

NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCE

Computer Networks Lab (CL307)

Lab Session 04

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OBJECTIVES:

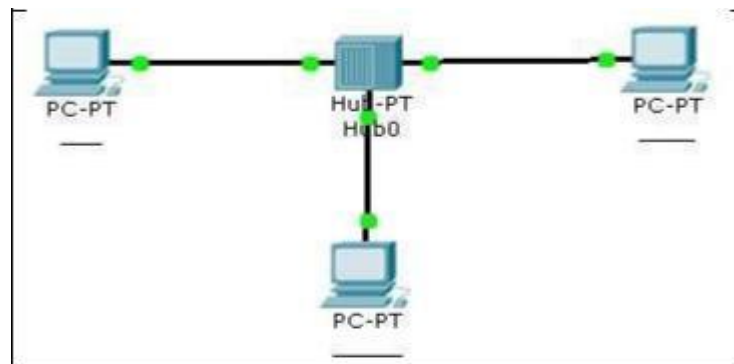
SOCKET PROGRAMMING (Recap and remaining examples from Lab#03)
HANDS ON - CISCO PACKET TRACER NETWORK DEVICES AND CONNECTION TYPES

Network Infrastructure

Aim: Study of following Network (Layer 1, Layer 2 and Layer 3) Devices in Detail (Recap).

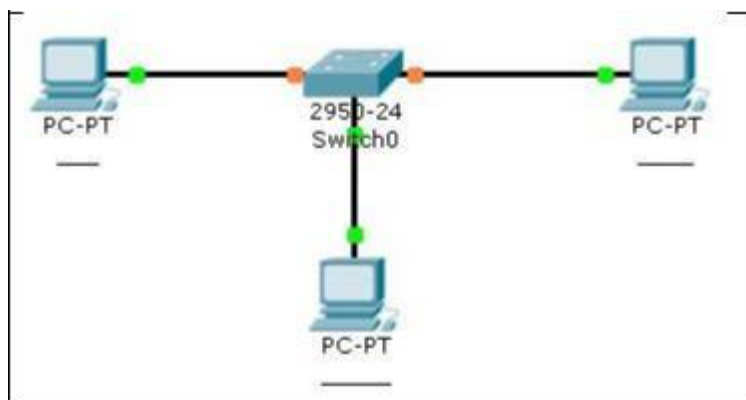
- Hub
- Switch
- Router

Task#1: Understand Network Topology and network hardware (L1) devices.



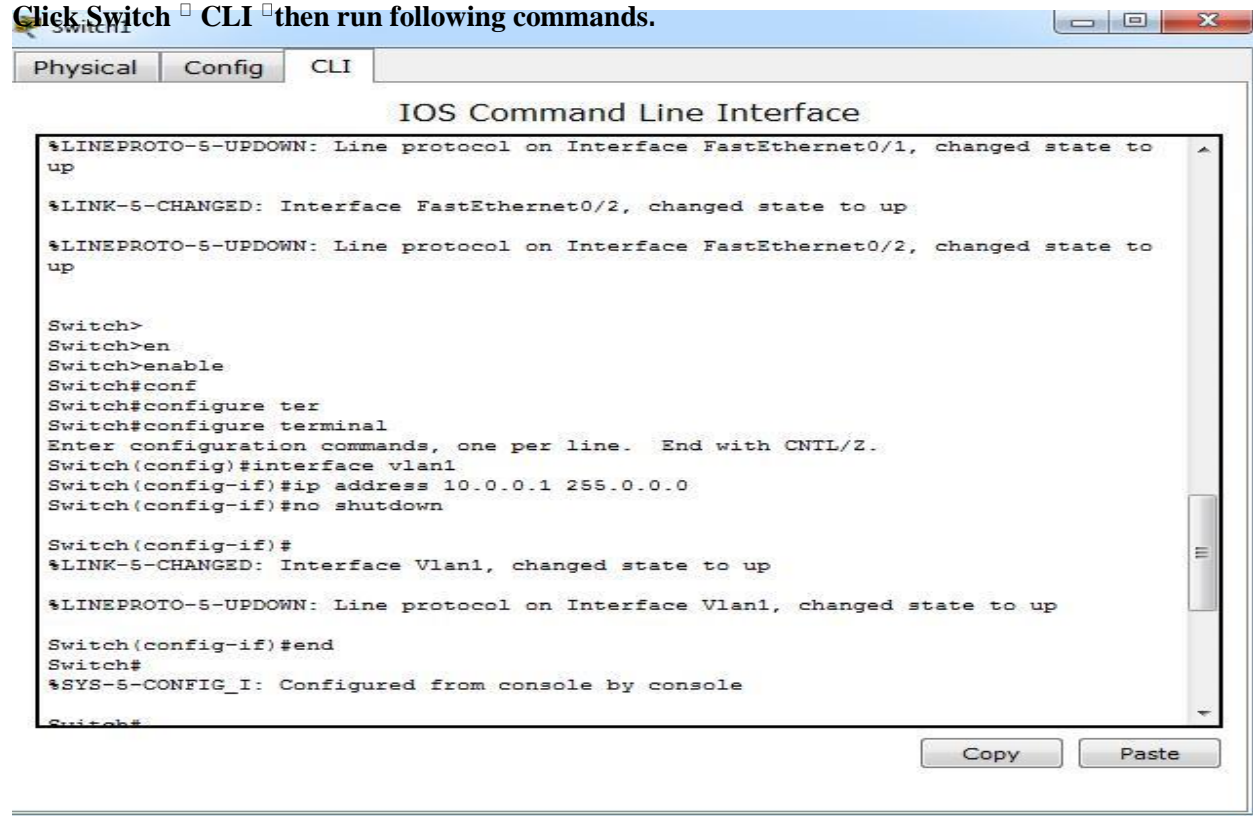
At which layer the HUB operates? _____

Task#2: Understand Network Topology and network hardware (L2) devices.

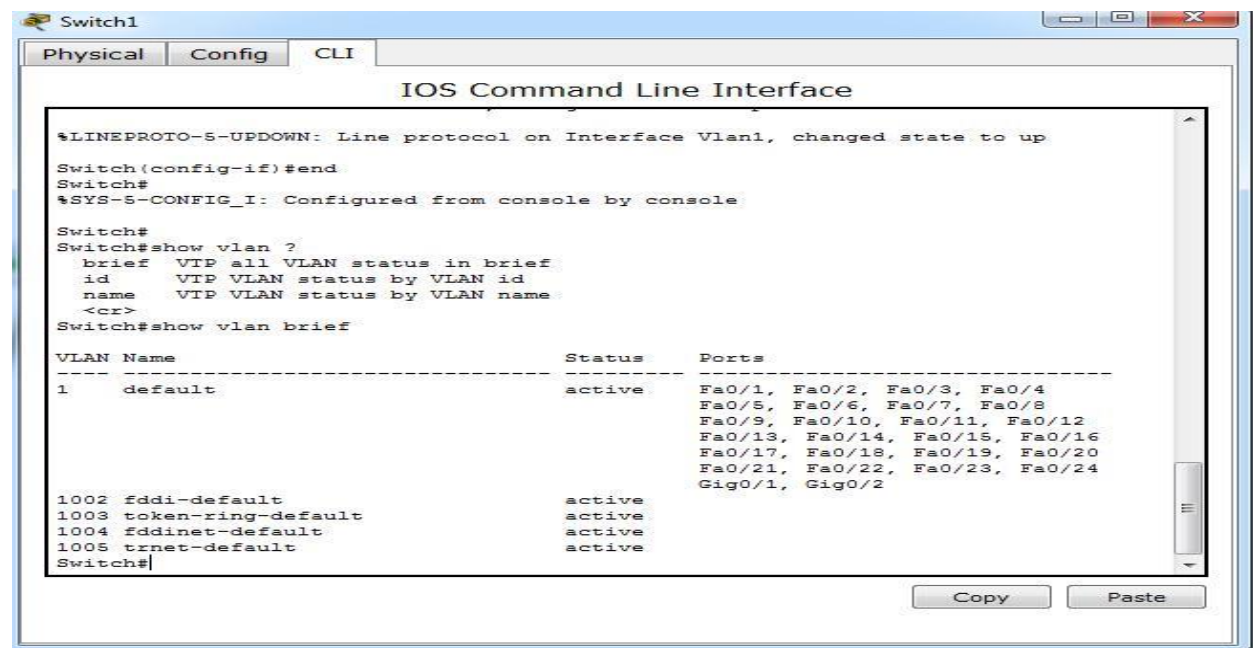


CONFIGURATION:

Click Switch ▢ CLI ▢ then run following commands.

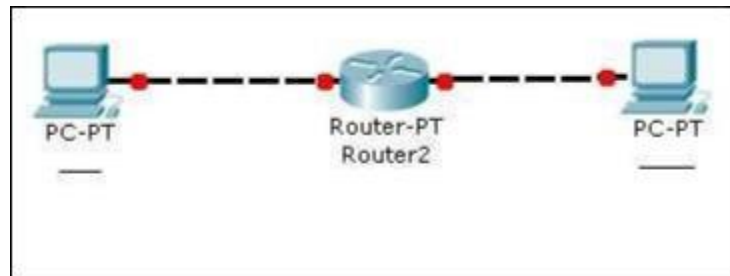


We have to assign IP address on Interface Vlan1 which is default interface in Switch as shown below.



At which layer the SWITCH operates? _____

Task#3: Understand Network Topology and network hardware (L3) devices.



CONFIGURATION:

```
Router0
Physical Config CLI
IOS Command Line Interface

Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa 0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#int fa 0/1
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#no shutdown

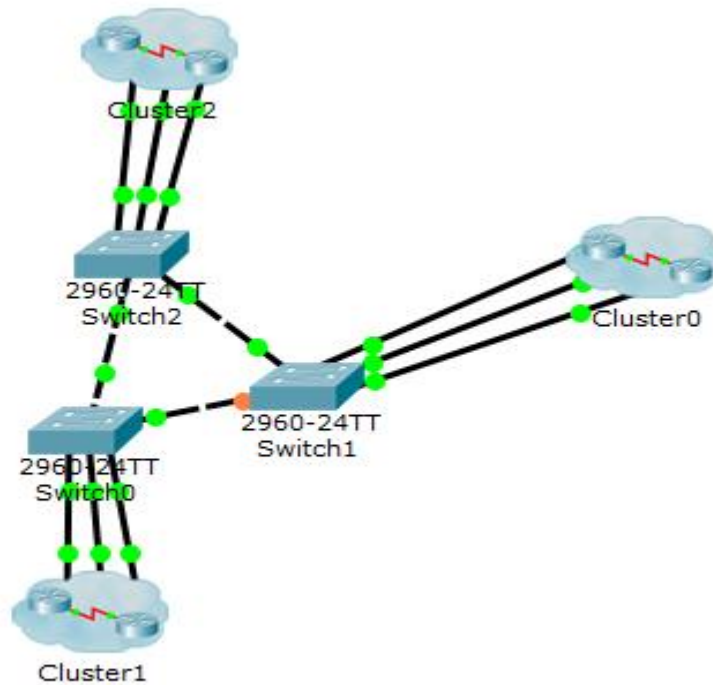
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
```

At which layer the ROUTER operates? _____

Task#4: Configure the following network by utilizing cluster feature.

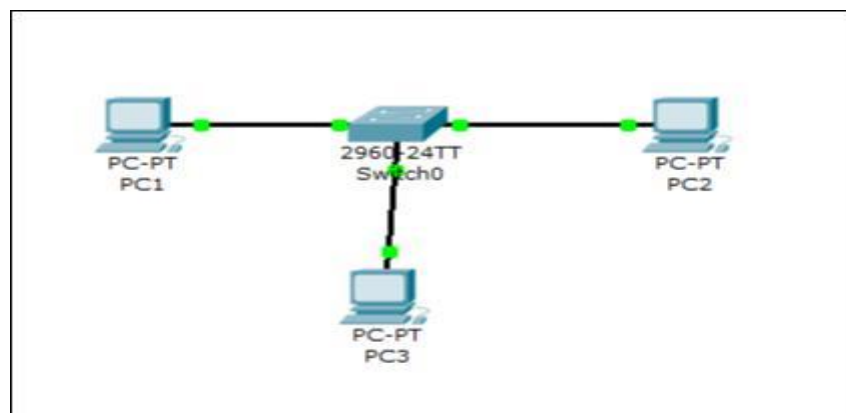
Cluster View of the Network: Make sure cluster will not affect any physical configuration it is just simple representation of a complex or large network.



Task#5: Design the following network, by picking up one router and one desktop pc connect it with console port.

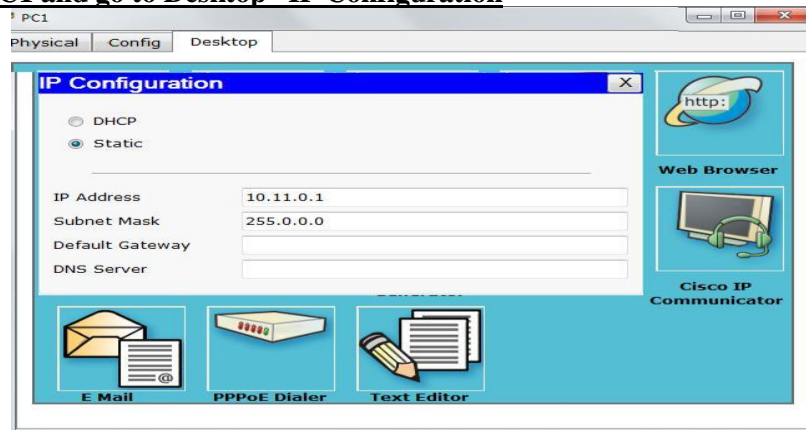


Task#5: Start the packet tracer and configure the following network and show the packet header format of ICMP protocol.

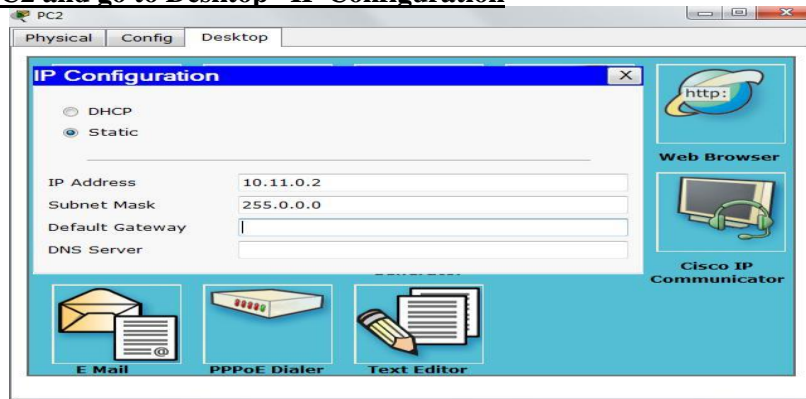


Step#1: configure PC1.

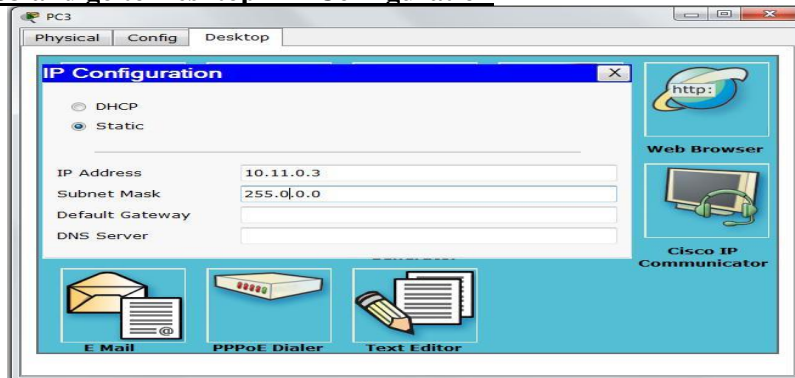
a) Click on the PC1 and go to Desktop ▢ IP Configuration



b) Click on the PC2 and go to Desktop ▢ IP Configuration



c) Click on the PC3 and go to Desktop ▢ IP Configuration



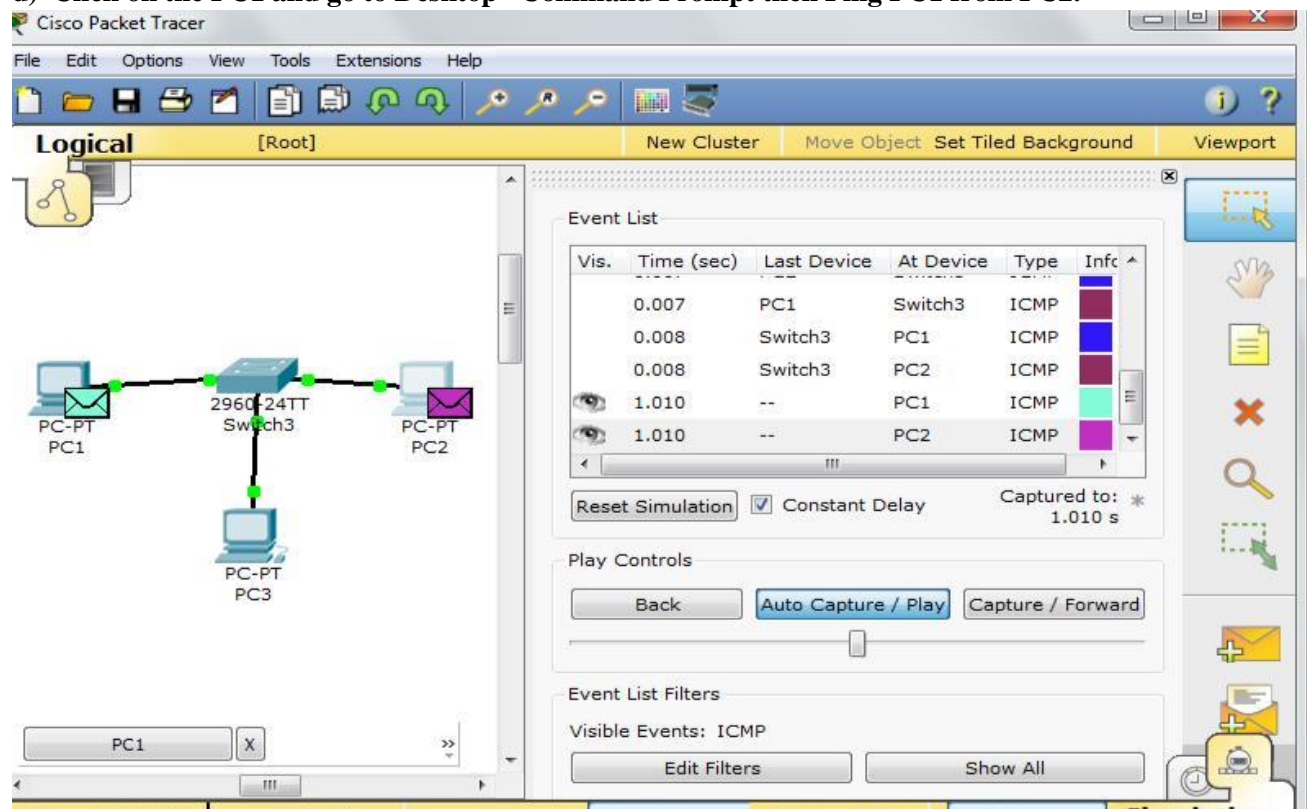
Step#2:

a) Now click on simulation icon in the right bottom of packet Tracer.

b) Now click on edit filter and to capture ICMP protocol packets, Click on ICMP check box.

c) Now click on auto capture /play icon for packet capturing.

d) Click on the PC1 and go to Desktop ▢ Command Prompt then Ping PC1 from PC2.



Step#3: Now click on the ICMP packet show its header.

a) Shows OSI layers involved in transmission.

The popped up window (below) will enable you to trace the content of the message through the OSI layer and what changes will occur at each layer (use next and previous buttons to trace each layer content).

The screenshot shows the 'PDU Information at Device: PC2' window. It has three tabs: 'OSI Model', 'Inbound PDU Details', and 'Outbound PDU Details'. The 'OSI Model' tab is active, showing the OSI layers for both In and Out directions. The 'In Layers' table shows Layer 1: Port FastEthernet, Layer 2: Ethernet II Header, Layer 3: IP Header, and Layer 4: ICMP Message. The 'Out Layers' table shows Layer 1: Port(s): FastEthernet, Layer 2: Ethernet II Header, Layer 3: IP Header, and Layer 4: ICMP Message. Below the tables, a status bar indicates '1. FastEthernet receives the frame.'

At Device: PC2	
Source: PC1	
Destination: 10.11.0.2	
In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer 3: IP Header Src. IP: 10.11.0.1, Dest. IP: 10.11.0.2 ICMP Message Type: 8	Layer 3: IP Header Src. IP: 10.11.0.2, Dest. IP: 10.11.0.1 ICMP Message Type: 0
Layer 2: Ethernet II Header 0030.A30B.95A8 >> 000C.8561.C7A4	Layer 2: Ethernet II Header 000C.8561.C7A4 >> 0030.A30B.95A8
Layer 1: Port FastEthernet	Layer 1: Port(s): FastEthernet

1. FastEthernet receives the frame.

b) Shows Inbound PDU Details.

The inbound tab shows the content of the message (header format) during the receiving process.

The screenshot shows the 'PDU Information at Device: Switch3' window. It has three tabs: 'OSI Model', 'Inbound PDU Details', and 'Outbound PDU Details'. The 'Inbound PDU Details' tab is active, showing the PDU Formats for Ethernet II, IP, and ICMP. The Ethernet II format shows a preamble, destination MAC, source MAC, type, data, and FCS. The IP format shows IHL, DSCP, TL, ID, PRO, CHKSUM, SRC IP, DST IP, OPT, and data. The ICMP format shows type, code, checksum, ID, and sequence number.

Ethernet II

0	4	8	14	19	Bytes
PREAMBLE: 101010...1011		DEST MAC: 0030.A30B.95A8		SRC MAC: 000C.8561.C7A4	
TYPE: 0x800		DATA (VARIABLE LENGTH)		FCS: 0x0	

IP

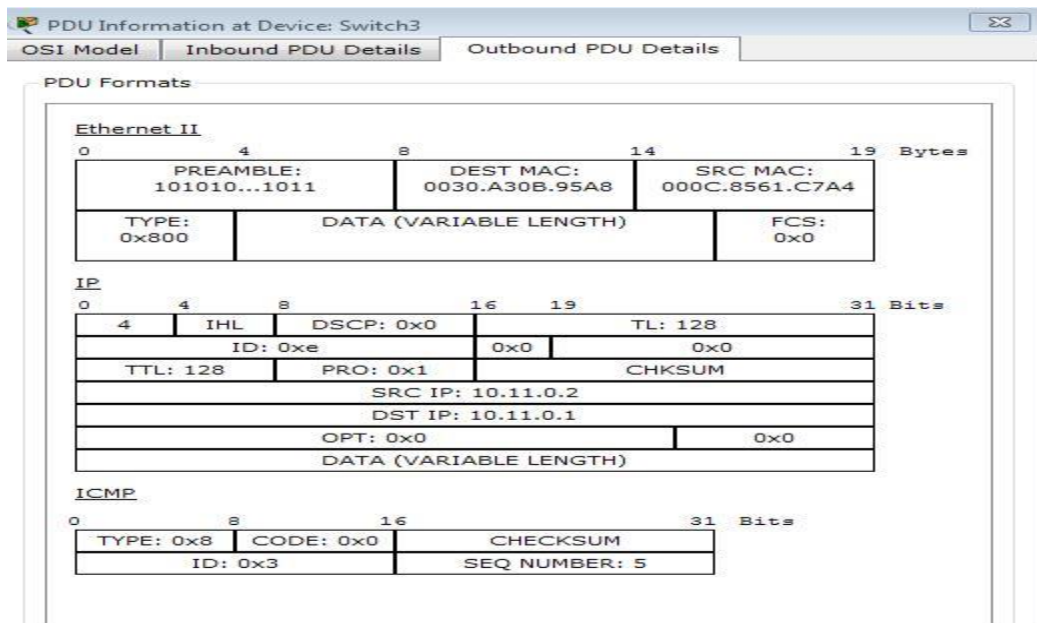
0	4	8	16	19	31	Bits
4		4	4	4		
IHL		DSCP: 0x0		TL: 128		
ID: 0xe		0x0		0x0		
TTL: 128		PRO: 0x1		CHKSUM		
SRC IP: 10.11.0.2						
DST IP: 10.11.0.1						
OPT: 0x0						
DATA (VARIABLE LENGTH)						

ICMP

0	8	16	31	Bits	
TYPE: 0x8		CODE: 0x0		CHECKSUM	
ID: 0x3		SEQ NUMBER: 5			

c) Shows Outbound PDU Details.

The outbound tab shows the content of the message (header format) during the Sending process



Reading Material for Students

Cisco Network Devices: Chapter#02 from provided reference material.

Cisco Connection Wires: Chapter#04 from provided reference material.