

What is EIGRP?

EIGRP stands for **Enhanced Interior Gateway Routing Protocol**.

It is a **Cisco proprietary** dynamic routing protocol used to help **routers share route information** efficiently inside a network.

- EIGRP is classified as an **advanced distance vector protocol** (some also call it hybrid because it has link-state features).

How EIGRP Works: Step-by-Step

- ◆ **1. Router Discovery & Neighbor Formation**
 - EIGRP sends **Hello packets** on each interface to **discover and form neighbor relationships**.
 - These packets are sent to **Multicast IP 224.0.0.10**.
 - If two routers match criteria (like AS number, K values), they become **neighbors**.

◆ **2. DUAL Algorithm – EIGRP's Brain**

EIGRP uses the **DUAL (Diffusing Update Algorithm)** to:

- Calculate the **best path** (Successor)
 - Find a **backup path** (Feasible Successor) without recalculating everything
 - Avoid **routing loops**
- DUAL makes EIGRP **very fast and loop-free**.

◆ **3. Metric Calculation (Composite Metric)**

EIGRP uses the following to calculate the best path:

- **Bandwidth** (lowest link bandwidth)
- **Delay** (cumulative delay)
- Optionally: Reliability, Load, MTU

Formula:

$$\text{Metric} = 256 * [(10^7 / \text{bandwidth}) + \text{delay}]$$

 This makes EIGRP more accurate than RIP (which only uses hop count).

◆ **4. Routing Table Formation**

- **Successor:** Best route to destination
- **Feasible Successor:** Backup route (if it meets Feasibility Condition)

Feasibility Condition:

A route is a feasible successor **only if** its reported distance < current successor's feasible distance.

◆ 5. Partial and Bounded Updates

Unlike RIP (which sends full table every 30s), EIGRP:

- Sends **only changed routes** (partial updates)
 - Sends to **specific neighbors** (bounded updates)
- This reduces **bandwidth usage** and **CPU processing**.

EIGRP Packet Types

Packet Type	Purpose
Hello	Discover and maintain neighbors
Update	Send route changes
Acknowledgement	Confirms receipt of updates
Query	Ask neighbors for routes
Reply	Send back answers to queries

EIGRP Administrative Distance

- **90** for internal routes
- **170** for external routes (routes learned via redistribution)
- **5** for summary routes

◆ What are EIGRP Timers?

EIGRP (Enhanced Interior Gateway Routing Protocol) uses timers to control how often routers send updates and how long they wait before declaring a neighbor down.

The two main timers are:

Timer	Purpose	Default (on LAN)	Default (on WAN/low-speed)
Hello Timer	Interval between Hello packets (used to maintain neighbor adjacency)	5 seconds	60 seconds
Hold Timer	How long to wait before declaring a neighbor as <i>dead</i> if no Hellos received	15 seconds	180 seconds
	 Hold Timer = usually 3 × Hello Timer		

EIGRP Configuration (Basic Example)

R1(config)# router eigrp 100 ← 100 is AS number

```
R1(config-router)# network 192.168.1.0 0.0.0.255
```

```
R1(config-router)# network 10.0.0.0 0.0.0.255
```

Use wildcard mask (like inverse subnet mask)

All interfaces matching the network will participate in EIGRP

EIGRP Summary

Feature	Description
Protocol Type	Cisco proprietary (supports IPv4 & IPv6)
Metric Used	Bandwidth, Delay, (optional: Load, Reliability)
Algorithm	DUAL
Administrative Distance	90 (internal), 170 (external)
Hello Timer	5 sec (LAN), 60 sec (WAN)
Hold Timer	15 sec (LAN), 180 sec (WAN)
Updates	Multicast to 224.0.0.10
Route Types	Successor, Feasible Successor

Real-Life Analogy

Imagine routers like **delivery hubs**:

- EIGRP helps them **discover each other** (neighbors)
- They **share best delivery routes**
- If the best route is down, there's a **backup ready**
- Only **changed routes are shared**, not everything again and again