

Switching Technology

Module Objectives

Upon completion, you will be able to:

- Describe the different switching **modes**.
- Demonstrate how a **CAM Table** is built and modified.
- Explain the **ARP** process and its function.
- Describe the many processes related to **Spanning Tree Protocol**.



Switching Methods

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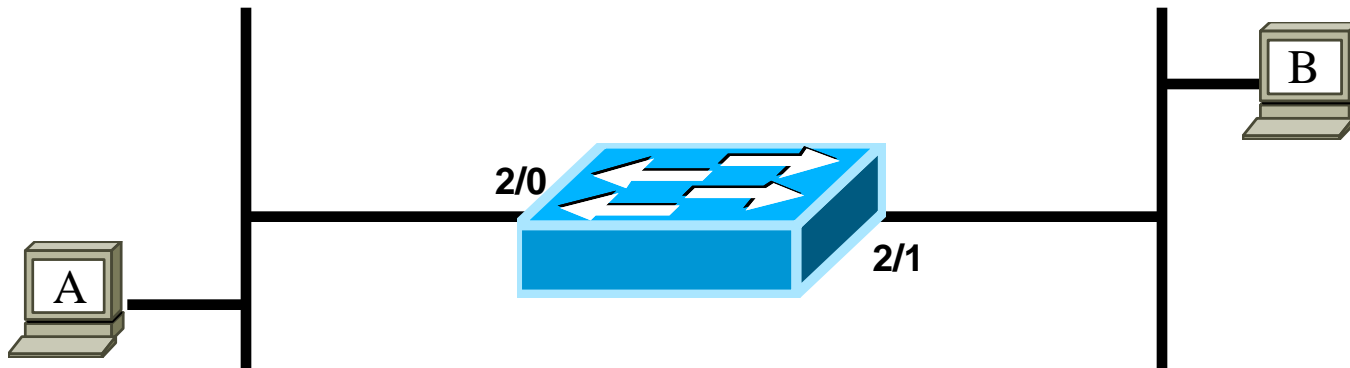
RTP – July,



- **Cut Through**
Looks only at DMAC, then forwards
Fast, but will pass corrupted frames
- **Store & Forward**
Copies the entire frame into buffer
Eliminates bad frames - FCS
Higher Latency –
(Variable latency – Why?)
Cisco's standard
- **Modified (Fragment Free)**
Reads only 1st 64 bytes
Eliminates fragments of collision

Switch/Bridge Functionality

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- **Four Major Functions:**
 - Learning
 - Forward/Filter
 - Forward Broadcasts
 - Loop Avoidance - Spanning Tree

Address Learning: Building the CAM Table

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Brussels – May,
2003

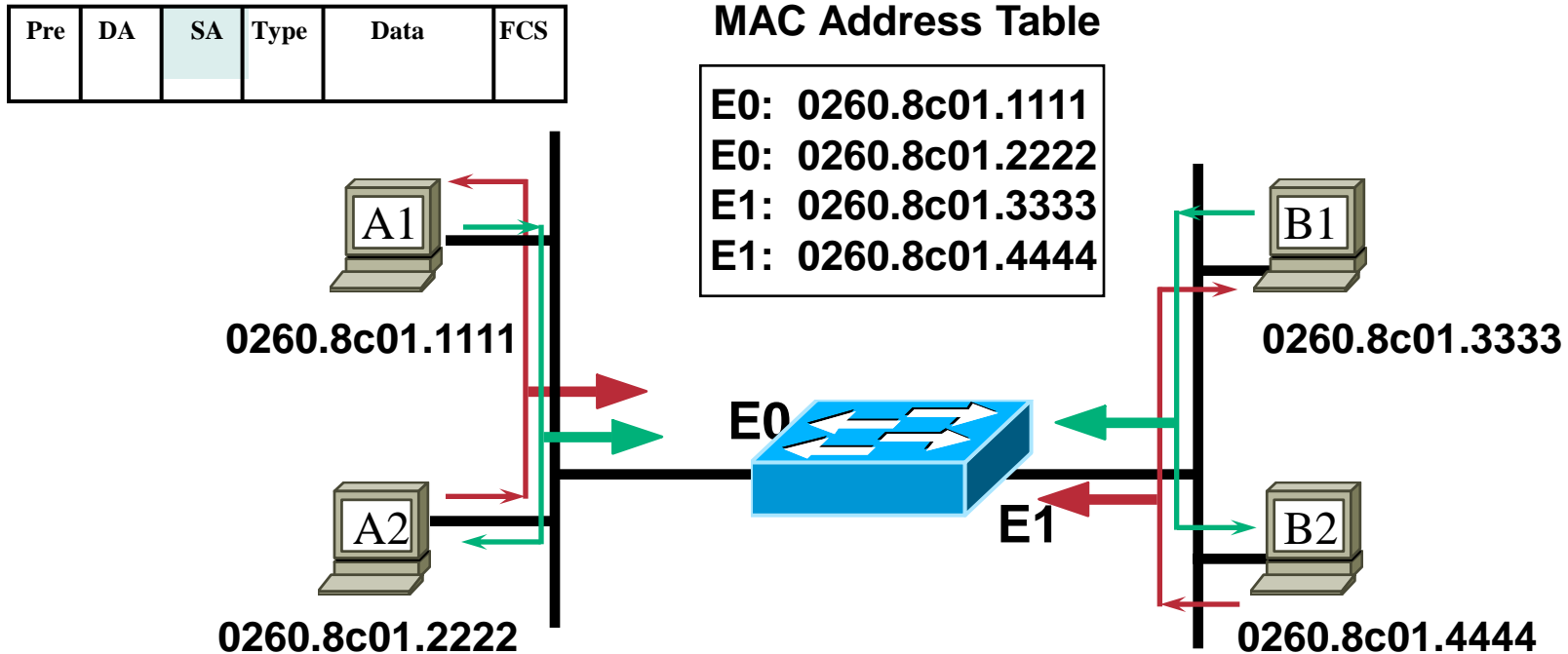


- CAM Table is **empty** at ‘power-on’.
- Switch learns MAC address from **Source** Address field in Header.
- **Source** Address is placed in CAM Table, associated with its port. More than one MAC can be associated with a single port. . . **How?**
- Subsequent frames with DA found in CAM Table are directed to the proper port.
- Subsequent frames with DA not found in CAM Table are **flooded to all ports**.
- CAM entries do **age out** after a period of inactivity – **300 seconds**.

Address Learning: Building the CAM Table

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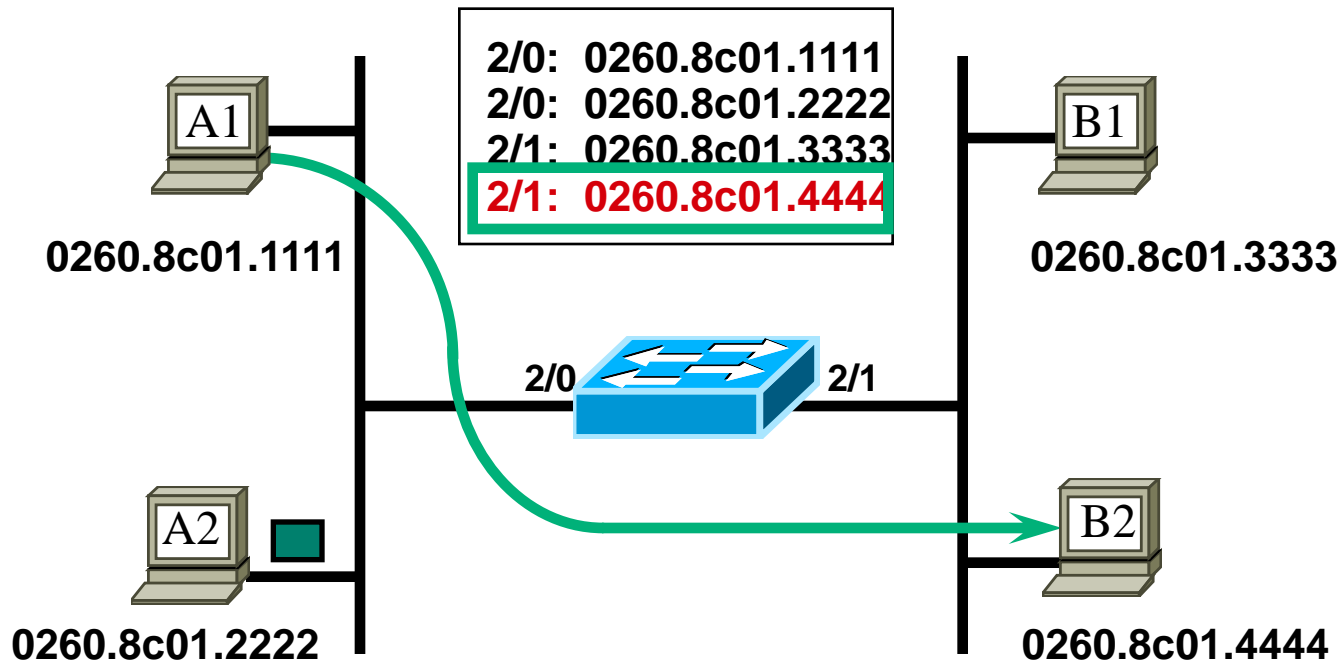
Multiple stations connected to ports on a switch.



- Source MAC address associated with the port.
- Addresses are learned from SA field of Ethernet frame.
- Independent of destination – Can be a Unicast or Broadcast

Frame Forwarding

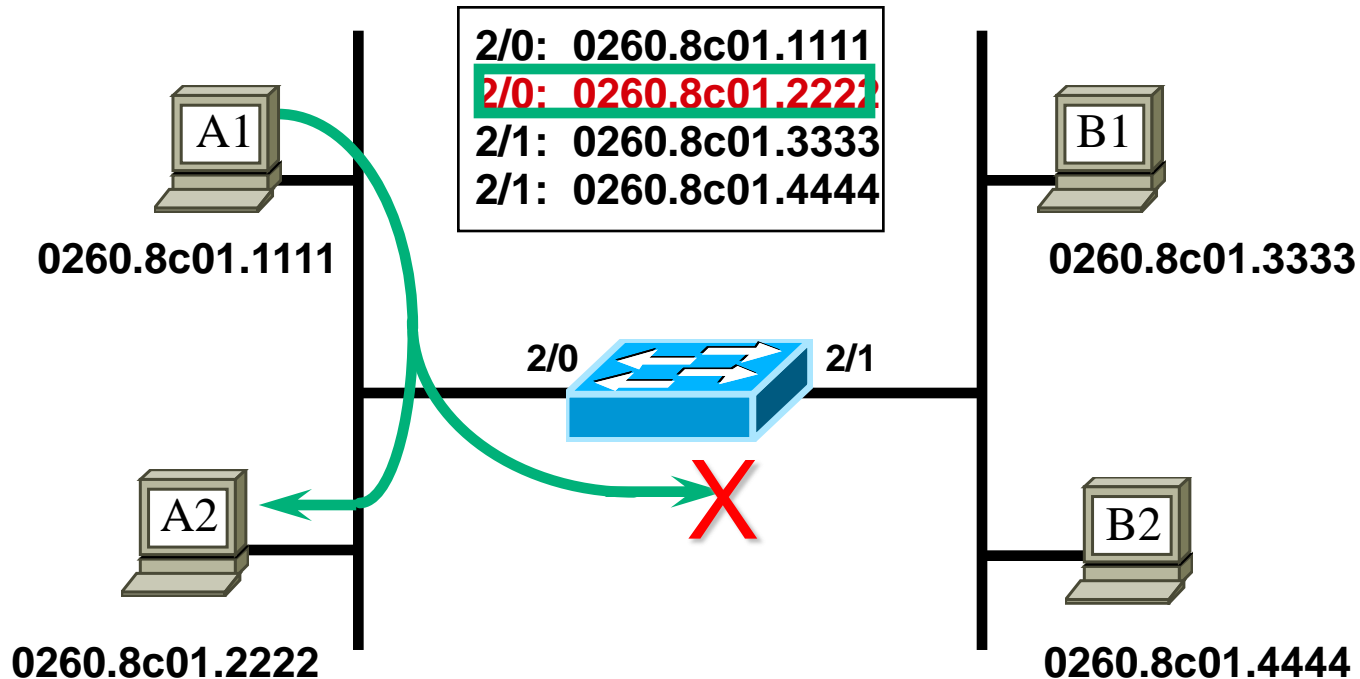
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- A1 sends a frame to B2.
- Frame is forwarded
- Occurs when destination is known

Frame Filtering

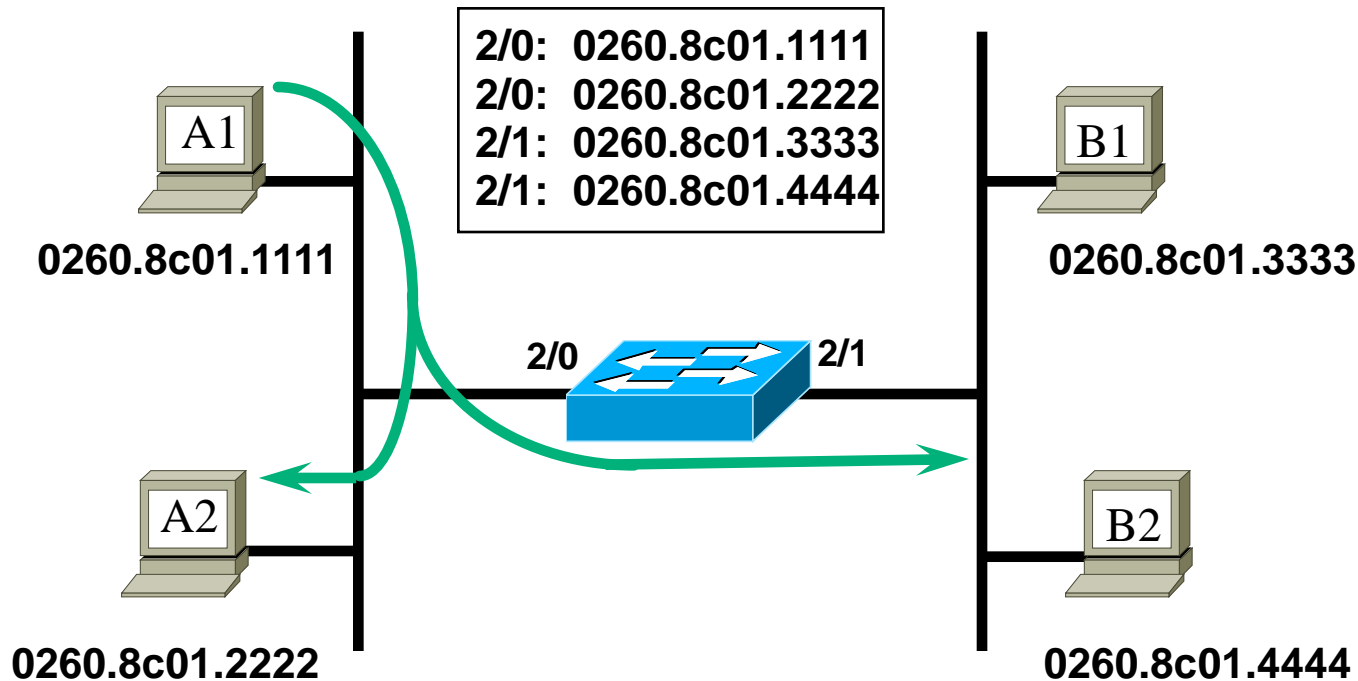
Collisions on Segment A do not affect Segment B



- A1 sends a frame to A2.
- Frame is filtered **(not forwarded)**.
- Occurs when destination is known to exist on source's segment.

Handling Broadcasts

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- A1 sends out a broadcast.
- The frame is forwarded (flooded) when all ports on the switch (VLAN) are in a common Broadcast Domain

CAM Table Address Types

- **Dynamic**

Learned by looking at SA (source address) of **every** incoming frame.

Aged out periodically – **Default is 300 seconds**

- **Permanent/Static**

Manually configured. **Never** aged out of CAM table until an administrator makes a change.

L2 Address/port



ARP - Address Resolution Protocol

- **Used to obtain MAC address from a known IP address**
- **Sent out as a L2 (ff.ff.ff.ff.ff.ff) Broadcast**

ARP Request: who has IP address A.B.C.D? Please tell me what your MAC address is.

ARP Reply: I am A.B.C.D. My MAC address is XX.XX.XX.XX.XX.XX

- **Routers and PCs cache ARP Replies, and a Router ages this entry out after 4 hours by default.**
- **Proxy ARP:**
 - A Router answers an ARP reply on behalf of Hosts connected on its other interface(s).
 - Router acts as a proxy agent for its clients (network nodes).

RARP - Reverse ARP

- Used to obtain L3 address from L2 address (“I know my MAC Address, **Can someone please tell me MY IP Address**”).

- **L2 Frame:**

Source address is my own MAC address

Destination MAC address field may be unicast or broadcast depending on whether the client already is aware of a DHCP server.

- **L3 Packet:**

Source IP address is all 0's

Destination IP Address may be unicast or broadcast depending on whether the client already is aware of a DHCP server.

- RARP (aka BootP) reply from server may contain not only the client's L3 address (IP Address) but also a path to a bootfile which provides additional booting instructions.

Inverse ARP

- Unlike Reverse ARP, which is used to find out your **OWN** Layer3 address, **Inverse ARP** is used to find out **L3 addresses of remote users**.
- Used with Frame Relay to obtain L3 address of remote devices on the “other end” of a Virtual Circuit.

