived from Ethernet
  - have a local forwarding table
- The main functions of the bridge are:
  - frame forwarding
    - **Singlecast** frames forwarding based on *Destination MAC Address*
    - **Broadcast** frames are forwarded in every ports except the port where as been received
  - stations auto-learning
  - loop detection by spanning tree algorithm



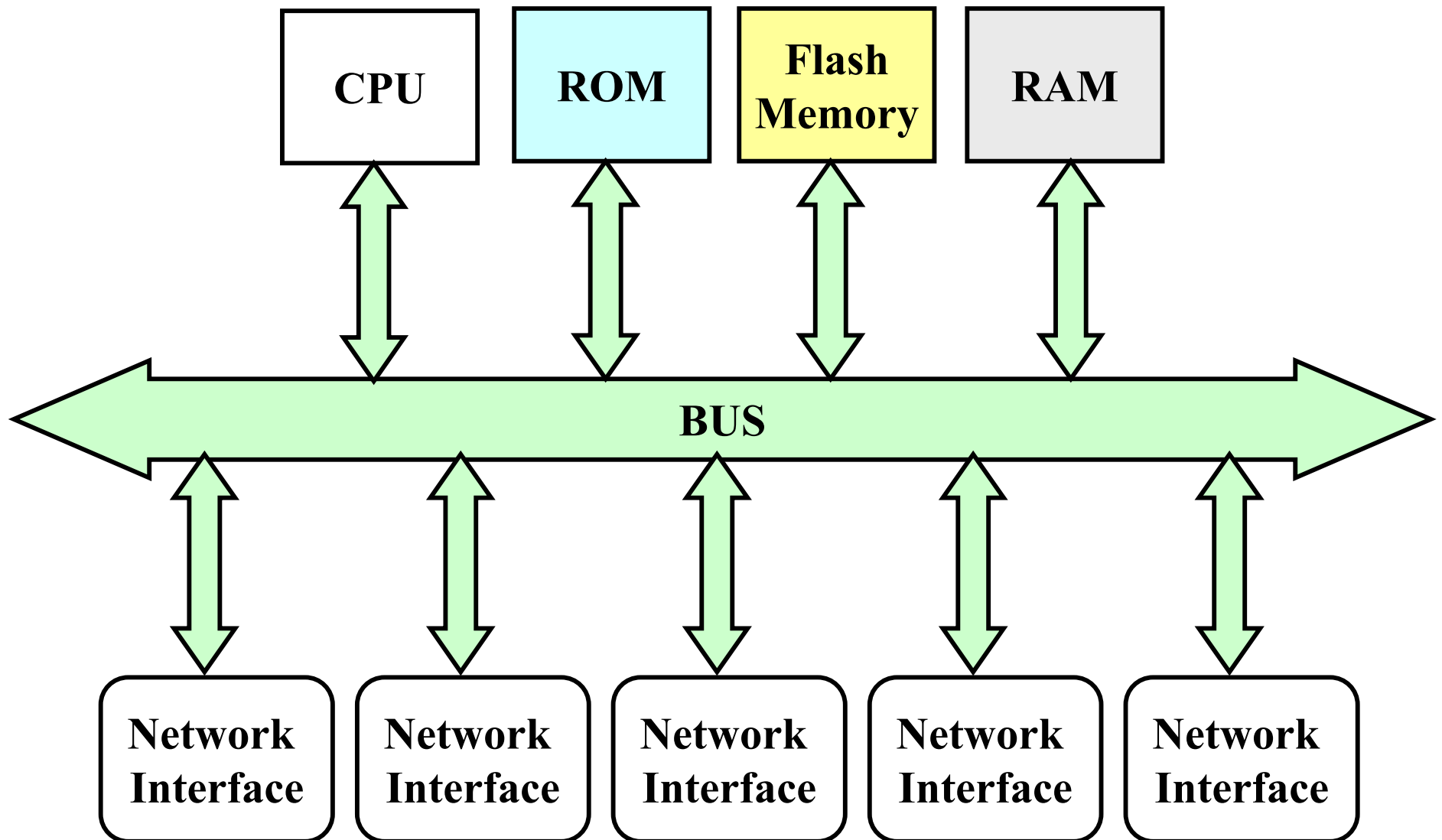
# Transparent Bridge





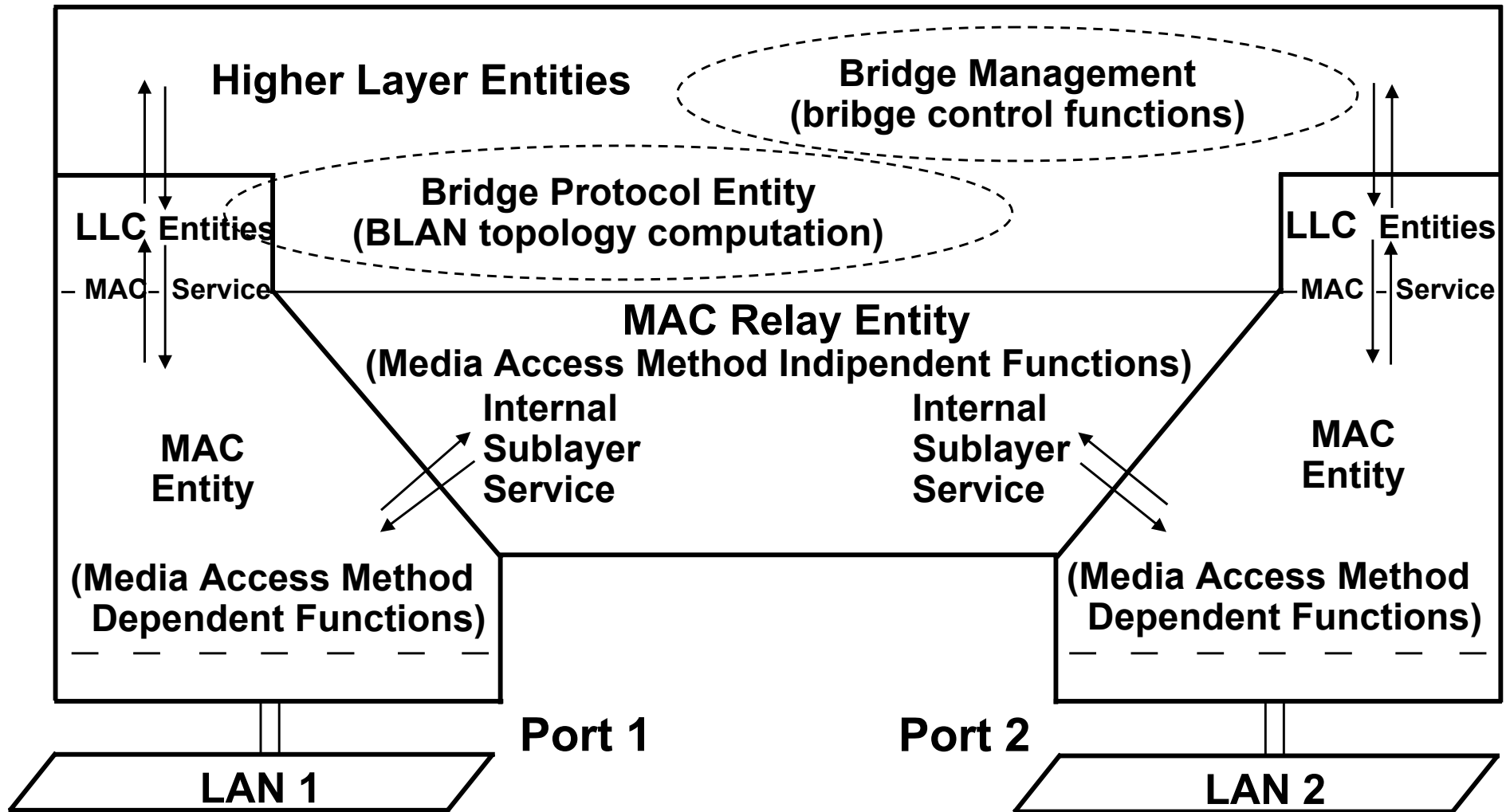


# Bridge physical architecture



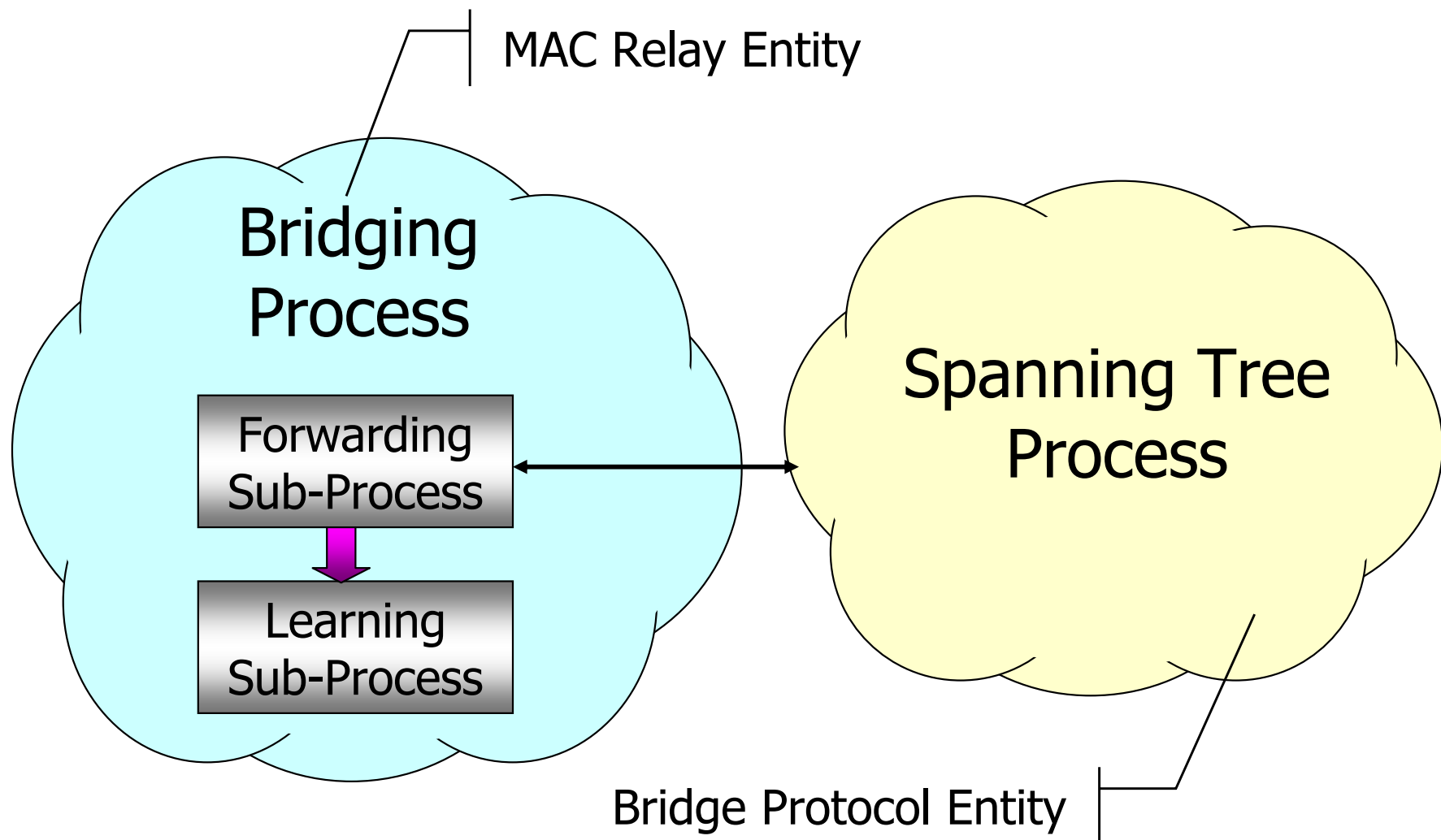


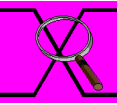
# Bridge logical architecture





# Bridge functions





# Filtering data base

- ***Entry*** fields
  - MAC address
  - Destination port
  - Ageing time (default expire after 300 s)
  - Port status (depending by spanning tree protocol)
  - Entry type
    - dynamic
      - Updated by learning process
      - Max entries: 1024 ÷ 65 K
    - static
      - Not updated by learning process
      - 256 entries typically
- Lookup by CAM (Content Addressable Memory)



# Filtering database example

filtering database show command

Switch-1> show cam dynamic

\* = Static Entry. + = Permanent Entry.

# = System Entry X = Port Security Entry

```

Dest MAC Address
-----
00-00-86-1a-a6-44
00-00-c9-10-b3-0f
00-00-f8-31-1c-3b
00-00-f8-31-f7-a0
00-01-e7-00-e3-80
00-02-a5-84-a7-a6
00-02-b3-1e-b4-aa
00-02-b3-1e-da-da
00-02-b3-1e-dc-fd
  
```

```

Ports      Age
-----
1/1        1
1/1        0
1/2        4
1/1        2
2/2        0
2/1        1
2/1        5
2/5        1
2/4        2
  
```

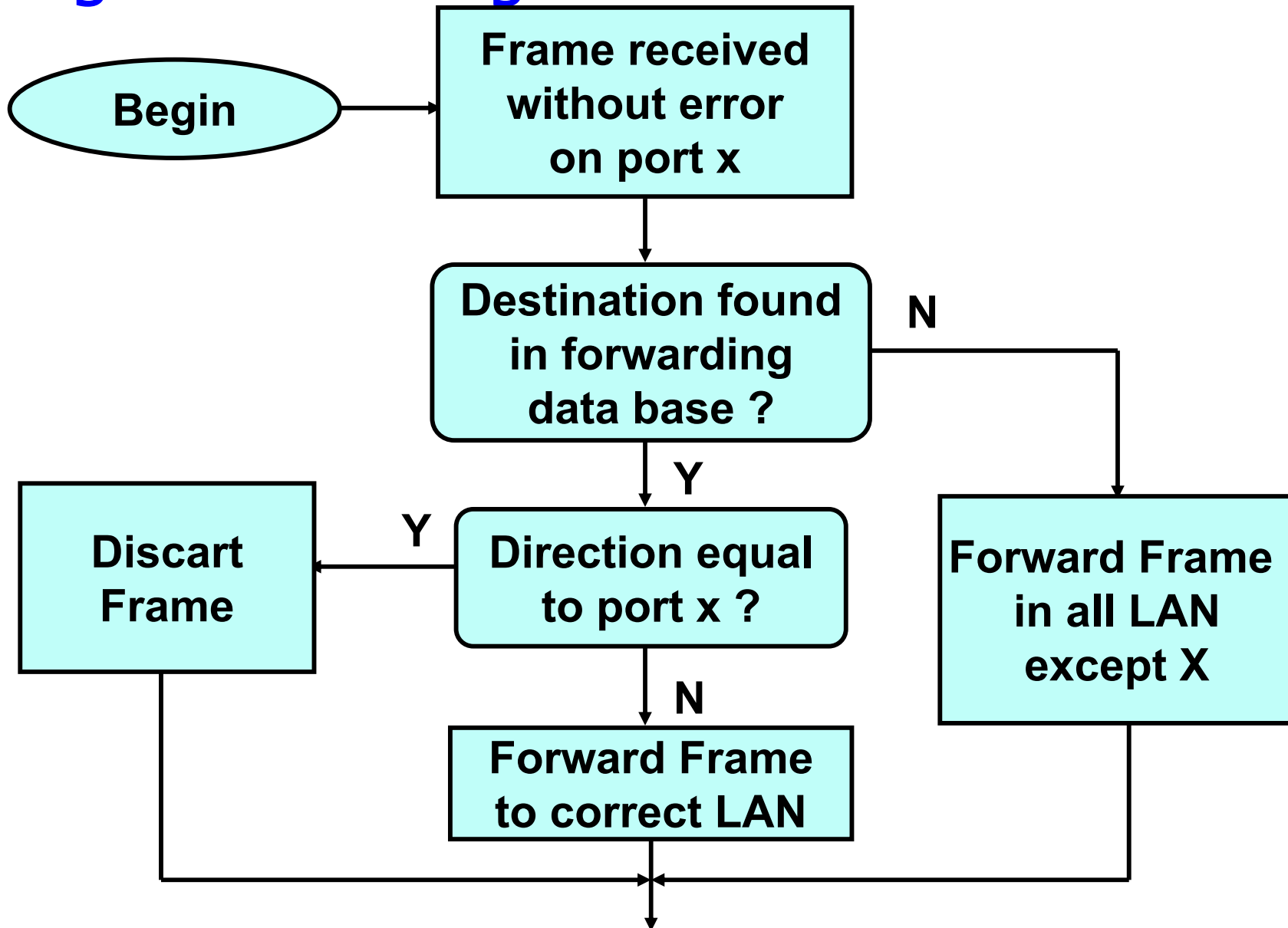
Modular switch:  
slot/port

Ageing time

Stations MAC address

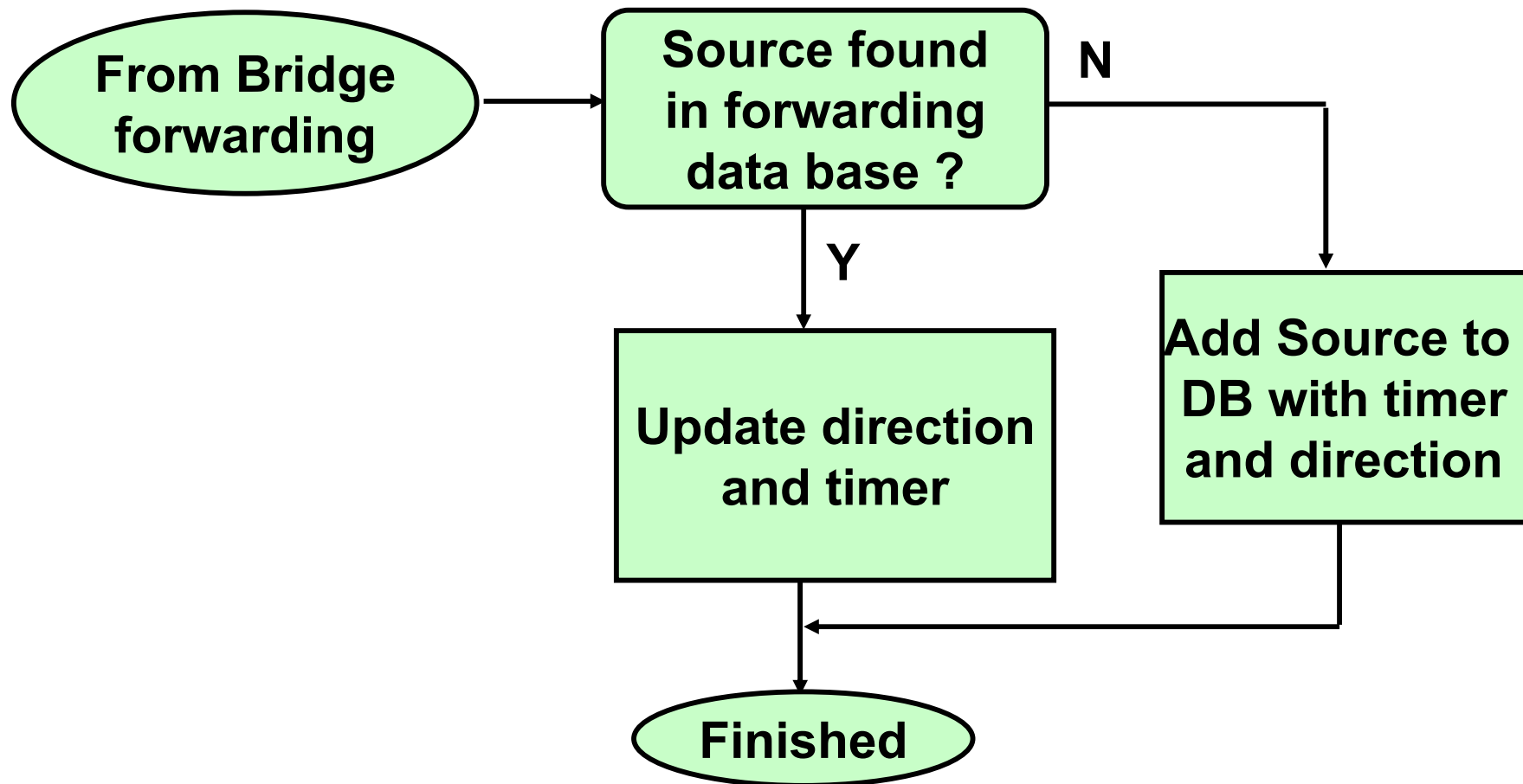


# Bridge Forwarding



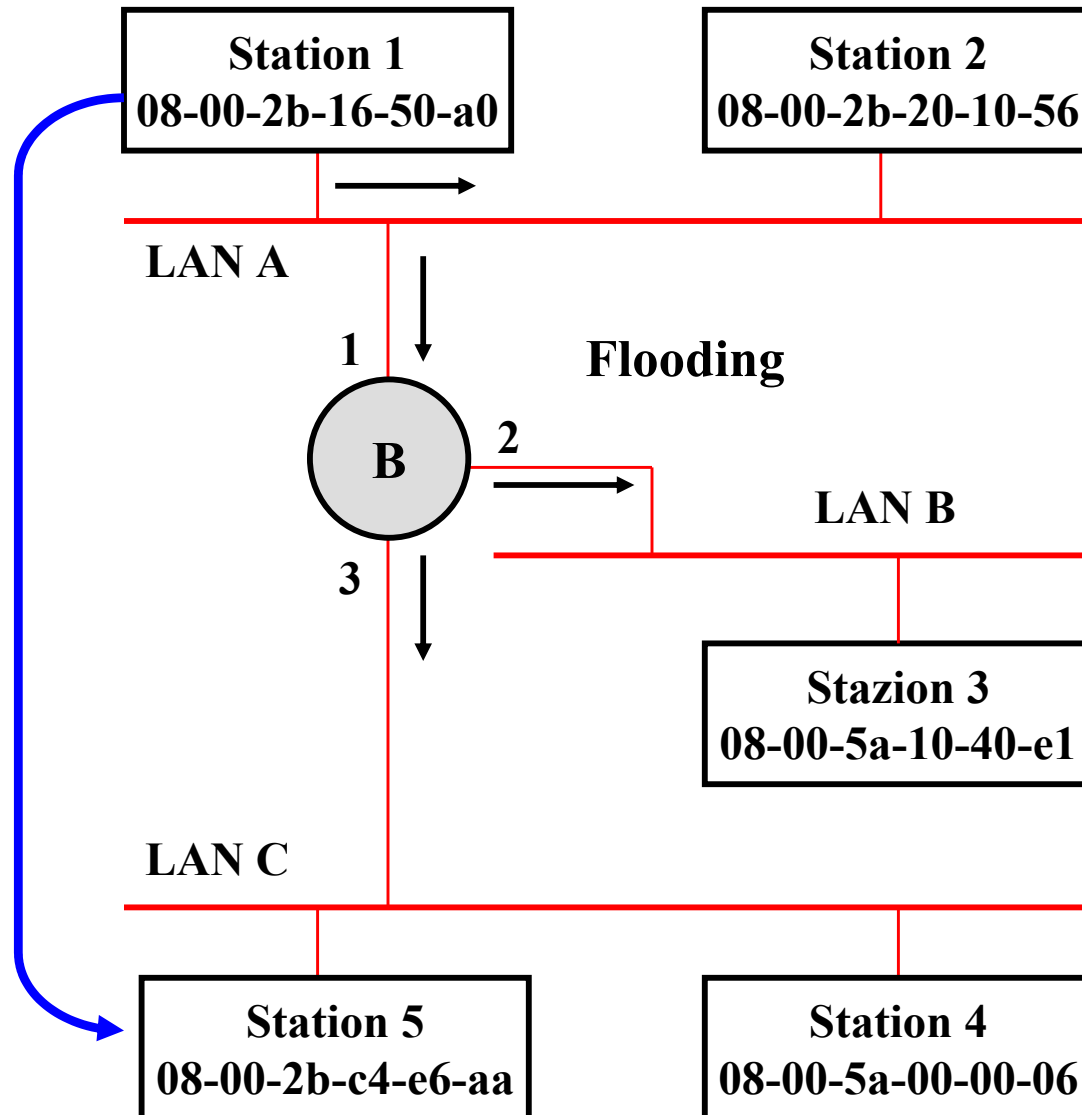


# Bridge Learning





# Forwarding frame to unknown destination

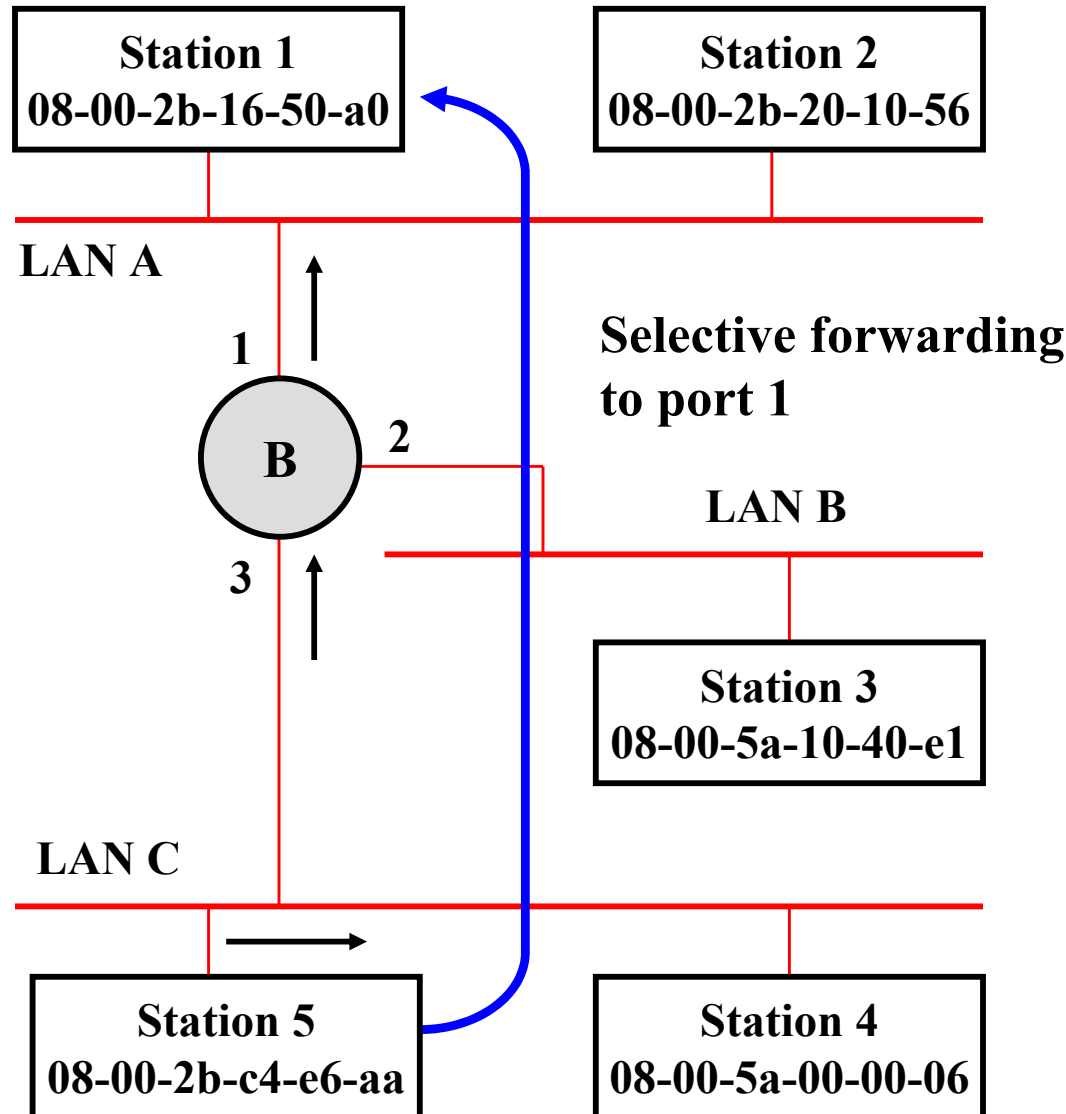


Port	MAC address	Ageing time
1	08-00-2b-16-50-a0	0





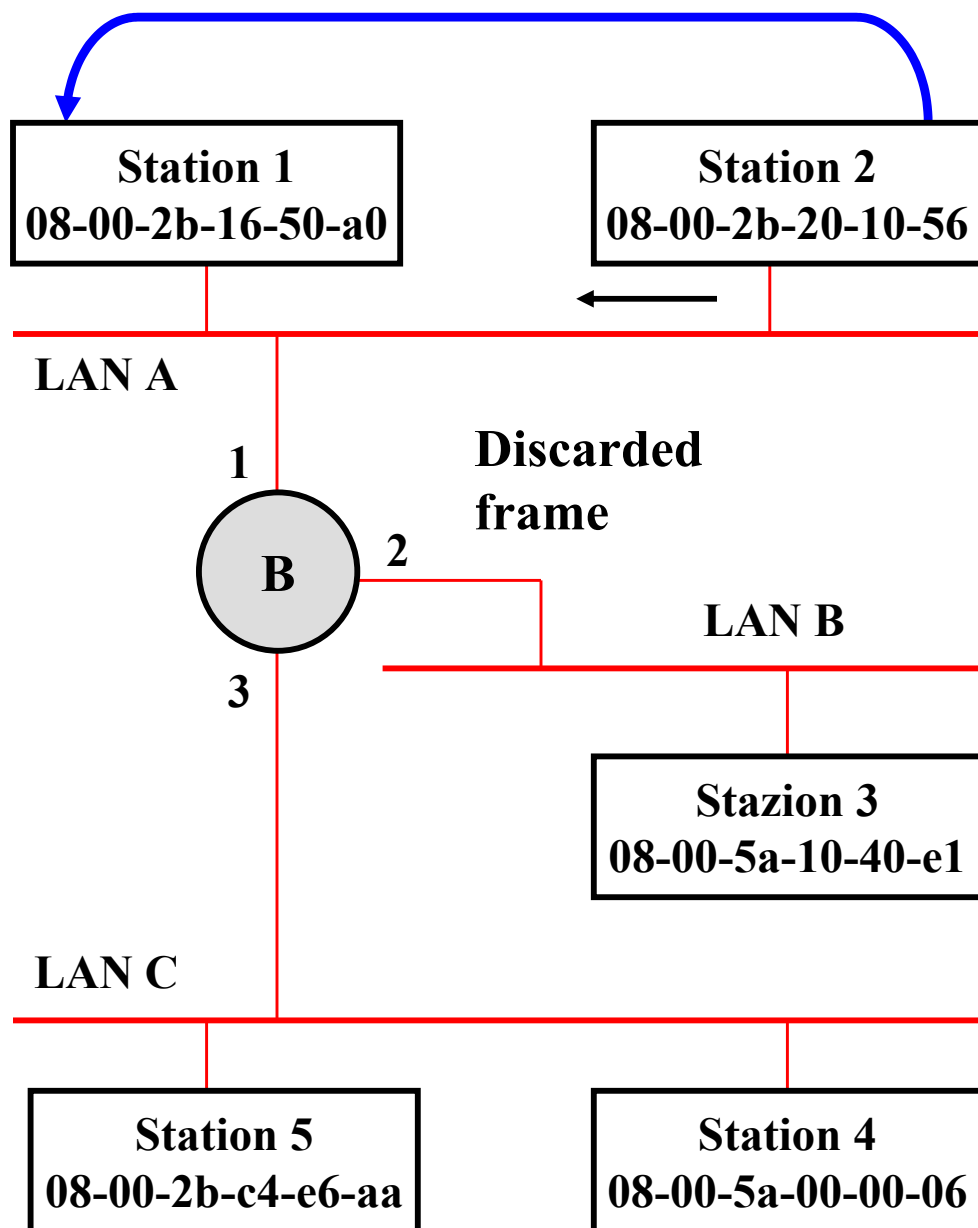
# Forwarding frame to known address destination



Port	MAC address	Ageing time
1	08-00-2b-16-50-a0	5
3	08-00-2b-c4-e6-aa	0



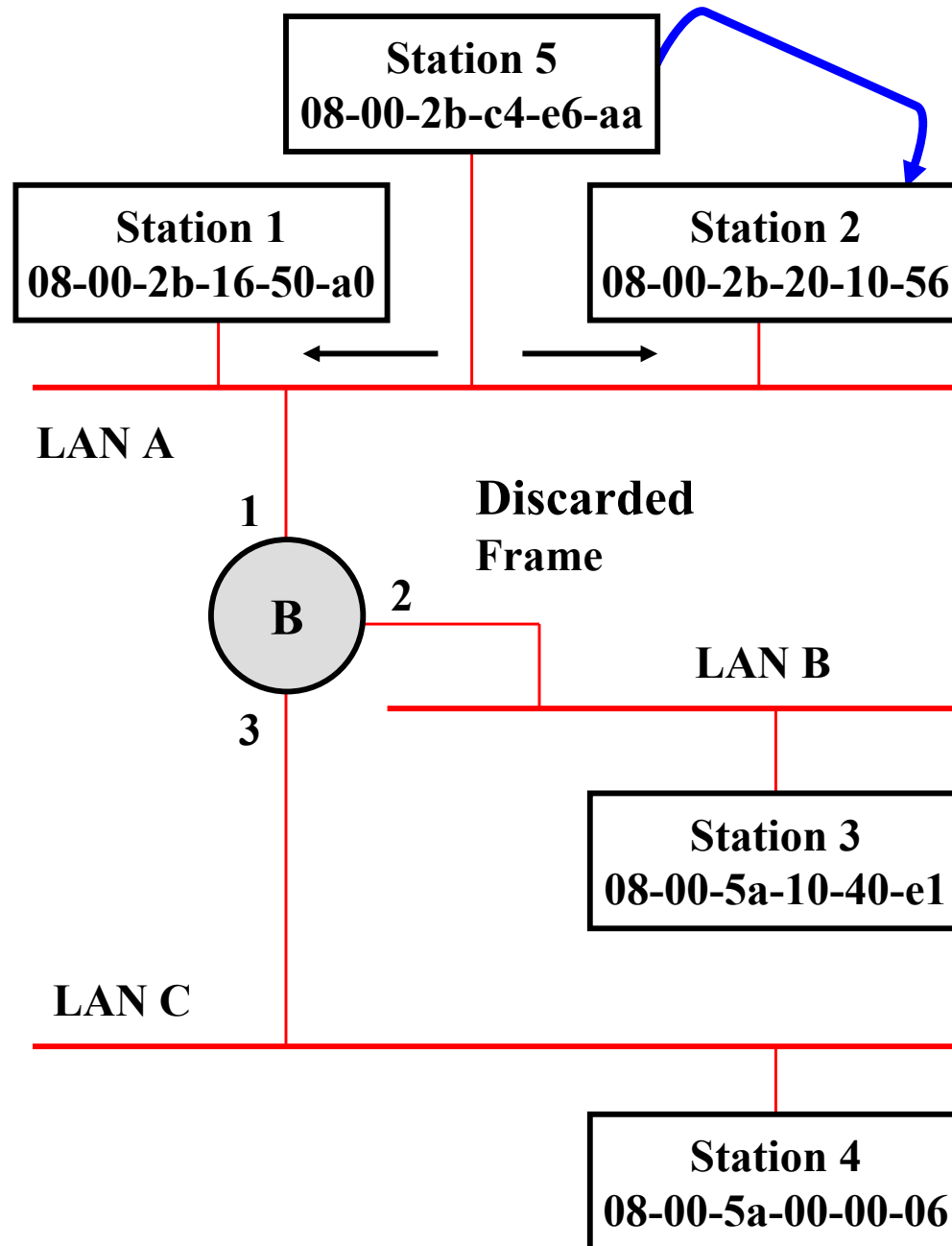
# Traffic limitation



Port	MAC address	Ageing time
1	08-00-2b-16-50-a0	12
3	08-00-2b-c4-e6-aa	13
1	08-00-2b-20-10-56	0



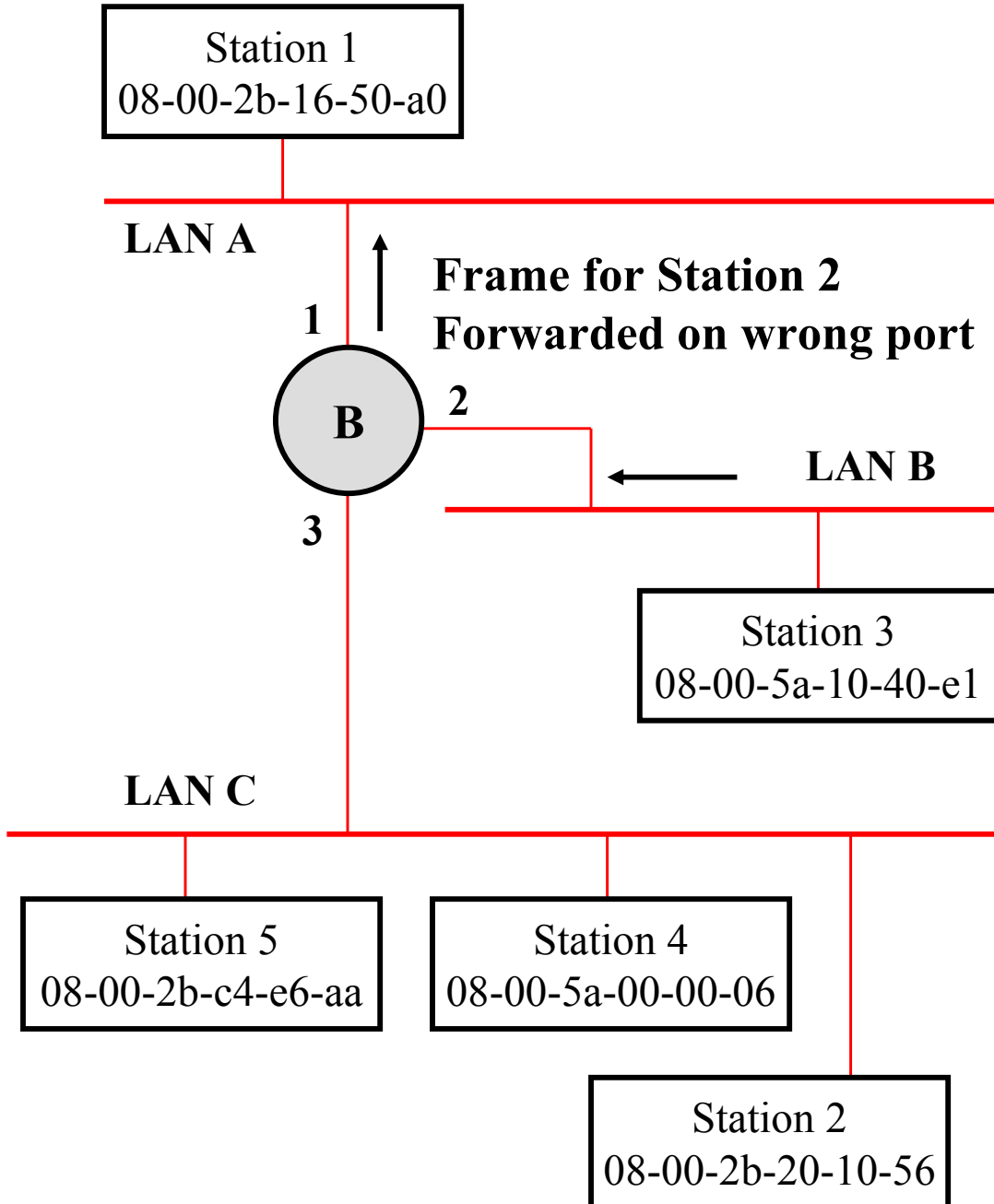
# Station 5 move and Filtering Data Base update



Port	MAC address	Ageing time
1	08-00-2b-16-50-a0	40
1	08-00-2b-c4-e6-aa	0
1	08-00-2b-20-10-56	20



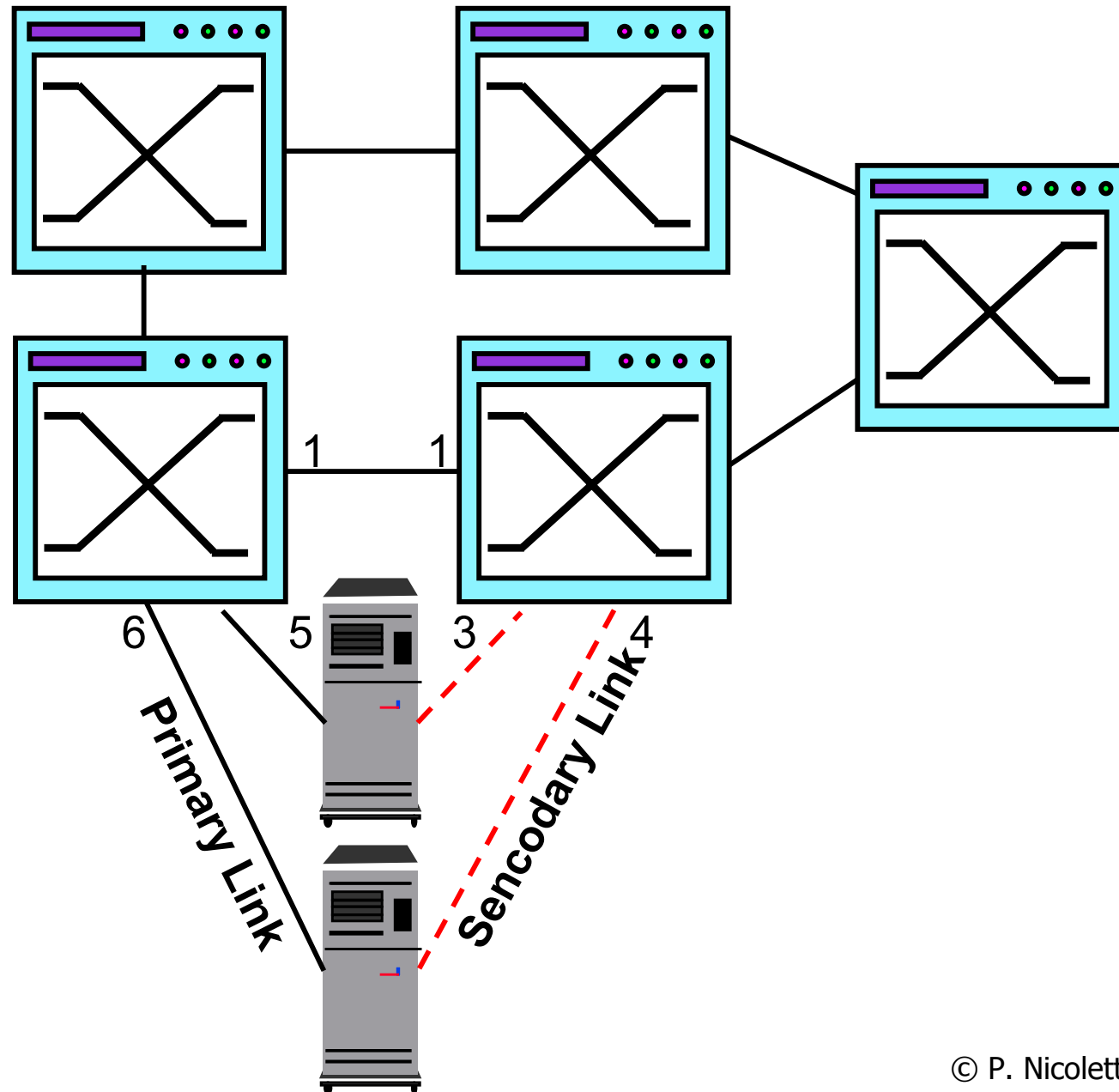
# Station 2 move and forwarding error



Port	MAC address	Ageing time
1	08-00-2b-16-50-a0	50
3	08-00-2b-c4-e6-aa	51
1	08-00-2b-20-10-56	40
2	08-00-5a-10-40-e1	0



# Fault Tolerant network and Filtering Data Base Update





# Loop on the network

- Broadcast are not filtered: **broadcast storm**

