⭐ Lecture 12 – Passive Interface,Default Routing,Wildcard Mask,EIGRP+Lab

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🔶 1. Passive Interface (VERY IMPORTANT)

✅ What is a Passive Interface?

A passive interface is a router interface that:

- ❌ **Does NOT send routing updates**
- ✅ **Can still receive routing updates**
- ✅ **Keeps the network advertised through other active interfaces**

💡 Why use it?

- 🔒 **Security** – Prevent routing updates on untrusted networks
- 📉 **Reduce unnecessary routing traffic**
- 🚫 **Prevent unwanted neighbor relationships**

🔧 Cisco Command

Example with RIP:

Router(config)# router rip

Router(config-router)# passive-interface FastEthernet0/0

👉 RIP/OSPF/EIGRP **stop sending updates out of that interface**.

🏠 Real Life Example

Imagine your router connected to a LAN with 50 PCs.
You **don't want routing updates going to all PCs**, right?

➞ So you use **passive-interface LAN-port**.

🔶 2. Default Routing (0.0.0.0/0)

✅ What is Default Routing?

A routing method in which **all unknown destination traffic** goes to a **default gateway**.

📌 When is it used?

- Small networks
- Home networks
- Branch office routers
- When Internet is the only exit path

🔧 Command:

ip route 0.0.0.0 0.0.0.0 <next-hop IP>

🔥 Example

Your router → ISP router (192.168.1.1)

ip route 0.0.0.0 0.0.0.0 192.168.1.1

🏠 Real-Life Example

Your home WiFi router:
Anything outside your network → **Your ISP default route**.

🔶 3. Wildcard Mask

✅ What is a Wildcard Mask?

Used in Cisco for:

- EIGRP
- OSPF
- ACLs

🎯 Wildcard mask = opposite of subnet mask

Subnet Mask: 255.255.255.0
Wildcard Mask: 0.0.0.255

✓ **Meaning:**

- 0 → MUST match
- 1/255 → CAN vary

🔶 4. EIGRP (Enhanced Interior Gateway Routing Protocol)

⭐ What is EIGRP?

A Cisco proprietary advanced distance-vector routing protocol.

💖 Why is it powerful?

- Fast convergence
- Supports unequal cost load balancing
- Reliable updates
- Uses DUAL algorithm

⚙ How EIGRP Works (Step-by-Step)

1️⃣ Neighbor Discovery (Hello Packets)

Routers send **Hello packets** to 224.0.0.10
→ If they match parameters → they become neighbors.

2️⃣ Exchange Topology Table

Routers share **Update packets** with full routing info.

3️⃣ Calculate Best Path (DUAL Algorithm)

DUAL checks:

- **Successor** = Best path
- **Feasible Successor** = Backup path

🛗 Convergence

If a route fails:

- Router checks for feasible successor
- If available → fast switch
- If not → send queries

🔥 EIGRP Multicast IP: 224.0.0.10

Used for **Hello, Update, Query, Reply**.

❓ Why multicast?

- One packet → all neighbors
- Efficient
- Saves bandwidth

🔶 Bandwidth-Based Path Selection

EIGRP uses **minimum bandwidth** along the path to calculate metrics.

💡 *"Jaha bandwidth jyada hota hai(matlab speed jyada hoti hai), waha EIGRP best path consider karta hai."*

🔶 ECMP (Equal Cost Multi Path)

If two paths have **same metric**, EIGRP will load-balance.

🔶 UNEQUAL Cost Multi Path (Variance)

EIGRP can load-balance across **different metrics** using:

variance <value>

🔶 EIGRP Packet Types

Packet	Purpose
👋 Hello	Discover + maintain neighbors
🔁 Update	Advertise routing changes
✓ ACK	Acknowledge reliable updates
❓ Query	Ask neighbors for alternative routes
💬 Reply	Response to Query

🧠 DUAL Key Terms (Most Important)

1️⃣ Successor

Best path → Goes to routing table.

2️⃣ Feasible Successor

Backup path fulfilling Feasibility Condition (RD < FD)

3️⃣ Reported Distance (RD)

Distance advertised BY the neighbor.

4️⃣ Feasible Distance (FD)

Lowest calculated distance to reach a network.

🖥️ Now FULL EIGRP LAB (4 Routers + 4 PCs)

(As per your configs)

🚦 LAB TOPOLOGY

R1 ---- R2

| |

R3 ---- R4

🎯 Router 1 – Configuration

Interfaces

R1(config)#int g0/0

R1(config-if)#ip add 192.168.10.1 255.255.255.0

R1(config-if)#no shut

R1(config)#int g0/1

R1(config-if)#ip add 192.168.40.1 255.255.255.0

R1(config-if)#no shut

R1(config)#int g0/2

R1(config-if)#ip add 192.168.1.1 255.255.255.0

R1(config-if)#no shut

Enable EIGRP

R1(config)#router eigrp 100

R1(config-router)#network 192.168.10.0 0.0.0.255

R1(config-router)#network 192.168.40.0 0.0.0.255

R1(config-router)#network 192.168.1.0 0.0.0.255

R1(config-router)#passive-interface g0/2

🎯 Router 2 – Configuration

Interfaces

R2(config)#int g0/0

R2(config-if)#ip add 192.168.10.2 255.255.255.0

no shut

R2(config)#int g0/1

R2(config-if)#ip add 192.168.20.1 255.255.255.0

no shut

R2(config)#int g0/2

R2(config-if)#ip add 192.168.2.1 255.255.255.0

no shut

EIGRP

R2(config)#router eigrp 100

R2(config-router)#network 192.168.10.0 0.0.0.255

R2(config-router)#network 192.168.20.0 0.0.0.255

R2(config-router)#network 192.168.2.0 0.0.0.255

R2(config-router)#passive-interface g0/2

🎯 Router 3 – Configuration

R3(config)#int g0/0

R3(config-if)#ip add 192.168.40.2 255.255.255.0

no shut

R3(config)#int g0/1

R3(config-if)#ip add 192.168.30.2 255.255.255.0

no shut

R3(config)#int g0/2

R3(config-if)#ip add 192.168.4.1 255.255.255.0

no shut

EIGRP

R3(config)#router eigrp 100

R3(config-router)#network 192.168.40.0 0.0.0.255

R3(config-router)#network 192.168.30.0 0.0.0.255

R3(config-router)#network 192.168.4.0 0.0.0.255

R3(config-router)#passive-interface g0/2

🎯 **Router 4 – Configuration**

R4(config)#int g0/0

R4(config-if)#ip add 192.168.20.2 255.255.255.0

no shut

R4(config)#int g0/1

R4(config-if)#ip add 192.168.30.1 255.255.255.0

no shut

R4(config)#int g0/2

R4(config-if)#ip add 192.168.3.1 255.255.255.0

no shut

EIGRP

R4(config)#router eigrp 100

R4(config-router)#network 192.168.20.0 0.0.0.255

R4(config-router)#network 192.168.30.0 0.0.0.255

R4(config-router)#network 192.168.3.0 0.0.0.255

R4(config-router)#passive-interface g0/2

🔍 Show Commands – Explanation

1️⃣ show ip route

- **C** → Directly Connected
- **L** → Local interface
- **D** → EIGRP learned route
- **FD Metric** shown in brackets

2️⃣ show ip eigrp neighbors

Shows:

- Neighbor IP
- Interface
- Hold-time
- SRTT (smooth round trip time)
- RTO (retransmission timeout)

3️⃣ show ip eigrp topology

Shows:

- Successors
- Feasible successors
- FD & RD
- All network entries

🎯 EIGRP Real-Life Example

Suppose:

- Your office has **4 routers**.
- Each router connects to different departments.
- EIGRP exchanges routing information so all departments can access each other efficiently.

EIGRP ensures:

- Fast failover
- Less bandwidth use
- Load balancing