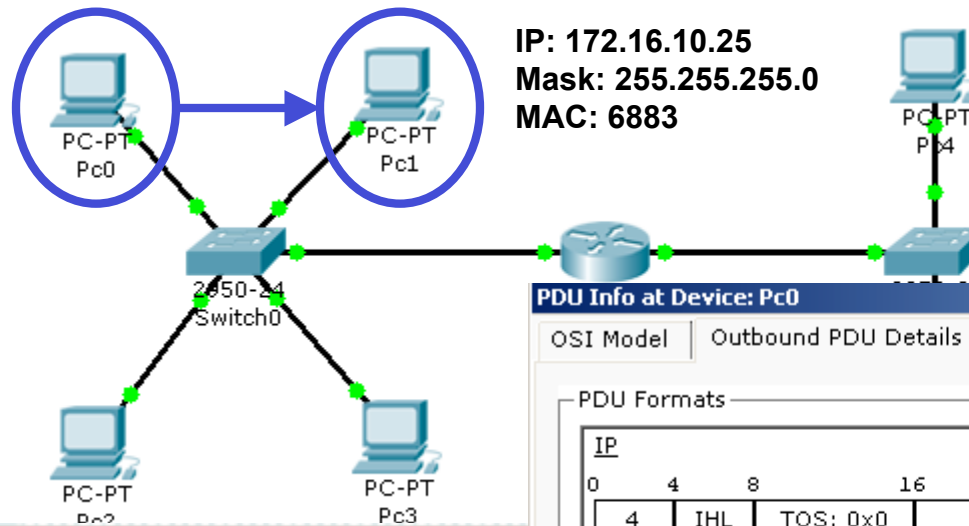


ARP Scenarios

Scenario 1: Sending packets directly to the destination when going inside the network

IP: 172.16.10.10
Mask: 255.255.255.0
Def.Gate: 172.16.10.1
MAC: 2790



IP: 172.16.10.25
Mask: 255.255.255.0
MAC: 6883

```
C:\WINNT\system32\cmd.exe
C:\>ping 172.16.10.25
```

PDU Info at Device: Pc0

OSI Model | Outbound PDU Details

PDU Formats

IP

0	4	8	16	19	31	Bits
4	IHL	TOS: 0x0	TL: 0x0			
ID: 0x0		0x0	FRAG OFFSET: 0x0			
TTL: 32		PRO: 0x1	CHKSUM: 0x0			
SRC IP: 172.16.10.10						
DST IP: 172.16.10.25						
OPT: 0x0			0x0			
DATA (VARIABLE LENGTH)						

ICMP

0	8	16	31	Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM: 0x0		

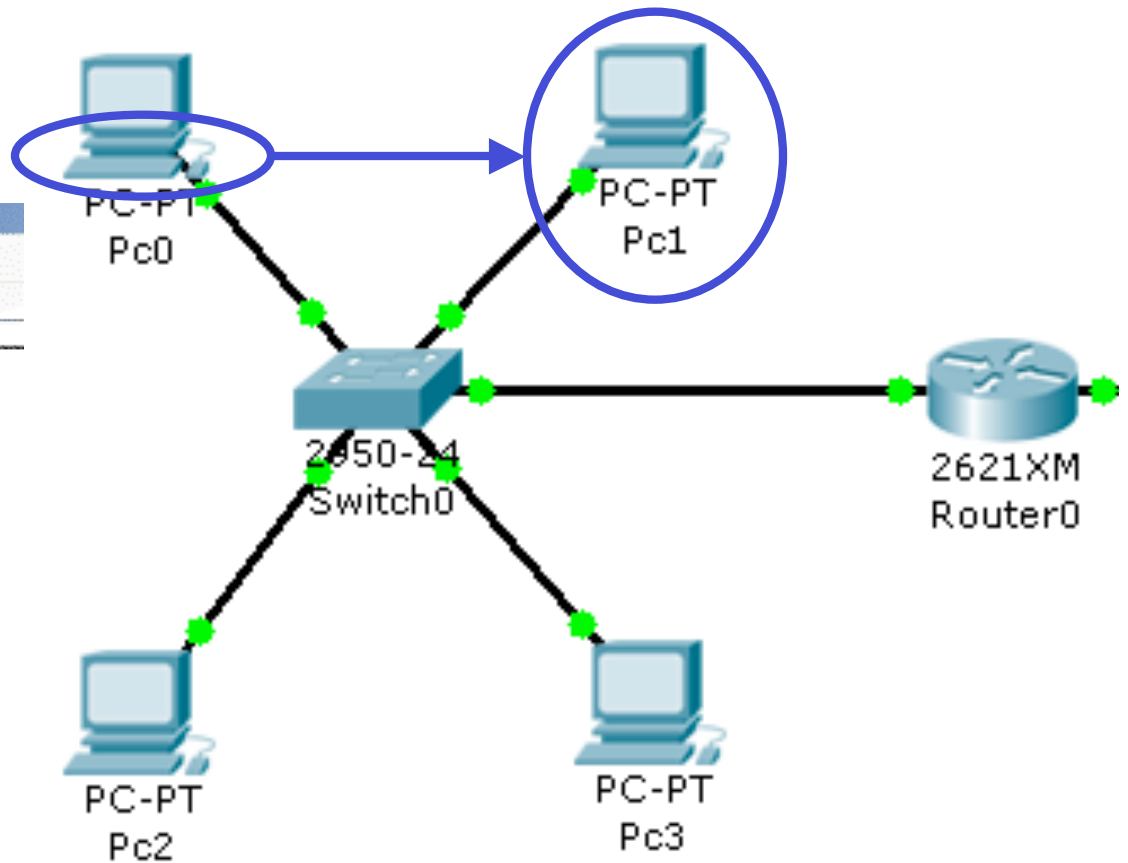
PDU Info at Device: Pc0

OSI Model | Outbound PDU Details

PDU Formats

IP			
0	4	8	31 Bits
4	IHL	TOS: 0x0	TL: 0x0
ID: 0x0		0x0	FRAG OFFSET: 0x0
TTL: 32	PRO: 0x1	CHKSUM: 0x0	
SRC IP: 172.16.10.10			
DST IP: 172.16.10.25			
OPT: 0x0		0x0	
DATA (VARIABLE LENGTH)			

ICMP		
0	8	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM: 0x0



- Does the Pc0 need to issue an ARP Request before sending out this packet?
 - Framing the ARP Request: What is the Destination MAC Address? _____
 - ARP Request: I know _____, but I need to know the _____.
 - ARP Reply: You knew my _____, but here is my _____.
 - What information is added to the ARP Table? _____
- What does Pc0 do with the ARP Request information?

ARP Table

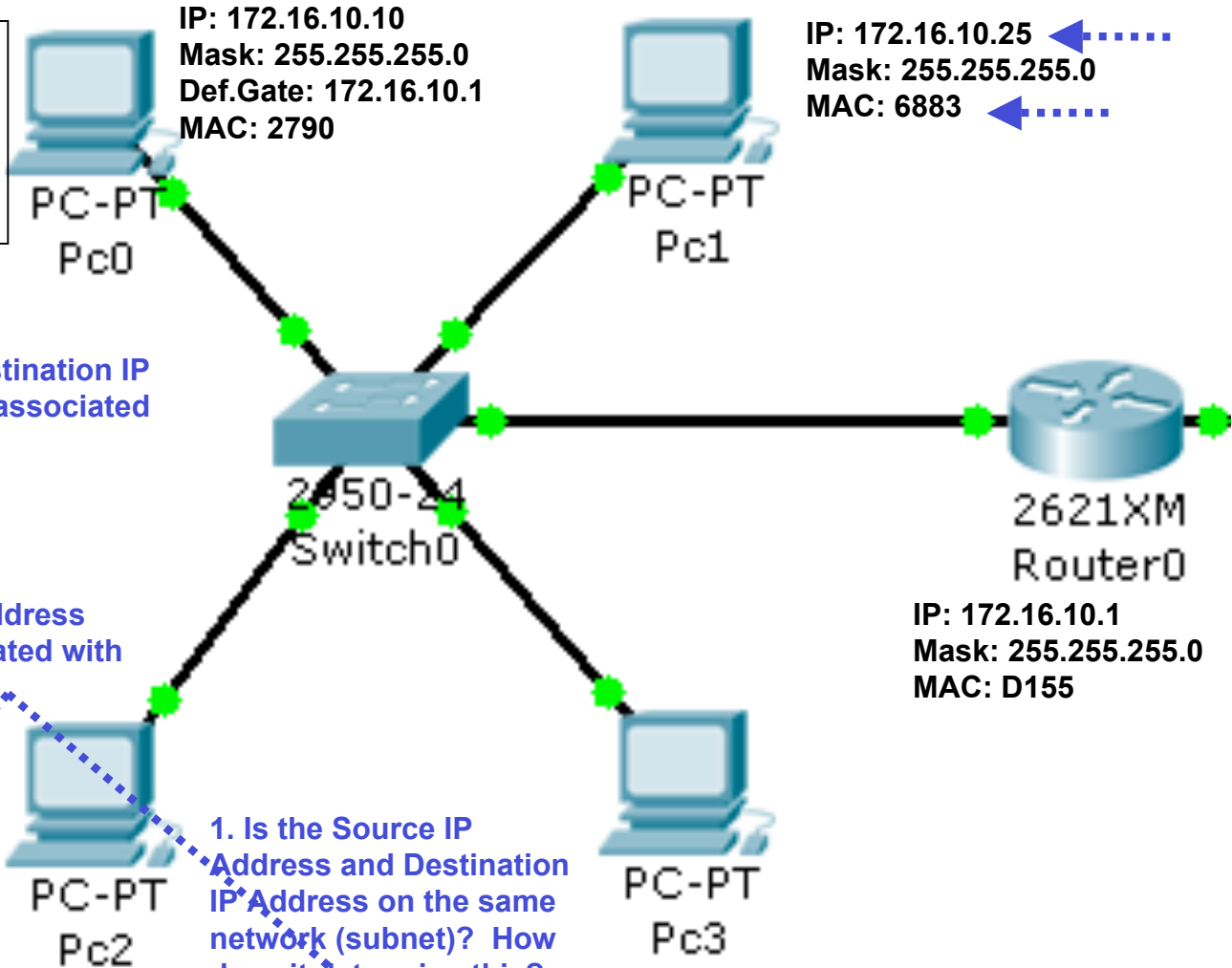
--

↑ (Next slide)

3. Examine ARP Table for Destination IP Address 172.16.10.25 and an associated MAC Address . No entry.

2. Yes, so the Destination MAC Address must be the MAC Address associated with the Destination IP Address.

1. Is the Source IP Address and Destination IP Address on the same network (subnet)? How does it determine this?



Ethernet Header		IP Header				
Destination MAC Add.	Source MAC Address	Type	Source IP Address	Destination IP Address	Rest of IP Hdr	Data
	2790	0x800	172.16.10.10	172.16.10.25		ICMP

ARP

ARP Table

172.16.10.25	6883
--------------	------

5. Update ARP Table

1. Examine ARP Table for Destination IP Address 172.16.10.25 and an associated MAC Address . No entry.

VLAN	Mac Address	Port
1	0003.E417.2790	FastEthernet0/1
1	00E0.8F26.6883	FastEthernet0/2

6. Update Ethernet MAC Address of frame and send out frame/packet

2. Put frame/packet on hold and issue ARP Request

Ethernet Header

Destination MAC Address	Source MAC Address	Type	Source IP Address
6883	2790	0x800	172.16.10.10

IP Header

Address	Hdr	
172.16.10.25		ICMP

IP: 172.16.10.10
Mask: 255.255.255.0
Def.Gate: 172.16.10.1
MAC: 2790



3. ARP Request (broadcast)

IP: 172.16.10.25
Mask: 255.255.255.0
MAC: 6883



4. Update ARP Table from ARP Request and issue ARP Reply (unicast)

ARP Table

172.16.10.10	2790
--------------	------

PDU Info at Device: Switch0

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19 Bytes
PREAMBLE:	DEST MAC:	SRC MAC:		
1010 1010	0003.E417.2790	00E0.8F26.6883		
TYPE:	DATA (VARIABLE LENGTH)	FCS:		
0x806		0x0		

ARP

0	8	16	31 Bits
HARDWARE TYPE: 0x1	PROTOCOL TYPE: 0x800		
HLEN: 0x6	PLEN: 0x4	OPCODE: 0x2	
SOURCE MAC: 00E0.8F26.6883 (48 bits)			
172.16.10.25		SOURCE IP (32 bits) ==>	
TARGET MAC: 0003.E417.2790 (48 bits)			
TARGET IP: 172.16.10.10 (32 bits)			



ARP Table

172.16.10.25	6883
--------------	------

IP: 172.16.10.10
 Mask: 255.255.255.0
 Def.Gate: 172.16.10.1
 MAC: 2790



IP: 172.16.10.25
 Mask: 255.255.255.0
 MAC: 6883



ARP Table

172.16.10.10	2790
--------------	------

ICMP Echo Request

MAC Table for Switch 1

VLAN	Mac Ad
1	0003.E4
1	00E0.8F

Switch 1. Learns Source MAC, 2. Forwards: Switch filters unicast out port fa0/1.



1. Update Ethernet MAC Address of frame and send out frame/packet

PDU Info at Device: Pc0

OSI Model Outbound PDU D

PDU Formats

Ethernet II

0	4	PREAMBLE: 1010 1010	
TYPE: 0x800	DATA (VARIABLE LENGTH)		FCS: 0x0

IP

0	4	8	16	19	31	Bits
4	IHL	TOS: 0x0	TL: 0x0			
ID: 0x0		0x0	FRAG OFFSET: 0x0			
TTL: 32	PRO: 0x1	CHKSUM: 0x0				
SRC IP: 172.16.10.10						
DST IP: 172.16.10.25						
OPT: 0x0			0x0			
DATA (VARIABLE LENGTH)						

ICMP

0	8	16	31	Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM: 0x0		

2. Pc1 receives the ping, ICMP Echo and prepares the Echo Reply. Pc1 determines Source and Destination IP Addresses are on the same network and that it can forward the packet to the Source of the ICMP Echo Request.

Ethernet Header		IP Header	
Destination MAC Add.	Source MAC Address	Type	Source IP Address
6883	2790	0x800	172.16.10.10

172.16.10.25	ICMP
--------------	------

ICMP Echo Reply

ARP Table

172.16.10.25	6883
--------------	------

IP: 172.16.10.10
Mask: 255.255.255.0
Def.Gate: 172.16.10.1
MAC: 2790

PC-PT
Pc0

IP: 172.16.10.25
Mask: 255.255.255.0
MAC: 6883

PC-PT
Pc1

ARP Table

172.16.10.10	2790
--------------	------

1. Pc1 creates IP Packet with ICMP Echo Reply.
2. Pc1 examines the Destination IP Address and notices it is on same network as its Source IP Address, and looks for Dest.IP in its ARP Table.
3. The information is in the ARP Table so Pc1 encapsulates the IP packet into an Ethernet frame with the MAC address of 172.16.10.10.

MAC Table for Switch 1

VLAN	Mac Ad
1	0003.E417.2790
1	00E0.8F26.6883

Switch 1. Learns Source MAC, 2. Forwards: Switch filters unicast out port fa0/1.

PDU Info at Dev

OSI Model | 1

PDU Format

Ethernet II

0	4	8	14	19 Bytes
PREAMBLE: 1010 1010		DEST MAC: 0003.E417.2790		SRC MAC: 00E0.8F26.6883
TYPE: 0x800	DATA (VARIABLE LENGTH)			FCS: 0x0

IP

0	4	8	16	19	31 Bits
IHL		TOS: 0x0		TL: 0x0	
ID: 0x0			FRAG OFFSET: 0x0		
TTL: 32		PRO: 0x1		CHKSUM: 0x0	
SRC IP: 172.16.10.25					
DST IP: 172.16.10.10					
OPT: 0x0				0x0	
DATA (VARIABLE LENGTH)					

ICMP

0	8	16	31 Bits
TYPE: 0x0	CODE: 0x0	CHECKSUM: 0x0	

```
PC>ping 172.16.10.25
Pinging 172.16.10.25 with 32 bytes of data:
Reply from 172.16.10.25: bytes=32 time=8ms TTL=120
```

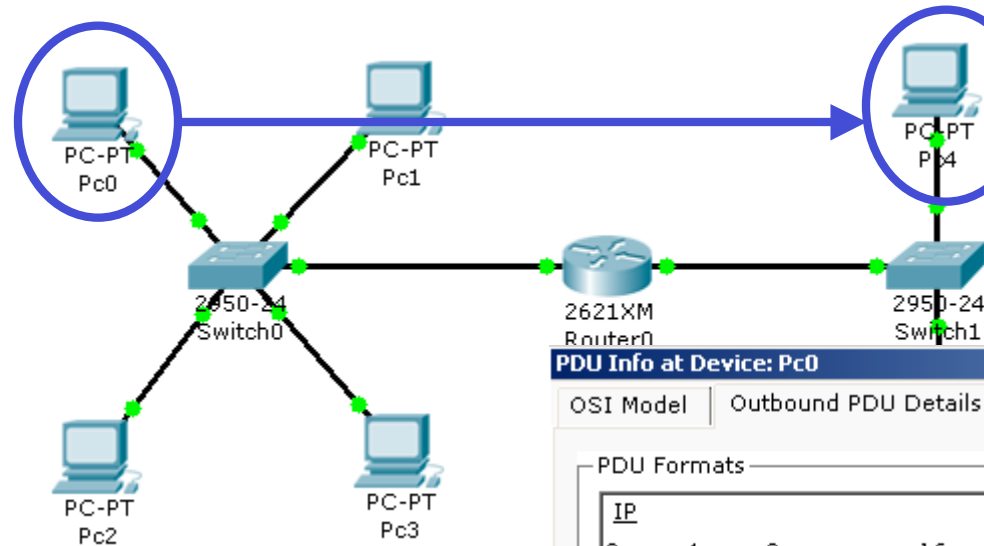
frame/packet

Pc2

Ethernet Header			IP Header
Destination MAC Add.	Source MAC Address	Type	Source IP Address
6883	2790	0x800	172.16.10.10

Scenario 2: Sending packets to the default gateway when going outside the network

IP: 172.16.10.10
 Mask: 255.255.255.0
 Def.Gate: 172.30.10.1
 MAC: 2790



IP: 172.16.20.12
 Mask: 255.255.255.0
 Def.Gate: 172.30.20.1
 MAC: 6883

PDU Info at Device: Pc0

OSI Model | Outbound PDU Details

PDU Formats

IP					
0	4	8	16	31	Bits
4	IHL	TOS: 0x0	TL: 0x0		
ID: 0x0		0x0	FRAG OFFSET: 0x0		
TTL: 32		PRO: 0x1	CHKSUM: 0x0		
SRC IP: 172.16.10.10					
DST IP: 172.16.20.12					
OPT: 0x0			0x0		
DATA (VARIABLE LENGTH)					
ICMP					
0	8	16	31		Bits
TYPE: 0x8		CODE: 0x0	CHECKSUM: 0x0		

```

C:\> C:\WINNT\system32\cmd.exe
C:\> ping 172.16.20.12_
    
```

ARP Table

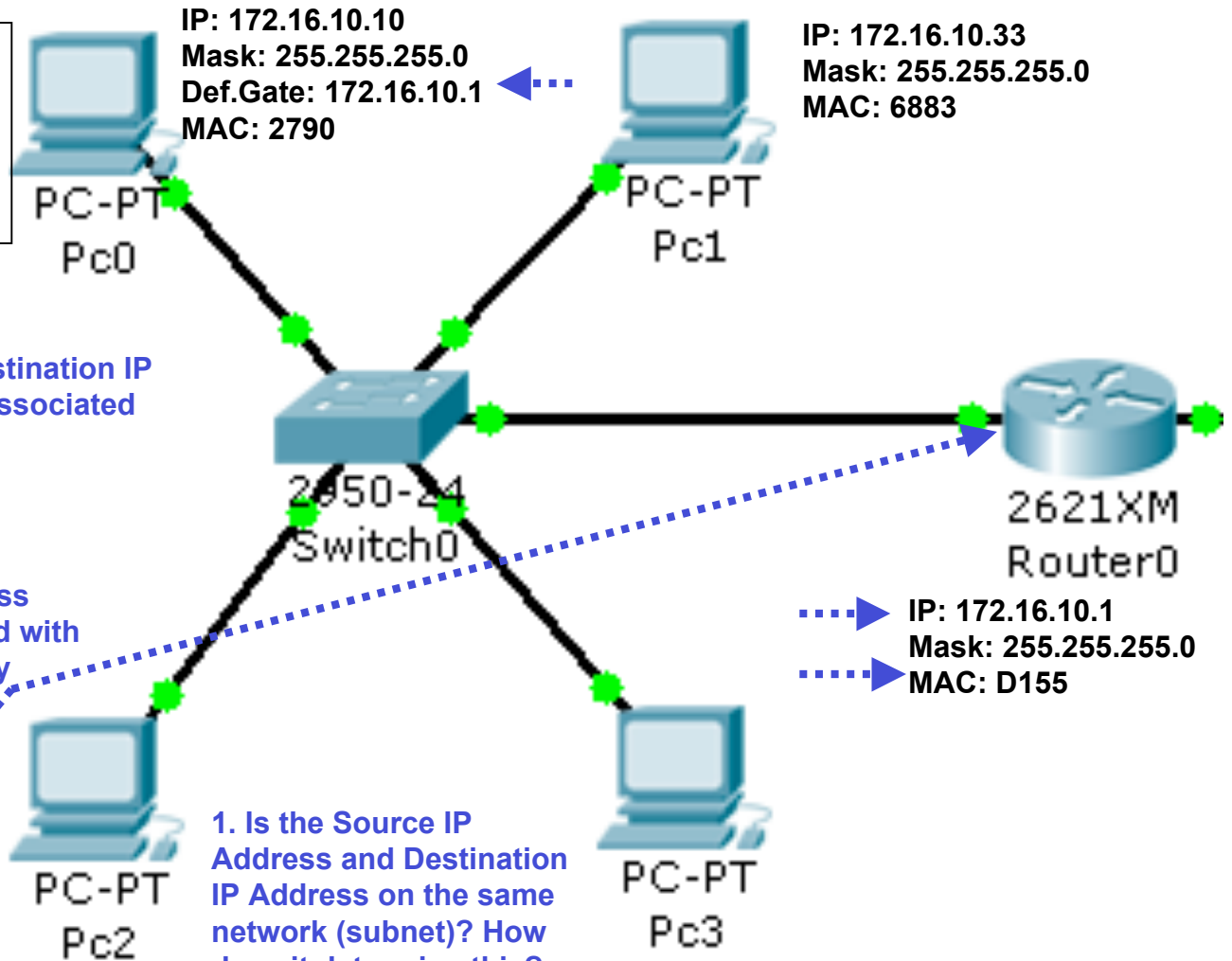
--

↑ (Next slide)

3. Examine ARP Table for Destination IP Address 172.16.10.1 and an associated MAC Address . No entry.

2. No, so the Destination MAC Address must be the MAC Address associated with the IP Address of the Default gateway (router).

1. Is the Source IP Address and Destination IP Address on the same network (subnet)? How does it determine this?



Ethernet Header		IP Header				
Destination MAC Add.	Source MAC Address	Type	Source IP Address	Destination IP Address	Rest of IP Hdr	Data
	2790	0x800	172.16.10.10	172.16.20.12		ICMP

ARP Table

172.16.10.1	D155
-------------	------

5. Update ARP Table

1. Examine ARP Table for Destination IP Address 172.16.10.1 and an associated MAC Address . No entry.

MAC Table for Switch0

VLAN	Mac Address	
1	0003.E417.2790	F
1	0090.2164.D155	F

Switch 1. Learns Source MAC, 2. Forwards: Switch filters unicast out port fa0/1.

6. Update Ethernet MAC Address of frame and send out frame/packet

2. Put frame/packet on hold and issue ARP Request

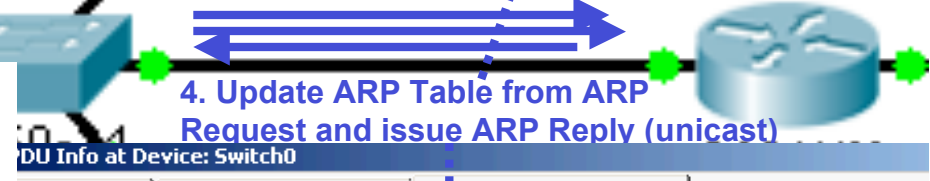
Ethernet Header		IP Header	
Destination MAC Add	Source MAC Address	Type	Source IP Addr
D155	2790	0x800	172.16.10

PC-PT Pc0
 IP: 172.16.10.10
 Mask: 255.255.255.0
 Def.Gate: 172.16.10.1
 MAC: 2790

PC-PT Pc1
 IP: 172.16.10.1
 Mask: 255.255.255.0
 MAC: D155

Router ARP Table

172.16.10.10	2790
--------------	------



DU Info at Device: Switch0

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19	Bytes
PREAMBLE: 1010 1010		DEST MAC: 0090.2164.D155		SRC MAC: 0003.E417.2790	
TYPE: 0x800		DATA (VARIABLE LENGTH)		FCS: 0x0	

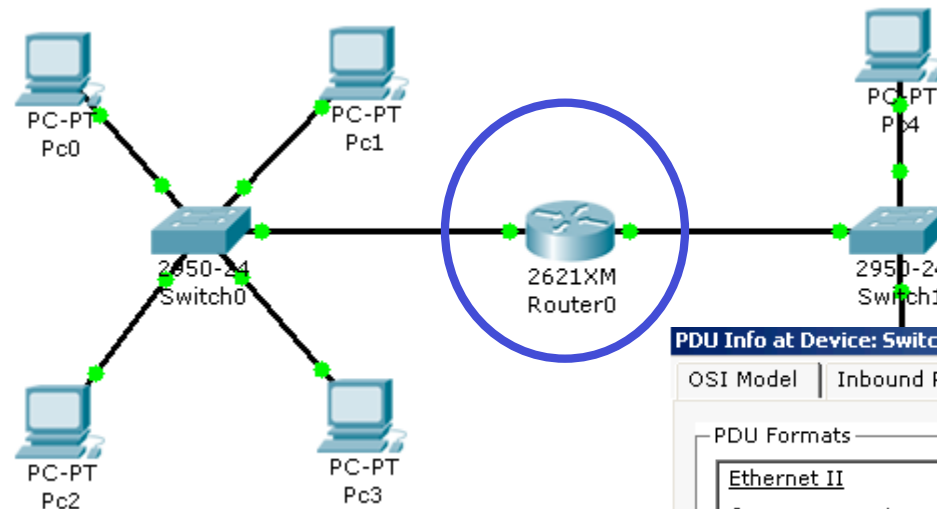
IP

0	4	8	16	19	31	Bits
IHL: 4		TOS: 0x0		TL: 0x0		
ID: 0x0		FRAG OFFSET: 0x0				
TTL: 32		PRO: 0x1		CHKSUM: 0x0		
SRC IP: 172.16.10.10						
DST IP: 172.16.20.12						
OPT: 0x0				0x0		
DATA (VARIABLE LENGTH)						

ICMP

0	8	16	31	Bits
TYPE: 0x8		CODE: 0x0		CHECKSUM: 0x0

Now, what does the router do with it?



- This is just a preview!
- Let's see if we can figure it out!

PDU Info at Device: Switch0

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19	Bytes
PREAMBLE: 1010 1010		DEST MAC: 0090.2164.D155		SRC MAC: 0003.E417.2790	
TYPE: 0x800		DATA (VARIABLE LENGTH)		FCS: 0x0	

IP

0	4	8	16	19	31	Bits
4		IHL	TOS: 0x0		TL: 0x0	
ID: 0x0			0x0		FRAG OFFSET: 0x0	
TTL: 32		PRO: 0x1		CHKSUM: 0x0		
SRC IP: 172.16.10.10						
DST IP: 172.16.20.12						
OPT: 0x0				0x0		
DATA (VARIABLE LENGTH)						

ICMP

0	8	16	31	Bits	
TYPE: 0x8		CODE: 0x0		CHECKSUM: 0x0	

PDU Info at Device: Switch0

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19	Bytes
PREAMBLE: 1010 1010		DEST MAC: 0800.2104.D155		SRC MAC: 0003.E417.2790	
TYPE: 0x800		DATA (VARIABLE LENGTH)		FCS: 0x0	

IP

0	4	8	16	19	31	Bits
4	IHL	TOS: 0x0	TL: 0x0			
ID: 0x0		0x0	FRAG OFFSET: 0x0			
TTL: 32	PRO: 0x1	CHKSUM: 0x0				
SRC IP: 172.16.10.10						
DST IP: 172.16.20.12						
OPT: 0x0			0x0			
DATA (VARIABLE LENGTH)						

ICMP

0	8	16	31	Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM: 0x0		

PDU Info at Device: Router0

OSI Model | Inbound PDU Details | Outbound PDU Details

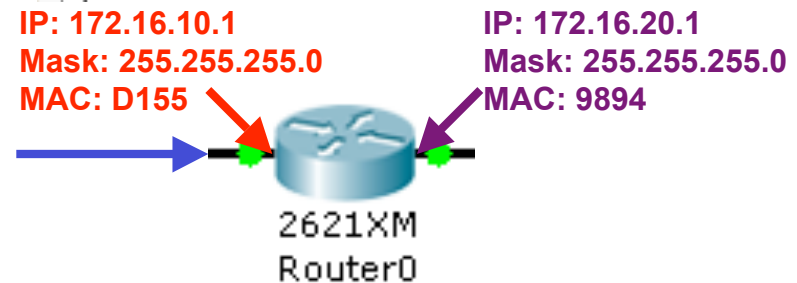
PDU Formats

IP

0	4	8	16	19	31	Bits
4	IHL	TOS: 0x0	TL: 0x0			
ID: 0x0		0x0	FRAG OFFSET: 0x0			
TTL: 31	PRO: 0x1	CHKSUM: 0x0				
SRC IP: 172.16.10.10						
DST IP: 172.16.20.12						
OPT: 0x0			0x0			
DATA (VARIABLE LENGTH)						

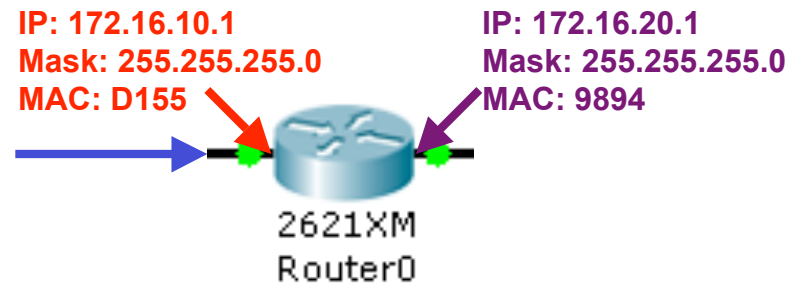
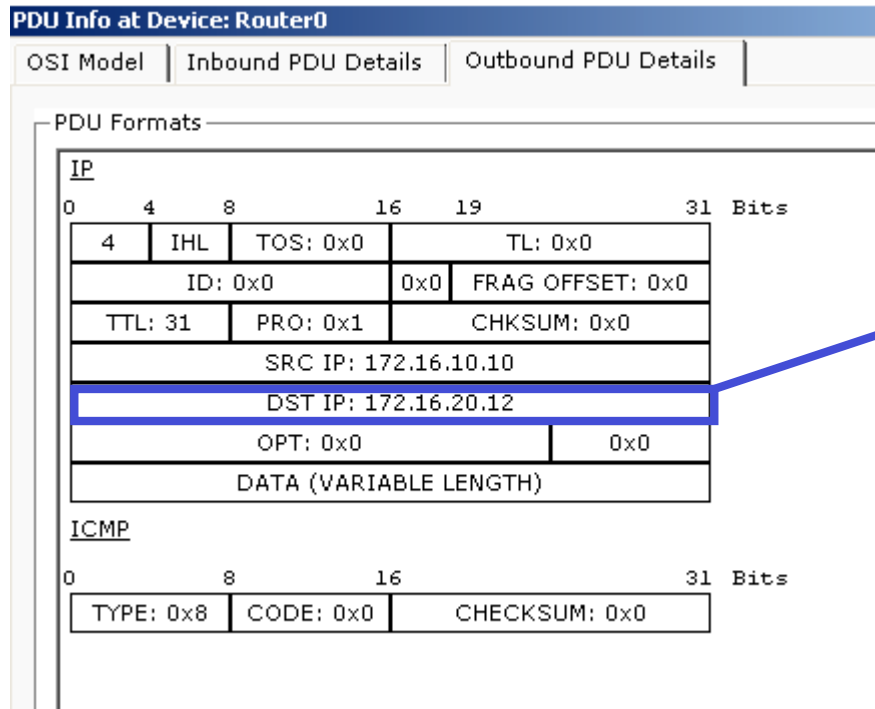
ICMP

0	8	16	31	Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM: 0x0		



- Router copies in Ethernet frame, because the Destination MAC Address matches its Ethernet interface MAC Address.
- The router strips off the Ethernet header and examines the Layer 3 IP packet.

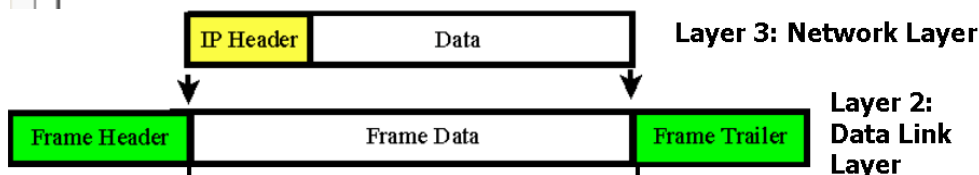
1. The router looks for the Destination IP Address in the routing table.



Type	Network	Port	Next Hop	Metric
C	172.16.10.0/24	FastEthernet0/0	---	0/0
C	172.16.20.0/24	FastEthernet0/1	---	0/0

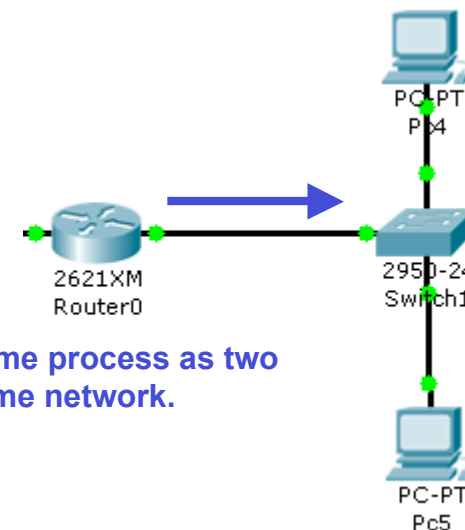
2. The Destination IP Address of the packet belongs to the 172.16.20.0/24 network in its routing table.

3. The port or exit interface is FastEthernet0/1. This is an Ethernet interface, which means the router must encapsulate this IP packet into an Ethernet frame.



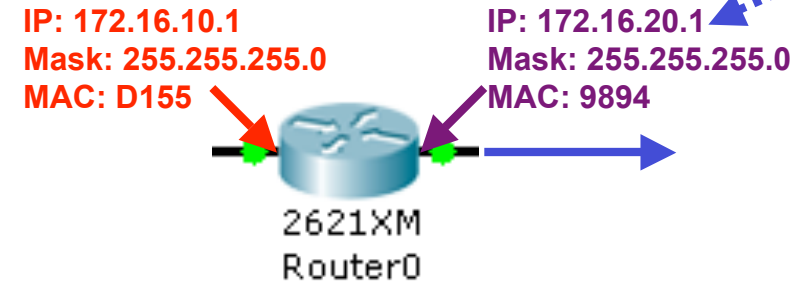
4. Because this network is "C" directly connected, this means that the device with this Destination IP address is on the same network as the exit interface Fa0/1 and is somewhere on this network.

5. This is the same process as two hosts on the same network.



Type	Network	Port	Next Hop	Metric
C	172.16.10.0/24	FastEthernet0/0	---	0/0
C	172.16.20.0/24	FastEthernet0/1	---	0/0

1. The IP Packet needs to be encapsulated in an Ethernet Frame.



2. Remember, the router's exit interface's IP Address is on the same network as the Destination IP Address of the IP packet. This is just like two hosts on the same network!

IP Address	Hardware Address	Interface
172.16.10.1	0090.2164.D155	FastEthernet0/0
172.16.10.10	0003.E417.2790	FastEthernet0/0
172.16.20.1	00E0.B038.9894	FastEthernet0/1

3. Examine ARP Table for Destination IP Address 172.16.20.12 and an associated MAC Address. No entry. (Next Slide)

OSI Model	Inbound PDU Details	Outbound PDU Details				
PDU Formats						
IP						
0	4	8	16	19	31	Bits
4	IHL	TOS: 0x0	TL: 0x0			
ID: 0x0		0x0	FRAG OFFSET: 0x0			
TTL: 31	PRO: 0x1	CHKSUM: 0x0				
SRC IP: 172.16.10.10						
DST IP: 172.16.20.12						
OPT: 0x0			0x0			
DATA (VARIABLE LENGTH)						
ICMP						
0	8	16	31			Bits
TYPE: 0x8		CODE: 0x0	CHECKSUM: 0x0			

3. The Destination MAC Address must be the MAC Address associated with the Destination IP Address.

Ethernet Header		IP Header				
Destination MAC Add.	Source MAC Address	Type	Source IP Address	Destination IP Address	Rest of IP Hdr	Data
	9894	0x800	172.16.10.10	172.16.20.12		ICMP

PDU Info at Device: Pc4

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19 Bytes
PREAMBLE: 1010 1010		DEST MAC: 00E0.B038.9894		SRC MAC: 0001.4251.AA42
TYPE: 0x806		DATA (VARIABLE LENGTH)		FCS: 0x0

ARP

0	8	16	31 Bits
HARDWARE TYPE: 0x1		PROTOCOL TYPE: 0x800	
HLEN: 0x6		PLEN: 0x4	
OPCODE: 0x2		SOURCE MAC: 0001.4251.AA42 (48 bits)	
SOURCE IP (32 bits) ==>		172.16.20.12	
TARGET MAC: 00E0.B038.9894 (48 bits)		TARGET IP: 172.16.20.1 (32 bits)	

ARP

ARP Table

172.16.20.1	9894
-------------	------

IP: 172.16.20.12
Mask: 255.255.255.0
MAC: AA42

IP: 172.16.20.1
Mask: 255.255.255.0
MAC: 9894

4. Update ARP Table from ARP Request and issue ARP Reply (unicast)

3. ARP Request (broadcast)



MAC Table for Switch1

VLAN	Mac Address	Port
1	0001.4251.AA42	FastEthernet0/1
1	00E0.B038.9894	FastEthernet0/24

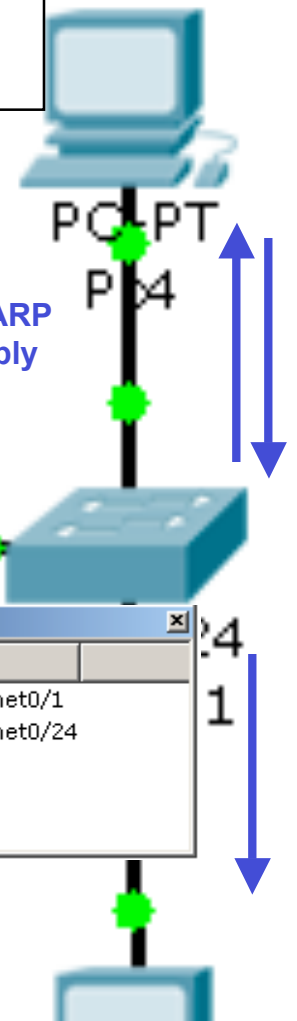
ARP Table for Router0

IP Address	Hardware Address	Interface
172.16.10.1	0090.2164.D155	FastEthernet0/0
172.16.10.10	0003.E417.2790	FastEthernet0/0
172.16.20.1	00E0.B038.9894	FastEthernet0/1
172.16.20.12	0001.4251.AA42	FastEthernet0/1

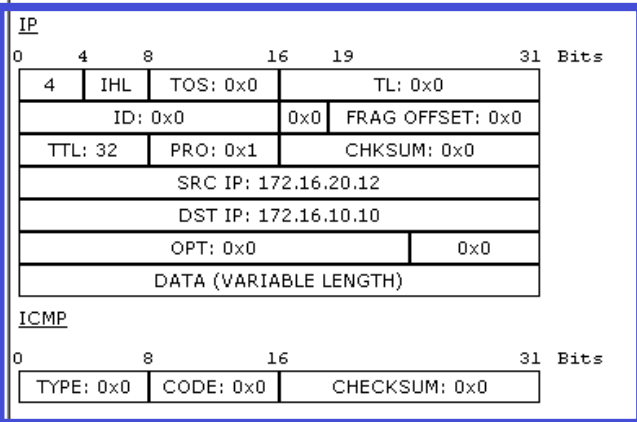
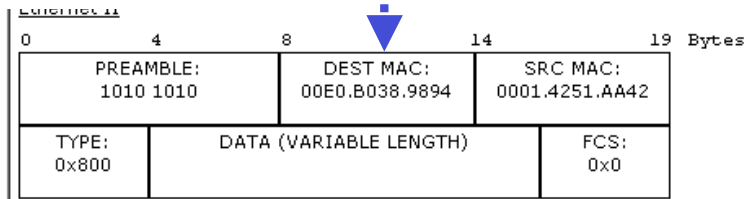
2. Put frame/packet on hold and issue ARP Request

1. Examine ARP Table for Destination IP Address 172.16.20.12 and an associated MAC Address . No entry.

Ethernet Header			IP Header			
Destination MAC Add.	Source MAC Address	Type	Source IP Address	Destination IP Address	Rest of IP Hdr	Data
AA42	9894	0x800	172.16.10.10	172.16.20.12		ICMP



4. The ICMP Echo Reply is encapsulated in an Ethernet frame with the MAC Address found in the ARP Table. The frame is sent to the switch.



IP Address	Hardware Address	Interface
172.16.10.1	0090.2164.D155	FastEthernet0/0
172.16.10.10	0003.E417.2790	FastEthernet0/0
172.16.20.1	00E0.B038.9894	FastEthernet0/1
172.16.20.12	0001.4251.AA42	FastEthernet0/1

Packet Forwarding

3. Pc4 examines its ARP table and finds the MAC Address for the Default Gateway.

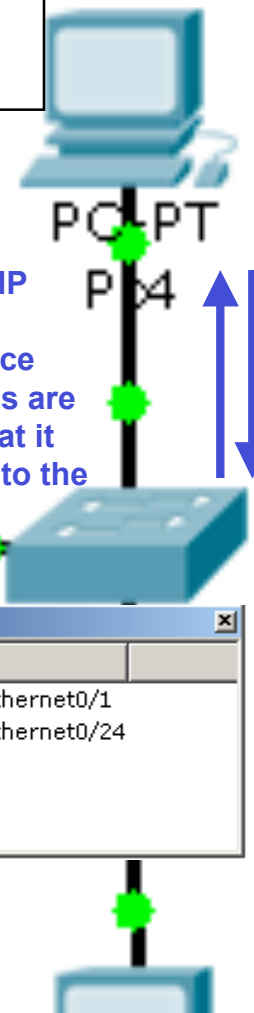
IP: 172.16.20.1
Mask: 255.255.255.0
MAC: 9894

2. Pc4 receives the ping, ICMP Echo and prepares the Echo Reply. Pc4 determines Source and Destination IP Addresses are on different networks and that it needs to forward the packet to the Default Gateway (router).



172.16.20.1	9894
-------------	------

IP: 172.16.20.12
Mask: 255.255.255.0
MAC: AA42



1. Now that the IP packet has been encapsulated into an Ethernet frame, the frame can be forwarded on to the switch.

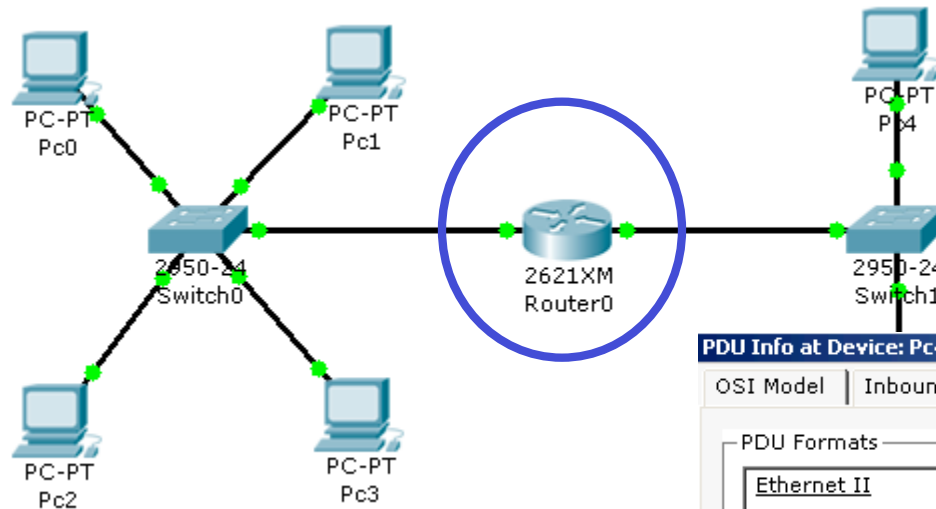
VLAN	Mac Address	Port
1	0001.4251.AA42	FastEthernet0/1
1	00E0.B038.9894	FastEthernet0/24

Ethernet Header

IP Header

Destination MAC Add.	Source MAC Address	Type	Source IP Address	Destination IP Address	Rest of IP Hdr	Data
AA42	9894	0x800	172.16.10.10	172.16.20.12		ICMP

Now, what does the router do with it?



Reminder:

- This is just a preview!
- Let's see if we can figure it out!

PDU Info at Device: Pc4

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19	Bytes
PREAMBLE: 1010 1010		DEST MAC: 00E0.B038.9894		SRC MAC: 0001.4251.AA42	
TYPE: 0x800		DATA (VARIABLE LENGTH)		FCS: 0x0	

IP

0	4	8	16	19	31	Bits
4	IHL	TOS: 0x0		TL: 0x0		
ID: 0x0		0x0	FRAG OFFSET: 0x0			
TTL: 32		PRO: 0x1		CHKSUM: 0x0		
SRC IP: 172.16.20.12						
DST IP: 172.16.10.10						
OPT: 0x0				0x0		
DATA (VARIABLE LENGTH)						

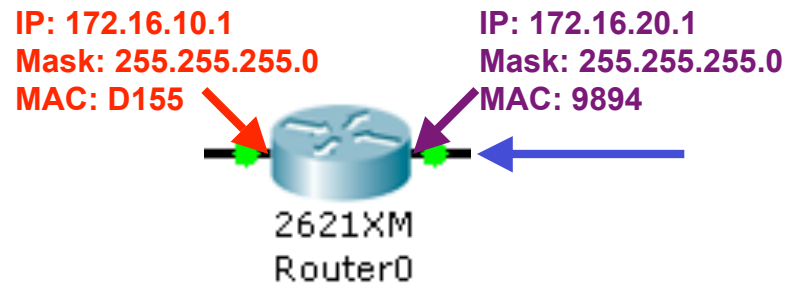
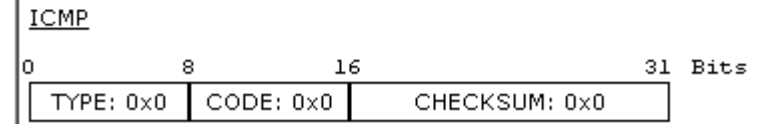
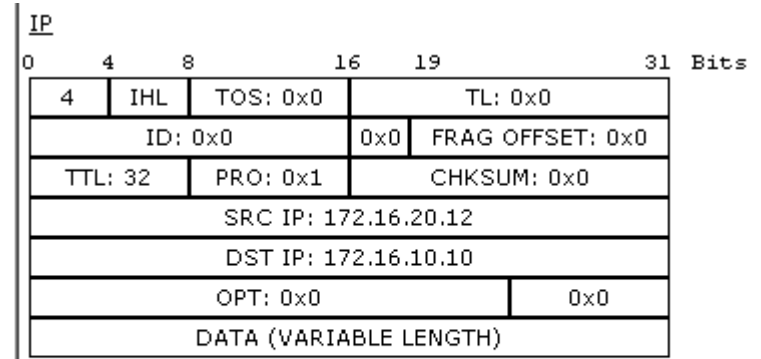
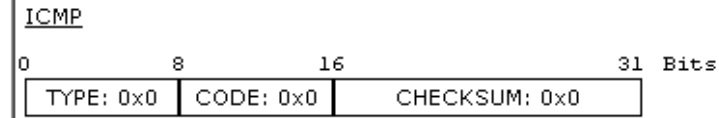
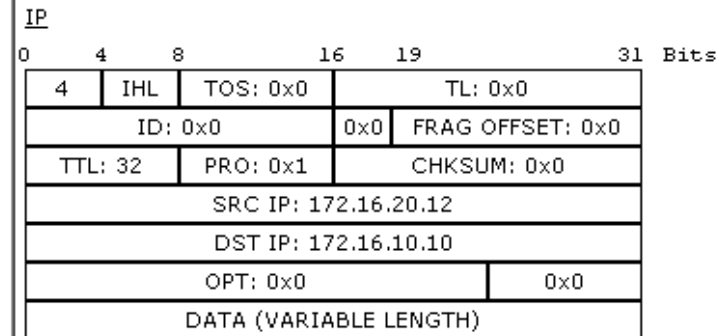
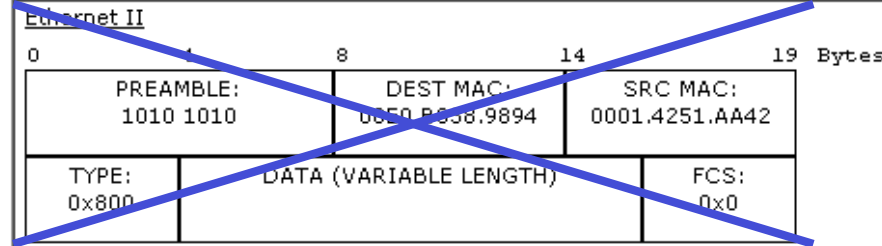
ICMP

0	8	16	31	Bits	
TYPE: 0x0		CODE: 0x0		CHECKSUM: 0x0	

PDU Info at Device: Pc4

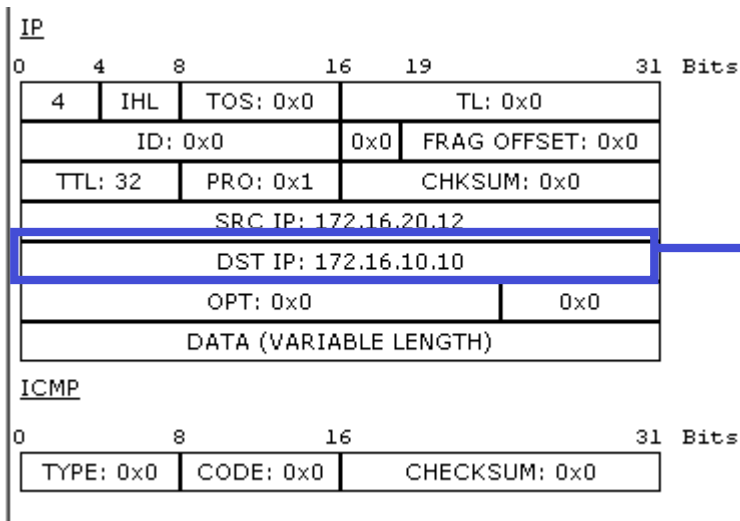
OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats



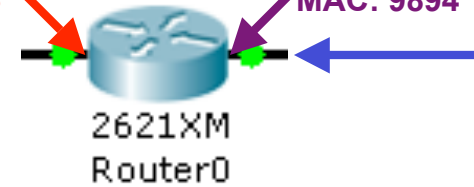
- Router copies in Ethernet frame, because the Destination MAC Address matches its Ethernet interface MAC Address.
- The router strips off the Ethernet header and examines the Layer 3 IP packet.

1. The router looks for the Destination IP Address in the routing table.



IP: 172.16.10.1
Mask: 255.255.255.0
MAC: D155

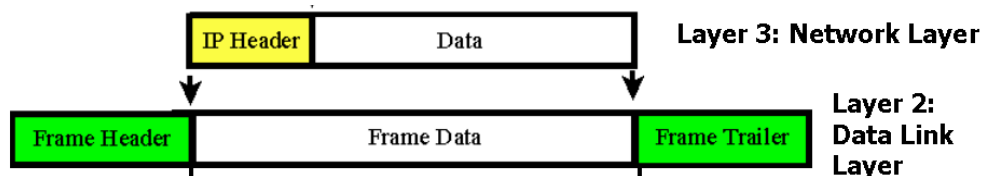
IP: 172.16.20.1
Mask: 255.255.255.0
MAC: 9894



Type	Network	Port	Next Hop	Metric
C	172.16.10.0/24	FastEthernet0/0	---	0/0
C	172.16.20.0/24	FastEthernet0/1	---	0/0

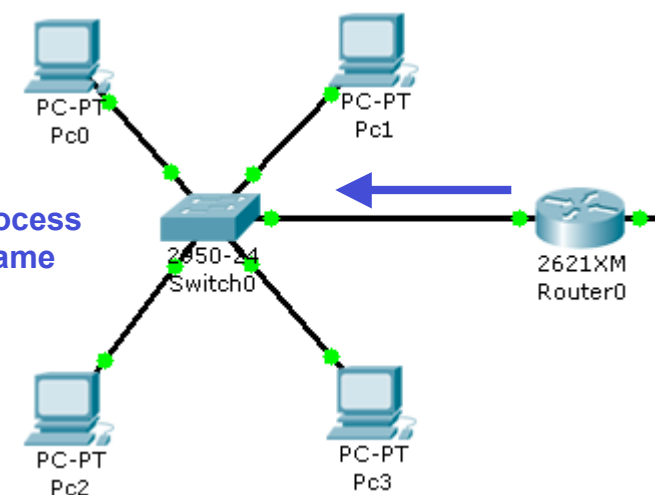
2. The Destination IP Address of the packet belongs to the 172.16.10.0/24 network in its routing table.

3. The port or exit interface is FastEthernet0/0. This is an Ethernet interface, which means the router must encapsulate this IP packet into an Ethernet frame.



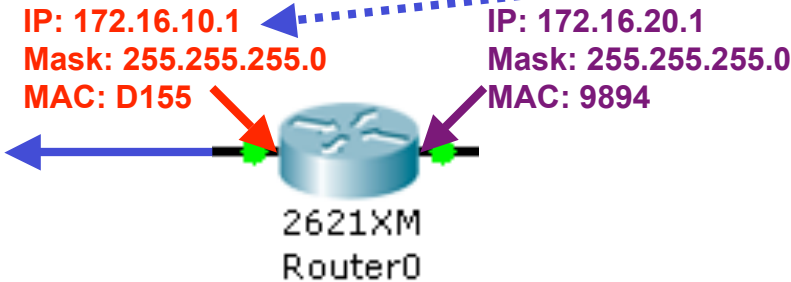
4. Because this network is "C" directly connected, this means that the device with this Destination IP address is on the same network as the exit interface Fa0/0 and is somewhere on this network.

5. This is the same process as two hosts on the same network.



Type	Network	Port	Next Hop	Metric
C	172.16.10.0/24	FastEthernet0/0	---	0/0
C	172.16.20.0/24	FastEthernet0/1	---	0/0

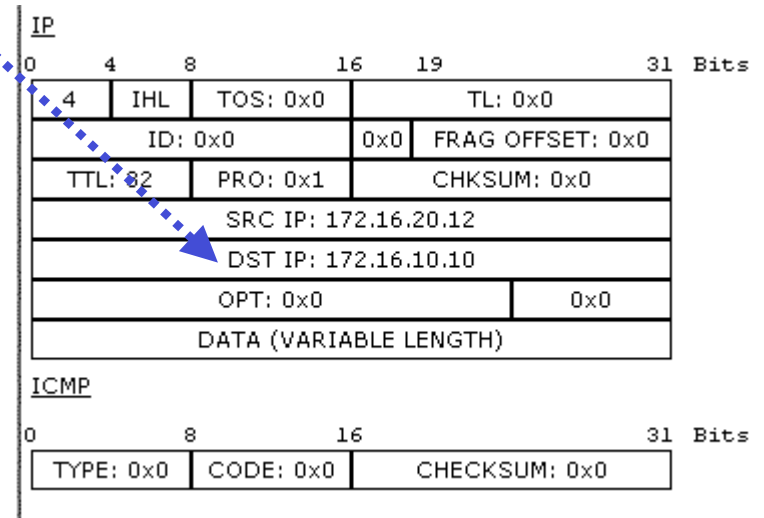
1. The IP Packet needs to be encapsulated in an Ethernet Frame.



2. Remember, the router's exit interface's IP Address is on the same network as the Destination IP Address of the IP packet. This is just like two hosts on the same network!

IP Address	Hardware Address	Interface
172.16.10.1	0090.2164.D155	FastEthernet0/0
172.16.10.10	0003.E417.2790	FastEthernet0/0
172.16.20.1	88E8.8888.9894	FastEthernet0/1
172.16.20.12	0001.4251.AA42	FastEthernet0/1

3. Examine ARP Table for Destination IP Address 172.16.10.10 and an associated MAC Address . Found it! (Next Slide)



3. The Destination MAC Address must be the MAC Address associated with the Destination IP Address.

Ethernet Header		IP Header				
Destination MAC Add.	Source MAC Address	Type	Source IP Address	Destination IP Address	Rest of IP Hdr	Data
2790	D155	0x800	172.16.20.12	172.16.10.10		ICMP

PDU Info at Device: Router0

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19	Bytes
PREAMBLE: 1010 1010		DEST MAC: 0003.E417.2790		SRC MAC: 0090.2164.D155	
TYPE: 0x800		DATA (VARIABLE LENGTH)		FCS: 0x0	

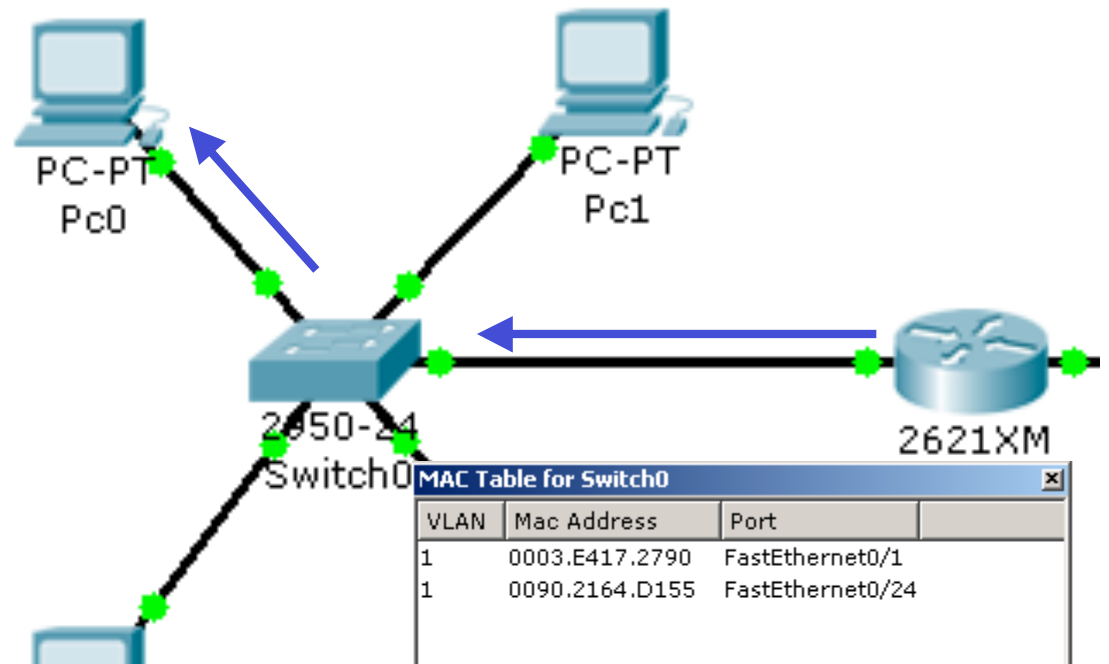
IP

0	4	8	16	19	31	Bits	
4		IHL		TOS: 0x0		TL: 0x0	
ID: 0x0				0x0		FRAG OFFSET: 0x0	
TTL: 31		PRO: 0x1		CHKSUM: 0x0			
SRC IP: 172.16.20.12							
DST IP: 172.16.10.10							
OPT: 0x0				0x0			
DATA (VARIABLE LENGTH)							

ICMP

0	8	16	31	Bits	
TYPE: 0x0		CODE: 0x0		CHECKSUM: 0x0	

Packet Forwarding



VLAN	Mac Address	Port
1	0003.E417.2790	FastEthernet0/1
1	0090.2164.D155	FastEthernet0/24

1. Now that the IP packet has been encapsulated into an Ethernet frame, the frame can be forwarded on to the switch.

```
PC>ping 172.16.20.12

Pinging 172.16.20.12 with 32 bytes of data:

Reply from 172.16.20.12: bytes=32 time=8ms TTL=120
```

2. Pc0 receives ICMP Echo Reply and displays the information on the screen.