Dynamic Routing

Dynamic routing protocols can dynamically respond to changes in the network. The routing protocol is configured on each router and the routers learn about both each other and remote networks. A dynamic routing table is created, maintained, and updated by a routing protocol running on the router. Examples of routing protocols include RIP ,EIGRP and OSPF and BGP. Dynamic routing protocols share routing updates with neighbors and they find best path to destination networks depends on various factors.

Advantages of Dynamic Routing

- Dynamically choose a different (or better) route if a link goes down
- Ability to load balance between multiple links
- Updates are shared between routers dynamically

Disadvantages of Dynamic Routing

- Routing protocols put additional load on router CPU/RAM
- The choice of the "best route" is in the hands of the routing protocol, and not the network administrator [We can manipulate routes if we want]

There are two categories of dynamic routing protocols:

- Distance-vector protocols
- Link-state protocols

Distance Vector

Dynamic routing protocol periodically send information about their known routes to their connected neighbors. [RIP sends

updates in every 30 seconds].Distance vector protocols are slow and have chances for loops.They compare their routing table against the information they receive from their neighbors – if it matches, they are good. If not, they update their routing tables to reflect the changes received

RIP is an example of a distance vector routing protocol.Some form of distance is used to calculate a route's metric. [RIP uses hopcount].RIP uses Bellman-Ford algorithm is used to determine the shortest path.Distance vector protocols maintain only routing table

Link State

Link state routing protocols operate differently. Routers send information about the state of their links to the entire network (or area) that they are a part of. In this way, each router understands the entire network topology.They run an algorithm every time a network change is announced to recalculate the best routes throughout the network.This makes link state routing protocols much more processor intensive.Link state protocols only send triggered updates not periodic updates

Link-state protocols maintain three separate tables:

- **Neighbor table** – contains a list of all neighbors, and the interface each neighbor is connected off of. Neighbors are formed by sending Hello packets.
- **Topology table** – otherwise known as the "link-state" table, contains a map of all links within an area, including each link's status.
- **Routing table** – contains the best routes to each particular destination

OSPF is the example of link state routing protocols.

Advanced Distance Vector

Advanced distance vector is the title Cisco gives to EIGRP,

which borrows the best attributes of both distance vector and link state designs. EIGRP does not send periodic route information; instead it sends updates only when changes occur (like link state protocols). Also, EIGRP forms neighbor relationships with its directly connected peers and only updates them – not the entire network (like distance vector protocols).