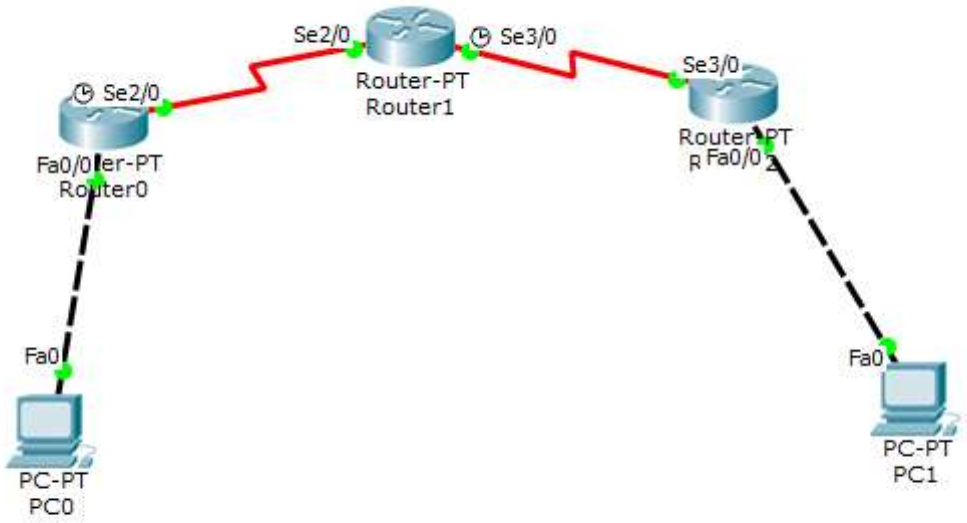
Week 6

1) Configure OSPF routing protocol

Topology



For router 1

R1(config)#interface fastethernet 2/0

R1(config-if)#ip address 10.0.0.1 255.0.0.0
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#interface serial 1/0
R1(config-if)#ip address 20.0.0.1 255.0.0.0
R1(config-if)#encapsulation ppp
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown
R1(config-if)#exit

In Router R2,

R2(config)#interface serial 1/0
R2(config-if)#ip address 20.0.0.2 255.0.0.0
R2(config-if)#encapsulation ppp
R2(config-if)#no shutdown
R2(config-if)#exit

R2(config)#interface serial 1/1

```
R2(config-if)#ip address 30.0.0.1 255.0.0.0
R2(config-if)#encapsulation ppp
R2(config-if)#clock rate 64000
R2(config-if)#no shutdown
R2(config-if)#exit
```

In Router R3,

```
R3(config)#
R3(config)#interface serial 1/0
R3(config-if)#ip address 30.0.0.2 255.0.0.0
R3(config-if)#encapsulation ppp
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
R3(config)#interface fastethernet 2/0
R3(config-if)#ip address 40.0.0.1 255.0.0.0
R3(config-if)#no shutdown
```

In Router R1,

```
 R1(config)#router ospf 1
 R1(config-router)#router-id 1.1.1.1
 R1(config-router)#network 10.0.0.0 0.255.255.255 area 3
 R1(config-router)#network 20.0.0.0 0.255.255.255 area 1
 R1(config-router)#exit
```

In Router R2,

```
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 20.0.0.0 0.255.255.255 area 1
R2(config-router)#network 30.0.0.0 0.255.255.255 area 0
R2(config-router)#exit
```

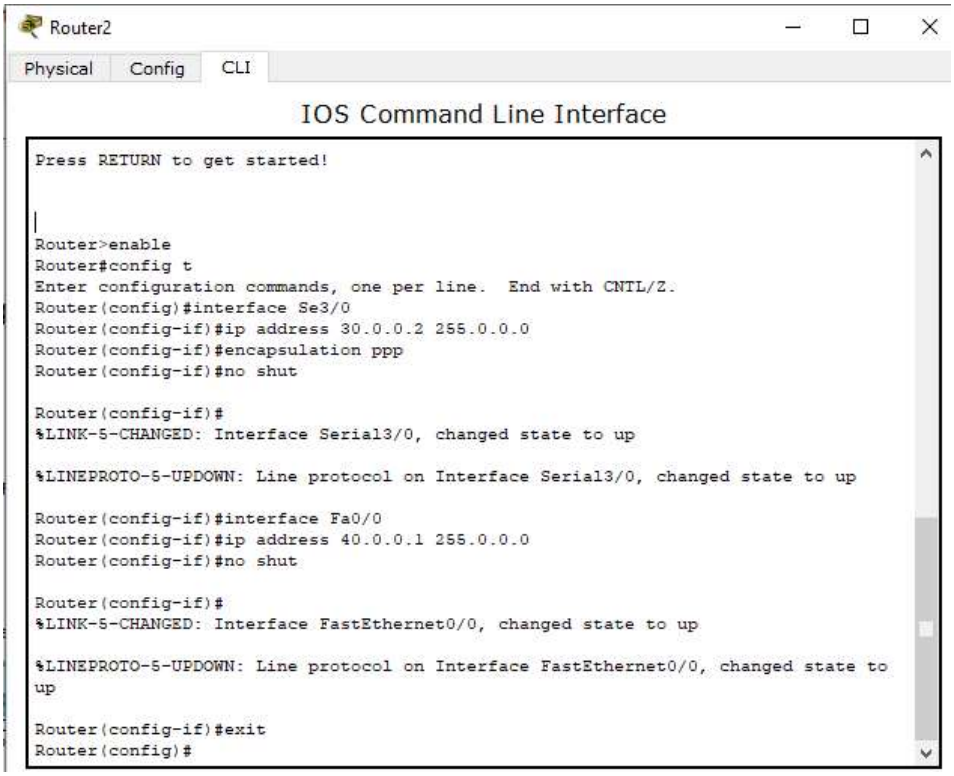
In Router R3,

```
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 30.0.0.0 0.255.255.255 area 0
R3(config-router)#network 40.0.0.0 0.255.255.255 area 2
R3(config-router)#exit
```

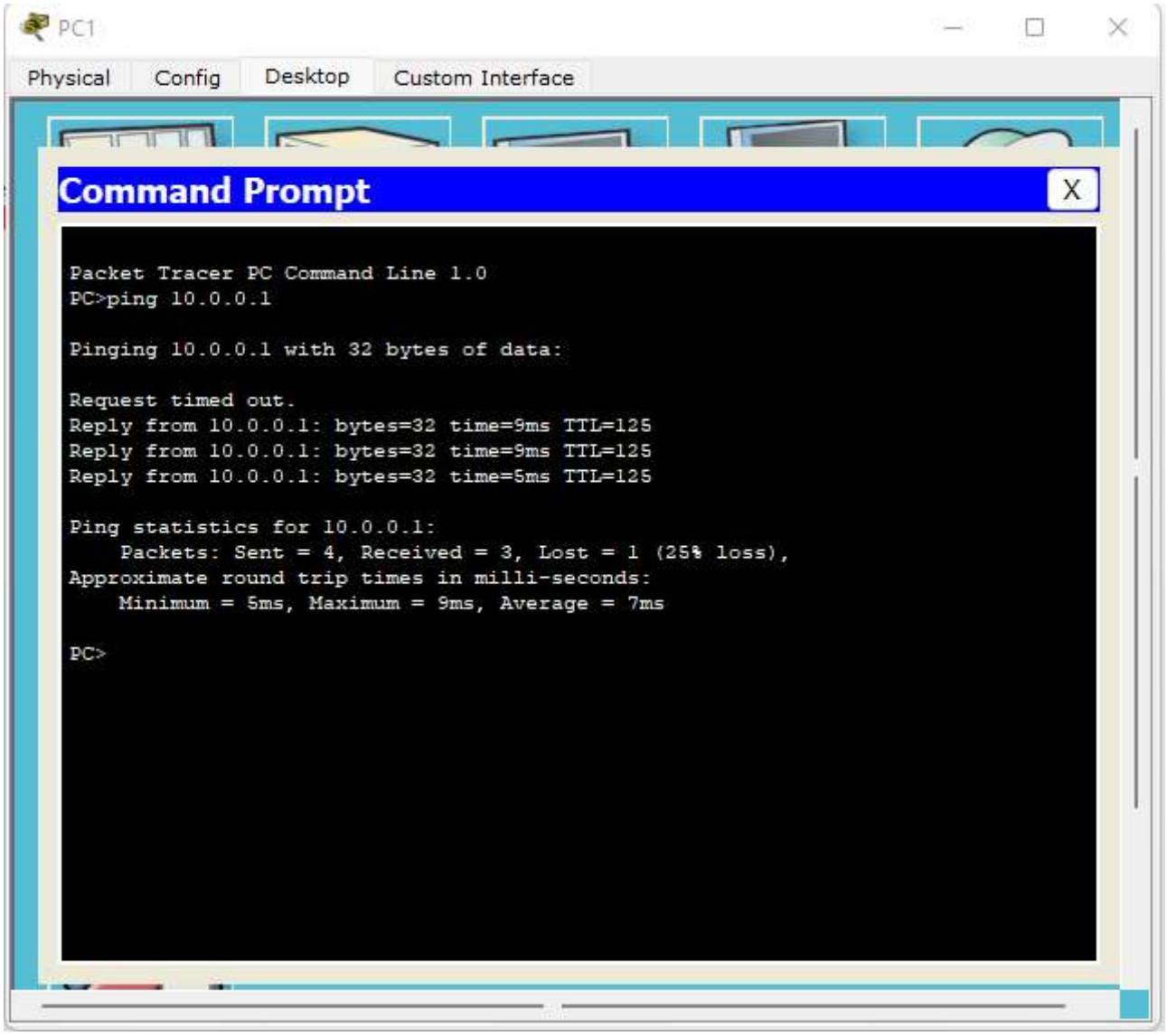
```
R1(config-if)#interface loopback 0
R1(config-if)#ip add 172.16.1.252 255.255.0.0
R1(config-if)#no shutdown
```

R2(config-if)#interface loopback 0
R2(config-if)#ip add 172.16.1.253 255.255.0.0
R2(config-if)#no shutdown
R3(config-if)#interface loopback 0
R3(config-if)#ip add 172.16.1.254 255.255.0.0
R3(config-if)#no shutdown

In Router R1,
R1(config)#router ospf 1
R1(config-router)#area 1 virtual-link 2.2.2.2
In Router R2,
R2(config-router)#area 1 virtual-link 1.1.1.1
R2(config-router)#exit

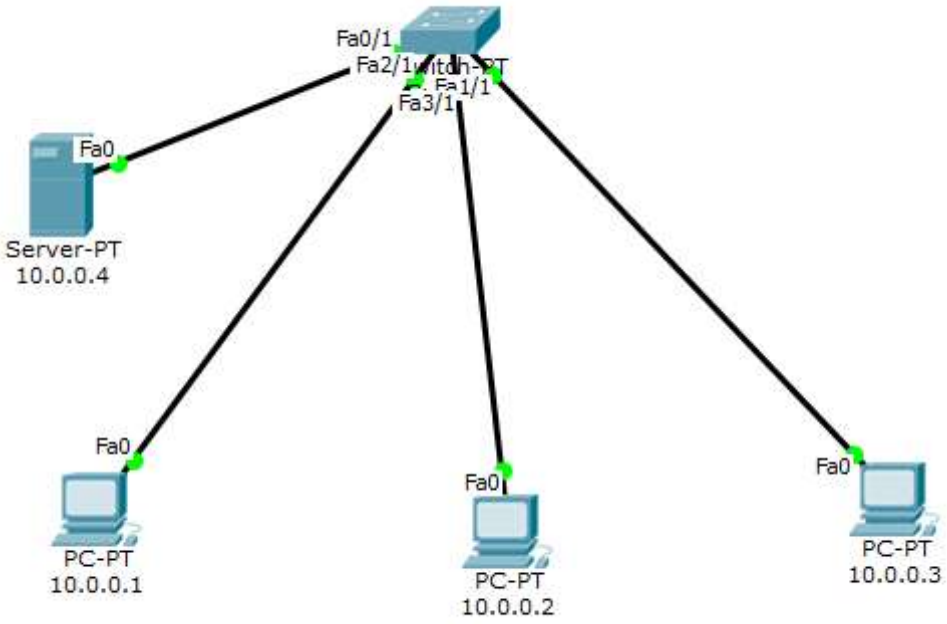


Output-


PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Request timed out.
Reply from 10.0.0.1: bytes=32 time=9ms TTL=125
Reply from 10.0.0.1: bytes=32 time=9ms TTL=125
Reply from 10.0.0.1: bytes=32 time=5ms TTL=125
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 5ms, Maximum = 9ms, Average = 7ms
PC>

2) To construct simple LAN and understand the operation of Address Resolution Protocol (ARP)

Topology-



ARP Table for 10.0.0.1

IP Address	Hardware Address	Interface
10.0.0.2	00E0.B091.E14E	FastEthernet0
10.0.0.3	0001.C90D.DD27	FastEthernet0

```
Switch>show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.c90d.dd27    DYNAMIC     Fa1/1
   1    0060.5cb8.27be    DYNAMIC     Fa2/1
   1    00d0.5821.a158    DYNAMIC     Fa0/1
   1    00e0.b091.e14e    DYNAMIC     Fa3/1
Switch>
```

PC0

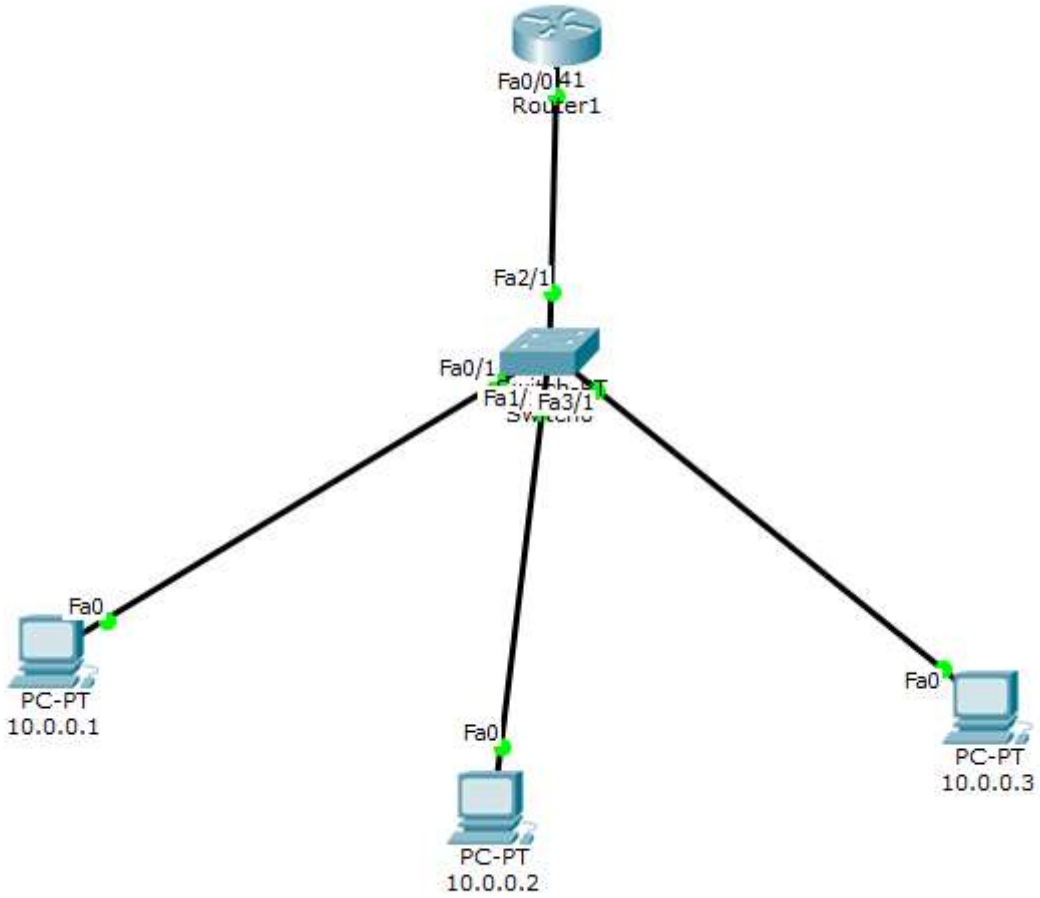
Physical | Config | Desktop | Custom Interface

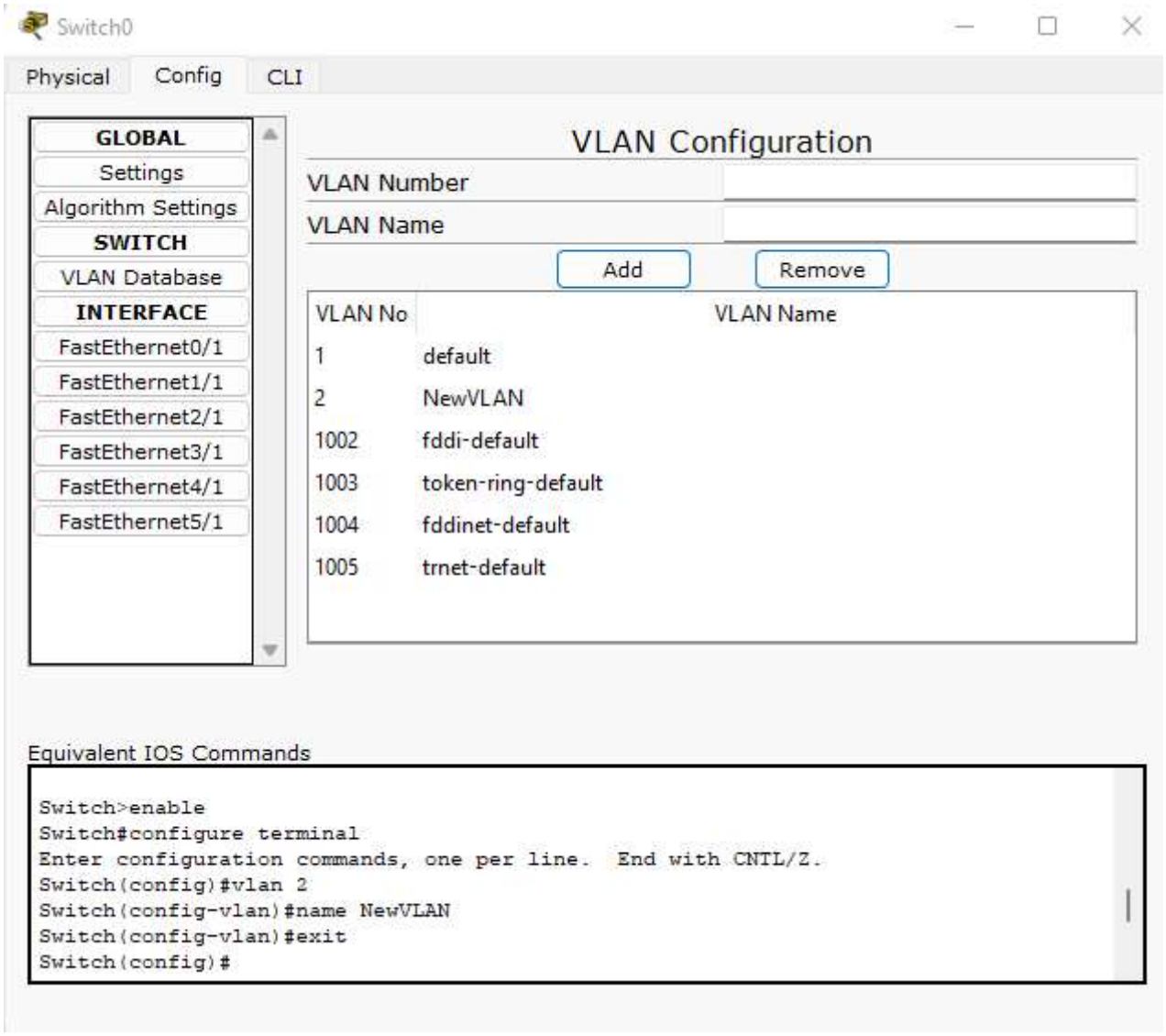
Command Prompt

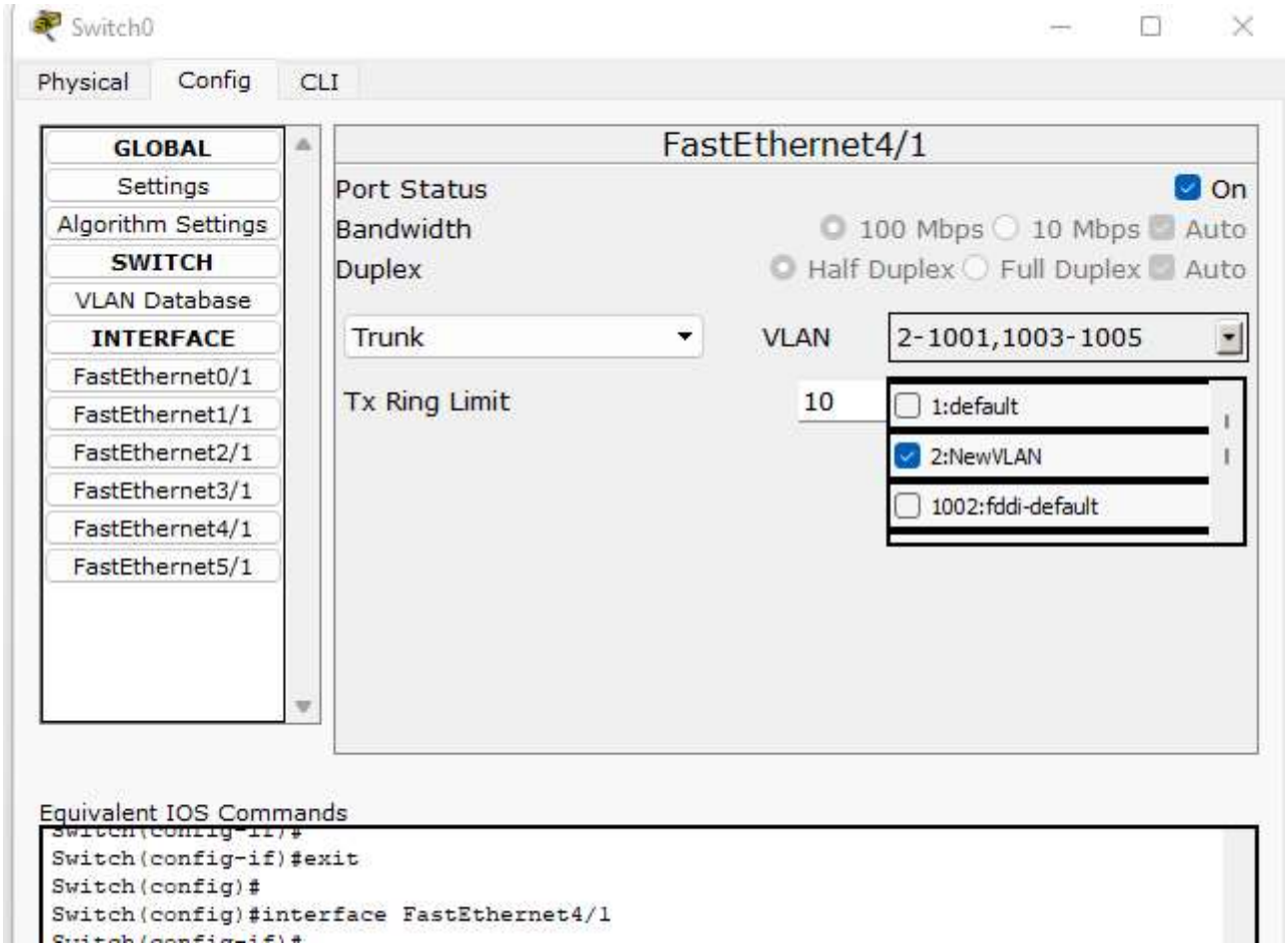
```
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.2              00e0.b091.e14e        dynamic

PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=0ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128
Reply from 10.0.0.3: bytes=32 time=1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.2              00e0.b091.e14e        dynamic
  10.0.0.3              0001.c90d.dd27        dynamic

PC>
```

Week - 7

1) To construct a VLAN and make the PCs communicate among a VLAN




Switch0
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
SWITCH
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet1/1
FastEthernet2/1
FastEthernet3/1
FastEthernet4/1
FastEthernet5/1
VLAN Configuration
VLAN Number
VLAN Name
Add
Remove
VLAN No
VLAN Name
1 default
2 NewVLAN
1002 fddi-default
1003 token-ring-default
1004 fddinet-default
1005 trnet-default
Equivalent IOS Commands
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name NewVLAN
Switch(config-vlan)#exit
Switch(config)#



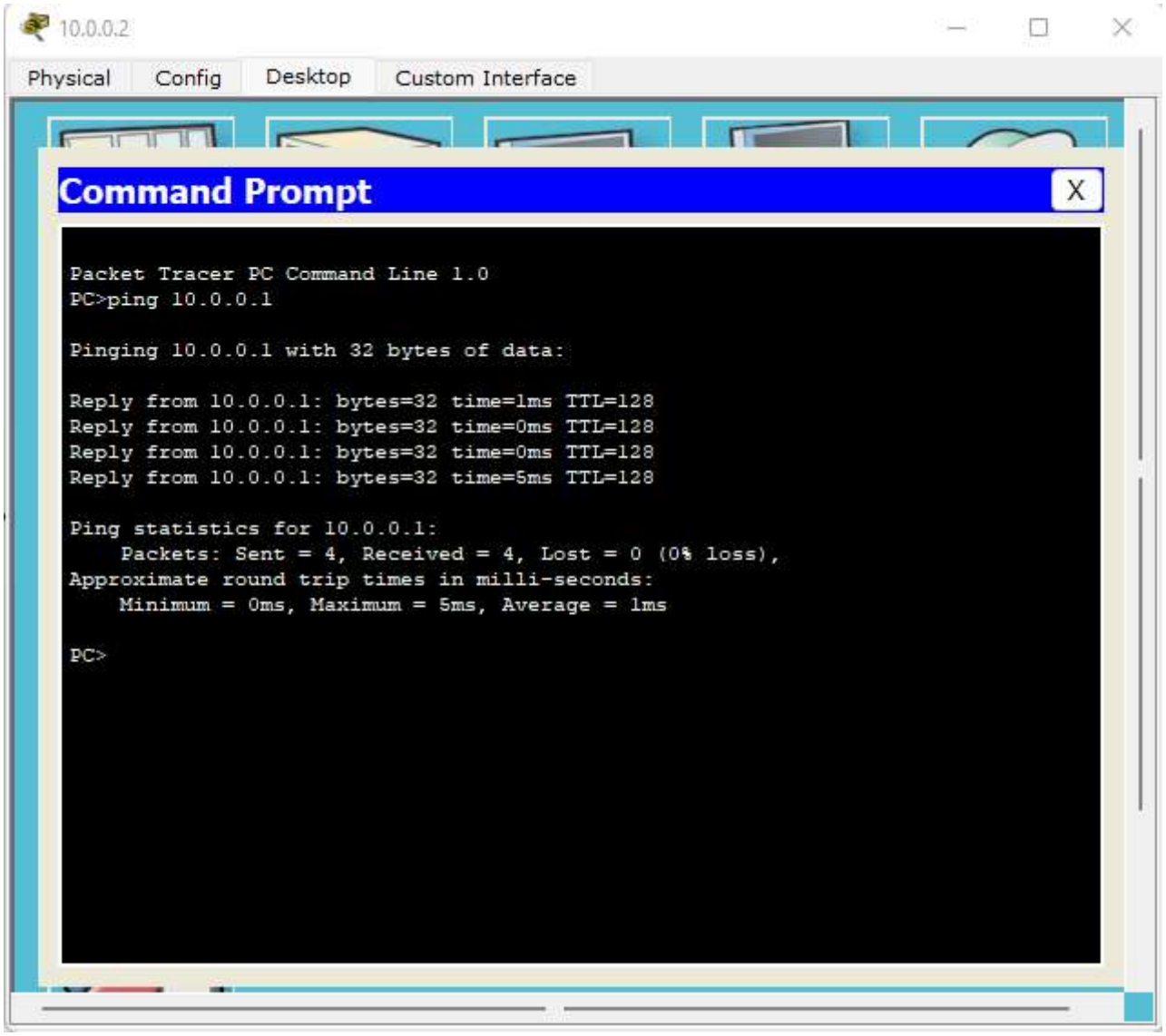
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Fa0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shut

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

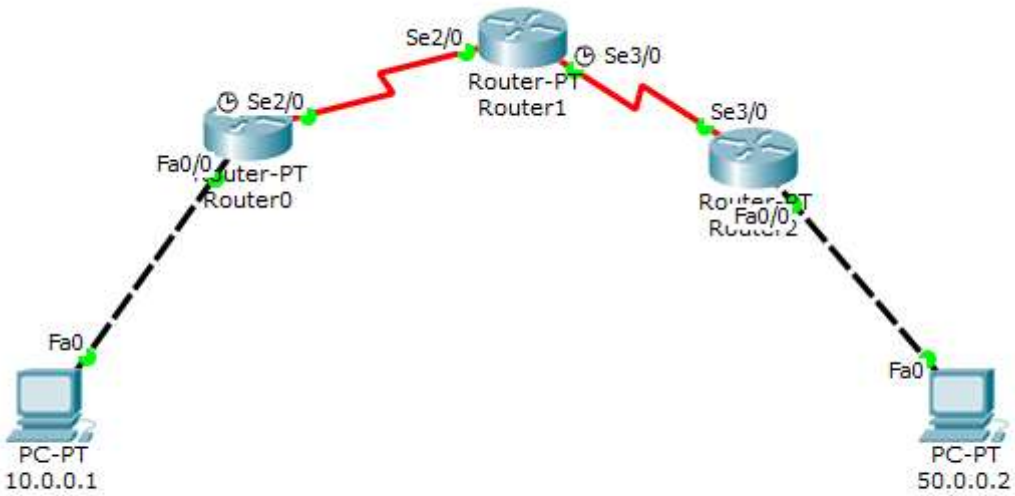
Router#vlan database

```
% Warning: It is recommended to configure VLAN from config mode,
  as VLAN database mode is being deprecated. Please consult user
  documentation for configuring VTP/VLAN in config mode.

Router(vlan)#vlan 2 name NewVLAN
VLAN 2 modified:
    Name: NewVLAN
Router(vlan)#exit
APPLY completed.
Exiting....
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Fa0/0.1
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up

Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#exit
Router#
```

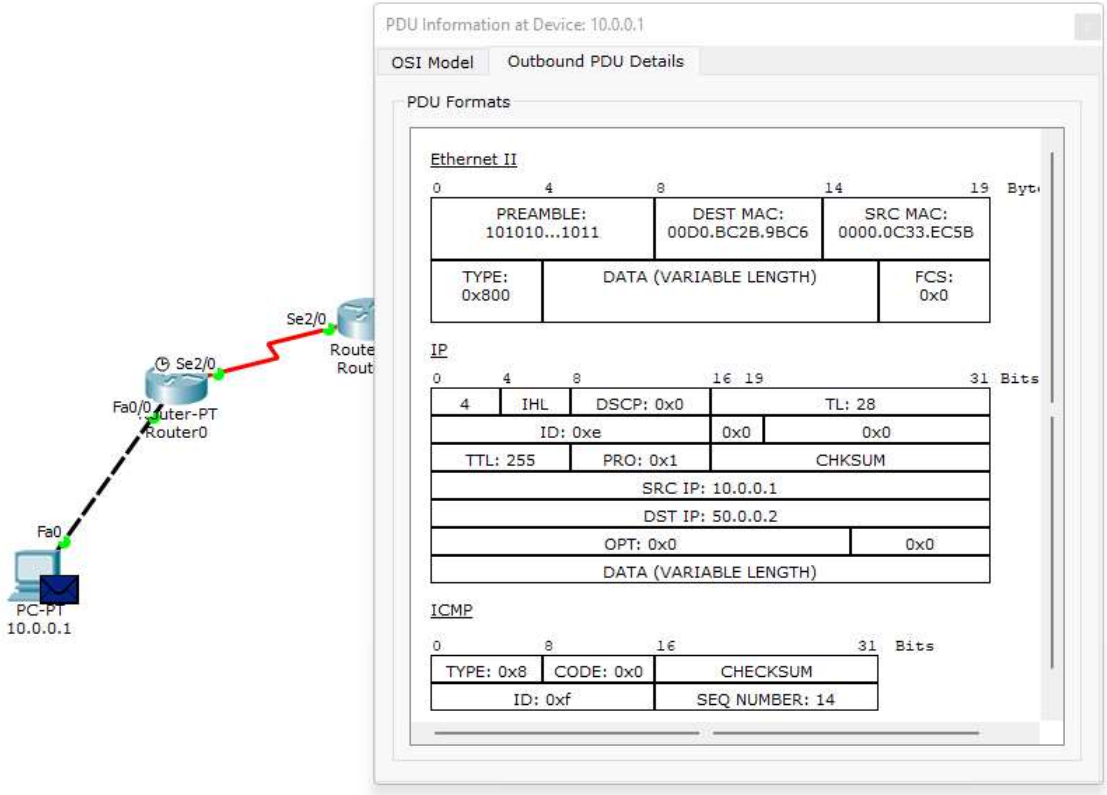

10.0.0.2
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time=1ms TTL=128
Reply from 10.0.0.1: bytes=32 time=0ms TTL=128
Reply from 10.0.0.1: bytes=32 time=0ms TTL=128
Reply from 10.0.0.1: bytes=32 time=5ms TTL=128
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 5ms, Average = 1ms
PC>

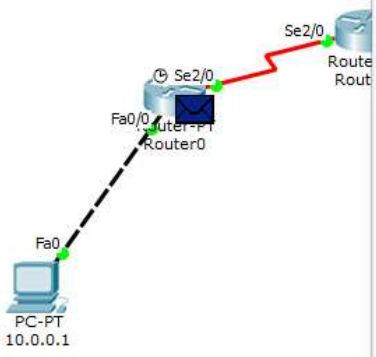
2) Demonstrate the TTL/Life of a packet

Topology-



OUTPUT-





PDU Information at Device: Router0

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

HDLC

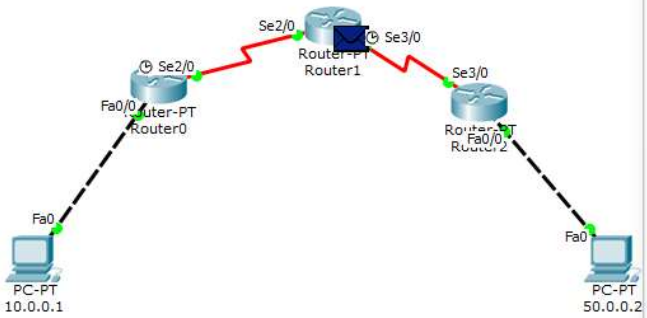
0	8	16	32	32+x	48+x	56+x
FLG: 0111 1110	ADR: 0x8f	CONTROL: 0x0	DATA: (VARIABLE LENGTH)	FCS: 0x0	FLG: 0111 1110	

IP

0	4	8	16 19	31 Bits
4	IHL	DSCP: 0x0	TL: 28	
ID: 0xe			0x0	0x0
TTL: 254		PRO: 0x1	CHKSUM	
SRC IP: 10.0.0.1				
DST IP: 50.0.0.2				
OPT: 0x0				0x0
DATA (VARIABLE LENGTH)				

ICMP

0	8	16	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM	
ID: 0xf		SEQ NUMBER: 14	



PDU Information at Device: Router1

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

HDLC

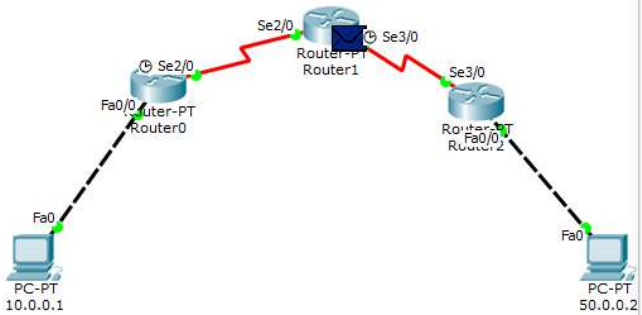
0	8	16	32	32+x	48+x	56+x
FLG: 0111 1110	ADR: 0x8f	CONTROL: 0x0	DATA: (VARIABLE LENGTH)	FCS: 0x0	FLG: 0111 1110	

IP

0	4	8	16 19	31 Bits
4	IHL	DSCP: 0x0	TL: 28	
ID: 0xe			0x0	0x0
TTL: 253		PRO: 0x1	CHKSUM	
SRC IP: 10.0.0.1				
DST IP: 50.0.0.2				
OPT: 0x0				0x0
DATA (VARIABLE LENGTH)				

ICMP

0	8	16	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM	
ID: 0xf		SEQ NUMBER: 14	



PDU Information at Device: Router1

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

HDLC

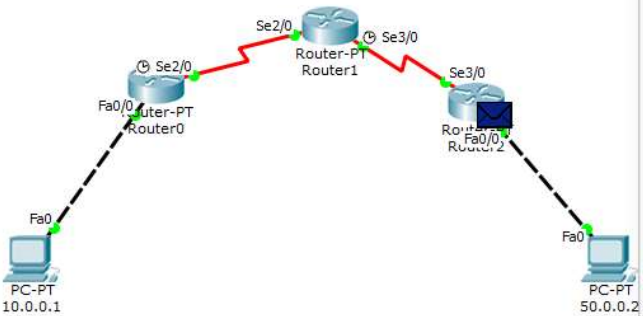
0	8	16	32	32+x	48+x	56+x
FLG: 0111 1110	ADR: 0x8f	CONTROL: 0x0	DATA: (VARIABLE LENGTH)		FCS: 0x0	FLG: 0111 1110

IP

0	4	8	16	19	31 Bits
4	IHL	DSCP: 0x0	TL: 28		
ID: 0xe			0x0	0x0	
TTL: 254		PRO: 0x1	CHKSUM		
SRC IP: 10.0.0.1					
DST IP: 50.0.0.2					
OPT: 0x0					0x0
DATA (VARIABLE LENGTH)					

ICMP

0	8	16	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM	
ID: 0xf		SEQ NUMBER: 14	



PDU Information at Device: Router2

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

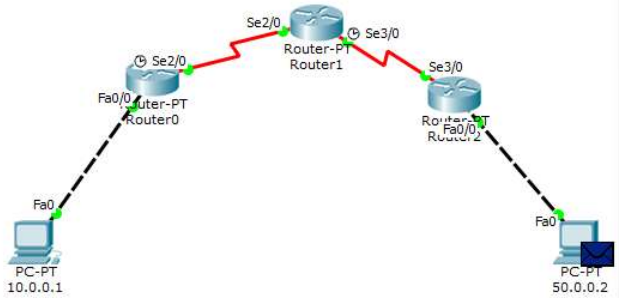
0	4	8	14	19 Byt
PREAMBLE: 101010...1011		DEST MAC: 0060.5C16.A79C	SRC MAC: 000B.BED4.C8C7	
TYPE: 0x800	DATA (VARIABLE LENGTH)			FCS: 0x0

IP

0	4	8	16	19	31 Bits
4	IHL	DSCP: 0x0	TL: 28		
ID: 0xe			0x0	0x0	
TTL: 252		PRO: 0x1	CHKSUM		
SRC IP: 10.0.0.1					
DST IP: 50.0.0.2					
OPT: 0x0					0x0
DATA (VARIABLE LENGTH)					

ICMP

0	8	16	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM	
ID: 0xf		SEQ NUMBER: 14	



PDU Information at Device: 50.0.0.2

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

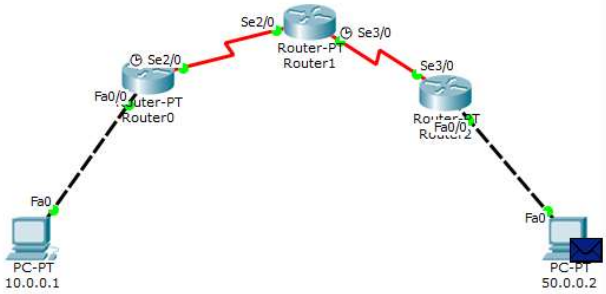
0	4	8	14	19 Byt
PREAMBLE: 101010...1011		DEST MAC: 000B.BED4.C8C7	SRC MAC: 0060.5C16.A79C	
TYPE: 0x800	DATA (VARIABLE LENGTH)			FCS: 0x0

IP

0	4	8	16 19	31 Bits
4	IHL	DSCP: 0x0	TL: 28	
ID: 0x2		0x0	0x0	
TTL: 128	PRO: 0x1	CHKSUM		
SRC IP: 50.0.0.2				
DST IP: 10.0.0.1				
OPT: 0x0			0x0	
DATA (VARIABLE LENGTH)				

ICMP

0	8	16	31 Bits
TYPE: 0x0	CODE: 0x0	CHECKSUM	
ID: 0xf		SEQ NUMBER: 14	



PDU Information at Device: 50.0.0.2

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19 Byt
PREAMBLE: 101010...1011		DEST MAC: 0060.5C16.A79C	SRC MAC: 000B.BED4.C8C7	
TYPE: 0x800	DATA (VARIABLE LENGTH)			FCS: 0x0

IP

0	4	8	16 19	31 Bits
4	IHL	DSCP: 0x0	TL: 28	
ID: 0xe		0x0	0x0	
TTL: 252	PRO: 0x1	CHKSUM		
SRC IP: 10.0.0.1				
DST IP: 50.0.0.2				
OPT: 0x0			0x0	
DATA (VARIABLE LENGTH)				

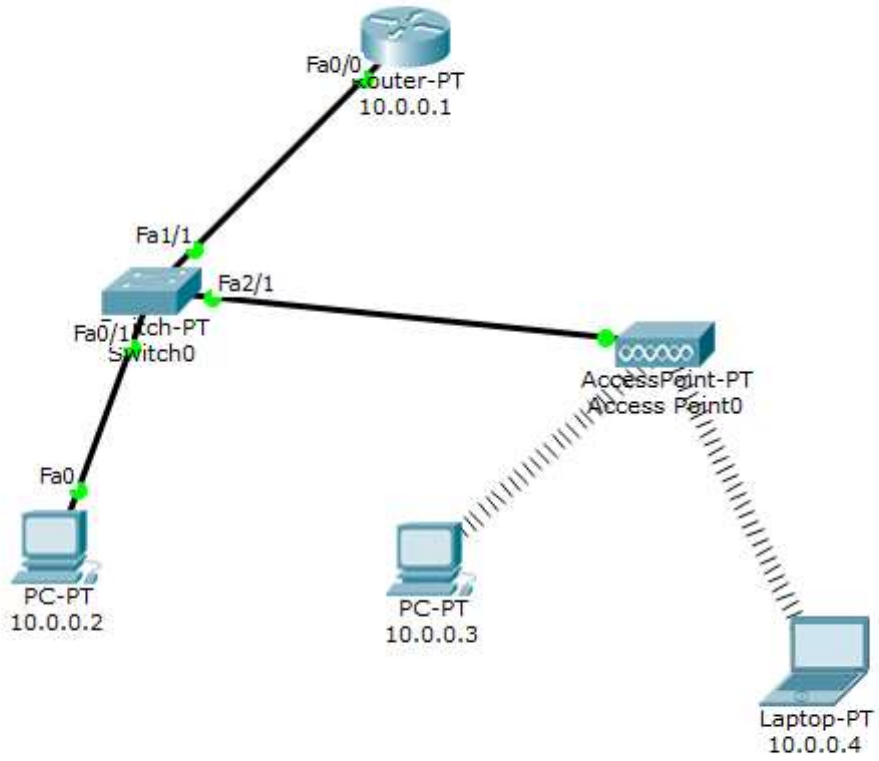
ICMP

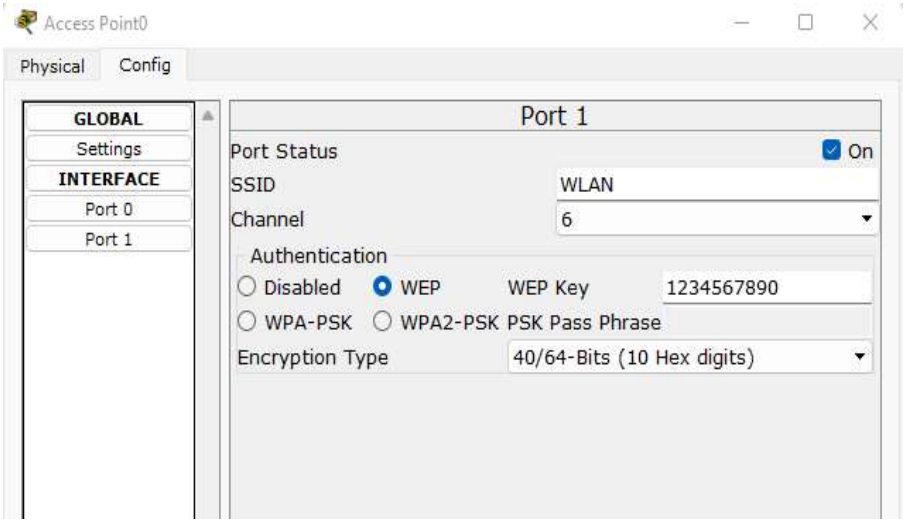
0	8	16	31 Bits
TYPE: 0x8	CODE: 0x0	CHECKSUM	
ID: 0xf		SEQ NUMBER: 14	

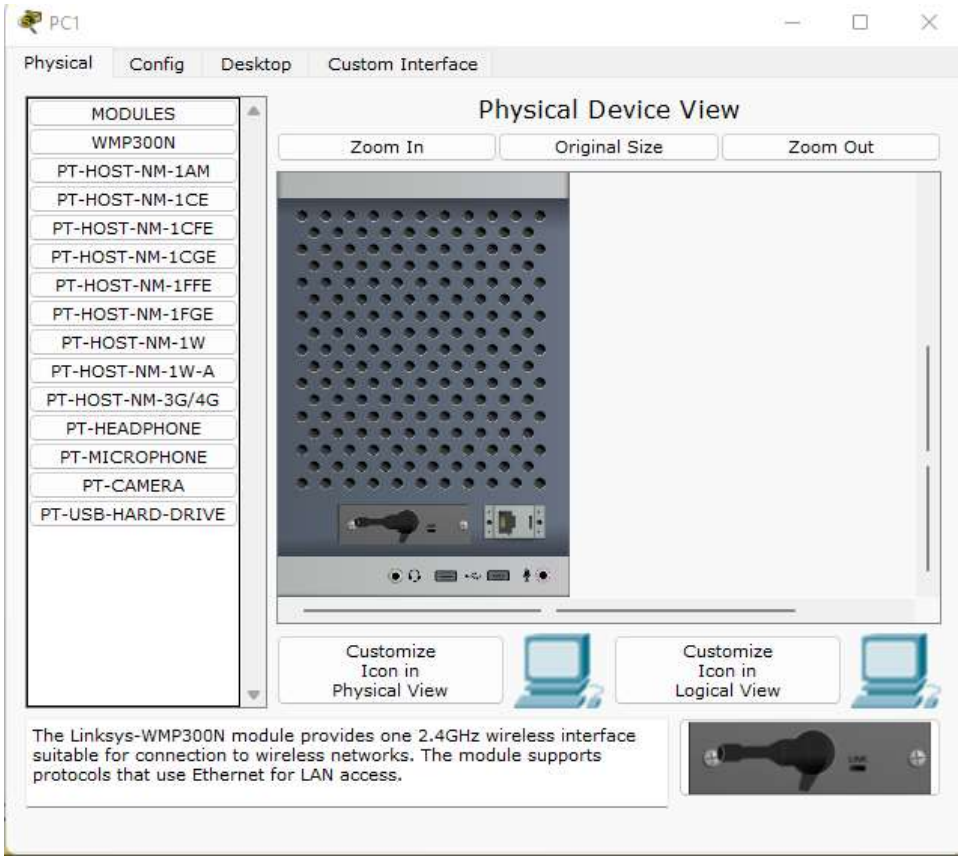
WEEK-8

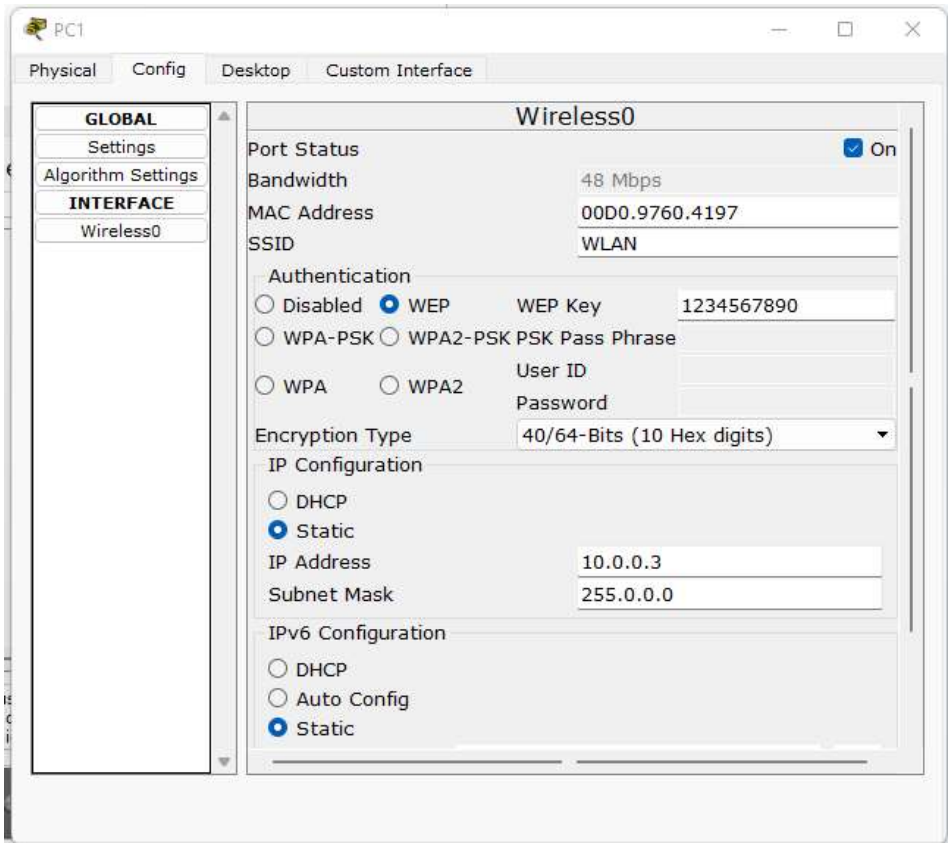
1)To construct a WLAN and make the nodes communicate with each other

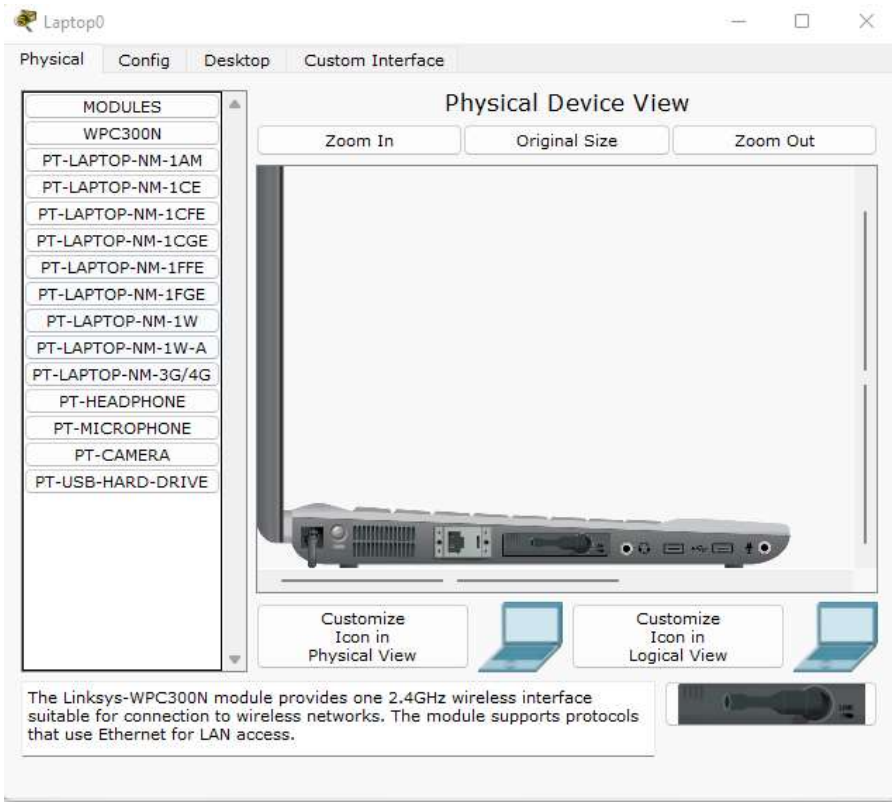
Topology-

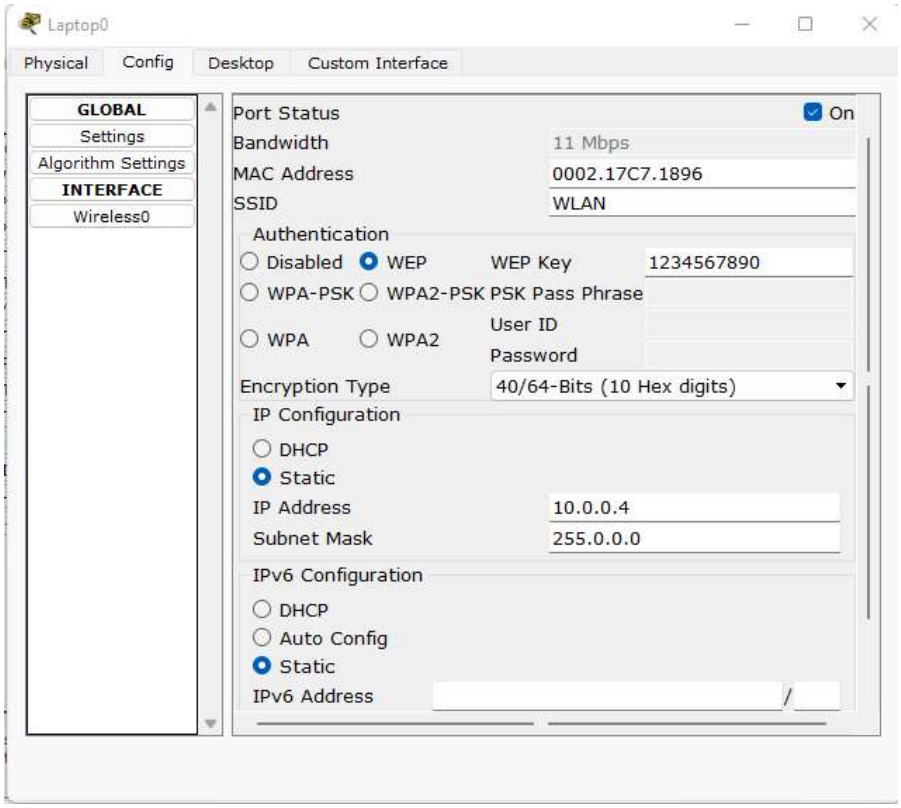





PC1
Physical
Config
Desktop
Custom Interface
MODULES
WMP300N
PT-HOST-NM-1AM
PT-HOST-NM-1CE
PT-HOST-NM-1CFE
PT-HOST-NM-1CGE
PT-HOST-NM-1FFE
PT-HOST-NM-1FGE
PT-HOST-NM-1W
PT-HOST-NM-1W-A
PT-HOST-NM-3G/4G
PT-HEADPHONE
PT-MICROPHONE
PT-CAMERA
PT-USB-HARD-DRIVE
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The Linksys-WMP300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

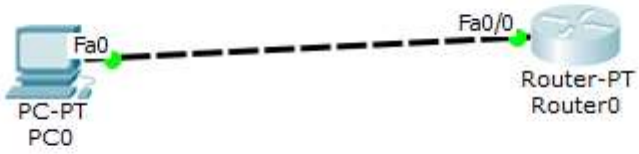

PC1
Physical
Config
Desktop
Custom Interface
GLOBAL
Settings
Algorithm Settings
INTERFACE
Wireless0
Wireless0
Port Status
On
Bandwidth
48 Mbps
MAC Address
00D0.9760.4197
SSID
WLAN
Authentication
Disabled
WEP
WEP Key
1234567890
WPA-PSK
WPA2-PSK
PSK Pass Phrase
WPA
WPA2
User ID
Password
Encryption Type
40/64-Bits (10 Hex digits)
IP Configuration
DHCP
Static
IP Address
10.0.0.3
Subnet Mask
255.0.0.0
IPv6 Configuration
DHCP
Auto Config
Static


Laptop0
Physical
Config
Desktop
Custom Interface
Physical Device View
MODULES
WPC300N
PT-LAPTOP-NM-1AM
PT-LAPTOP-NM-1CE
PT-LAPTOP-NM-1CFE
PT-LAPTOP-NM-1CGE
PT-LAPTOP-NM-1FFE
PT-LAPTOP-NM-1FGE
PT-LAPTOP-NM-1W
PT-LAPTOP-NM-1W-A
PT-LAPTOP-NM-3G/4G
PT-HEADPHONE
PT-MICROPHONE
PT-CAMERA
PT-USB-HARD-DRIVE
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The Linksys-WPC300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.


Laptop0
Physical
Config
Desktop
Custom Interface
GLOBAL
Settings
Algorithm Settings
INTERFACE
Wireless0
Port Status
On
Bandwidth
11 Mbps
MAC Address
0002.17C7.1896
SSID
WLAN
Authentication
Disabled
WEP
WEP Key
1234567890
WPA-PSK
WPA2-PSK
PSK Pass Phrase
WPA
WPA2
User ID
Password
Encryption Type
40/64-Bits (10 Hex digits)
IP Configuration
DHCP
Static
IP Address
10.0.0.4
Subnet Mask
255.0.0.0
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address

2) To understand the concept Of TELNET by accessing the router in server room from a PC in the IT office.

Topology-



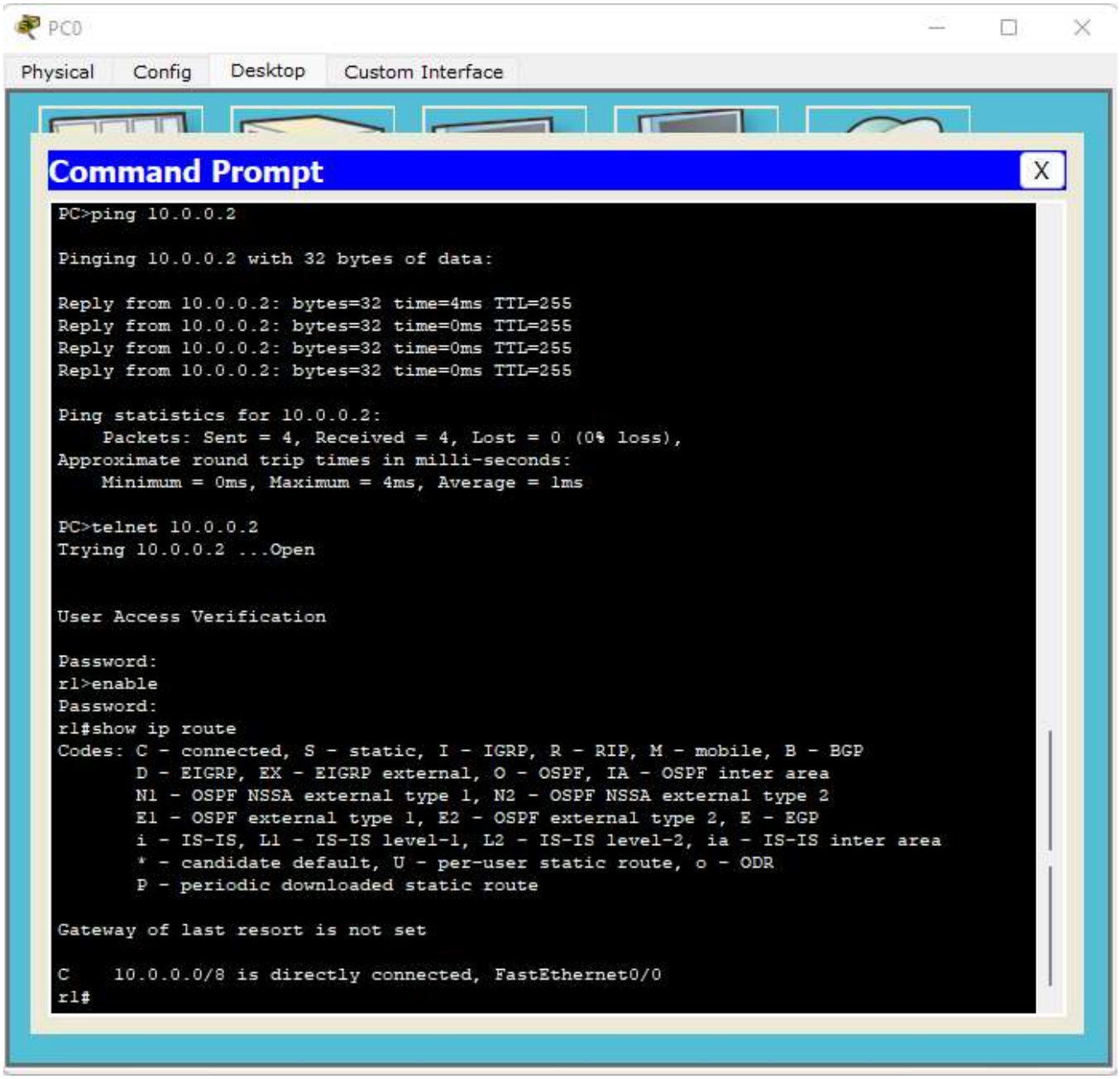
Router0

Physical Config CLI

IOS Command Line Interface

```
Router>enable
Router#config
Configuring from terminal, memory, or network [terminal]? t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname r1
r1(config)#enable secret p1
r1(config)#interface FastEthernet0/0
r1(config-if)#ip address 10.0.0.2 255.0.0.0
r1(config-if)#no shut

r1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to
up

r1(config-if)#line vty 0 5
r1(config-line)#login
% Login disabled on line 132, until 'password' is set
% Login disabled on line 133, until 'password' is set
% Login disabled on line 134, until 'password' is set
% Login disabled on line 135, until 'password' is set
% Login disabled on line 136, until 'password' is set
% Login disabled on line 137, until 'password' is set
r1(config-line)#password p0
r1(config-line)#exit
r1(config)#exit
r1#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
r1#
```

Copy Paste


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
PC>ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:
Reply from 10.0.0.2: bytes=32 time=4ms TTL=255
Reply from 10.0.0.2: bytes=32 time=0ms TTL=255
Reply from 10.0.0.2: bytes=32 time=0ms TTL=255
Reply from 10.0.0.2: bytes=32 time=0ms TTL=255
Ping statistics for 10.0.0.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 4ms, Average = 1ms
PC>telnet 10.0.0.2
Trying 10.0.0.2 ...Open
User Access Verification
Password:
r1>enable
Password:
r1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
C 10.0.0.0/8 is directly connected, FastEthernet0/0
r1#