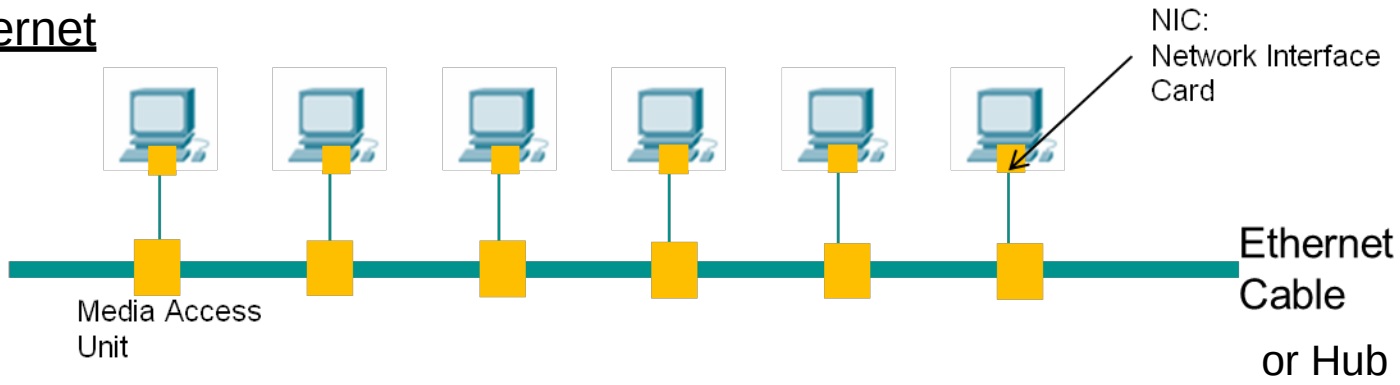
ALGONQUIN COLLEGE

Midterm Exam 1 REVIEW

Ethernet

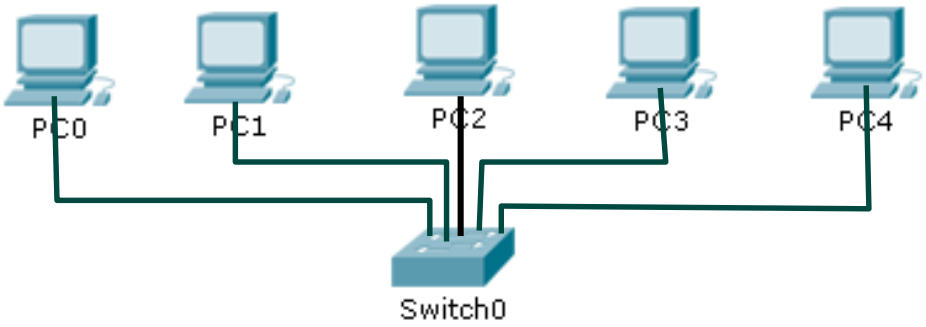
Legacy Ethernet

- CSMA/CD
- Half Duplex



Modern Ethernet

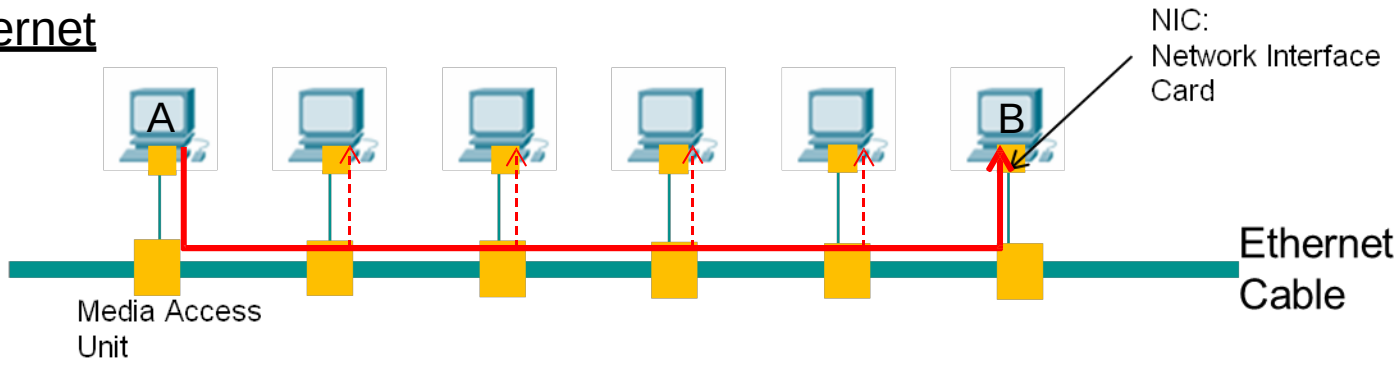
- Switched
- Full Duplex



Example: Ethernet Frame Sent from A to B

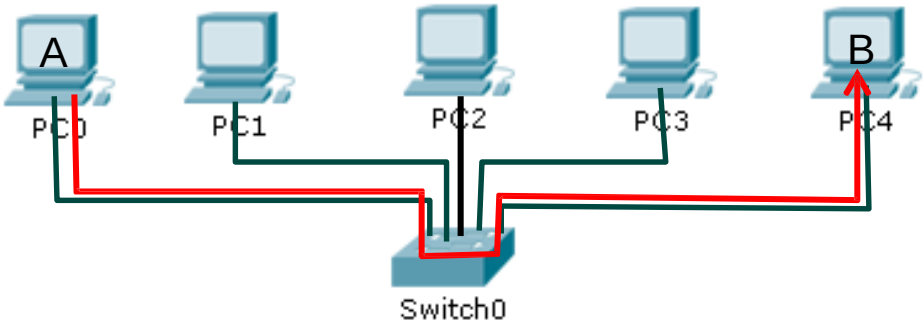
Legacy Ethernet

Source MAC: A
Dest MAC: B



Modern Ethernet

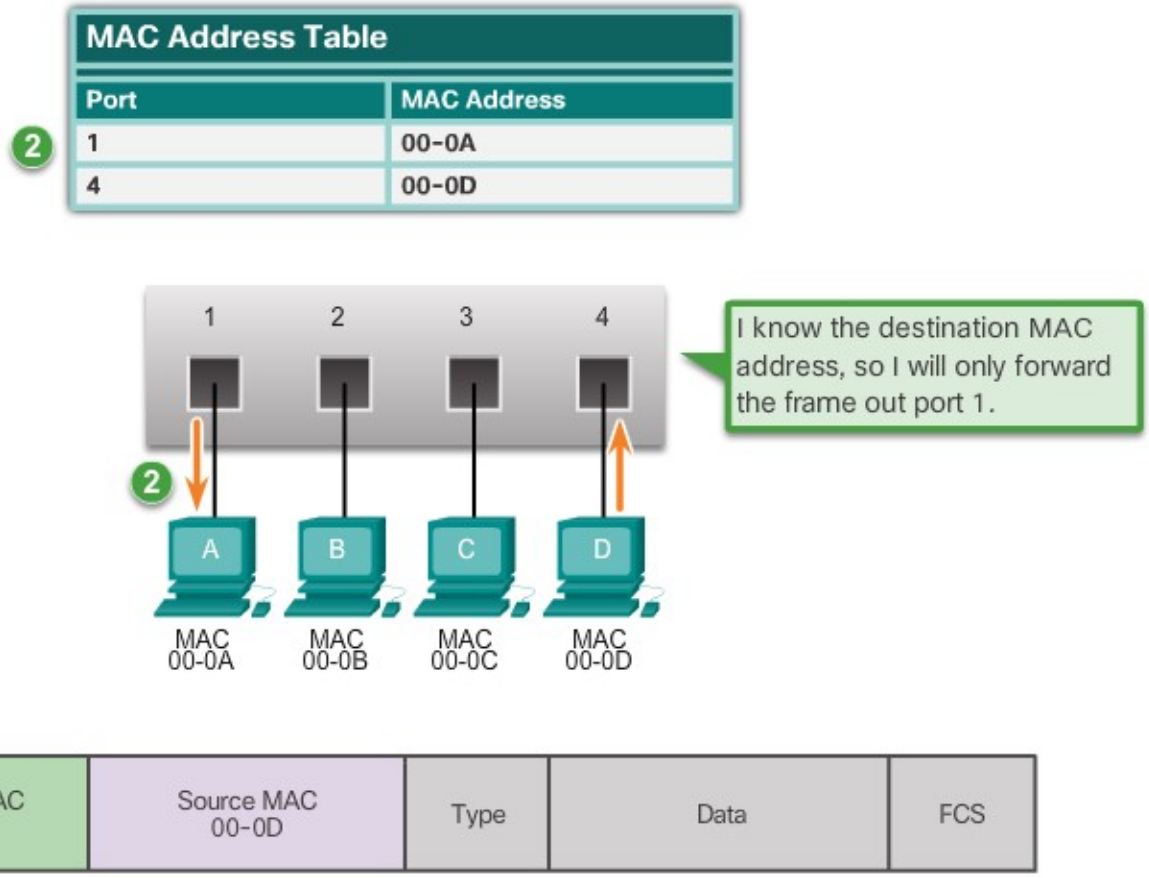
Source MAC: A
Dest MAC: B



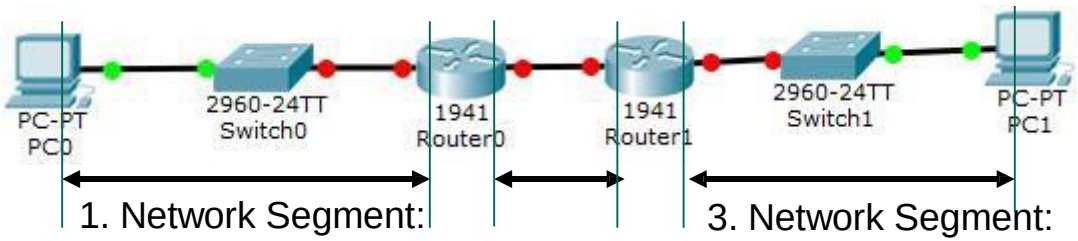
Layer 2 Switching - 4

Step 1: Forward the Frame

Since the Switch MAC Address table contains PC-A's MAC Address, it sends the frame out only port 1.



How Many Destination MAC Addresses

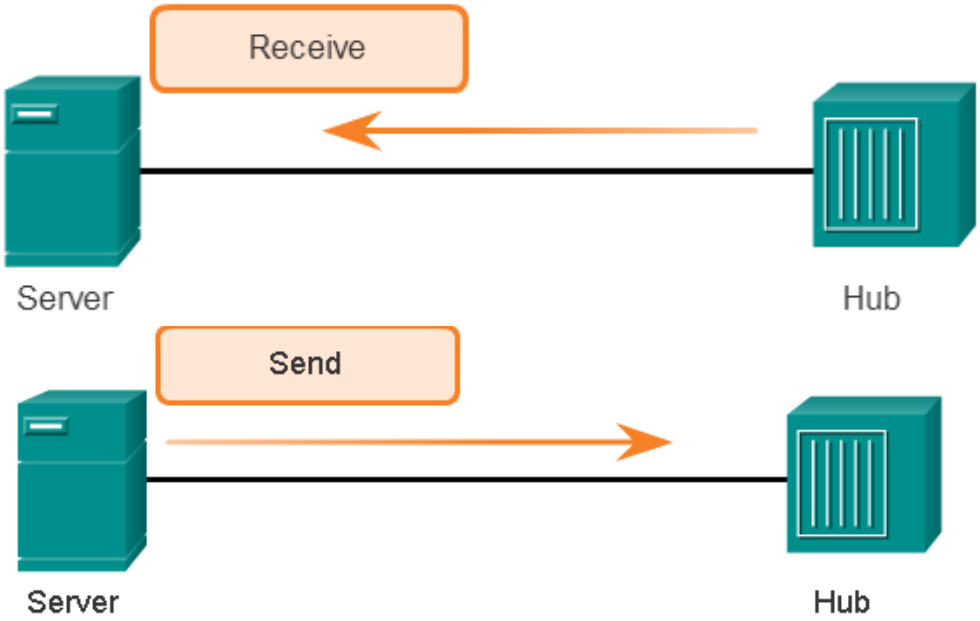


1. Network Segment: PC0 sends Frame to Router0

2. Router0 sends Frame to Router1

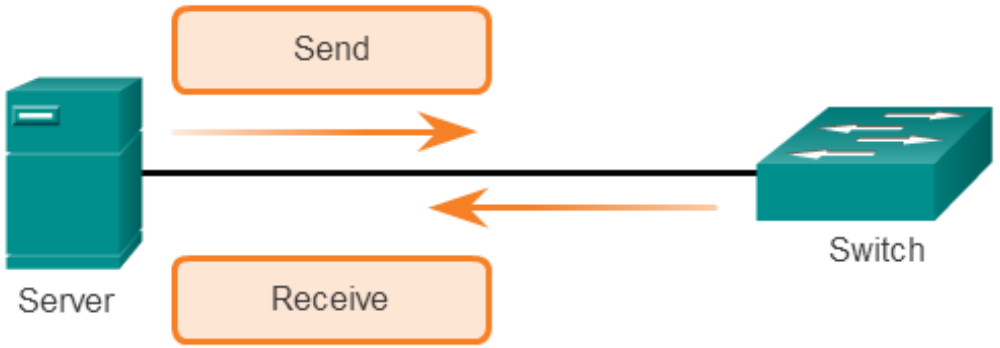
3. Network Segment: Router1 sends Frame to PC1

Half and Full Duplex



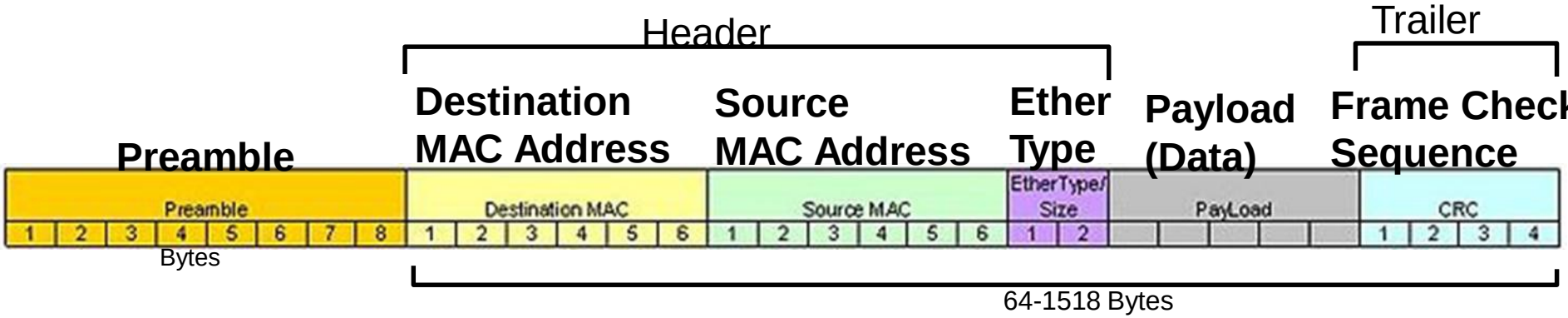
Half-Duplex Communication

Full-Duplex Communication



Ethernet Encapsulation

IEEE 802.3 Standard / Ethernet II



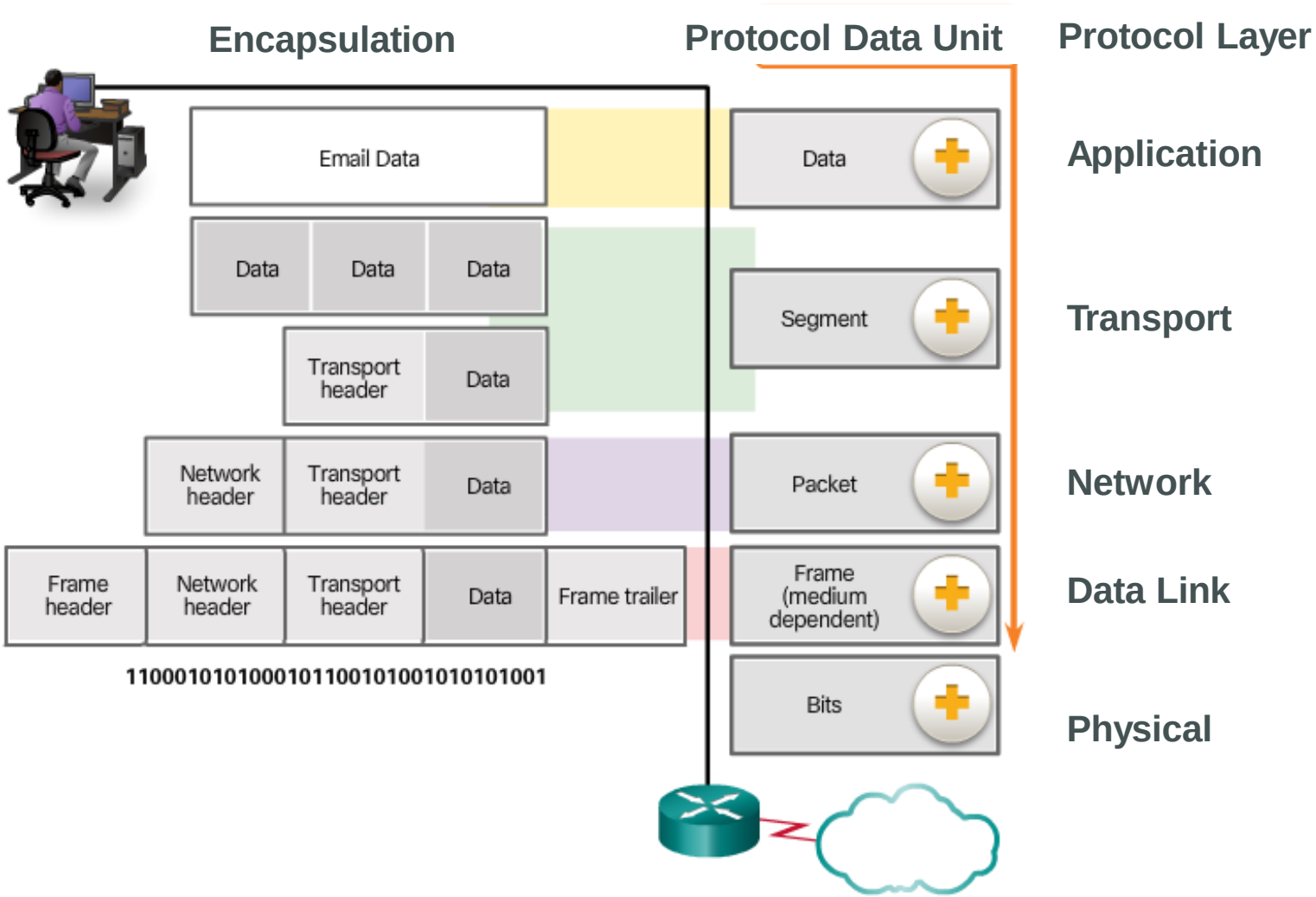
Preamble: sequence of 10101 for bit synchronization
Destination and Source MAC Address:
EtherType: Identifies upper layer Protocol, see table below for examples
Frame Check Sequence: Redundant information for error detection

EtherType for some notable protocols

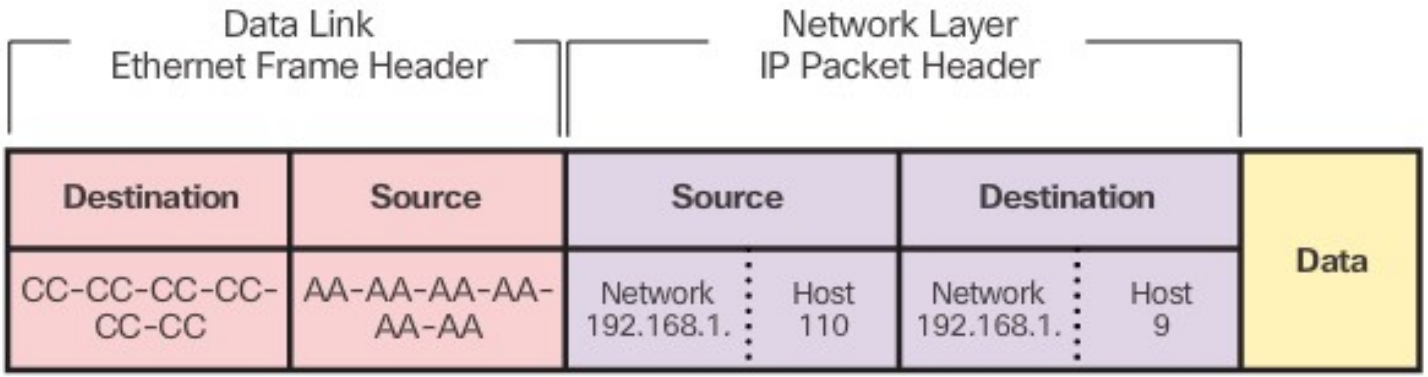
EtherType	Protocol
0x0800	Internet Protocol version 4 (IPv4)
0x0806	Address Resolution Protocol (ARP)
0x0842	Wake-on-LAN[6]
0x22F3	IETF TRILL Protocol
0x6003	DECnet Phase IV
0x8035	Reverse Address Resolution Protocol

Protocol Data Units

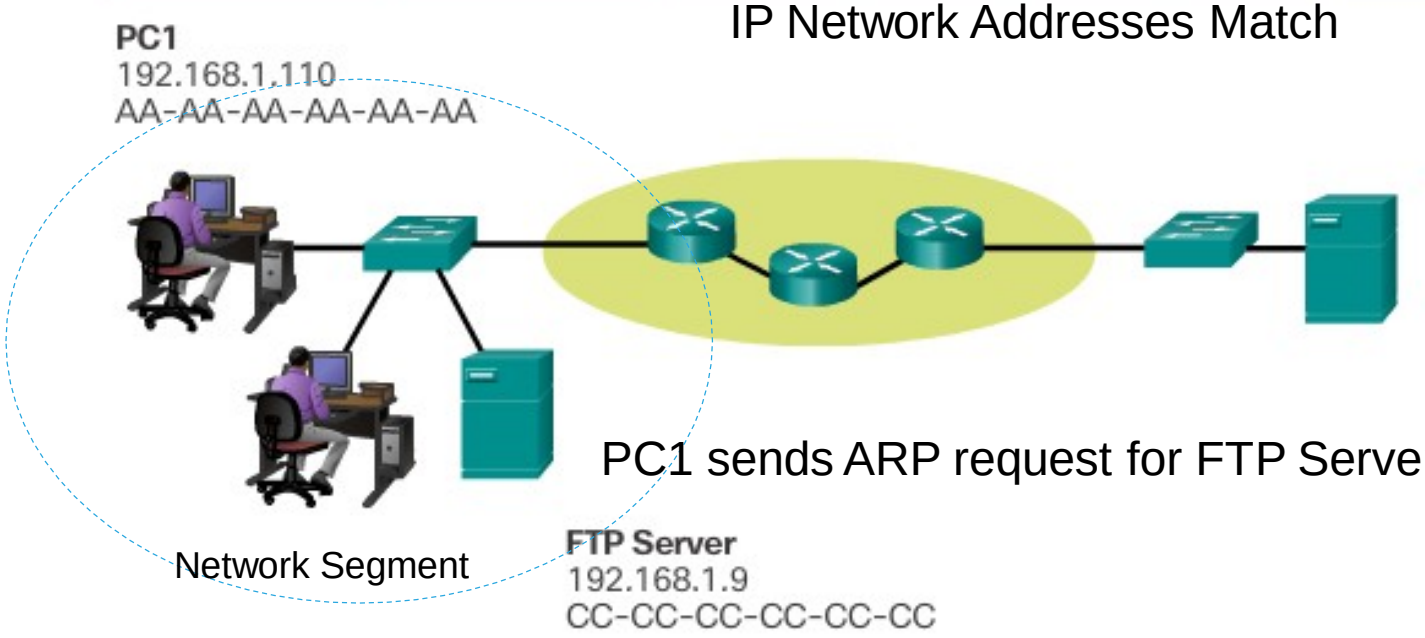
- **Segmentation – partition of application data into blocks of data**
- **A data block with its header is called a Protocol Data Unit (PDU)**



Devices on the Same Network



IP Network Addresses Match



PC1 sends ARP request for FTP Server

Network Layer Protocols

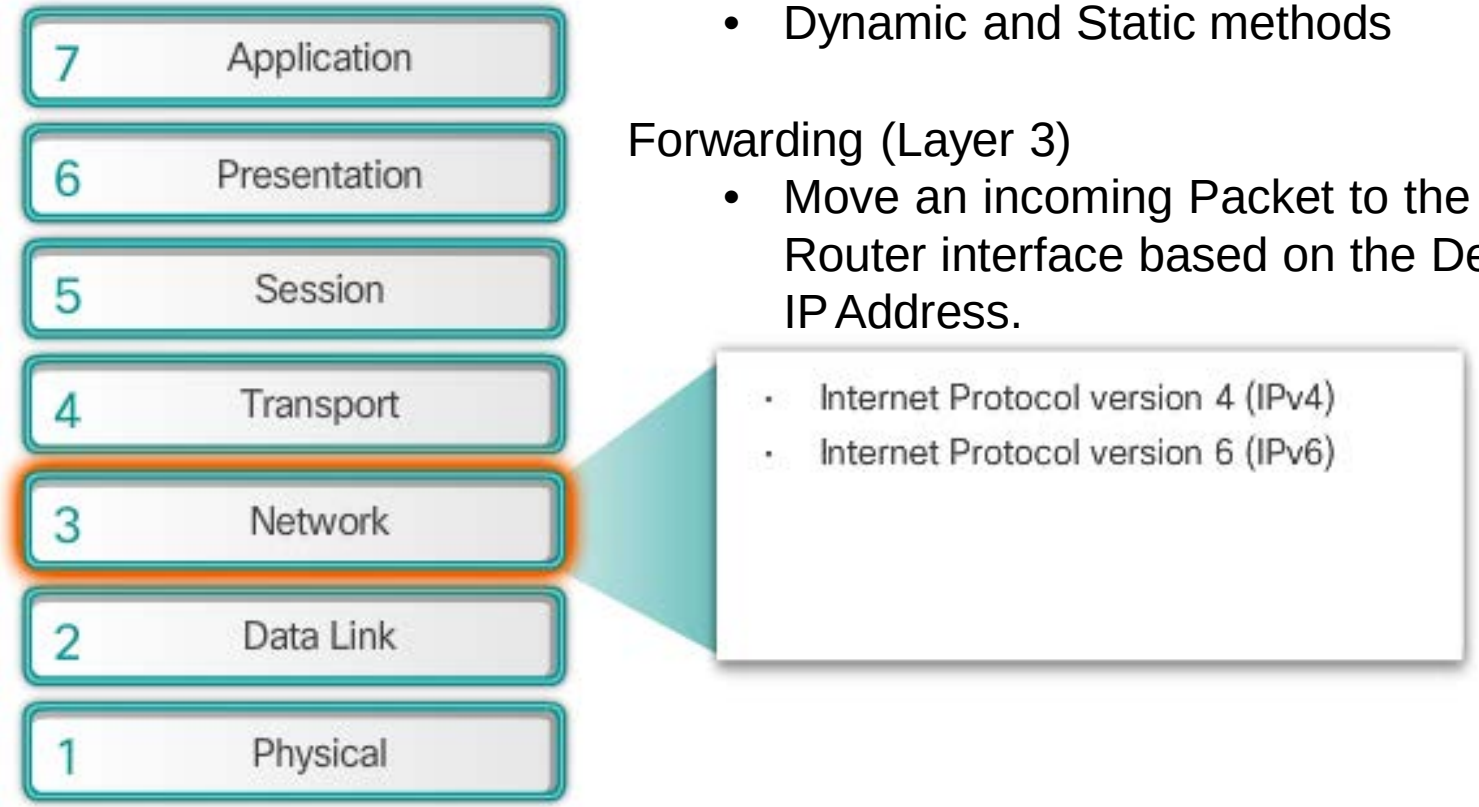
Responsible for:

Routing:

- Determine the path to reach relevant destination networks
- Dynamic and Static methods

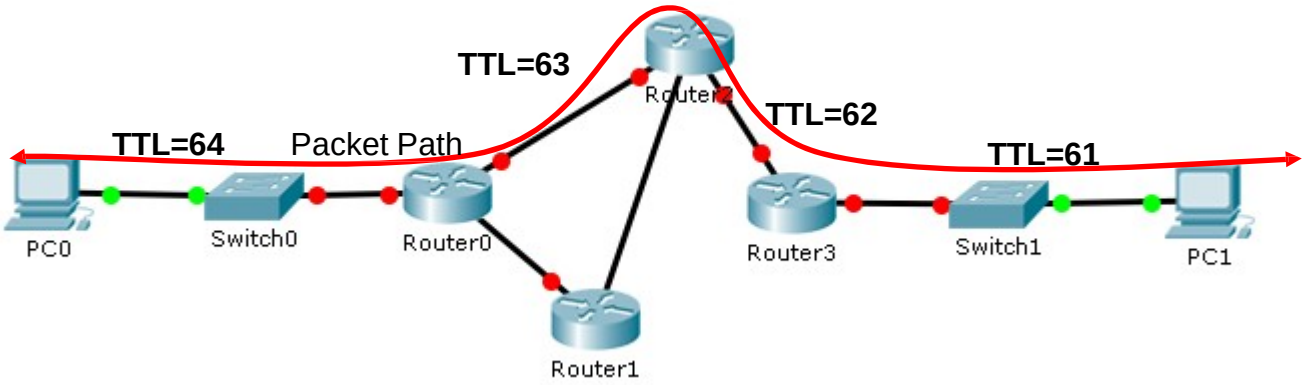
Forwarding (Layer 3)

- Move an incoming Packet to the next hop Router interface based on the Destination IP Address.

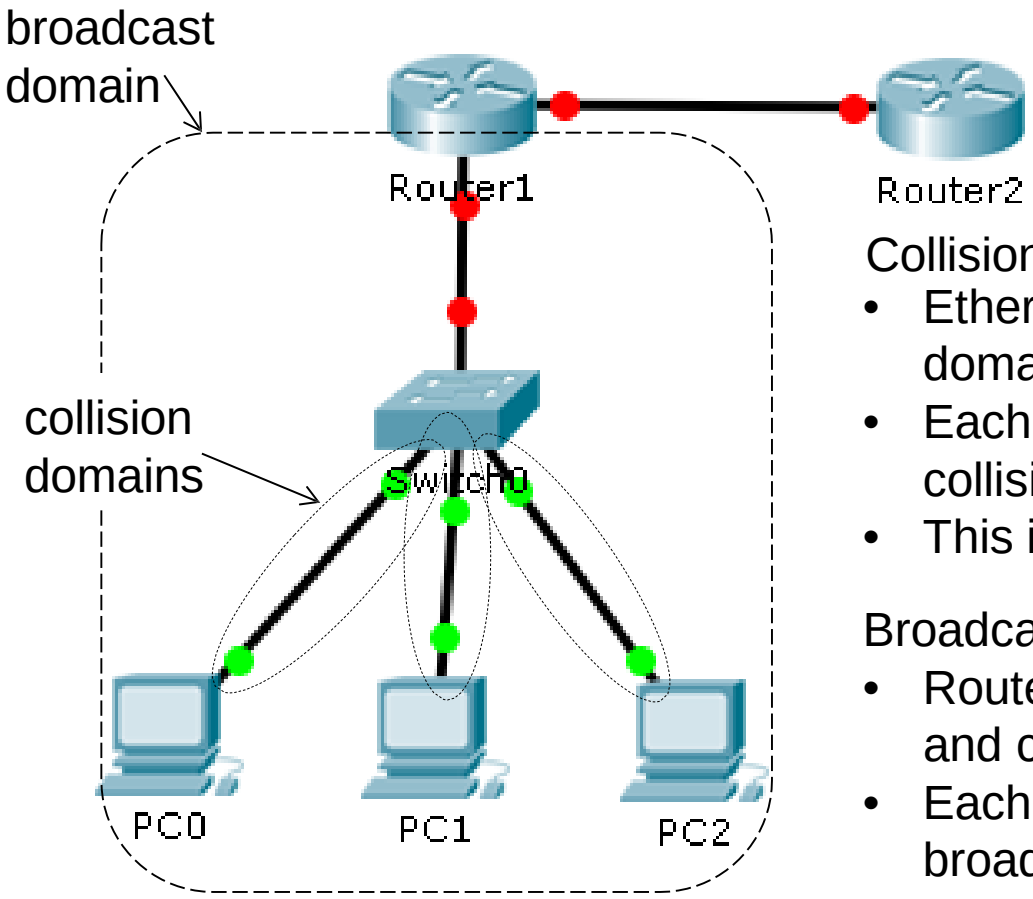


Time-to-Live TTL

- TTL value ranges from 0 – 255.
- TTL value is set by sending device
- TTL value is decremented at each Router.
- Packet is dropped if TTL = 0 before it reaches its destination.
- ICMP message is returned to the source device if TTL=0.
- Prevents packets from getting “stuck” in infinite forwarding loop



Collision Domain & Broadcast Domain: Ethernet Switched Network



Collision Domain:

- Ethernet Switches break up collision domains into point-to-point links.
- Each Switch port forms a separate collision domain
- This is due to the switching function

Broadcast Domain:

- Routers break up broadcast domains and collision domains
- Each Router port forms a separate broadcast domain
- Routers do not forward broadcasts
- The switch prevents collisions in the broadcast domain.

This is important for capacity planning

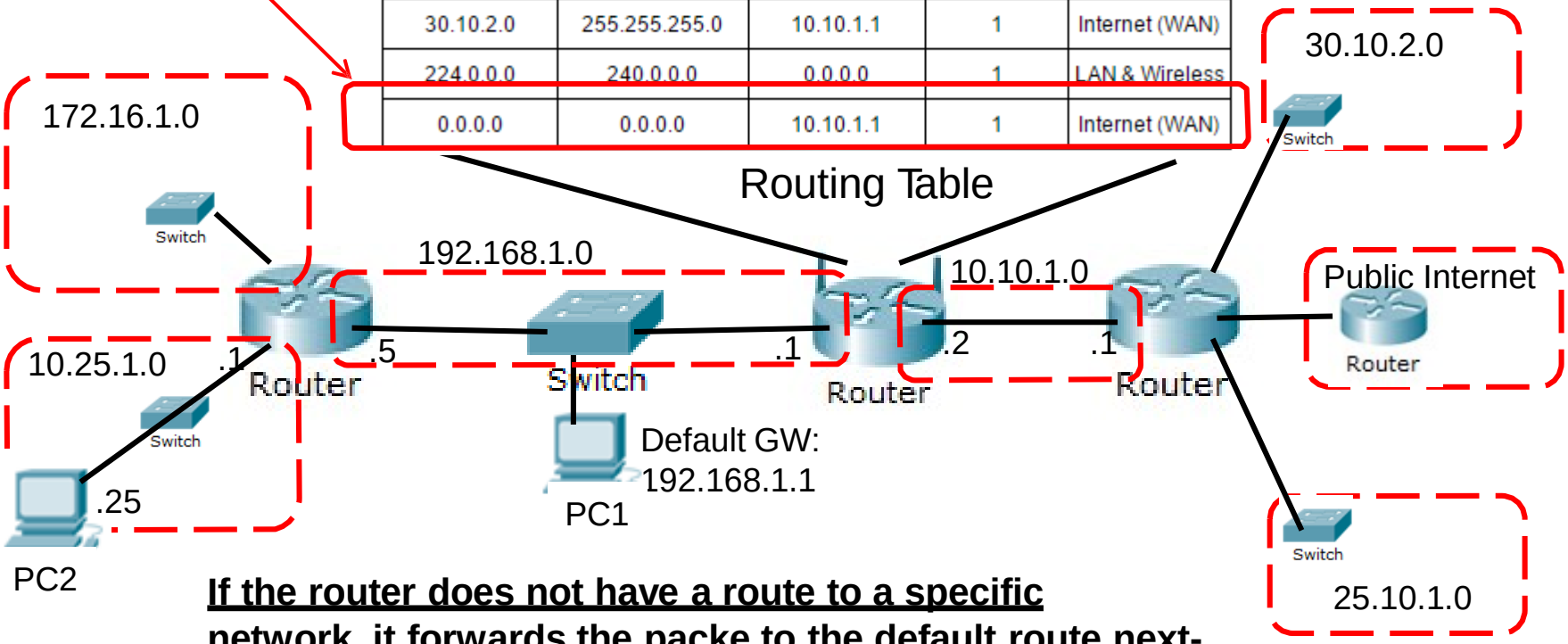
The Default Route

Connected Networks

Default Route

Destination LAN IP	Subnet Mask	Gateway	Hop Count	Interface
25.10.1.0	255.255.255.0	10.10.1.1	1	Internet (WAN)
192.168.1.0	255.255.255.0	0.0.0.0	1	LAN & Wireless
10.10.1.0	255.255.255.0	0.0.0.0	1	Internet (WAN)
172.16.1.0	255.255.255.0	192.168.1.5	1	LAN & Wireless
10.25.1.0	255.255.255.0	192.168.1.5	1	LAN & Wireless
30.10.2.0	255.255.255.0	10.10.1.1	1	Internet (WAN)
224.0.0.0	240.0.0.0	0.0.0.0	1	LAN & Wireless
0.0.0.0	0.0.0.0	10.10.1.1	1	Internet (WAN)

Routing Table



If the router does not have a route to a specific network, it forwards the packe to the default route next-hop address.