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COMPUTER NETWORK

LAB #3

Basic Configuration of a Router

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Table of Contents

List of Outputs

1   Title

Basic Configuration of a Router

2   Objective

- To be familiar with Network Simulation Tool: Packet Tracer

- To be familiar with router, and its different components

- To be familiar with commands for basic configuration of a router

3   Requirement

- Network simulation tool: Packet Tracer

4   Procedure

This do-along Lab session Includes Introduction to Routers its Functions and different components used in Routers . We used CISCO packet tracer software to simulate the setup of router ,switches and some PCs and their connection. We performed the Basic Configuration of Router using terminal and different commands , Changed hostname , set password and virtual terminal and used telnet.

5   Exercises:

5.1   Question -1

What is a router? Explain its role in computer networks.

Answer:

Routers are networking device capable of receiving analyzing and forwarding data packets among the connected computers.At Router the arrived packets are inspected to determine destination address and then with the help of routing table shortest/best route is determined and packets are forwarded .

Figure 1: Working of Routers

Routers are Network layers device having basic functionality of exchanging data packets among the networks.The network can be both Local area or Wide area Network.The received IP packets are forwarded towards their destination using routing Tables , which is updated frequently through communication between routers. Other important roles of router are Load balancing, Firewall,packet filtering etc..

5.2   Question -2

List out the basic configuration commands of router (that you have used in this lab) with their syntax and functions.

- To move to Privileged EXEC mode from User EXEC mode **enable** is used and to return back **disable** is used.

```
AMRIT>enable
AMRIT#disable
AMRIT>
```

Output 1: Router user interface modes

- To configure Router Hostname first we have to be at Privileged EXEC mode followed by **configure terminal** command and then following codes are executed and required hostname : AMRIT is set.

```
PC4>enable
PC4#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

PC4(config)#hostname ?
  WORD  This system's network name

PC4(config)#hostname AMRIT

AMRIT(config)#
```

Output 2: Configuring Hostname

- To configure ethernet interface, Privileged EXEC mode is used one of the important command is **ip address (ip) (subnet)**. All other codes and syntaxes are mentioned below:

```
AMRIT>enable
AMRIT#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

AMRIT(config)#interface ?
  Dialer            Dialer interface
  Dot11Radio        Dot11 interface
  Ethernet          IEEE 802.3
  FastEthernet      FastEthernet IEEE 802.3
  GigabitEthernet   GigabitEthernet IEEE 802.3z
  Loopback          Loopback interface
  Port-channel      Ethernet Channel of interfaces
  Serial            Serial
  Tunnel            Tunnel interface
  Virtual-Template  Virtual Template interface
  Vlan              Catalyst Vlans
  range             interface range command

AMRIT(config)#interface GigabitEthernet0/0
AMRIT(config-if)#ip address 200.10.8.1 255.255.255.0
AMRIT(config-if)#no shutdown
```

Output 3: Configuting Ethernet Interface

5.3   Question -3

Note down the observation of each steps with necessary commands specified in activity D mentioned above and comment on it.

- **Activity D.1**

  First of all router is configured through terminal and all other PCs are configured with the help of IP configuration Option.For left Switches GigabitEthernet 0/0 port is used and configured to **200.10.8.1** and for right GigabitEthernet 0/1 is used and configured to **200.10.9.1**. In all PCs the given ip are assigned with subnet mask **255.255.255.0** and default gateway **0.0.0.0**(default)

```
PC4#disable
PC4>enable
PC4#configure terminal
```

```
Enter configuration commands, one per line.  End with CNTL/Z.

PC4(config)#interface gigabitEthernet0/0
PC4(config-if)#ip address 200.10.8.1 255.255.255.0
PC4(config-if)#no shutdown
PC4(config-if)#exit

PC4(config)#interface gigabitEthernet0/1
PC4(config-if)#ip address 200.10.9.1 255.255.255.0
PC4(config-if)#no shutdown
```

Output 4: Configuring Router for Left and right switches

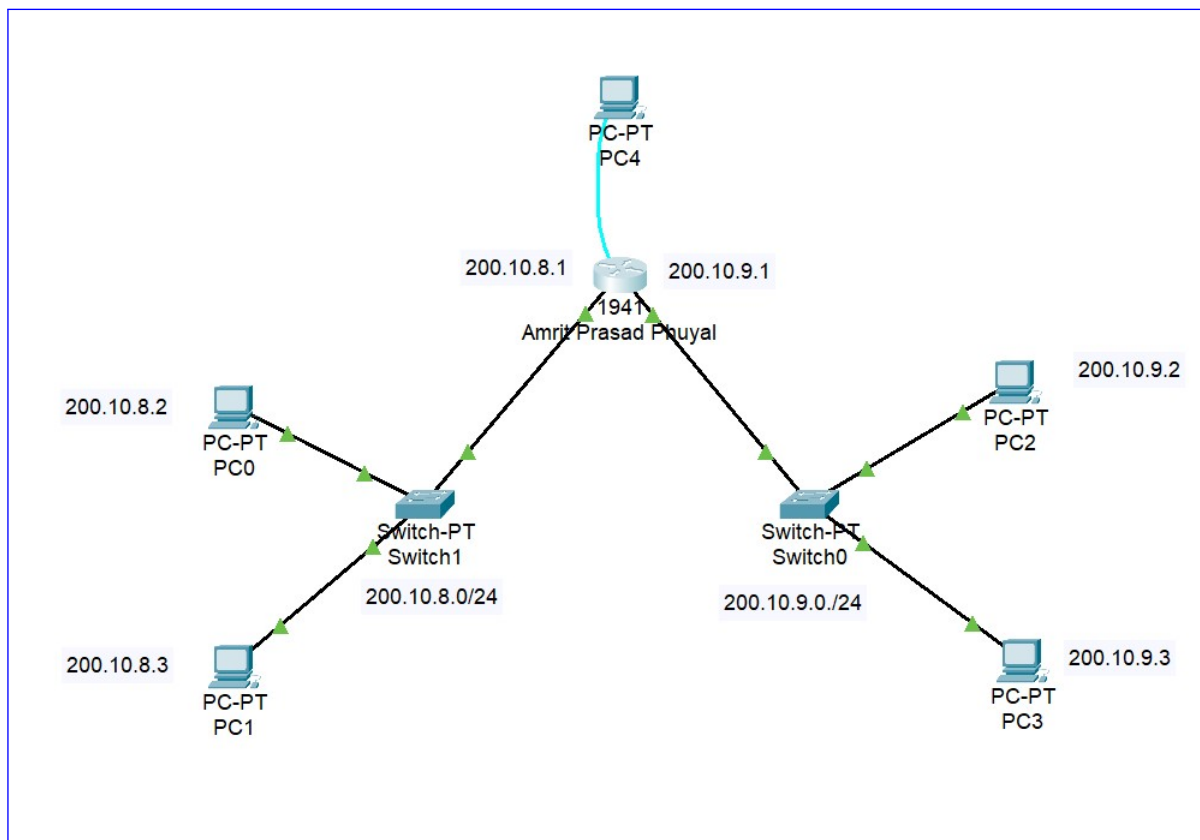And finally the following configuration is achieved.

Figure 2: Basic configuration and Setup

All PCs and Router IP's are listed below.

Name	IP address
GigabitEthernet0/0	200.10.8.1
PC0	200.10.8.2
PC1	200.10.8.3
GigabitEthernet0/1	200.10.9.1
PC2	200.10.9.2
PC3	200.10.9.3

- **Activity D.2**

  Hostname is set to AMRIT as an identifier to the network.

```
PC4>enable
PC4#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

PC4(config)#hostname ?
  WORD  This system's network name

PC4(config)#hostname AMRIT

AMRIT(config)#
```

Output 5: Changing Hostname to AMRIT

- **Activity D.3**

  Performing Ping from PC0 to all other PCs and Router.

  – PCO to GigabitEthernet 0/0

```
C:\>ping 200.10.8.1

Pinging 200.10.8.1 with 32 bytes of data:

Reply from 200.10.8.1: bytes=32 time=1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255

Ping statistics for 200.10.8.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Output 6: Ping PCO to GigabitEthernet 0/0

  – PCO to PC1

```
C:\>ping 200.10.8.3

Pinging 200.10.8.3 with 32 bytes of data:

Reply from 200.10.8.3: bytes=32 time<1ms TTL=128
Reply from 200.10.8.3: bytes=32 time=7ms TTL=128
Reply from 200.10.8.3: bytes=32 time<1ms TTL=128
Reply from 200.10.8.3: bytes=32 time<1ms TTL=128

Ping statistics for 200.10.8.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 1ms
```

Output 7: Ping PCO to PC1

  – PCO to GigabitEthernet 0/1

```
C:\>ping 200.10.9.1

Pinging 200.10.9.1 with 32 bytes of data:

Request timed out.
```

```
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 200.10.9.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Output 8: Ping PCO to GigabitEthernet 0/1

– PCO to PC2

```
C:\>ping 200.10.9.2

Pinging 200.10.9.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 200.10.9.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Output 9: Ping PCO to PC2

– PCO to PC3

```
C:\>ping 200.10.9.3

Pinging 200.10.9.3 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 200.10.9.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Output 10: Ping PCO to PC3

- **Activity D.4**

Performing Ping from PC3 to all other PCs and Router.

– PC3 to GigabitEthernet 0/0

```
C:\>ping 200.10.8.1

Pinging 200.10.8.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 200.10.8.1:
```

```
       Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```
Output 11: Ping PC3 to GigabitEthernet 0/0

– PC3 to PC0

```
C:\>ping 200.10.8.2

Pinging 200.10.8.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 200.10.8.2:
     Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```
Output 12: Ping PC3 to PC0

– PC3 to PC1

```
C:\>ping 200.10.8.3

Pinging 200.10.8.3 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 200.10.8.3:
     Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```
Output 13: Ping PC3 to PC1

– PC3 to GigabitEthernet 0/1

```
C:\>ping 200.10.9.1

Pinging 200.10.9.1 with 32 bytes of data:

Reply from 200.10.9.1: bytes=32 time=1ms TTL=255
Reply from 200.10.9.1: bytes=32 time=3ms TTL=255
Reply from 200.10.9.1: bytes=32 time=1ms TTL=255
Reply from 200.10.9.1: bytes=32 time=1ms TTL=255

Ping statistics for 200.10.9.1:
     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 1ms, Maximum = 3ms, Average = 1ms
```
Output 14: Ping PC3 to GigabitEthernet 0/1

– PC3 to PC2

```
C:\>ping 200.10.9.2

Pinging 200.10.9.2 with 32 bytes of data:

Reply from 200.10.9.2: bytes=32 time=1ms TTL=128
```

```
Reply from 200.10.9.2: bytes=32 time<1ms TTL=128
Reply from 200.10.9.2: bytes=32 time=20ms TTL=128
Reply from 200.10.9.2: bytes=32 time<1ms TTL=128

Ping statistics for 200.10.9.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 20ms, Average = 5ms
```

Output 15: Ping PC3 to PC2

- **Activity D.5**

  Performing Ping from Router to all other PCs.

    – Router to PC0

    ```
    AMRIT>ping 200.10.8.2

    Type escape sequence to abort.
    Sending 5, 100-byte ICMP Echos to 200.10.8.2, timeout is 2
        seconds:
    !!!!!
    Success rate is 100 percent (5/5), round-trip min/avg/max =
        0/0/3 ms
    ```

    Output 16: Router to PC0

    – Router to PC1

    ```
    AMRIT>ping 200.10.8.3

    Type escape sequence to abort.
    Sending 5, 100-byte ICMP Echos to 200.10.8.3, timeout is 2
        seconds:
    !!!!!
    Success rate is 100 percent (5/5), round-trip min/avg/max =
        0/0/3 ms
    ```

    Output 17: Router to PC1

    – Router to PC2

    ```
    AMRIT>ping 200.10.9.2

    Type escape sequence to abort.
    Sending 5, 100-byte ICMP Echos to 200.10.9.2, timeout is 2
        seconds:
    .!!!!
    Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/3
        ms
    ```

    Output 18: Router to PC2

    – Router to PC3

    ```
    AMRIT>ping 200.10.9.3

    Type escape sequence to abort.
    Sending 5, 100-byte ICMP Echos to 200.10.9.3, timeout is 2
        seconds:
    !!!!!
    ```

```
Success rate is 100 percent (5/5), round-trip min/avg/max =
    0/0/3 ms
```
Output 19: Router to PC3

Set the default gateway of PC0 and PC1 as **200.10.8.1** Similarly set the default gateway of PC2 and PC3 as **200.10.9.1** and repeating activity D.3, D.4, D.5 once again

- **Repeating Activity D.3**

  Performing Ping from PC0 to all other PCs and Router.

  – PCO to GigabitEthernet 0/0

```
C:\>ping 200.10.8.1

Pinging 200.10.8.1 with 32 bytes of data:

Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255

Ping statistics for 200.10.8.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```
Output 20: Ping PCO to GigabitEthernet 0/0

  – PCO to PC1

```
C:\>ping 200.10.8.3

Pinging 200.10.8.3 with 32 bytes of data:

Reply from 200.10.8.3: bytes=32 time=1ms TTL=128
Reply from 200.10.8.3: bytes=32 time=4ms TTL=128
Reply from 200.10.8.3: bytes=32 time<1ms TTL=128
Reply from 200.10.8.3: bytes=32 time<1ms TTL=128

Ping statistics for 200.10.8.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms
```
Output 21: Ping PCO to PC1

  – PCO to GigabitEthernet 0/1

```
C:\>ping 200.10.9.1

Pinging 200.10.9.1 with 32 bytes of data:

Reply from 200.10.9.1: bytes=32 time<1ms TTL=255
Reply from 200.10.9.1: bytes=32 time<1ms TTL=255
```

```
Reply from 200.10.9.1: bytes=32 time<1ms TTL=255
Reply from 200.10.9.1: bytes=32 time<1ms TTL=255

Ping statistics for 200.10.9.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Output 22: Ping PCO to GigabitEthernet 0/1

– PCO to PC2

```
C:\>ping 200.10.9.2

Pinging 200.10.9.2 with 32 bytes of data:

Reply from 200.10.9.2: bytes=32 time<1ms TTL=127
Reply from 200.10.9.2: bytes=32 time<1ms TTL=127
Reply from 200.10.9.2: bytes=32 time<1ms TTL=127
Reply from 200.10.9.2: bytes=32 time=1ms TTL=127

Ping statistics for 200.10.9.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Output 23: Ping PCO to PC2

– PCO to PC3

```
C:\>ping 200.10.9.3

Pinging 200.10.9.3 with 32 bytes of data:

Reply from 200.10.9.3: bytes=32 time<1ms TTL=127
Reply from 200.10.9.3: bytes=32 time<1ms TTL=127
Reply from 200.10.9.3: bytes=32 time=3ms TTL=127
Reply from 200.10.9.3: bytes=32 time<1ms TTL=127

Ping statistics for 200.10.9.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 0ms
```

Output 24: Ping PCO to PC3

- **Repeating Activity D.4**

  Performing Ping from PC3 to all other PCs and Router.

    – PC3 to GigabitEthernet 0/0

```
C:\>ping 200.10.8.1

Pinging 200.10.8.1 with 32 bytes of data:

Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
Reply from 200.10.8.1: bytes=32 time<1ms TTL=255
```

```
Ping statistics for 200.10.8.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Output 25: Ping PC3 to GigabitEthernet 0/0

– PC3 to PC0

```
C:\>ping 200.10.8.2

Pinging 200.10.8.2 with 32 bytes of data:

Reply from 200.10.8.2: bytes=32 time=5ms TTL=127
Reply from 200.10.8.2: bytes=32 time=1ms TTL=127
Reply from 200.10.8.2: bytes=32 time<1ms TTL=127
Reply from 200.10.8.2: bytes=32 time=3ms TTL=127

Ping statistics for 200.10.8.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 2ms
```

Output 26: Ping PC3 to PC0

– PC3 to PC1

```
C:\>ping 200.10.8.3

Pinging 200.10.8.3 with 32 bytes of data:

Reply from 200.10.8.3: bytes=32 time<1ms TTL=127
Reply from 200.10.8.3: bytes=32 time=6ms TTL=127
Reply from 200.10.8.3: bytes=32 time<1ms TTL=127
Reply from 200.10.8.3: bytes=32 time=1ms TTL=127

Ping statistics for 200.10.8.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms
```

Output 27: Ping PC3 to PC1

– PC3 to GigabitEthernet 0/1

```
C:\>ping 200.10.9.1

Pinging 200.10.9.1 with 32 bytes of data:

Reply from 200.10.9.1: bytes=32 time=1ms TTL=255
Reply from 200.10.9.1: bytes=32 time<1ms TTL=255
Reply from 200.10.9.1: bytes=32 time<1ms TTL=255
Reply from 200.10.9.1: bytes=32 time<1ms TTL=255

Ping statistics for 200.10.9.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Output 28: Ping PC3 to GigabitEthernet 0/1

– PC3 to PC2

```
C:\>ping 200.10.9.2

Pinging 200.10.9.2 with 32 bytes of data:

Reply from 200.10.9.2: bytes=32 time=12ms TTL=128
Reply from 200.10.9.2: bytes=32 time<1ms TTL=128
Reply from 200.10.9.2: bytes=32 time<1ms TTL=128
Reply from 200.10.9.2: bytes=32 time<1ms TTL=128

Ping statistics for 200.10.9.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 3ms
```

Output 29: Ping PC3 to PC2

- **Repeating Activity D.5**

  Performing Ping from Router to all other PCs.

    – Router to PC0

```
AMRIT>ping 200.10.8.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.10.8.2, timeout is 2
    seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
    0/0/1 ms
```

Output 30: Router to PC0

– Router to PC1

```
AMRIT>ping 200.10.8.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.10.8.3, timeout is 2
    seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
    0/0/1 ms
```

Output 31: Router to PC1

– Router to PC2

```
AMRIT>ping 200.10.9.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.10.9.2, timeout is 2
    seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
    0/0/1 ms
```

Output 32: Router to PC2

– Router to PC3

```
AMRIT>ping 200.10.9.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.10.9.3, timeout is 2
   seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
   0/1/3 ms
```

Output 33: Router to PC3

Default gateway is the Hardware node that facilitate the connection betweens and among the networks. Previously the default gateway for device connected to left switch was **0.0.0.0** though it is physically connected to GigabitEthernet 0/0 port of Router having assigned ip **200.10.8.1** and similarly for right side the default gateway was **0.0.0.0** though it is physically connected to GigabitEthernet 0/1 port of Router having assigned ip **200.10.9.1**

Due to this problem PC0 can Ping PC1 But Unable to ping router or any devices on right sides (PC2,PC3), as without proper Default Gateway PC0 has no idea how it can connect to a totally different network at right hand side .

BUT after changes to Default gateway was made all PCs can Ping each other and Router.

6   Conclusion

Lab exercises includes Basic Configuration, Changing Hostname ,Ping and Information about importance of Default gateway(Router) in Network . While pinging PC3 fom PC0 with Default Gateway **0.0.0.0** there was error as Packets cant reach the destination because the sender PC0 has wrong information about Path to be followed to reach PC3. Soon after the Default Gateway was corrected all PCs and Router can Ping Each other. The Packet tracer file is attached with this report.