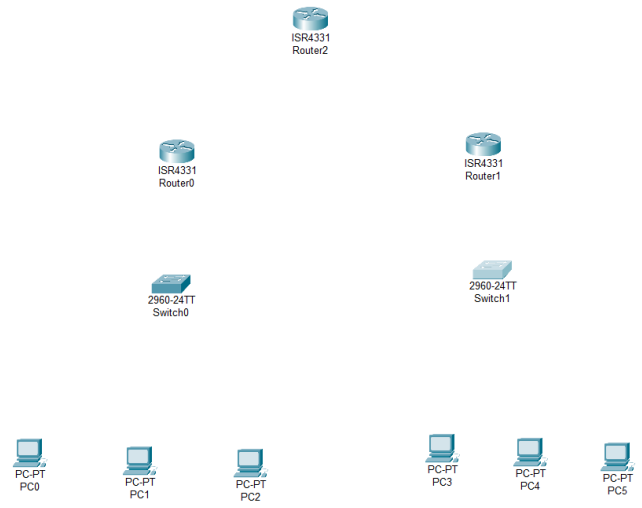
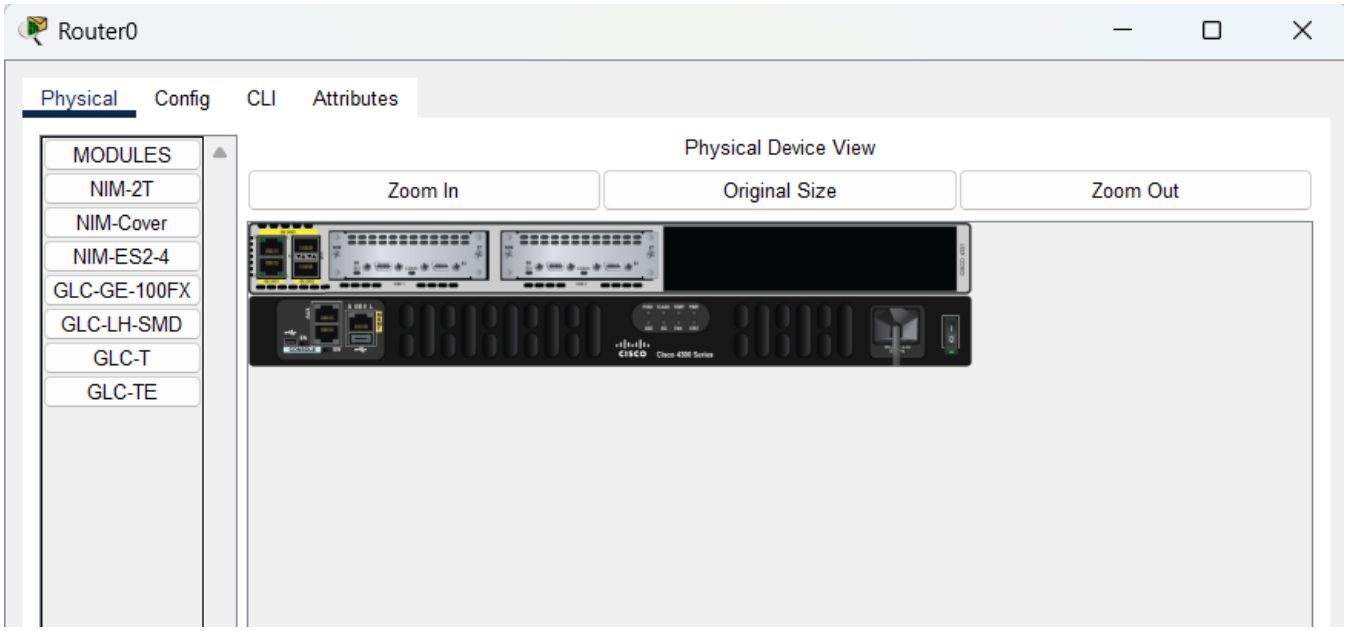
Marwadi University Marwadi Chandarana Group	**Marwadi University** **Faculty of Engineering and Technology** **Department of Information and Communication Technology**	
Subject: Computer Networks (01CT0503)	**Aim: Design WAN as per the given scenario and get the connectivity between all PCs using BGP.**	
Experiment No: 08	**Date: 24-10-2024**	**Enrolment No: 92200133030**

Aim: Design WAN as per the given scenario and get the connectivity between all PCs using BGP

Step – 1:- Open the Cisco Packet tracer and take three routers, two switch and six PC's.



Step – 2 :- To long distance communication we need to connect router using Serial DTE cable. For the serial port we have to open router turn off it and drag and drop WIC-1T on router and turn on router.



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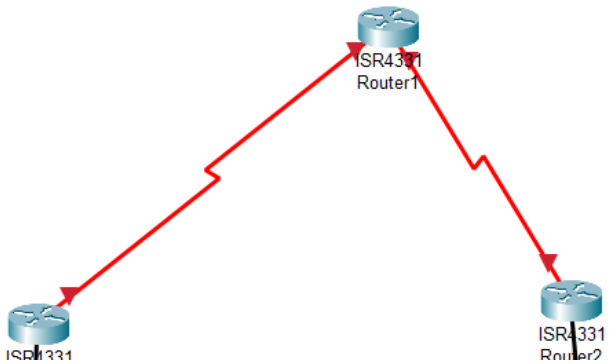
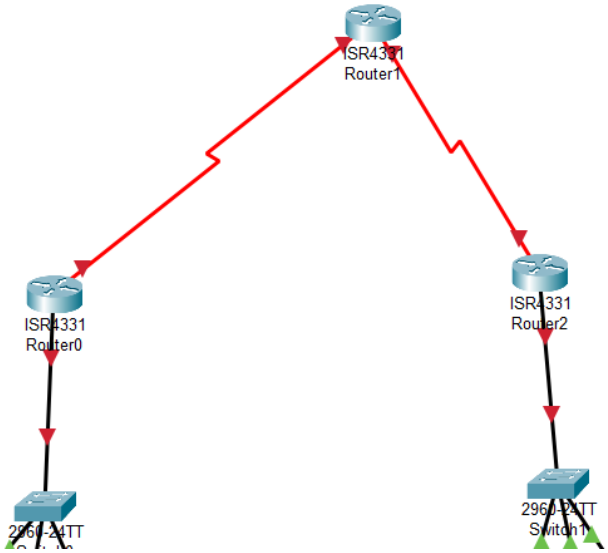
Step – 3 :- Now Connect Two Routers Using Serial DTE Cable.



Step – 4 :- Now Connect the Switches with routers using Copper Straight through cable In GigaEthernet Port.



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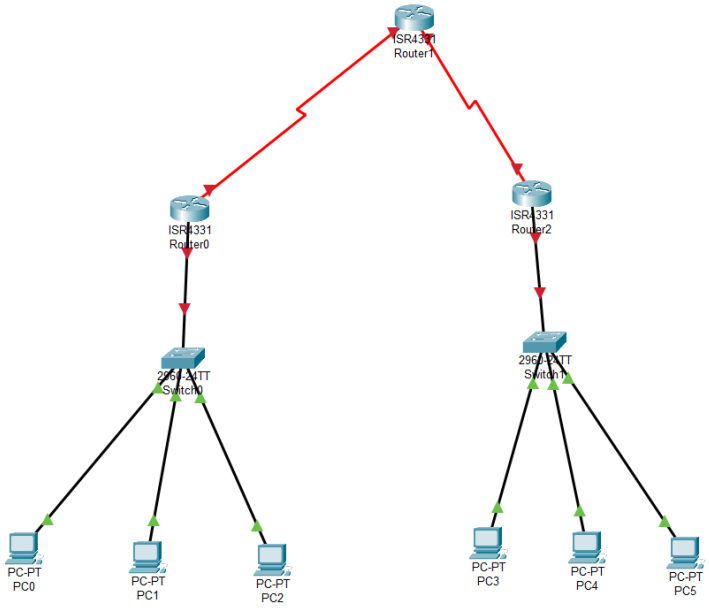
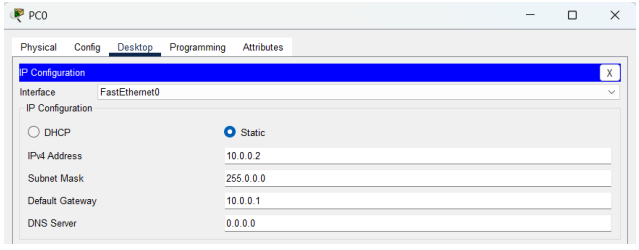
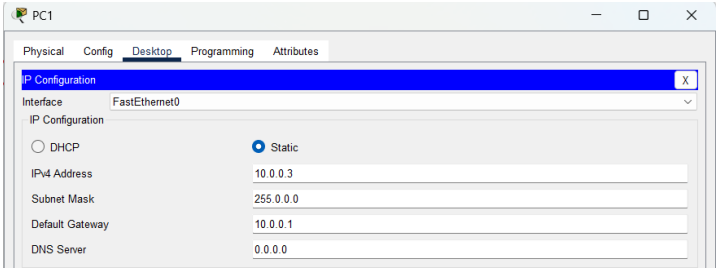
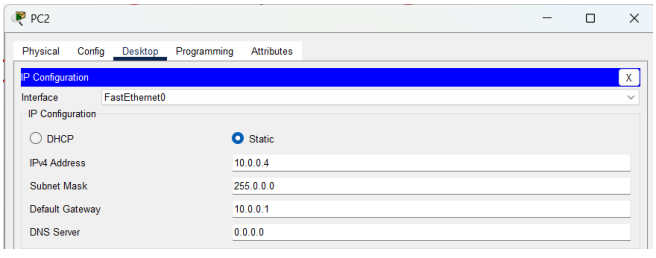
Step – 5 :- Now Connect PC's with Switches using copper Straight through cable.

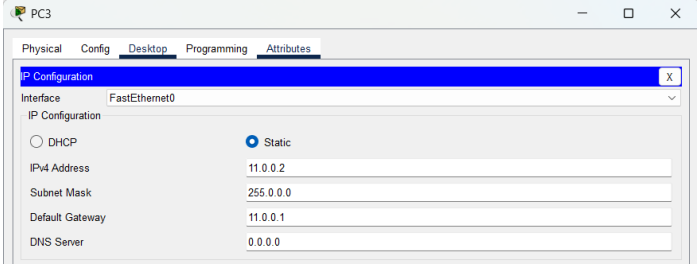


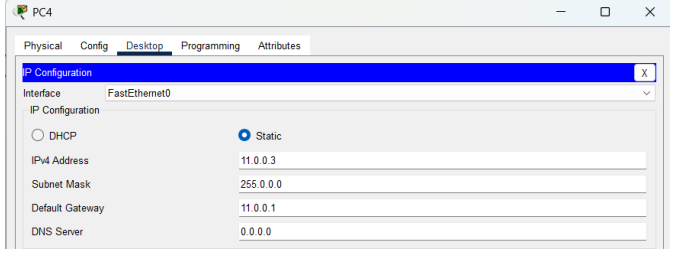
Step – 6:- Now assign the IP address And Subnet mask and Gateway to all PC's.

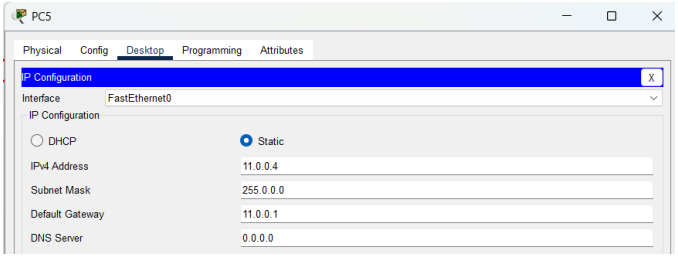












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Step – 7 :- Assign IP Address to Routers

Router – 0 :-

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
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 GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 12.0.0.2 255.0.0.0
Router(config-if)#ip address 12.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
```

Router – 1 :-

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 12.0.0.1 255.0.0.0
Router(config-if)#ip address 12.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/2/0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
ip address 13.0.0.1 255.0.0.0
Router(config-if)#ip address 13.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
```

Router – 2 :-

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial0/2/0
Router(config-if)#ip address 13.0.0.2 255.0.0.0
Router(config-if)#ip address 13.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/2/0, changed state to up

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up
ip address 11.0.0.1 255.0.0.0
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 GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
```

Step – 8 :- now we will configure router for BGPP Protocol.

Router – 0

1. **router bgp 10**
   This initializes a BGP process with AS number 10. This AS will be the local router's AS number.
2. **bgp router-id 1.1.1.1**
   This sets the BGP router ID to 1.1.1.1. The router ID is a unique identifier for the router in the BGP network and is typically set to an IP address that is stable and does not change (like a loopback address).
3. **neighbor 12.0.0.1 remote-as 30**
   This defines a BGP neighbor with IP 12.0.0.1 in AS 30. This means the router will establish a BGP session with a peer located in AS 30.
4. **network 10.0.0.0 mask 255.0.0.0**
   This advertises the network 10.0.0.0/8 into the BGP routing table. BGP will only advertise this network if the router has an exact match for it in its routing table (e.g., from a static route or another routing protocol).
5. **network 12.0.0.0 mask 255.0.0.0**
   This advertises the network 12.0.0.0/8 into the BGP routing table under the same conditions as above.

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```
Router>
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to

Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router bgp 10
Router(config-router)#bgp roueter-id 1.1.1.1
                      ^
% Invalid input detected at '^' marker.

Router(config-router)#bgp router-id 1.1.1.1
Router(config-router)#neighbor 12.0.0.1 remote-as 30
Router(config-router)#network 10.0.0.0 mask  255.0.0.0
Router(config-router)#network 12.0.0.0 mask 255.0.0.0
Router(config-router)#exiit
                     ^
% Invalid input detected at '^' marker.

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

Router – 1 :-

1) **bgp router-id 3.3.3.3**

- This sets the BGP router ID to 3.3.3.3.
- The router ID is a unique 32-bit identifier, often set to a loopback IP address for stability.
- It doesn't have to belong to a network advertised by BGP, but it should be unique within the BGP topology.

2) **neighbor 12.0.0.1 remote-as 10**

- Configures a BGP neighbor with IP 12.0.0.1 in AS 10.
- This establishes a BGP session with a peer that is part of the same AS as this router.

3) **neighbor 13.0.0.1 remote-as 20**

- Configures a BGP neighbor with IP 13.0.0.1 in AS 20.
- This establishes a BGP session with a peer in a different AS.

```
Router(config-if)#exit
Router(config)#router bgp 30
Router(config-router)#bgp router-id 3.3.3.3
Router(config-router)#neighbor 12.0.0.1 remote-as 10
Router(config-router)#
% Cannot configure the local system as neighbor


Router(config-router)#neighbor 13.0.0.1 remote-as 20
Router(config-router)#
% Cannot configure the local system as neighbor


Router(config-router)#neighbor 13.0.0.2 remote-as 20
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 13.0.0.2 Up

Router(config-router)#neighbor 12.0.0.2 remote-as 10
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 12.0.0.2 Up

Router(config-router)#
```

Router-2 :-

1) **router bgp 20**

- Starts the BGP process for Autonomous System (AS) 20.
- This defines the local router as part of AS 20.

2) **bgp router-id 2.2.2.2**

- Sets the BGP router ID to 2.2.2.2.
- The router ID is a unique identifier (usually a loopback IP) for this BGP process.

3) **neighbor 13.0.0.1 remote-as 30**

- Configures a neighbor with IP 13.0.0.1 in AS 30.
- This establishes an EBGP (External BGP) session between AS 20 and AS 30.

4) **network 11.0.0.0 mask 255.0.0.0**

- Advertises the 11.0.0.0/8 network from the local routing table into BGP.

5) **network 13.0.0.0 mask 255.0.0.0**

- Advertises the 13.0.0.0/8 network from the local routing table into BGP.

```
Router(config-if)#exit
Router(config)#router bgp 20
Router(config-router)#bgp router-id 2.2.2.2
Router(config-router)#neighbor 13.0.0.1 remote-as 30
Router(config-router)#network  11.0.0.0 mask 255.0.0.0
Router(config-router)#network   13.0.0.0 mask 255.0.0
                                          ^
% Invalid input detected at '^' marker.

Router(config-router)#network   13.0.0.0 mask 255.0.0.0
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 13.0.0.1 Up
```

Step – 9 :- now we will check the BGP Neighbour using the command **show ip bgp neighbor**

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```
Router(config)#do show ip bgp neighbor
BGP neighbor is 13.0.0.1,  remote AS 30, external link
  BGP version 4, remote router ID 3.3.3.3
  BGP state = Established, up for 00:08:46
  Last read 00:08:46, last write 00:08:46, hold time is 180, keepalive interval i
  Neighbor capabilities:
    Route refresh: advertised and received(new)
    Address family IPv4 Unicast: advertised and received
  Message statistics:
    InQ depth is 0
    OutQ depth is 0

                         Sent       Rcvd
    Opens:                  1          1
    Notifications:          0          0
    Updates:                2          2
    Keepalives:             9          9
    Route Refresh:          0          0
    Total:                 12         12
  Default minimum time between advertisements runs is 30 seconds

 For address family: IPv4 Unicast
  BGP table version 5, neighbor version 6/0
 --More--
```

Step – 10 :- now we will check summary of bgp using the command **show ip bgp summary**

```
Router#show ip bgp summary
Router#show ip bgp summary
BGP router identifier 2.2.2.2, local AS number 20
BGP table version is 5, main routing table version 6
4 network entries using 528 bytes of memory
4 path entries using 208 bytes of memory
2/2 BGP path/bestpath attribute entries using 368 bytes of memory
3 BGP AS-PATH entries using 72 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory
BGP using 1208 total bytes of memory
BGP activity 4/0 prefixes, 4/0 paths, scan interval 60 secs

Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
13.0.0.1        4    30      15      13        5    0    0 00:11:04        4

Router#
```

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Step – 11 :- now we will check the connection using the ping dest_ip command

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 11.0.0.4

Pinging 11.0.0.4 with 32 bytes of data:

Request timed out.
Reply from 11.0.0.4: bytes=32 time=27ms TTL=125
Reply from 11.0.0.4: bytes=32 time=37ms TTL=125
Reply from 11.0.0.4: bytes=32 time=19ms TTL=125

Ping statistics for 11.0.0.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 19ms, Maximum = 37ms, Average = 27ms

C:\>
```

Conclusion :-

In this Experiment of BGP we connect all the PC's using BGP Router from three Autonomous system AS 10 , AS 20 , AS 30. Every router has its unique id. AS10 was connected to AS30 via 12.0.0.1 and AS20 is connected to AS30 via 13.0.0.1. i learned the new commands bgp router id to give the id to the router neighbor 12.0.0.1 remote-as 30 to define the neighbour network 11.0.0.0 mask 255.0.0.0 Advertises the 11.0.0.0/8 network from the local routing table into BGP.show ip bgp neighbor to get all the neighbors and show ip bgp summary to get the summary.