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Experiment - 6

CN - C32 - 2103164

Aim:- Design VPN & configure RIP/OSPF using packet tracer.

Theory:-

A VPN or Virtual Private Network, is a technology that allows you to creat a secure and encrypted connection over a less secure network, such as the internet. VPNs are commonly used to provide privacy and security for data transmission over the internet. Here's how a VPN works in context of computer networking.

1.) Encryption and Tunneling:- When you connect to VPN, your computer or device creat a secure "tunnel" over the internet to remote server operated by VPN service provider. The tunnel is encrypted, which mean that all data travelling between your device and VPN server is encrypted and secure from eavedropping.

2.) Hide Your IP Address:- Your IP address like your online identity, and it can reveal your location and other information about you. When you connect a VPN, your real IP address is hidden and VPN address is used. This help protect your privacy & make it harder for website and other online

services to track your location.

3) Secure Data Transmission :- Any data you send and recieve while connected to VPN is encrypted. This includes web browsing, email, file transfer and any other online activities. This encryption makes it extremely diffic for hackers or malicious actors to intercept and r your data.

4) Acess to Restricted Content :- VPNs can be used to bypass geo-restrictions. For example, if a website or streaming service is only availa in certain countries, you connect to VPN server in that country to access the content of if you we physically located there.

5) Security and Privacy :- VPN provide an additio layer and privacy when using public Wi Fi network, such as those in coffee shops or ai They protect your data from physically lo here.

6) Bussiness Use :- VPNs are commonly used by bussiness to provide secure remote acess to their internal networks for employees work from home or while travelling. This ensures th sensitive company data remains secure even accessed from outside the office.

7) Types Of VPNs :- There are several type of including remote acess VPN, site to site VP client-to-site VPNs. Each type has its own use case & implementation.

5.) VPN service Providers - To use VPN you typically need to subscribe VPN service provider. These providers maintain a network of VPN server in various location around the world.

* RIP/OSPF

- RIP stands for Routing Information Protocol and OSPF stands for open Shortest path first are two different routing protocols used in computer networks to determine how data packets should be formacted from one network device to another. Both protocols are used to manage routing tables and facilitate efficient data transmission within a network, but they have significant difference in terms of operations and complexity

RIP

① Distance-vector Protocol: RIP is distance vector routing protocol. It determines the best path to destination by counting the number of hops (routers) between the source and destination. Each router periodically sends its routing table to its neighbhours.

② Hop Count Metric :- RIP uses hop count as it metric for route selection. A route with fewer hops is considered better. However, RIP is limited to a maximum hop count of 15., which restricts its scalibility.

(5) Convergence Time :- RIP has relatively slow converge times, when network topology changes occur, it can take a noticable amount of time for routers to update their routing table & converge to a stable state

* OSPF

(1) Link-state protocol :- OSPF is a link state routing protocol. It builds and maintains a detailed database of the entire network topology, including information about the link & routers. This database is used to count the shortest path to reach any dest

(2) Cost metric :- OSPF uses a cost metric, typically based on bandwidth to determine the best path to destination. Lower costs represent better paths. This allow OSPF to take account factors like link bandwidth & latency when making routing decisions.

(3) Convergence Time :- OSPF generally has fast convergence times compared to RIP. When network changes occur, routers quickly make it suitable for large and dynamic networks

(4) Commonly used in Enterprise Network : OSPF is commonly used in enterprise networks and service provider environment for its flexibility and robustness

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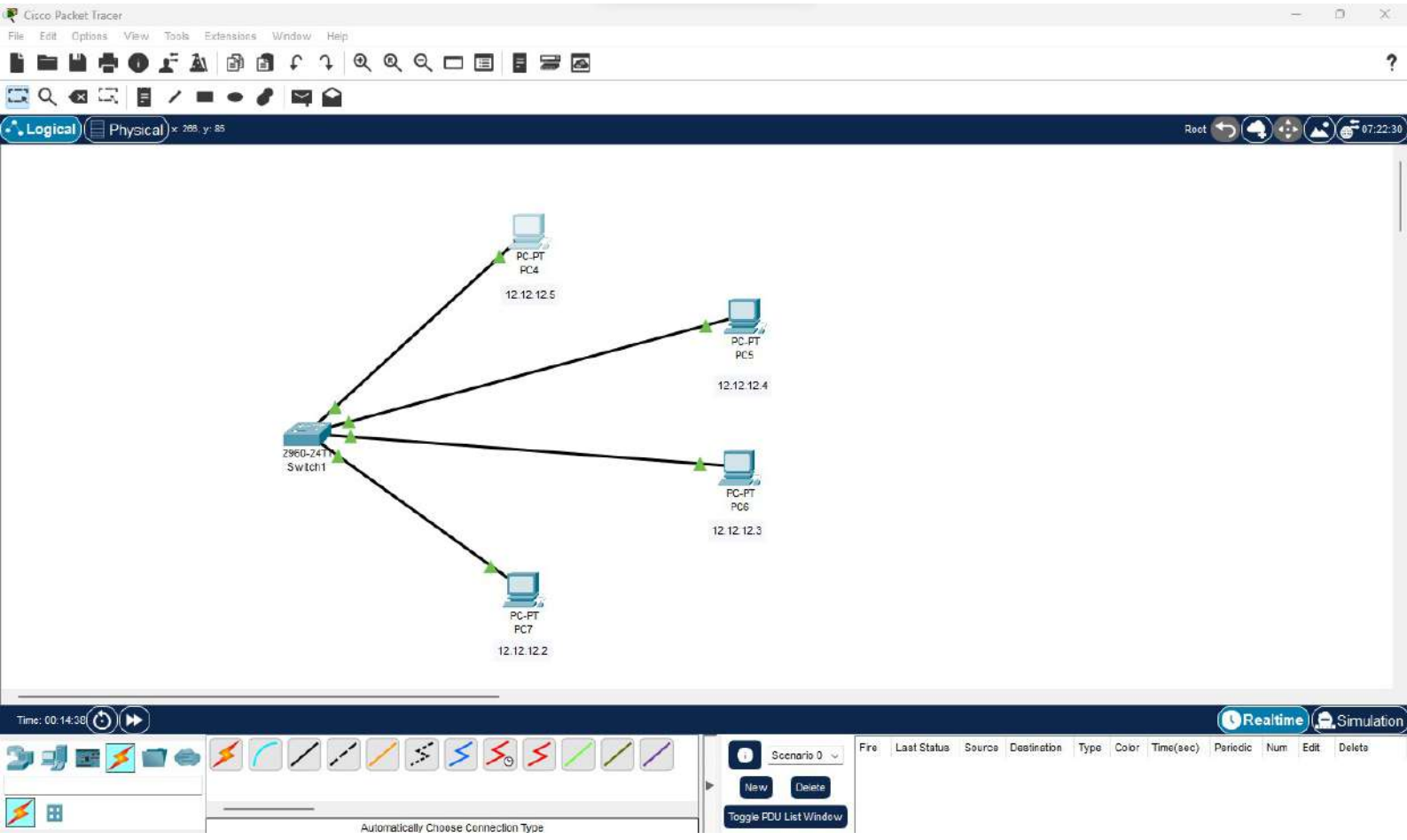
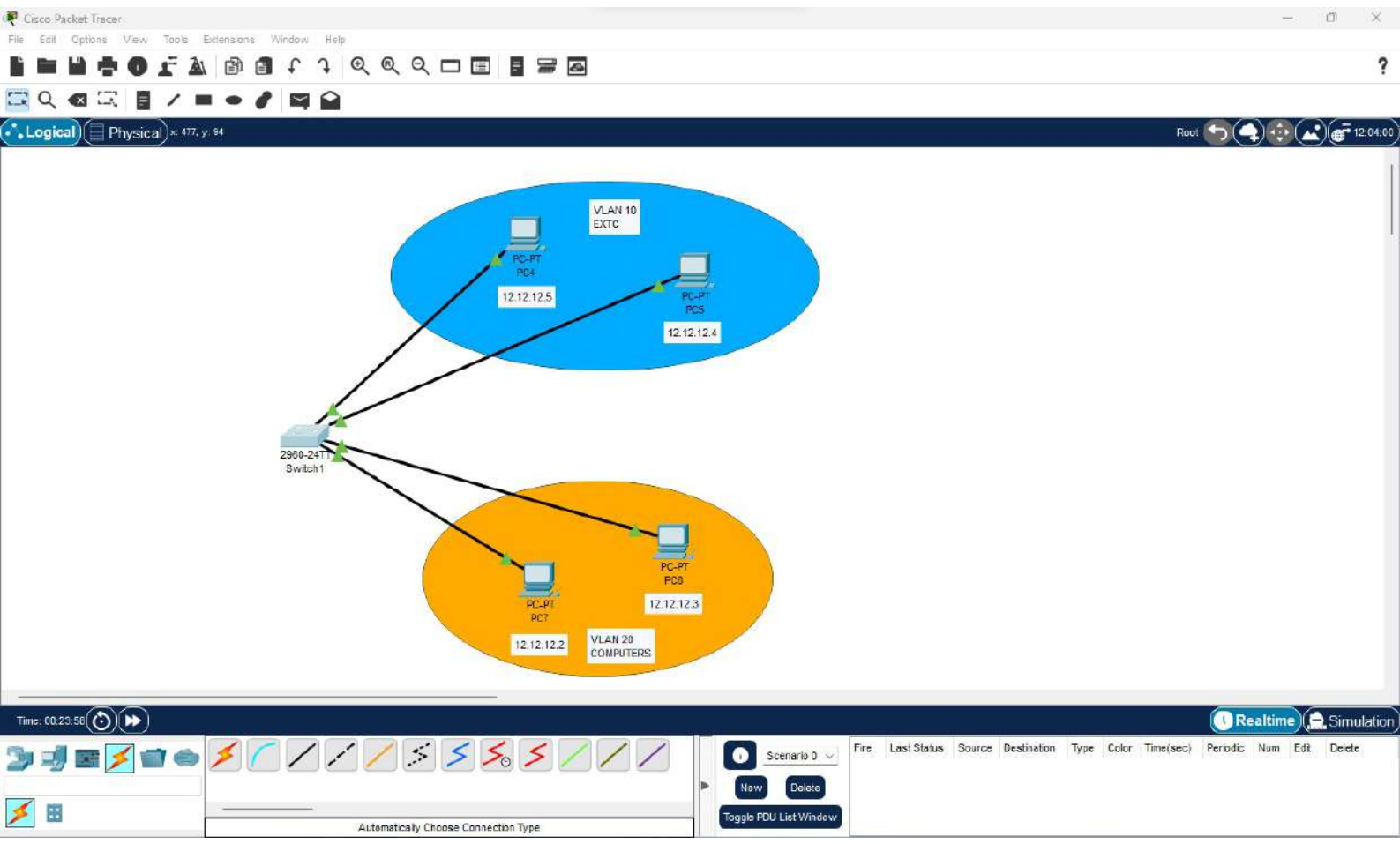
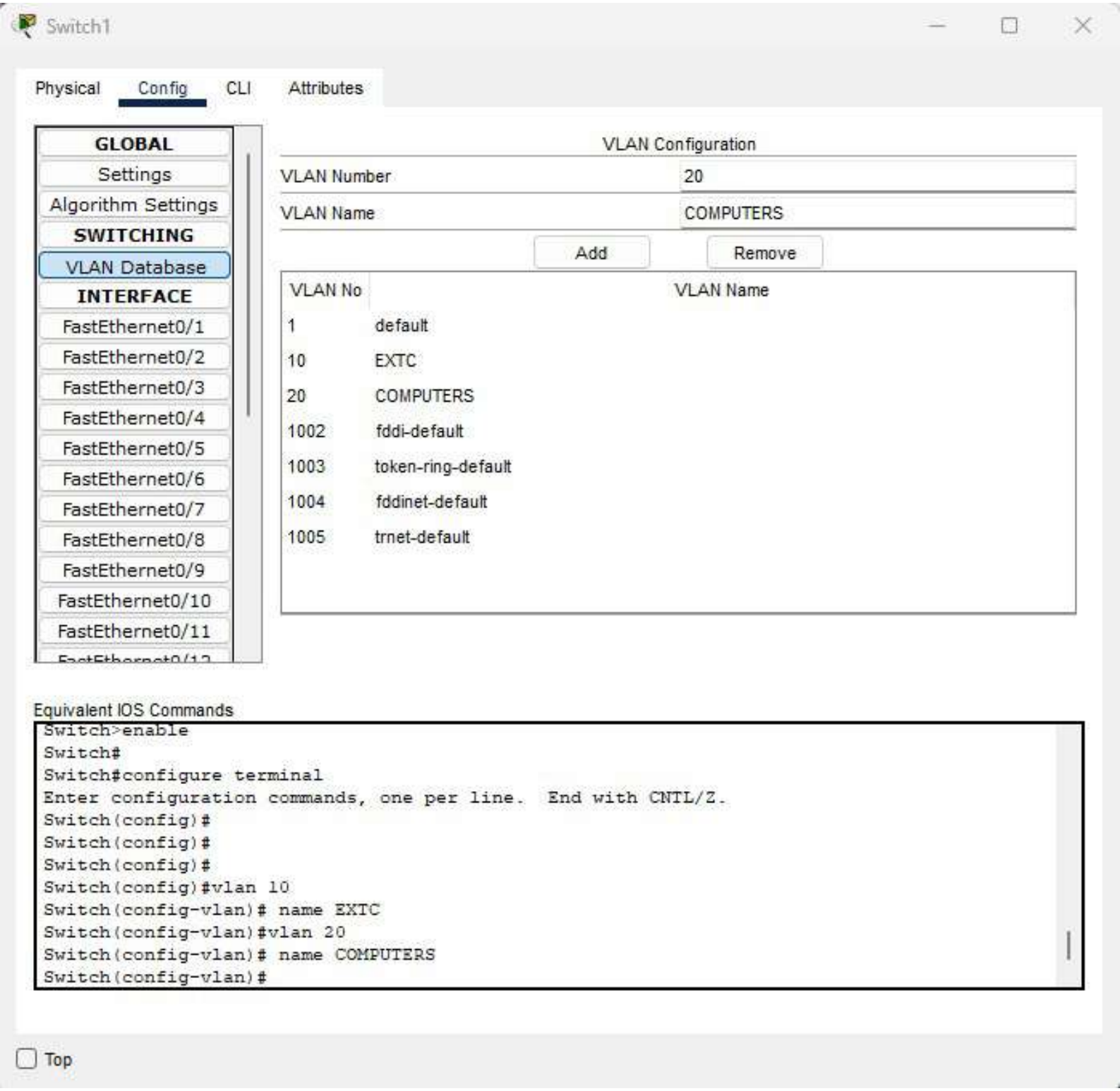
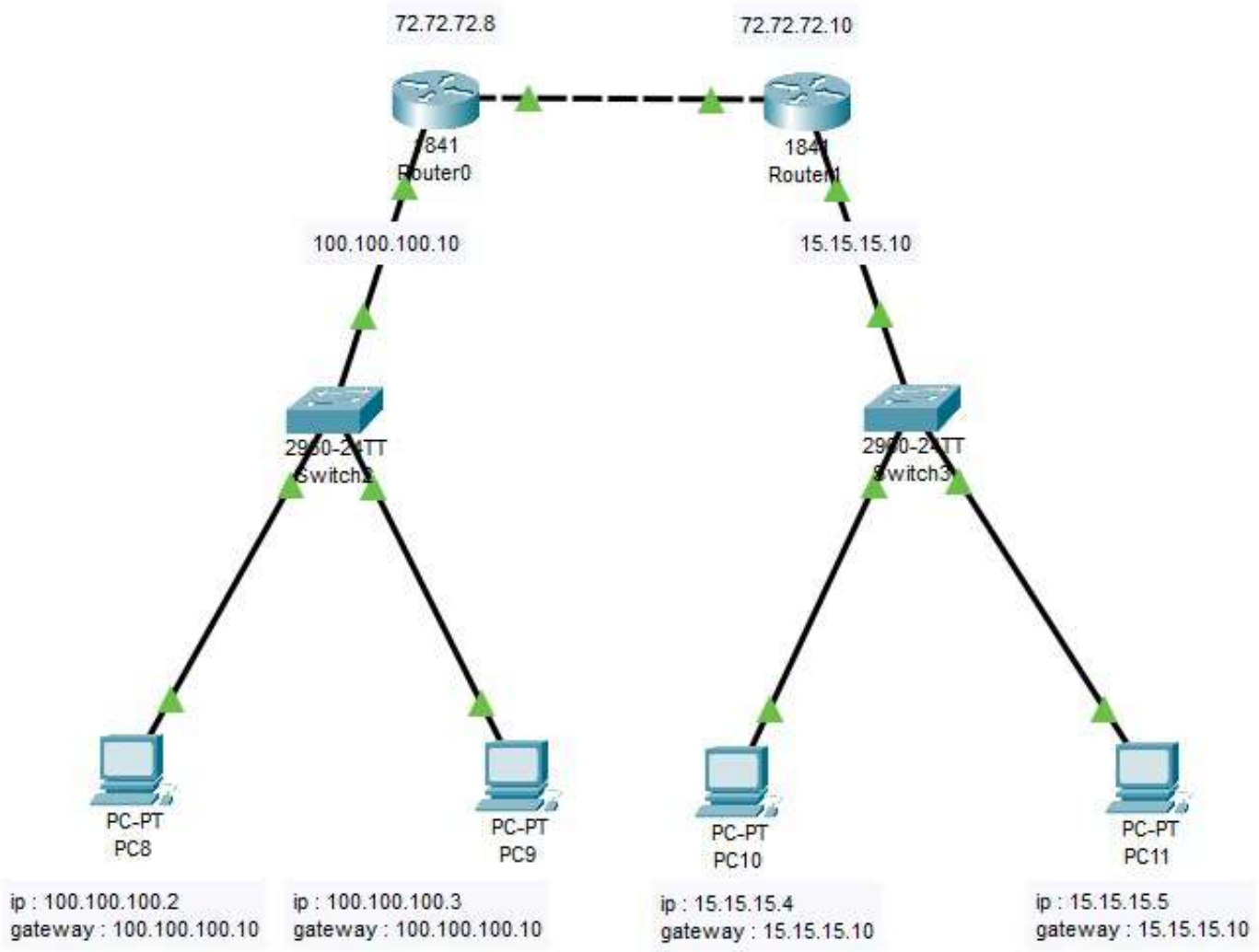
4) LSA (Link State Advertisment) :- Routers exchange LSAs to share information about their link and network topology.

5) VLSM and CIDR :- OSPF is commonly used in enterprise networks and service provider environment for its flexibility and enchancing network scalability.


Cisco Packet Tracer
File Edit Options View Tools Extensions Window Help
Logical
Physical
Root
07:22:30
PC-PT
PC4
12.12.12.5
PC-PT
PC5
12.12.12.4
2960-24TT
Switch1
PC-PT
PC6
12.12.12.3
PC-PT
PC7
12.12.12.2
Time: 00:14:38
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Automatically Choose Connection Type


Cisco Packet Tracer
File Edit Options View Tools Extensions Window Help
Logical
Physical
x: 477, y: 94
Root
12:04:00
VLAN 10
EXTC
PC-PT
PC4
12.12.12.5
PC-PT
PC5
12.12.12.4
2960-24TT
Switch1
PC-PT
PC8
12.12.12.3
PC-PT
PC7
12.12.12.2
VLAN 20
COMPUTERS
Time: 00:23:58
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Automatically Choose Connection Type


Switch1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet0/2
FastEthernet0/3
FastEthernet0/4
FastEthernet0/5
FastEthernet0/6
FastEthernet0/7
FastEthernet0/8
FastEthernet0/9
FastEthernet0/10
FastEthernet0/11
VLAN Configuration
VLAN Number
20
VLAN Name
COMPUTERS
Add
Remove
VLAN No
VLAN Name
1 default
10 EXTC
20 COMPUTERS
1002 fddi-default
1003 token-ring-default
1004 fddinet-default
1005 trnet-default
Equivalent IOS Commands
Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#vlan 10
Switch(config-vlan)# name EXTC
Switch(config-vlan)#vlan 20
Switch(config-vlan)# name COMPUTERS
Switch(config-vlan)#
Top


72.72.72.8
72.72.72.10
1841
Router0
1841
Router1
100.100.100.10
15.15.15.10
2960-24TT
Switch2
2960-24TT
Switch3
PC-PT
PC8
PC-PT
PC9
PC-PT
PC10
PC-PT
PC11
ip : 100.100.100.2
gateway : 100.100.100.10
ip : 100.100.100.3
gateway : 100.100.100.10
ip : 15.15.15.4
gateway : 15.15.15.10
ip : 15.15.15.5
gateway : 15.15.15.10

```
C:\>ping 15.15.15.4

Pinging 15.15.15.4 with 32 bytes of data:

Reply from 100.100.100.10: Destination host unreachable.
Reply from 100.100.100.10: Destination host unreachable.
Reply from 100.100.100.10: Destination host unreachable.
Reply from 100.100.100.10: Destination host unreachable.

Ping statistics for 15.15.15.4:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 15.15.15.4
```

PC6

Physical | Config | Desktop | Programming | Attributes

Command Prompt

```
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                         0.0.0.0

C:\>ping 12.12.12.5

Pinging 12.12.12.5 with 32 bytes of data:

Reply from 12.12.12.5: bytes=32 time=6ms TTL=128
Reply from 12.12.12.5: bytes=32 time=1ms TTL=128
Reply from 12.12.12.5: bytes=32 time<1ms TTL=128
Reply from 12.12.12.5: bytes=32 time<1ms TTL=128

Ping statistics for 12.12.12.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms

C:\>ping 12.12.12.4

Pinging 12.12.12.4 with 32 bytes of data:

Reply from 12.12.12.4: bytes=32 time<1ms TTL=128
Reply from 12.12.12.4: bytes=32 time=1ms TTL=128
Reply from 12.12.12.4: bytes=32 time=1ms TTL=128
Reply from 12.12.12.4: bytes=32 time=1ms TTL=128

Ping statistics for 12.12.12.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 12.12.12.2

Pinging 12.12.12.2 with 32 bytes of data:

Reply from 12.12.12.2: bytes=32 time<1ms TTL=128
Reply from 12.12.12.2: bytes=32 time=1ms TTL=128
Reply from 12.12.12.2: bytes=32 time<1ms TTL=128
Reply from 12.12.12.2: bytes=32 time<1ms TTL=128

Ping statistics for 12.12.12.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

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PC6

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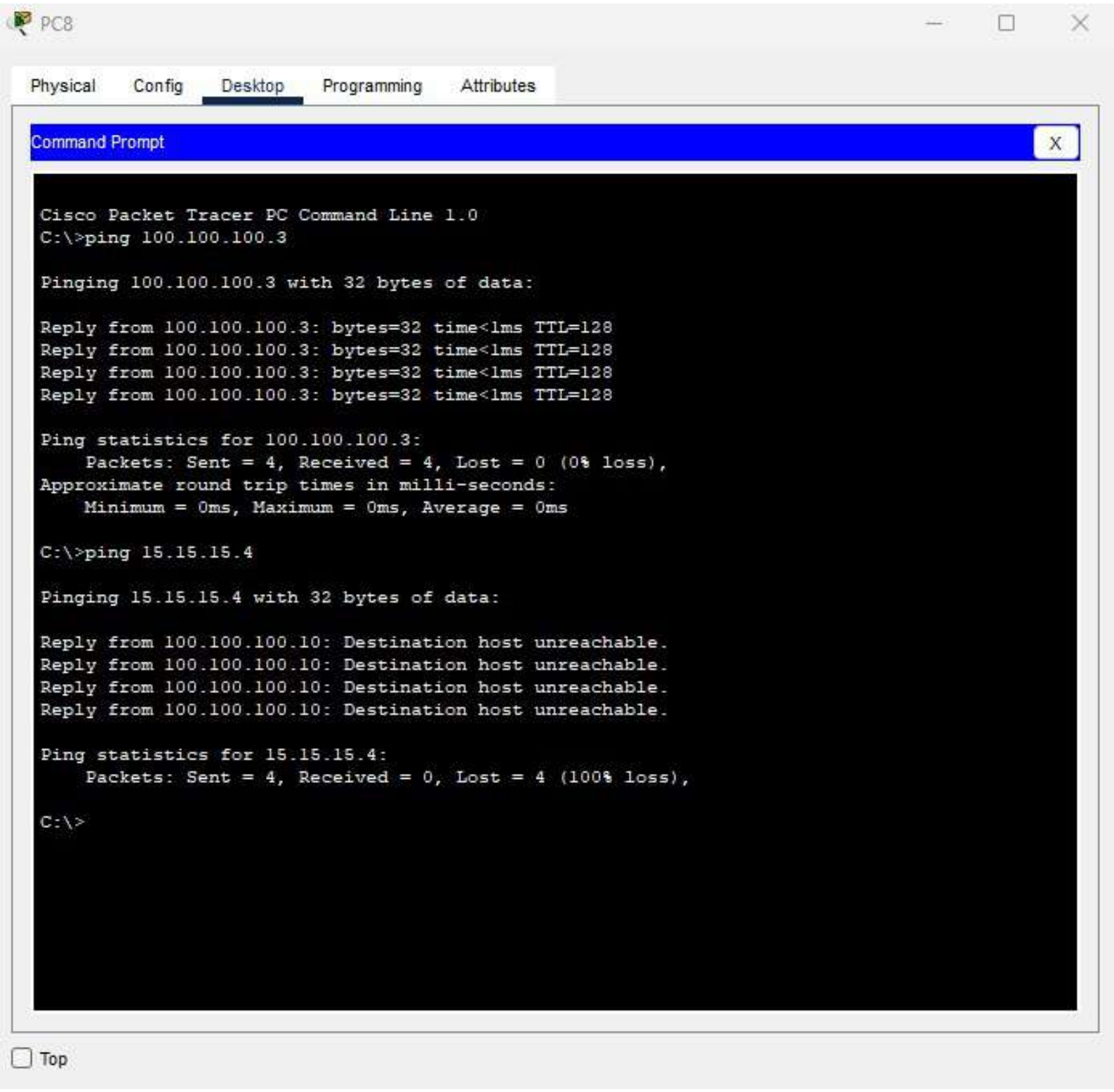
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::202:4AFF:FE0A:7B1
   IPv6 Address.....: ::
   IPv4 Address.....: 12.12.12.3
   Subnet Mask.....: 255.0.0.0
   Default Gateway.....: ::
                         0.0.0.0

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                         0.0.0.0

C:\>ping 12.12.12.5

Pinging 12.12.12.5 with 32 bytes of data:

Reply from 12.12.12.5: bytes=32 time=6ms TTL=128
Reply from 12.12.12.5: bytes=32 time=1ms TTL=128
Reply from 12.12.12.5: bytes=32 time<1ms TTL=128
Reply from 12.12.12.5: bytes=32 time<1ms TTL=128

Ping statistics for 12.12.12.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms

C:\>ping 12.12.12.4

Pinging 12.12.12.4 with 32 bytes of data:

Reply from 12.12.12.4: bytes=32 time<1ms TTL=128
Reply from 12.12.12.4: bytes=32 time=1ms TTL=128
Reply from 12.12.12.4: bytes=32 time=1ms TTL=128
Reply from 12.12.12.4: bytes=32 time=1ms TTL=128

Ping statistics for 12.12.12.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
```

Top


PC8
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 100.100.100.3
Pinging 100.100.100.3 with 32 bytes of data:
Reply from 100.100.100.3: bytes=32 time<1ms TTL=128
Reply from 100.100.100.3: bytes=32 time<1ms TTL=128
Reply from 100.100.100.3: bytes=32 time<1ms TTL=128
Reply from 100.100.100.3: bytes=32 time<1ms TTL=128
Ping statistics for 100.100.100.3:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 15.15.15.4
Pinging 15.15.15.4 with 32 bytes of data:
Reply from 100.100.100.10: Destination host unreachable.
Reply from 100.100.100.10: Destination host unreachable.
Reply from 100.100.100.10: Destination host unreachable.
Reply from 100.100.100.10: Destination host unreachable.
Ping statistics for 15.15.15.4:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
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