Routing Information Protocol (RIP)

The Routing Information Protocol (RIP) is designed to help routers determine the best path for sending data packets across a network. It uses hop count as its routing metric and is primarily used in small to medium-sized networks due to its scalability limitations.

- RIP operates at the Network Layer (Layer 3) of the OSI model and maintains routing tables on each router.
- Every 30 seconds, routers exchange their complete routing tables with neighbors using periodic updates.
- The hop count metric defines the number of routers a packet must pass through before reaching the destination.

Note: RIP supports a maximum hop count of 15, which limits its use in larger networks. A hop count of 16 is considered unreachable.

What is Hop Count?

- Hop count = number of routers between the source and the destination.
- RIP selects the path with the lowest hop count as the best route.
- Limiting the hop count to 15 prevents routing loops, but also reduces RIP's scalability.

Features of RIP

- Exchanges updates periodically (every 30 seconds).
- Broadcasts (RIPv1) or multicasts (RIPv2/RIPng) routing information.
- Sends entire routing tables in updates.
- Works on the principle of routing by rumor (trusting neighbors' information).
- Uses route poisoning and split horizon to avoid routing loops.

How RIP Works

- Each router maintains a routing table with distances to all known networks.
- Every 30 seconds, routers broadcast or multicast their entire routing table.
- If a new shorter path is learned, the routing table is updated.

- If a route isn't refreshed within 180 seconds, it's marked invalid. After 240 seconds, it's flushed.

Types of RIP Versions

Feature	RIPv1 (1988)	RIPv2 (1993)	RIPng (1997) for IPv6
Updates sent via	Broadcast (255.255.255.255)	Multicast (224.0.0.9)	Multicast (FF02::9)
Addressing	Classful (no subnet info)	Classless (includes subnet mask)	Classless (IPv6 only)
Authentication	Not supported	Supported	Not supported
IP version supported	IPv4 only	IPv4 only	IPv6 only

RIP Timers

- **Update Timer**: Default 30 seconds (interval between updates).
- **Invalid Timer**: 180 seconds (route not updated = marked invalid).
- **Hold-down Timer**: 180 seconds (time to suppress unstable routes).
- **Flush Timer**: 240 seconds (time before removing invalid routes).

Note: Adjustable using the timers basic command.

Where is RIP Used?

- Small to medium-sized networks with simple routing needs.
- Legacy networks that were built before OSPF/EIGRP became standard.
- Educational labs for training and learning routing basics.
- Backup routing protocol in case the primary protocol fails.

Pros of RIP

- Simple to configure and manage.
- Wide compatibility with network devices.
- Automatic routing table updates.

- Supports basic load balancing (equal-cost multipath).

Cons of RIP

- **Scalability issue:** limited to 15 hops.
- Slow convergence compared to OSPF/EIGRP.
- Routing loops possible (though mitigated with split horizon & poisoning).
- No advanced load balancing features.
- **Inefficient**: sends entire routing table, consuming bandwidth.
- **Security risk**: RIPv1 has no authentication.