Dynamic Routing

Introduction

- Dynamic Routing is a routing in which Routing protocols are used to find the networks and update routing tables on routers.
- Easier to configure than Static or Default Routing.
- But it will cost you in terms of router CPU processes and bandwidth on the network links.

Routing Protocols

Routing Protocols are the protocols which are used to find or search the available paths for the data communication.

Types of Routing Protocols:

- Distance Vector
- Link State
- Hybrid

Distance Vector Routing Protocols

- The protocols which find the best path to a remote network by judging distance.
- Each time a packet goes through a router, that's called a **hop**. The route with the least number of hops to the network is determined to be the best route.
- It is also responsible to broadcast the entire routing table in such time of intervals.

Example: -

- **RIP**   (Routing Information Protocol)
- **IGRP** (Interior Gateway Routing Protocol)

Link State Routing Protocols

- Link-state protocols use an algorithm called the Shortest Path First to find the best path to a destination.
- Link-state routers know more about the internetwork than any distance vector routing protocol. Well, Link-state protocols are normally used in large Internetworks.

  Example: -
    - **OSPF** (Open Shortest Path First)

Hybrid Routing Protocols

- A Hybrid protocol takes the advantages of both distance vector and Link-state protocols and merges them into a new protocol.
- It has more features than the distance vector and Link State routing protocols.

Example: -
- **EIGRP** (Enhanced Interior Gateway Routing Protocol)

On the basis of communication in terms of Autonomous system, routing protocols are of two types:

- ✓ **IGP**   (Interior Gateway Protocol)

- ✓ **EGP**   (Exterior Gateway Protocol)

S.No	IGP	EGP
1	Stands for Interior Gateway Protocol.	Stands for Exterior Gateway Protocol.
2	Responsible to handles routing within the same autonomous system.	Responsible to handles routing between different autonomous systems.
3	Example: **IGRP, EIGRP, OSPF and IS-IS**	Example: **BGP** (Border Gateway Protocol)

Autonomous Systems

- An Autonomous system (AS) is a group of networks under a single administrative control, which could be your company, a division within your company, or a group of companies.
- Interior gateway routing protocols are responsible to handle routing within the single autonomous system. But the Exterior gateway routing protocols is responsible to handles routing between different autonomous systems.
- Not every protocol understand the concept of AS.
- An AS can provide distinct boundaries for a routing protocol, and thus provide some advantages.
- For instance, you can control how far a network can be propagated by routers, plus you can control what routes you will advertise to other autonomous systems and what route you will accept from these autonomous systems.

Administrative Distance

The Administrative Distance (AD) is used to rate the **trustworthiness** of routing information received on a router from a neighbor router.

- AD is a rank provided to all types of routing and routing protocols.
- An administrative distance is an integer from **0 to 255**, where 0 is the most trusted and 255 means no traffic will be passed via this route.
- If more than one routing protocols has been configured on router, then router always listen to that protocol which has lowest AD than others.
- An administrative distance (AD) value can be changed.

Default Administrative Distance Values

Protocol	Administrative Distance
Connected Interface	0
Static Route	1
Internal BGP	20
Internal EIGRP	90
IGRP	100
OSPF	110
IS-IS	115
RIP	120
External EIGRP	170
External BGP	200
Unknown Route	255

Routing Metrics

When a situation might arise where there are more than one paths are available to the destination network, in this case, a routing protocol will use a measurement called a metric to determine which path is the best path.

Metric	Description
Bandwidth	The capacity of the links in **Kbps (T1=1.554)**
Cost	Measurement in the inverse of bandwidth of the links.
Delay	Times it takes to reach the destination.
Hop Count	How many routers away from the destination.
Load	The path with the least utilization.
MTU	The path that supports the largest frame sizes.
Reliability	The path with the least amount of errors or down time.

Routing Protocol Metrics

Routing Protocols	Metric
RIP	**Hop Count**
IGRP	**Bandwidth, Line delay (default) | Load, Reliability, MTU (Not default)**
EIGRP	**Bandwidth, Reliability**
OSPF	**Cost**