IP Routing - Computer Networks

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Dear Aspirants,

We'll take up Routing today. This article is designed keeping in mind the level of questions asked in professional knowledge section for specialist officers in IT. Use comments section freely for discussions/queries/suggestions/motivation.

==>> This article is a part of IT Officer's PK Series

Routing

IP routing is the process of moving packets from one network to another network using routers. A routing protocol is a tool used by routers to find all the networks in the internetwork and to ensure that all routers have same routing tables.

Routing Tables

A routing table is a set of rules, in a table format, that is used to determine where data packets travelling over internet will be directed. All IP enabled devices including routers and switches, use routing tables. Typical fields in a routing table are as below:

- Subnet Mask
- Destination IP address
- Next hop address
- Flags
- Interface

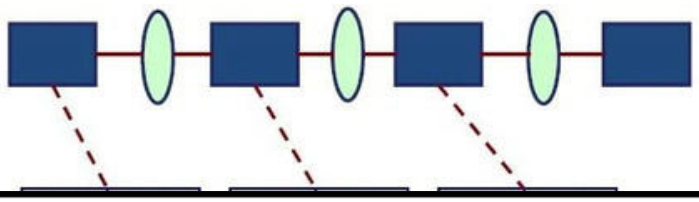
Static and Dynamic Routing

In **Static Routing**, router uses manually configured entries for directing the packets. It doesn't change with time.
In **Dynamic Routing**, routing tables are dynamically configured and automatically updated depending upon the network condition. It uses protocols like RIP, OSPF, BGP etc.

Routing Protocols

Routing Information Protocol

- One of the oldest **distance vector** routing protocols which uses **hop count** as a routing metric
- Table entries are updated using values from the neighbors.
- Maintains timers to detect failed links
- Used in first generation ARPANET



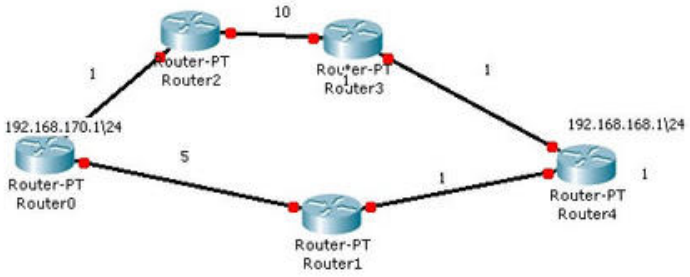
Dest	Next Hop
H2	R1

Dest	Next Hop
H2	R2

Dest	Next Hop
H2	--

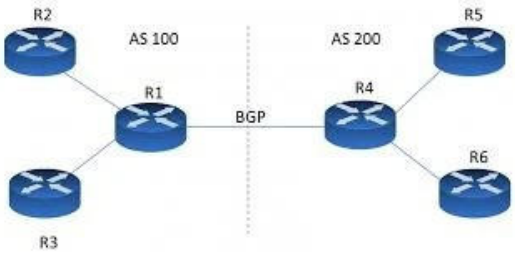
Open Shortest Path First (OSPF)

- Widely used **interior router protocol** on TCP/IP.
- Computes a route to all destination networks that incurs the **least cost** using Dijkstra's algorithm
- Each router maintains a **database**
- 'Hello' packets sent after every 10 seconds and absence of the same for 40 seconds indicate failure of the neighbor. It is sent to check if the neighbor is up.
- Uses **encrypted authentication** (MD5 Hash)



Border Gateway Protocol (BGP)

- Widely used **exterior router protocol** for internet.
- Allows router belong to different Autonomous systems to exchange routing information.
- Four types of messages used: **Open** (open a neighbor connection), **Update** (transmit information about a single route), **Keepalive** (confirm the neighbor connection), **Notification** (notify error condition)
- Uses **port 179** for connections.



Fun Fact of Today

Tim Berners Lee coined the phrase 'World Wide Web' in 1990