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***Practical 10***

***Aim: Create a network and implement eBGP***

**eBGP:** eBGP (External Border Gateway Protocol) is a type of Border Gateway Protocol (BGP) used to exchange routing information between different autonomous systems (ASes) on the internet.

1. What is BGP?

- BGP is a standardized exterior gateway protocol used to exchange routing information across the internet.
- It is a path vector protocol, which makes routing decisions based on paths, network policies, and rules.

2. What is an Autonomous System (AS)?

- An AS is a collection of IP networks and routers under a single administrative domain that presents a common routing policy.
- Each AS is identified by a unique Autonomous System Number (ASN).

3. What is eBGP?

- eBGP (External BGP) is used between routers in different ASes.
- For example, an ISP's router communicating with another ISP or with a large enterprise is an eBGP session.

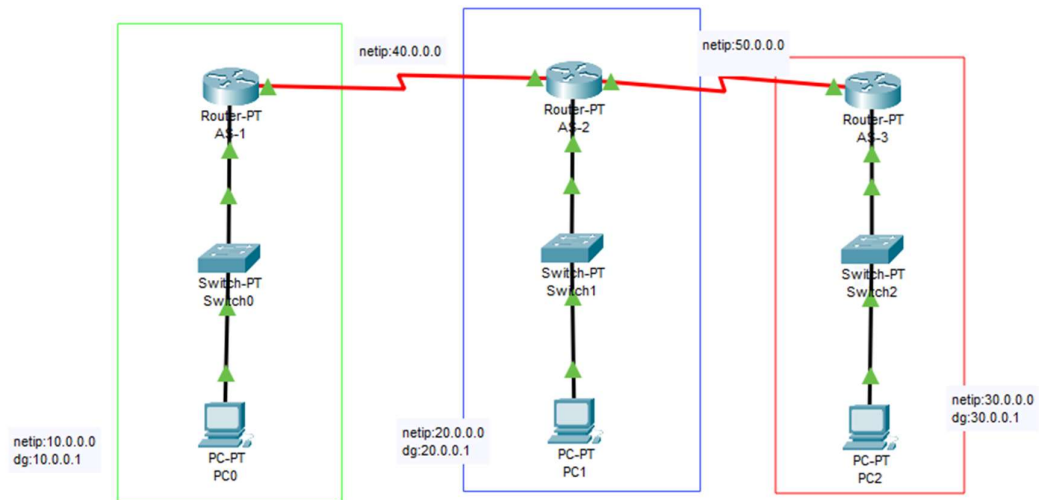
**iBGP:** iBGP (Internal Border Gateway Protocol) is a type of BGP (Border Gateway Protocol) used to exchange routing information within the same Autonomous System (AS).

1. What is iBGP?

- **iBGP** is used between routers that **belong to the same AS**.
- It allows routers inside an AS to **share routes learned via eBGP** with each other.
- Like eBGP, iBGP also uses **TCP port 179** for communication.

## iBGP vs eBGP

Feature	iBGP	eBGP
Used Between	Routers in the <b>same AS</b>	Routers in <b>different ASes</b>
Default TTL	255	1
AS_PATH Behavior	Not modified	Adds local AS to AS_PATH
Next-hop Attribute	<b>Preserved</b>	Usually <b>changed to sender IP</b>
Full Mesh Requirement	Yes (unless route reflectors or confederations are used)	No
Purpose	Internal route distribution	Inter-AS route exchange



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Failed	PC1	PC2	ICMP	Yellow	0.000	N	7	(ec
	Successful	PC1	PC2	ICMP	Blue	0.000	N	8	(ec
	Successful	PC0	PC1	ICMP	Green	0.000	N	9	(ec

## Router Configuration AS-1

AS-1

Physical

Config

CLI

Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet0/0

FastEthernet1/0

Serial2/0

Serial3/0

FastEthernet4/0

FastEthernet5/0

FastEthernet0/0

Port Status

Bandwidth

Duplex

MAC Address

IP Configuration

IPv4 Address

Subnet Mask

Tx Ring Limit

☒ On

☒ 100 Mbps ☐ 10 Mbps ☒ Auto

☐ Half Duplex ☒ Full Duplex ☒ Auto

IP Configuration

IPv4 Address

Subnet Mask

Equivalent IOS Commands

Press RETURN to get started!

Router>enable

Router#

Router#configure terminal

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

Router(config)#interface FastEthernet0/0

Router(config-if)#

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AS-1

PhysicalConfigCLIAttributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet0/0

FastEthernet1/0

Serial2/0

Serial3/0

FastEthernet4/0

FastEthernet5/0

Serial2/0

Port Status

Duplex

Clock Rate

IP Configuration

IPv4 Address

Subnet Mask

Tx Ring Limit

Full Duplex

1200

40.0.0.1

255.0.0.0

10

On

Equivalent IOS Commands

Press RETURN to get started!

Router>enable

Router#

Router#configure terminal

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

Router(config)#interface FastEthernet0/0

Router(config-if)#

Router(config-if)#exit

Router(config)#interface Serial2/0

Router(config-if)#

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AS-1

PhysicalConfigCLIAttributes

IOS Command Line Interface

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#interface Serial2/0
Router(config-if)#no shutdown
Router(config-if)#ip address 40.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
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
ip address 10.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#router bgp
% Incomplete command.
Router(config)#router bgp ?
<1-65535> Autonomous system number
```

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## Router Configuration of AS-2

AS-2

Physical Config CLI Attributes

**GLOBAL**

- Settings
- Algorithm Settings

**ROUTING**

- Static
- RIP

**INTERFACE**

- FastEthernet0/0
- FastEthernet1/0
- Serial2/0
- Serial3/0
- FastEthernet4/0
- FastEthernet5/0

**FastEthernet0/0**

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0001.436D.EDA3

IP Configuration

IPv4 Address 20.0.0.1

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

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Physical **Config** CLI Attributes

Serial2/0	
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input type="radio"/> Full Duplex
Clock Rate	2000000
IP Configuration	
IPv4 Address	40.0.0.2
Subnet Mask	255.0.0.0
Tx Ring Limit	10

## Equivalent IOS Commands

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
```

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Physical Config CLI Attributes

Serial3/0	
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input type="radio"/> Full Duplex
Clock Rate	1200
IP Configuration	
IPv4 Address	50.0.0.1
Subnet Mask	255.0.0.0
Tx Ring Limit	10

## Equivalent IOS Commands

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
```

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## IOS Command Line Interface

```
Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#ip address 40.0.0.2 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 50.0.0.1 255.0.0.0
Router(config-if)#ip address 50.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#exit
Router(config)#router bgp 2
Router(config-router)#network 20.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#neighbor 40.0.0.1 remote-as 1
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 40.0.0.1 Up

Router(config-router)#neighbor 50.0.0.2 remote-as 3
Router(config-router)#ex
Router(config)#%BGP-5-ADJCHANGE: neighbor 50.0.0.2 Up
```

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## Router Configuration of AS-3

AS-3

Physical Config CLI Attributes

**GLOBAL**

- Settings
- Algorithm Settings

**ROUTING**

- Static
- RIP

**INTERFACE**

- FastEthernet0/0
- FastEthernet1/0
- Serial2/0
- Serial3/0
- FastEthernet4/0
- FastEthernet5/0

**FastEthernet0/0**

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0050.0F6C.669A

IP Configuration

IPv4 Address 30.0.0.1

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
% Invalid input detected at '^' marker.

Router(config)#router bgp 3
Router(config-router)#network 30.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#neighbor 50.0.0.1 remote-as 2
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 50.0.0.1 Up

Router(config-router)#ex
Router(config)#
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

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Physical Config CLI Attributes

## IOS Command Line Interface

Press RETURN to get started.

Press RETURN to get started!

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#network 30.0.0.0
      ^
% Invalid input detected at '^' marker.

Router(config)#router bgp 3
Router(config-router)#network 30.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#neighbor 50.0.0.1 remote-as 2
Router(config-router)#%BGP-5-ADJCHANGE: neighbor 50.0.0.1 Up

Router(config-router)#ex
Router(config)#
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

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## ***Practical 11:***


***Aim: Create a MAC protocol for wireless network***

***What is a MAC ID (MAC Address)?***

MAC ID (also called MAC Address) stands for Media Access Control address.

Key Points:



- It is a unique identifier assigned to a network interface card (NIC) of a device (like a computer, smartphone, router, etc.).
- Used at the Data Link Layer (Layer 2) of the OSI model.
- MAC addresses are hardcoded into the hardware by the manufacturer but can sometimes be changed (called MAC spoofing).

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What is Wireless MAC Filtering?

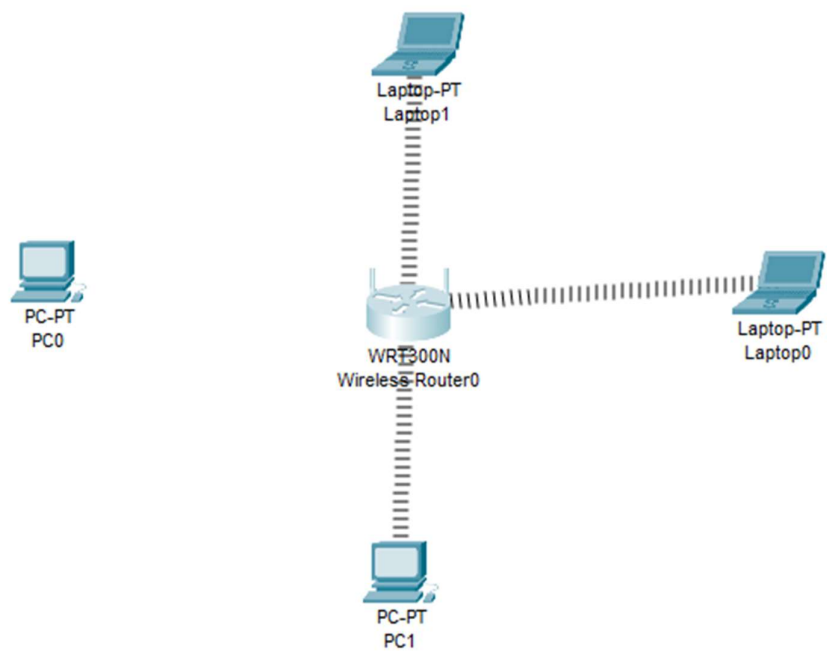
Wireless MAC Filtering is a security feature on routers or access points that controls which devices can connect to the Wi-Fi network based on their MAC addresses.

How It Works:

- The router keeps a list of allowed or denied MAC addresses.
- When a device tries to connect to the Wi-Fi:
  - If its MAC address is on the allow list →  It connects.
  - If it's on a deny list →  It's blocked.

Types of MAC Filtering:

1. Allow list (Whitelist):
  - Only devices on this list are allowed to connect.
  - All others are denied.
2. Deny list (Blacklist):
  - Devices on this list are blocked.
  - All others can connect.



PC0

Physical

Config

Desktop

Programming

Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status

☒ On

Bandwidth

300 Mbps

MAC Address

0001.6319.7E56

SSID

Default

Authentication

☒ Disabled

☐ WEP

WEP Key

☐ WPA-PSK

☐ WPA2-PSK

PSK Pass Phrase

☐ WPA

☐ WPA2

User ID

☐ 802.1X

Method:

MD5

Password

User Name

Password

Encryption Type

Disabled

IP Configuration

☒ DHCP

☐ Static

IPv4 Address

192.168.0.100

Subnet Mask

255.255.255.0

IPv6 Configuration

☒ Automatic

☐ Static

IPv6 Address

Link Local Address

FE80::201:63FF:FE19:7E56

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Wireless Router0

PhysicalConfigGUIAttributes

Wireless-N Broadband Router

Firmware Version: v0.93.3

WirelessSetupWirelessSecurityAccess RestrictionsApplications & GamingWireless-N Broadband RouterAdministrationStatusWRT300N

Basic Wireless SettingsWireless SecurityGuest NetworkWireless MAC FilterAdvanced Wireless Settings

Wireless MAC Filter

Wireless Port: 2.4G

☒ Enabled☐ Disabled

☒ Prevent PCs listed below from accessing the wireless network☐ Permit PCs listed below to access wireless network

Wireless Client List

MAC Address filter list

MAC 01:	00:01:63:19:7E:56	MAC 26:	00:00:00:00:00:00
MAC 02:	00:00:00:00:00:00	MAC 27:	00:00:00:00:00:00
MAC 03:	00:00:00:00:00:00	MAC 28:	00:00:00:00:00:00
MAC 04:	00:00:00:00:00:00	MAC 29:	00:00:00:00:00:00

Help...