RIT | جامعة روتشستر الأمريكية للتكنولوجيا في دبي
A Global American University in Dubai

**NSSA Lab - 05**

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## Activity 1 – 3550/3560 Switch

```
interface FastEthernet0/1
 switchport mode access
 switchport voice vlan 1
 spanning-tree portfast
!
interface FastEthernet0/2
 switchport mode access
 switchport voice vlan 1
 spanning-tree portfast
!
interface FastEthernet0/3
 switchport mode access
 switchport voice vlan 1
 spanning-tree portfast
!
interface FastEthernet0/4
 switchport mode access
 switchport voice vlan 1
 spanning-tree portfast
!
interface FastEthernet0/5
 switchport mode access
 switchport voice vlan 1
 spanning-tree portfast
!
```

```
interface FastEthernet0/6
 switchport mode access
 switchport voice vlan 1
 spanning-tree portfast
!
interface FastEthernet0/7
 switchport access vlan 2
 switchport mode access
 spanning-tree portfast
!
interface FastEthernet0/8
 switchport access vlan 2
 switchport mode access
 spanning-tree portfast
!
interface FastEthernet0/9
 switchport access vlan 2
 switchport mode access
 spanning-tree portfast
!
interface FastEthernet0/10
 switchport access vlan 2
 switchport mode access
 spanning-tree portfast
!
```

```
nterface FastEthernet0/11
switchport access vlan 2
switchport mode access
spanning-tree portfast

nterface FastEthernet0/12
switchport access vlan 2
switchport mode access
spanning-tree portfast
```

The switch has two VLANs configured in this manner. Voice communication is routed over the first VLAN (VLAN 1), which can be accessed by ports FastEthernet0/1 through FastEthernet0/6. In order to access the second VLAN (VLAN 2), ports FastEthernet0/7 through FastEthernet0/11 must be configured for data traffic. Because port FastEthernet0/11 is set up as a trunk port, traffic from both VLANs can pass via it.

Is there anything special about a 3550/3560? Can you use it to route between VLANs? Why would we need the 2811?

The Cisco Catalyst 3550 and 3560 switches are Layer 3 switches, meaning they can perform routing functions. They can route between VLANs using Inter-VLAN routing. The Cisco 2811 is a router that can also route between VLANs and other networks. It might be needed in the setup to route traffic between VLANs that are not directly connected to the Layer 3 switch.

## Activity 2 – 2811 Router:

```
interface FastEthernet0/0
 ip address 192.168.20.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 192.168.10.1 255.255.255.0
 duplex auto
 speed auto
!
```

This screenshot shows the configuration of a router to route traffic between the VLANs and other networks. It includes setting IP addresses on router interfaces (interface FastEthernet0/0, interface FastEthernet0/1)

Make the router a DHCP server. Set your DHCP server up for the following;
a. Providing the address for the tftp server
b. Providing the address of the default gateway
c. Providing the mask
d. Exclude addresses for the routers and servers from the pool

```
ip dhcp excluded-address 192.168.10.1 192.168.10.5
!
ip dhcp pool VoiceNet
 network 192.168.10.0 255.255.255.0
 default-router 192.168.10.1
 option 150 ip 192.168.10.1
```

The router's configuration for acting as a DHCP server is seen in this screenshot. It contains commands for configuring the DHCP pool itself (ip dhcp pool VoiceNet) and to exclude certain IP addresses from the DHCP pool (ip dhcp excluded-address).

Check the directory listings for your router. What commands do you use? What is the directory structure of a Cisco router/switch?

To check the directory listings for a Cisco router or switch, we typically use the "dir" command in privileged exec mode. First, we enter privileged exec mode by typing "enable" and entering the enable password if prompted. then we use the "dir" command to list the files and directories in the current directory.

## Activity 3 – Router configuration:

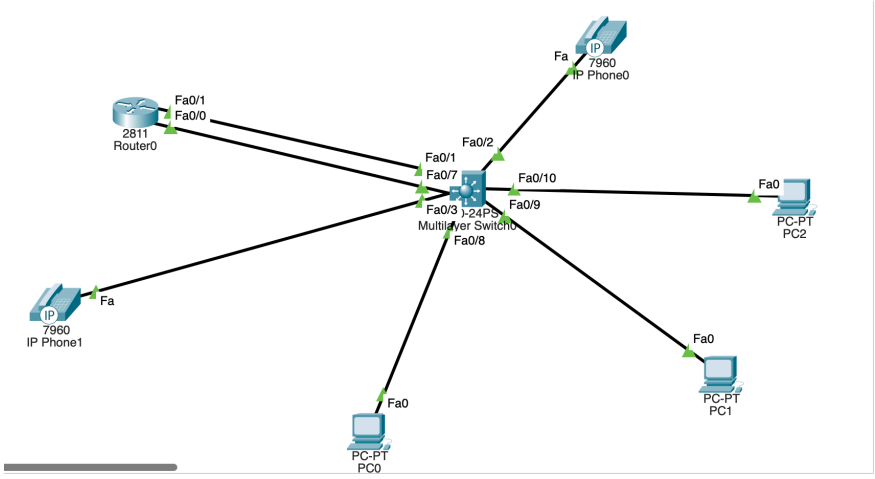
On the router, configure the lines for the phones. Attached are some sample config lines. Some things you will need include;

a. telephony service
b. ephone definitions and dial number
c. ephone MAC address
d. voice config name

```
telephony-service
 max-ephones 42
 max-dn 144
 ip source-address 192.168.10.1 port 2000
!
ephone-dn 1
 number 1001
!
ephone-dn 2
 number 1002
!
ephone 1
 device-security-mode none
 mac-address 0001.6388.004A
 type 7960
 button 1:1
!
ephone 2
 device-security-mode none
 mac-address 0060.3E93.881A
 type 7960
 button 1:2
!
```

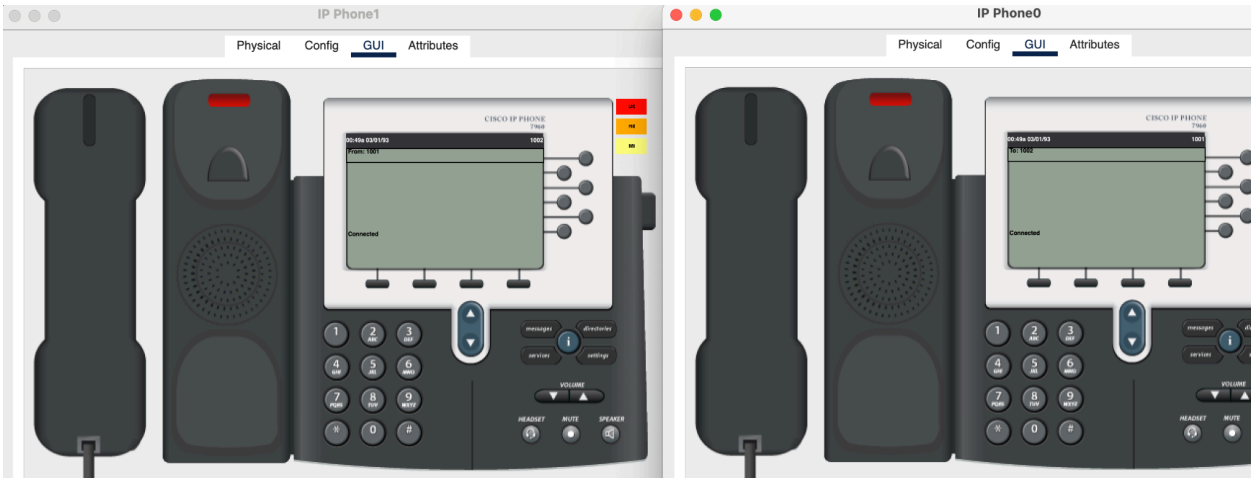
This screenshot shows the configuration of phones on the router using Cisco's Unified Communications Manager Express (CME). It includes commands to configure telephony service (telephony-service), ephone definitions (ephone-dn), and ephone settings (ephone).

Connect the wired phone (79xx) to your switch in the proper VLAN



This screenshot shows the network topology with a wired phone connected to a switch port assigned to the appropriate VLAN for voice traffic.

Once you have your phones registered and talking, experiment with the show and debug commands in order to determine what is happening with your phones




This screenshot shows the phone ringing, confirming that the phone registration and communication are working correctly.

## Activity 4 – Management:

**1. Create a mirrored port(s) on your switch that will track voice conversations.**

```
monitor session 1 source interface Fa0/2
monitor session 1 destination interface Fa0/1
'
```

This screenshot shows the configuration of a mirrored port on the switch to track voice conversations. The monitor session commands set up a SPAN (Switched Port Analyzer) session to mirror traffic from one interface to another for monitoring purposes.

**2. Capture the traffic from one of your voice conversations but remember – end to end.**

this step is capturing the traffic from a voice conversation in such a way that you capture the entire communication path, from one end of the conversation to the other. This typically means capturing traffic from the IP phone to the switch, then from the switch to the router, and finally from the router to the destination.

Simulation Panel

Event List

| Vis. | Time(sec) | Last Device | At Device | Type |
|---|---|---|---|---|
| | 0.000 | -- | IP Phone0 | ICMP |
| | 0.001 | IP Phone0 | Multilayer Switch0 | ICMP |
| | 0.002 | Multilayer Switch0 | IP Phone1 | ICMP |
| | 0.002 | Multilayer Switch0 | Router0 | ICMP |
| | 0.003 | IP Phone1 | Multilayer Switch0 | ICMP |
| | 0.004 | Multilayer Switch0 | IP Phone0 | ICMP |
| | 0.004 | Multilayer Switch0 | Router0 | ICMP |

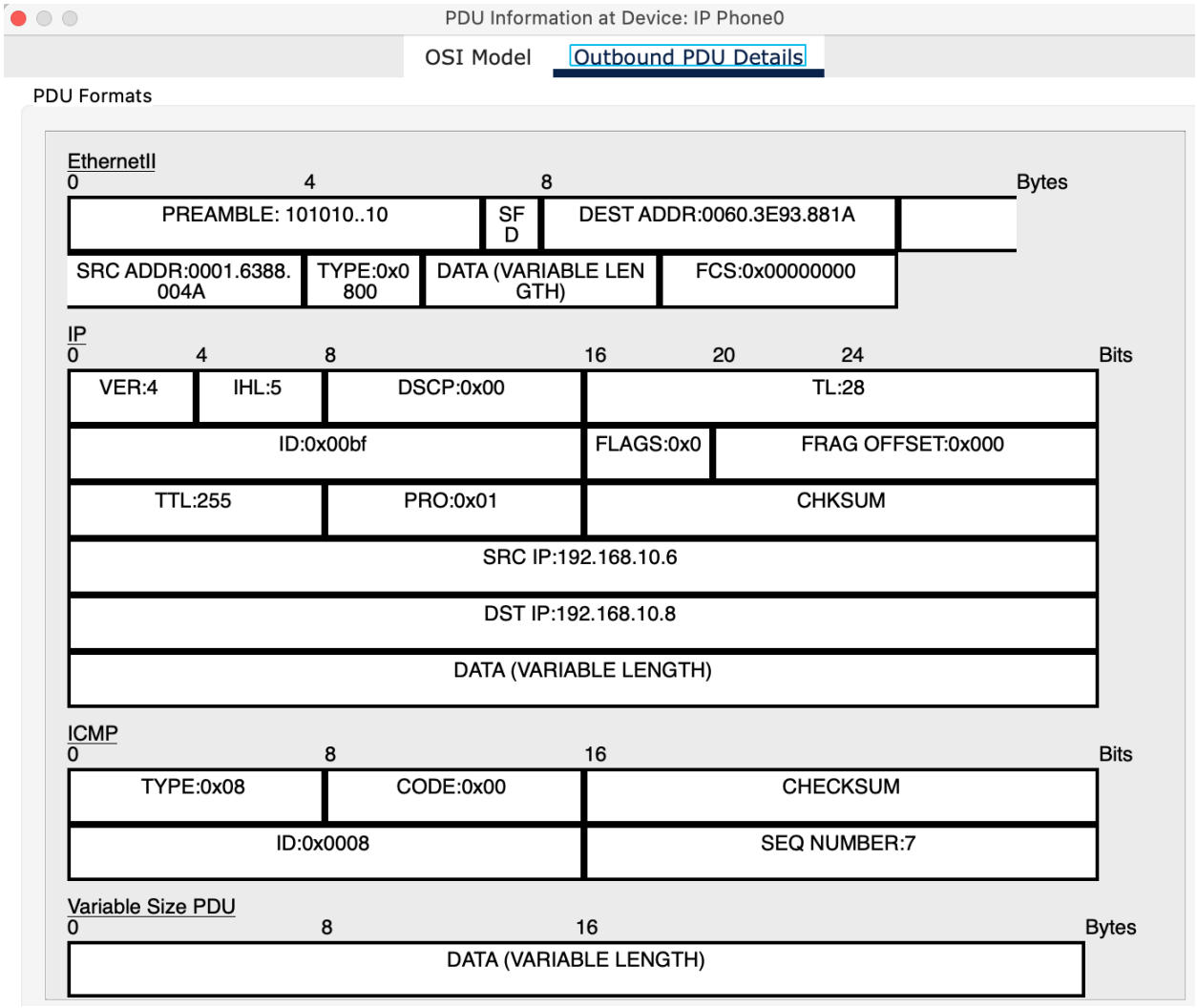
PDU Information at Device: IP Phone0

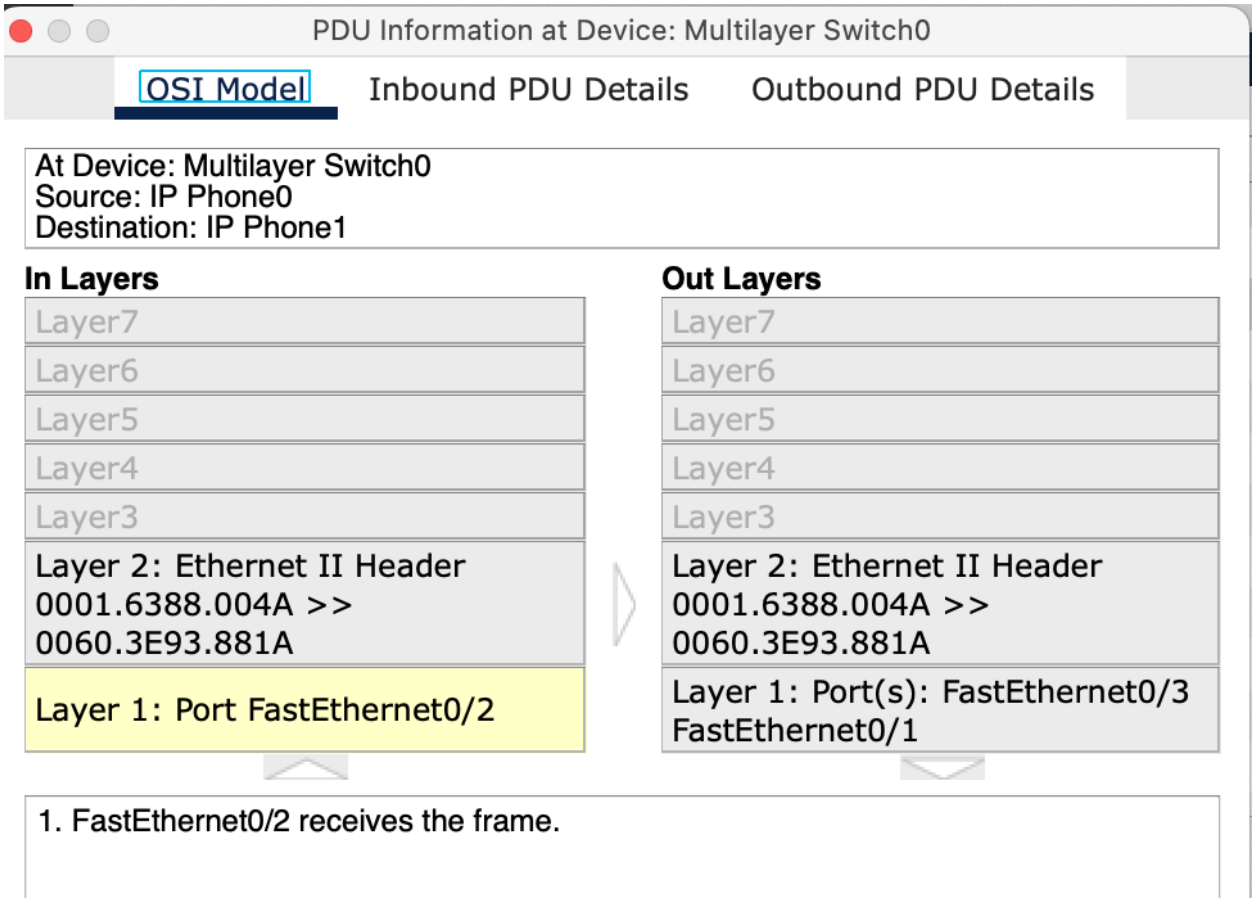
OSI Model | Outbound PDU Details

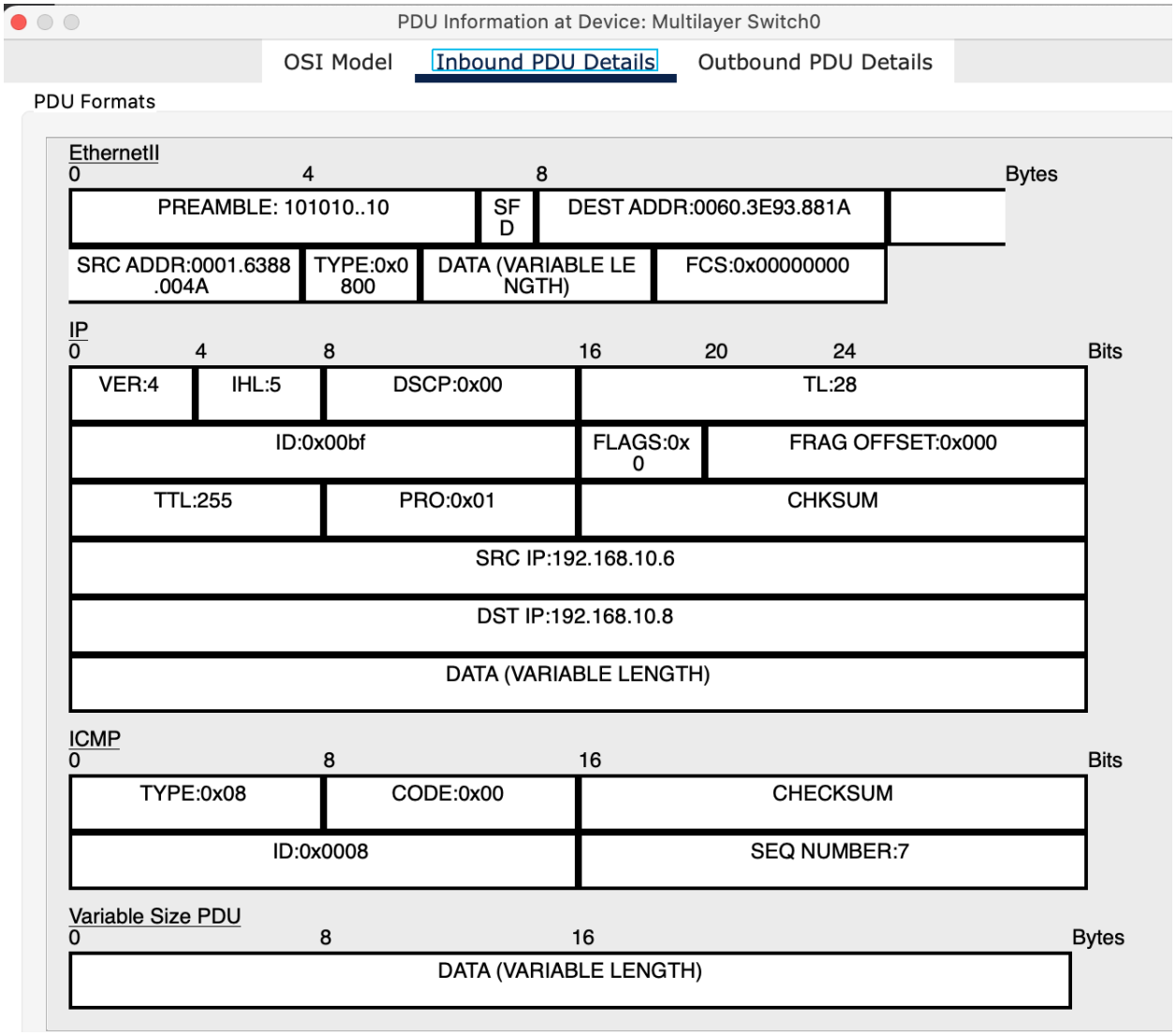
At Device: IP Phone0
Source: IP Phone0
Destination: IP Phone1

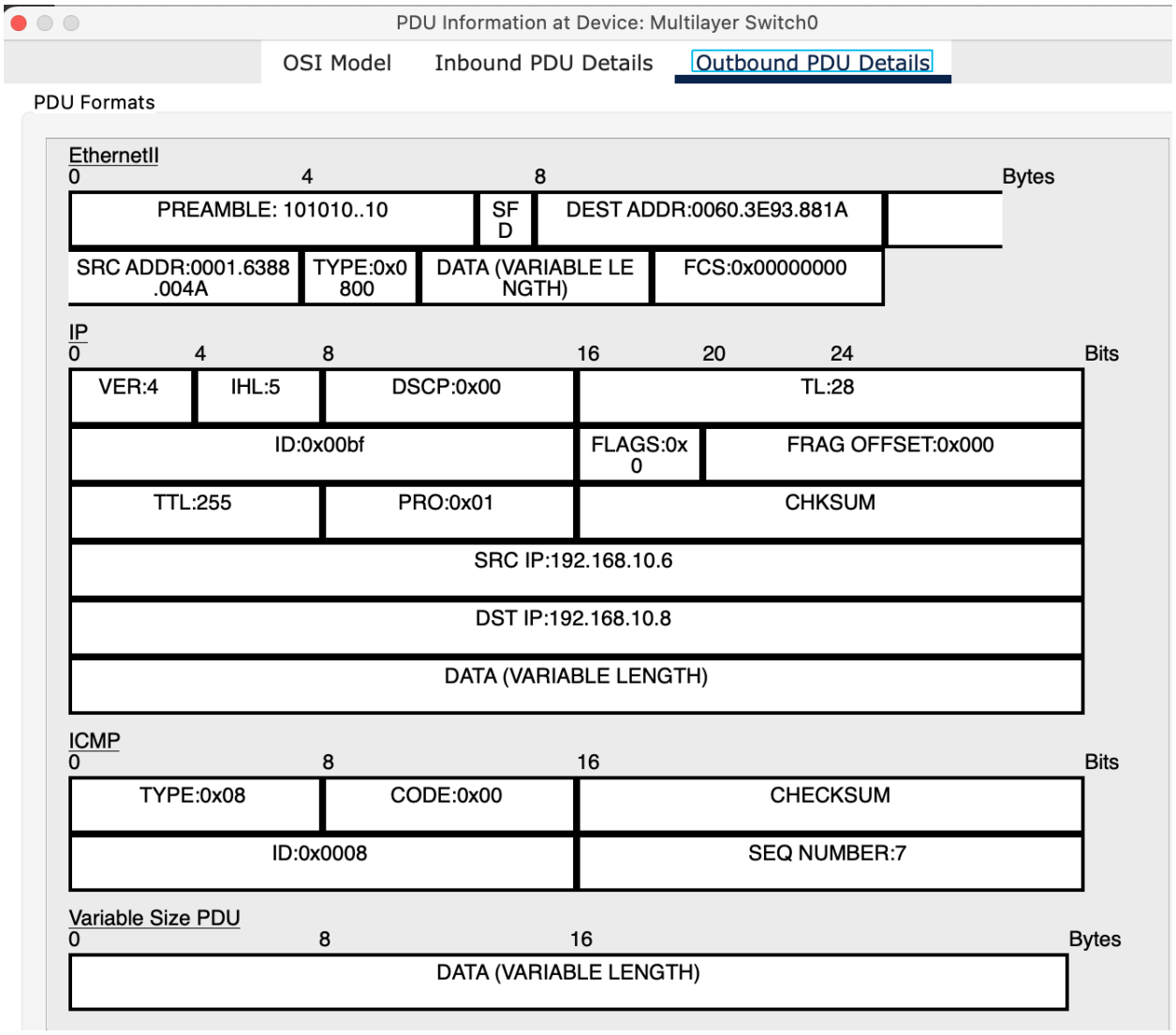
| In Layers | Out Layers |
|---|---|
| Layer7 | Layer7 |
| Layer6 | Layer6 |
| Layer5 | Layer5 |
| Layer4 | Layer4 |
| Layer3 | Layer 3: IP Header Src. IP: 192.168.10.6, Dest. IP: 192.168.10.8 ICMP Message Type: 8 |
| Layer2 | Layer 2: Ethernet II Header 0001.6388.004A >> 0060.3E93.881A |
| Layer1 | Layer 1: Port(s): Switch |

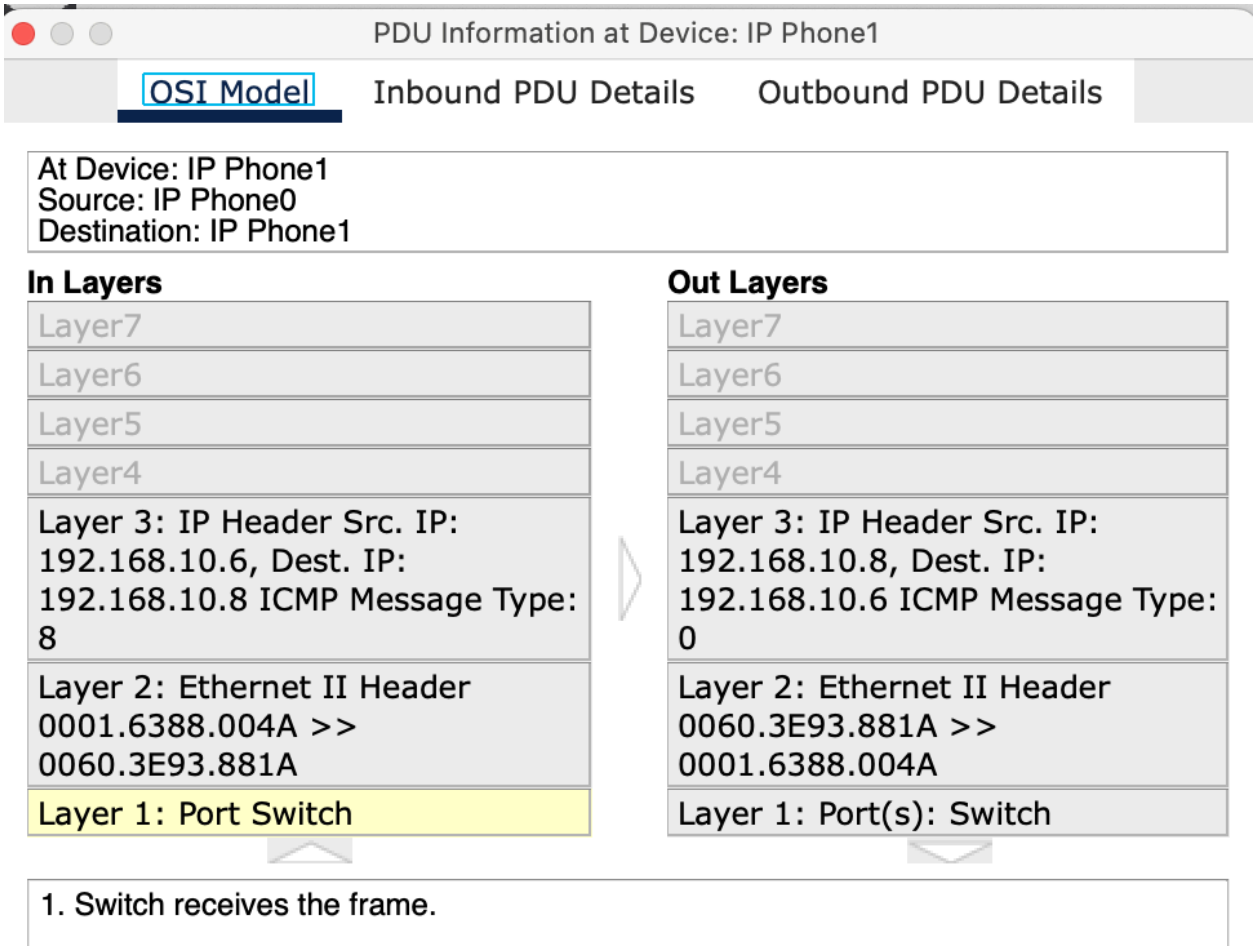
1. The Ping process starts the next ping request.
2. The Ping process creates an ICMP Echo Request message and sends it to the lower process.
3. The source IP address is not specified. The device sets it to the port's IP address.
4. The device sets TTL in the packet header.
5. The destination IP address is in the same subnet. The device sets the next-hop to destination.

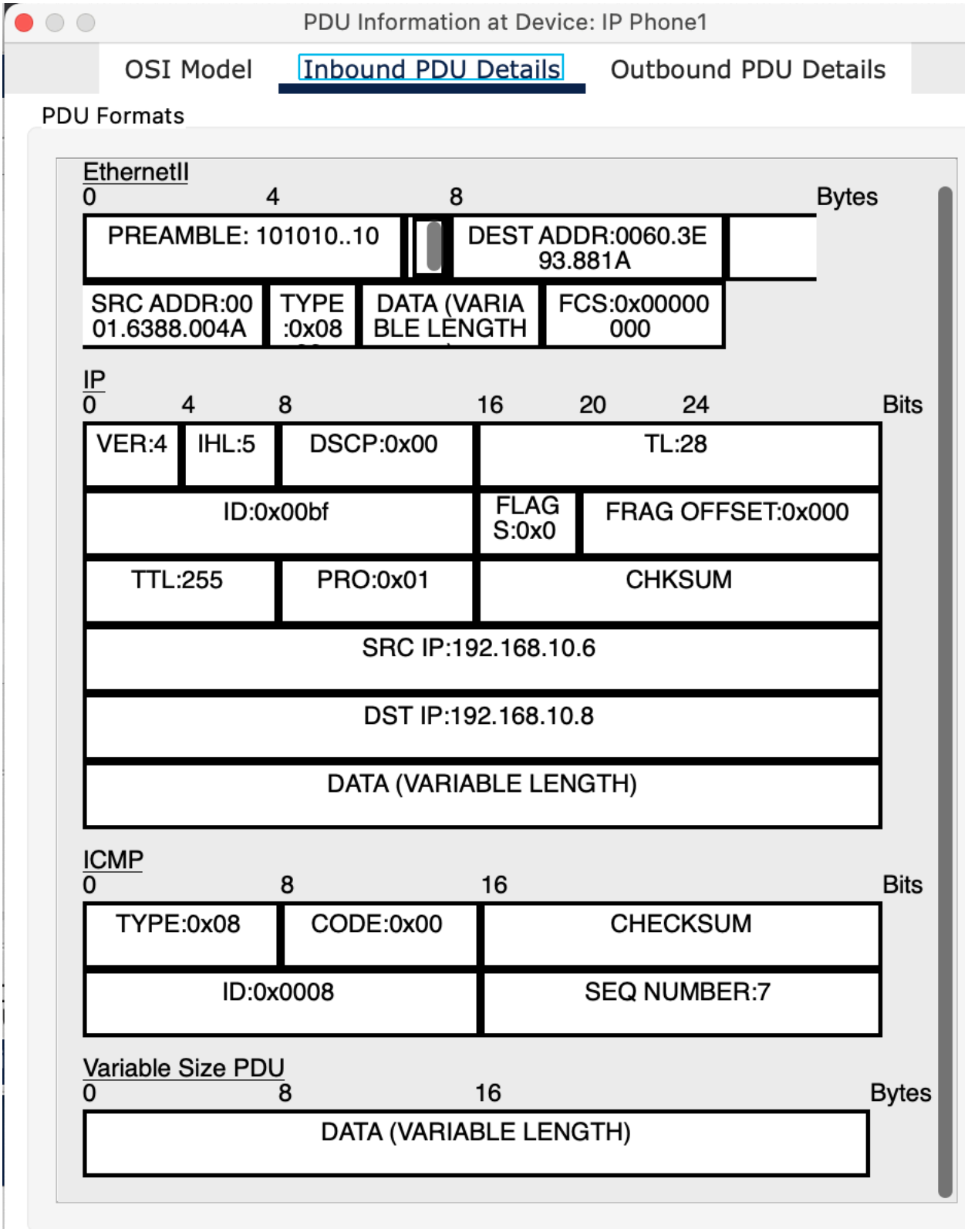

PDU Information at Device: IP Phone0
OSI Model
Outbound PDU Details
PDU Formats
EthernetII
0
4
8
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0060.3E93.881A
SRC ADDR:0001.6388.004A
TYPE:0x0800
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
0
4
8
16
20
24
Bits
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x00bf
FLAGS:0x0
FRAG OFFSET:0x000
TTL:255
PRO:0x01
CHKSUM
SRC IP:192.168.10.6
DST IP:192.168.10.8
DATA (VARIABLE LENGTH)
ICMP
0
8
16
Bits
TYPE:0x08
CODE:0x00
CHECKSUM
ID:0x0008
SEQ NUMBER:7
Variable Size PDU
0
8
16
Bytes
DATA (VARIABLE LENGTH)

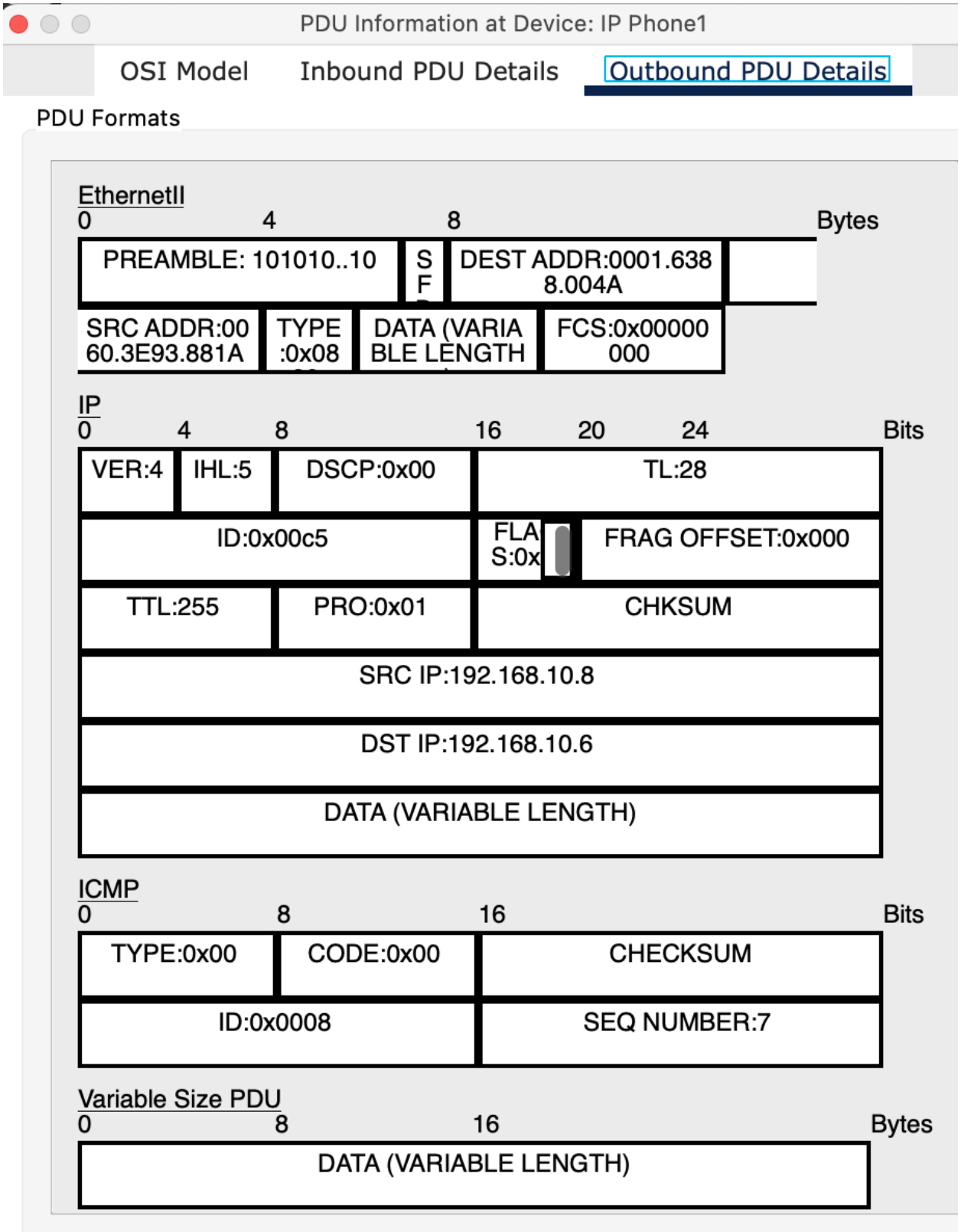

PDU Information at Device: Multilayer Switch0
OSI Model
Inbound PDU Details
Outbound PDU Details
At Device: Multilayer Switch0
Source: IP Phone0
Destination: IP Phone1
In Layers
Out Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer 2: Ethernet II Header 0001.6388.004A >> 0060.3E93.881A
Layer 1: Port FastEthernet0/2
Layer 2: Ethernet II Header 0001.6388.004A >> 0060.3E93.881A
Layer 1: Port(s): FastEthernet0/3 FastEthernet0/1
1. FastEthernet0/2 receives the frame.

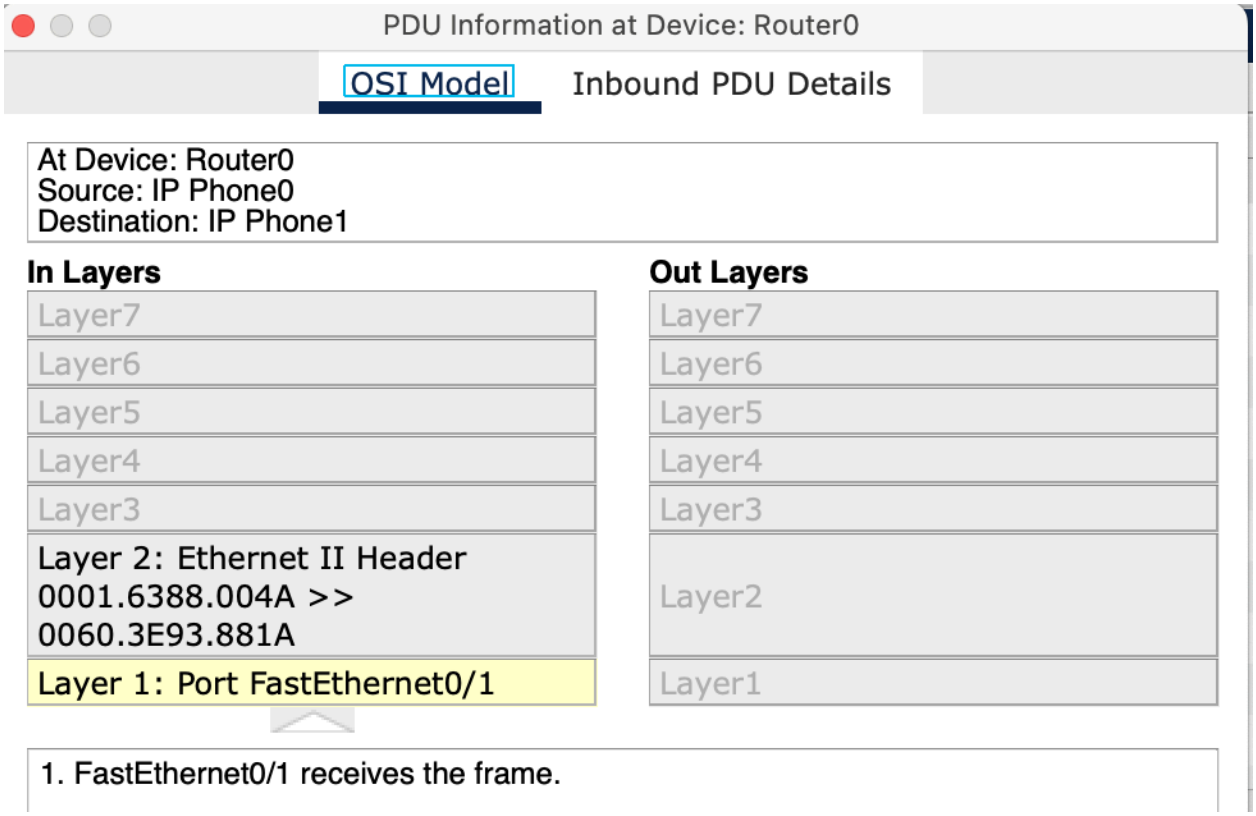

PDU Information at Device: Multilayer Switch0
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
EthernetII
0
4
8
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0060.3E93.881A
SRC ADDR:0001.6388.004A
TYPE:0x0800
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
0
4
8
16
20
24
Bits
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x00bf
FLAGS:0x0
FRAG OFFSET:0x000
TTL:255
PRO:0x01
CHKSUM
SRC IP:192.168.10.6
DST IP:192.168.10.8
DATA (VARIABLE LENGTH)
ICMP
0
8
16
Bits
TYPE:0x08
CODE:0x00
CHECKSUM
ID:0x0008
SEQ NUMBER:7
Variable Size PDU
0
8
16
Bytes
DATA (VARIABLE LENGTH)


PDU Information at Device: Multilayer Switch0
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
EthernetII
0
4
8
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0060.3E93.881A
SRC ADDR:0001.6388.004A
TYPE:0x0800
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
0
4
8
16
20
24
Bits
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x00bf
FLAGS:0x0
FRAG OFFSET:0x000
TTL:255
PRO:0x01
CHKSUM
SRC IP:192.168.10.6
DST IP:192.168.10.8
DATA (VARIABLE LENGTH)
ICMP
0
8
16
Bits
TYPE:0x08
CODE:0x00
CHECKSUM
ID:0x0008
SEQ NUMBER:7
Variable Size PDU
0
8
16
Bytes
DATA (VARIABLE LENGTH)


PDU Information at Device: IP Phone1
OSI Model
Inbound PDU Details
Outbound PDU Details
At Device: IP Phone1
Source: IP Phone0
Destination: IP Phone1
In Layers
Out Layers
Layer7
Layer6
Layer5
Layer4
Layer 3: IP Header Src. IP: 192.168.10.6, Dest. IP: 192.168.10.8 ICMP Message Type: 8
Layer 3: IP Header Src. IP: 192.168.10.8, Dest. IP: 192.168.10.6 ICMP Message Type: 0
Layer 2: Ethernet II Header 0001.6388.004A >> 0060.3E93.881A
Layer 2: Ethernet II Header 0060.3E93.881A >> 0001.6388.004A
Layer 1: Port Switch
Layer 1: Port(s): Switch
1. Switch receives the frame.


PDU Information at Device: IP Phone1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
EthernetII
0
4
8
Bytes
PREAMBLE: 101010..10
DEST ADDR:0060.3E 93.881A
SRC ADDR:00 01.6388.004A
TYPE :0x08
DATA (VARIA BLE LENGTH
FCS:0x00000 000
IP
0
4
8
16
20
24
Bits
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x00bf
FLAG S:0x0
FRAG OFFSET:0x000
TTL:255
PRO:0x01
CHKSUM
SRC IP:192.168.10.6
DST IP:192.168.10.8
DATA (VARIABLE LENGTH)
ICMP
0
8
16
Bits
TYPE:0x08
CODE:0x00
CHECKSUM
ID:0x0008
SEQ NUMBER:7
Variable Size PDU
0
8
16
Bytes
DATA (VARIABLE LENGTH)

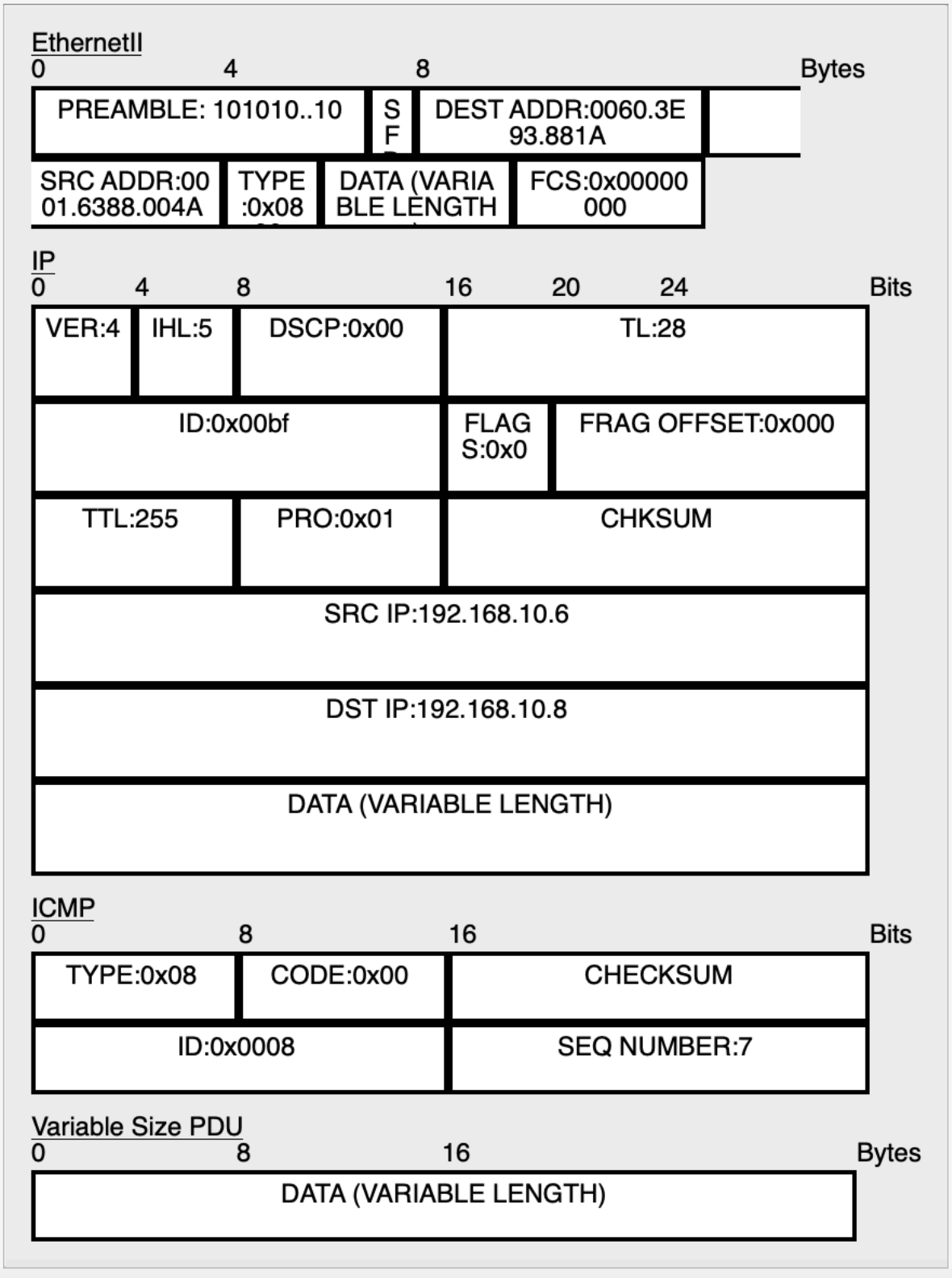

PDU Information at Device: IP Phone1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
EthernetII
0
4
8
Bytes
PREAMBLE: 101010..10
S
F
DEST ADDR:0001.6388.004A
SRC ADDR:0060.3E93.881A
TYPE:0x08
DATA (VARIABLE LENGTH
FCS:0x00000000
IP
0
4
8
16
20
24
Bits
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x00c5
FLAS:0x
FRAG OFFSET:0x000
TTL:255
PRO:0x01
CHKSUM
SRC IP:192.168.10.8
DST IP:192.168.10.6
DATA (VARIABLE LENGTH)
ICMP
0
8
16
Bits
TYPE:0x00
CODE:0x00
CHECKSUM
ID:0x0008
SEQ NUMBER:7
Variable Size PDU
0
8
16
Bytes
DATA (VARIABLE LENGTH)

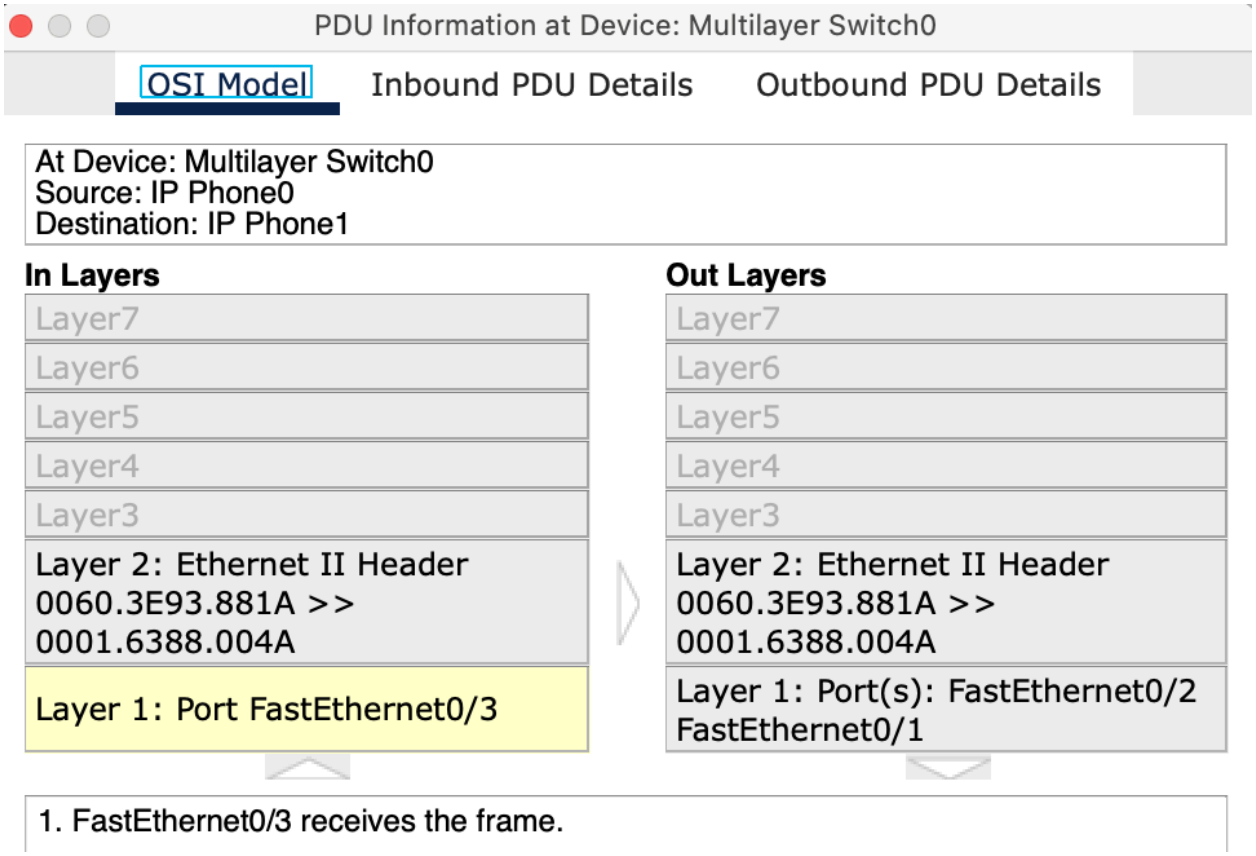

PDU Information at Device: Router0
OSI Model
Inbound PDU Details
At Device: Router0
Source: IP Phone0
Destination: IP Phone1
In Layers
Out Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer 2: Ethernet II Header
0001.6388.004A >>
0060.3E93.881A
Layer 1: Port FastEthernet0/1
Layer7
Layer6
Layer5
Layer4
Layer3
Layer2
Layer1
1. FastEthernet0/1 receives the frame.

PDU Information at Device: Router0

OSI Model | Inbound PDU Details

PDU Formats

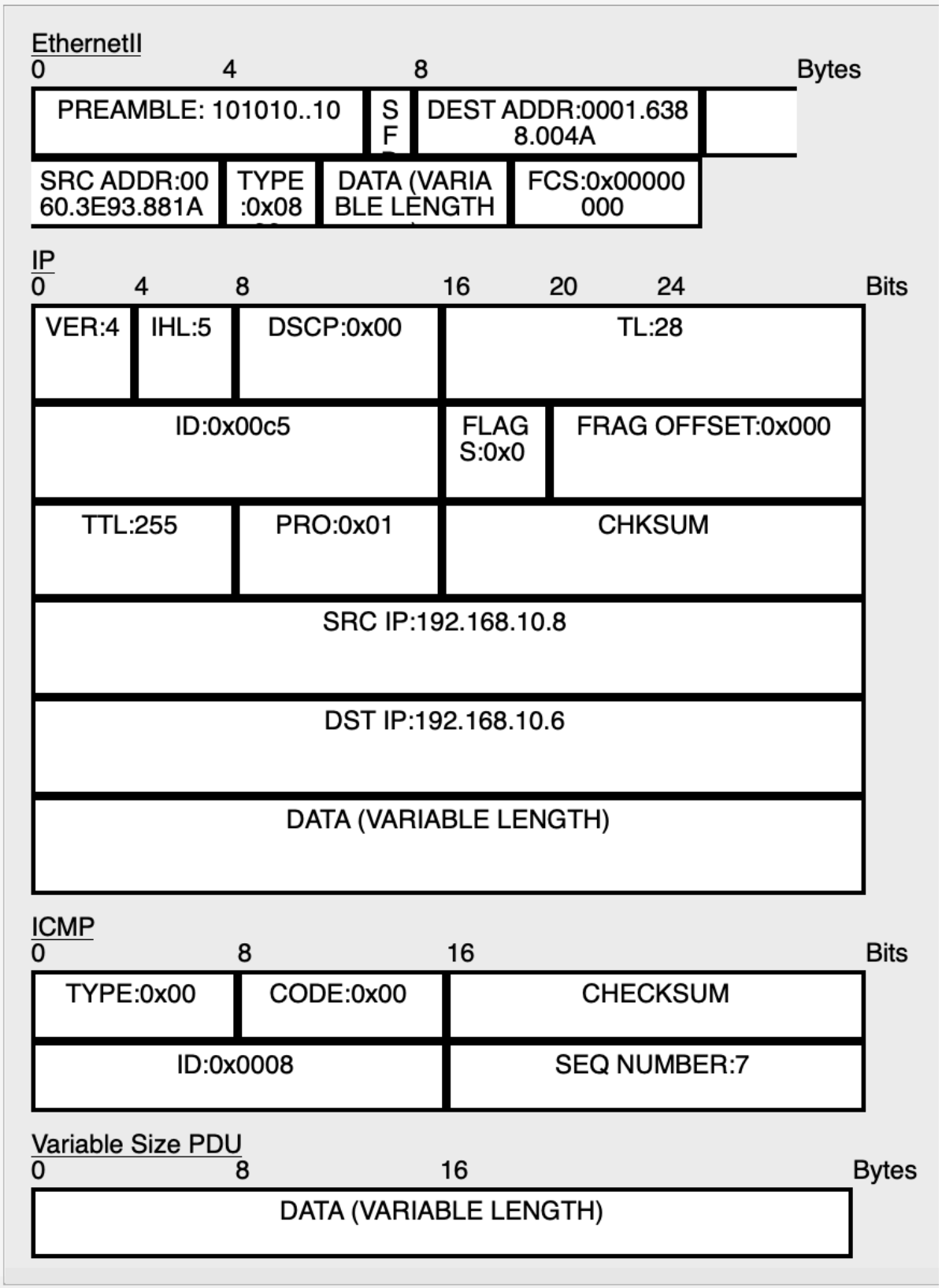



PDU Information at Device: Multilayer Switch0
OSI Model
Inbound PDU Details
Outbound PDU Details
At Device: Multilayer Switch0
Source: IP Phone0
Destination: IP Phone1
In Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer 2: Ethernet II Header
0060.3E93.881A >>
0001.6388.004A
Layer 1: Port FastEthernet0/3
Out Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer 2: Ethernet II Header
0060.3E93.881A >>
0001.6388.004A
Layer 1: Port(s): FastEthernet0/2
FastEthernet0/1
1. FastEthernet0/3 receives the frame.

PDU Information at Device: Multilayer Switch0

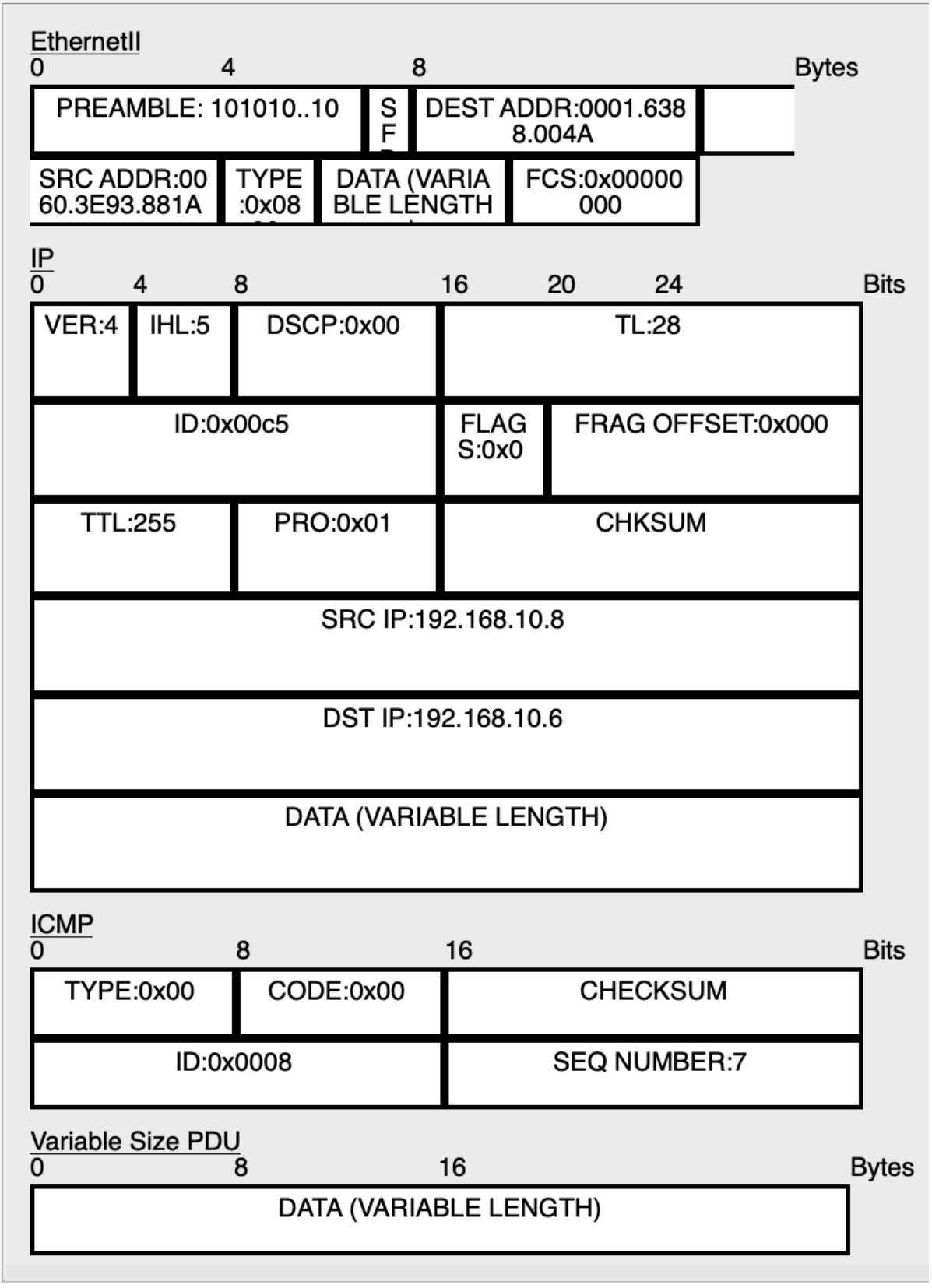
OSI Model | Inbound PDU Details | Outbound PDU Details

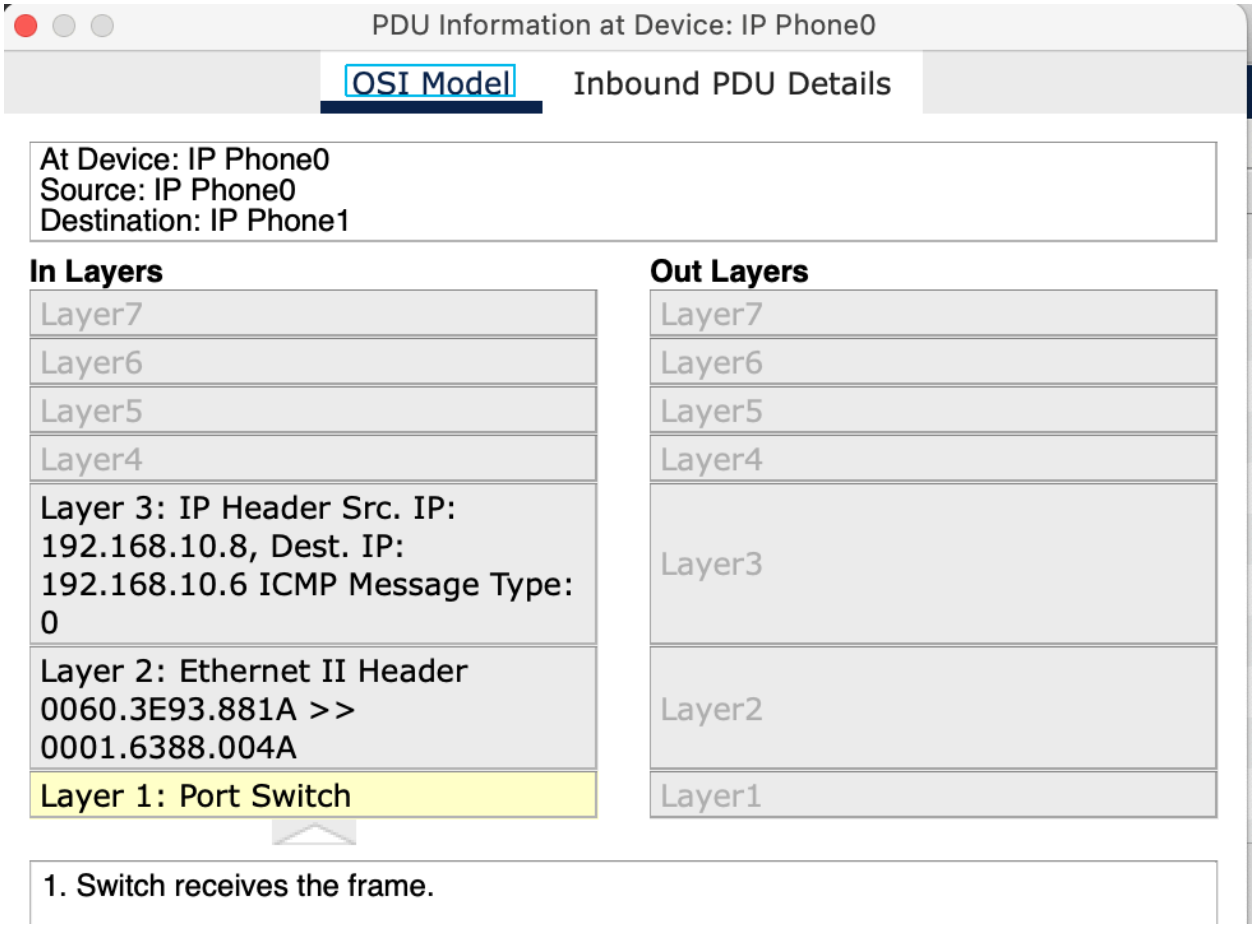
PDU Formats



OSI Model | Inbound PDU Details | Outbound PDU Details

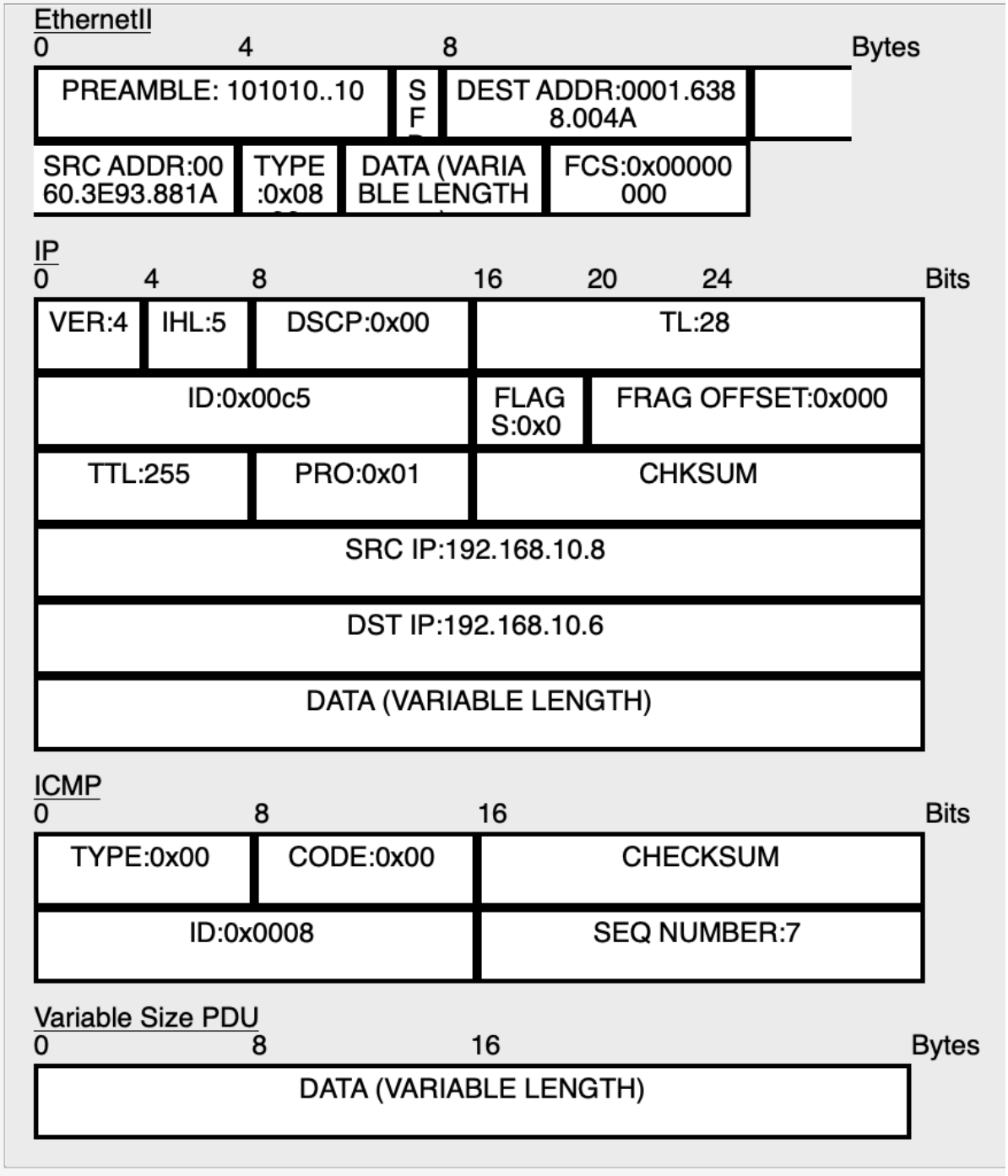
PDU Formats




PDU Information at Device: IP Phone0
OSI Model
Inbound PDU Details
At Device: IP Phone0
Source: IP Phone0
Destination: IP Phone1
In Layers
Out Layers
Layer7
Layer6
Layer5
Layer4
Layer 3: IP Header Src. IP: 192.168.10.8, Dest. IP: 192.168.10.6 ICMP Message Type: 0
Layer 2: Ethernet II Header 0060.3E93.881A >> 0001.6388.004A
Layer 1: Port Switch
Layer3
Layer2
Layer1
1. Switch receives the frame.

OSI Model | Inbound PDU Details

PDU Formats



OSI Model | Inbound PDU Details

At Device: Router0
Source: IP Phone0
Destination: IP Phone1

| In Layers | Out Layers |
| --- | --- |
| Layer7 | Layer7 |
| Layer6 | Layer6 |
| Layer5 | Layer5 |
| Layer4 | Layer4 |
| Layer3 | Layer3 |
| Layer 2: Ethernet II Header 0060.3E93.881A >> 0001.6388.004A | Layer2 |
| Layer 1: Port FastEthernet0/1 | Layer1 |

1. FastEthernet0/1 receives the frame.

OSI Model | Inbound PDU Details

PDU Formats