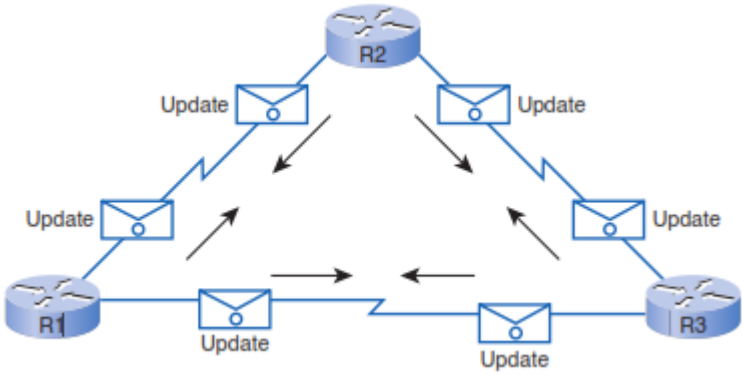
SINDH MADRESSATUL ISLAM UNIVERSITY
Aiwan-e-Tijarat Rd, Seari Quarters, Karachi, Karachi City,
Sindh 74000, Pakistan.

Dynamic Routing Protocols

Dynamic routing protocols play an important role in today's networks. important benefits that dynamic routing protocols discussed in this assignment. In many networks, dynamic routing protocols are typically used with static routes. Dynamic routing protocols have evolved over several years to meet the demands of changing network requirements. Although many organizations have migrated to more recent routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF), many of the earlier routing protocols, such as Routing Information Protocol (RIP), are still in use today.

Dynamic Routing Protocol Role:

What exactly are dynamic routing protocols? Routing protocols are used to facilitate the exchange of routing information between routers. Routing protocols allow routers to dynamically learn information about remote networks and automatically add this information to their own routing tables, as shown in below diagram:



Routing protocols determine the best path to each network, which is then added to the routing table. One of the primary benefits of using a dynamic

routing protocol is that routers exchange routing information whenever there is a topology change. This exchange allows routers to automatically learn about new networks and also to find alternate paths if there is a link failure to a current network.

Purpose of Dynamic Routing Protocols:

A routing protocol is a set of processes, algorithms, and messages that are used to exchange routing information and populate the routing table with the routing protocol's choice of best paths. The purpose of a routing protocol includes:

1. Discovering remote networks.
2. Maintaining up-to-date routing information.
3. Choosing the best path to destination networks.
4. Having the ability to find a new best path if the current path is no longer available.

Component of Routing Protocol:

- ***Data structures:*** Some routing protocols use tables or databases for their operations. This information is kept in RAM.
- ***Algorithm:*** An algorithm is a finite list of steps used in accomplishing a task. Routing protocols use algorithms for processing routing information and for best-path determination.
- ***Routing protocol messages:*** Routing protocols use various types of messages to discover neighboring routers, exchange routing information, and do other tasks to learn and maintain accurate information about the network.

Dynamic Routing Pros & Cons:

Pros:

- Administrator has less work in maintaining the configuration when adding or deleting networks.
- Protocols automatically react to the topology changes.
- Configuration is less error-prone.

- More scalable; growing the network usually does not present a problem.

Cons:

- Router resources are used (CPU cycles, memory, and link bandwidth).
- More administrator knowledge is required for configuration, verification, and troubleshooting.

Classifying Dynamic Routing Protocols:

Routing protocols can be classified into different groups according to their characteristics:

- IGP or EGP.
- Distance vector or link-state.
- Classful or classless.

The most commonly used routing protocols are:

- RIP: A distance vector interior routing protocol.
- IGRP: The distance vector interior routing protocol developed by Cisco (deprecated from Cisco IOS Release 12.2 and later).
- OSPF: A link-state interior routing protocol.
- IS-IS: A link-state interior routing protocol.
- EIGRP: The advanced distance vector interior routing protocol developed by Cisco.
- BGP: A path vector exterior routing protocol.

Difference Between Static and Dynamic Routing:

Key Difference's	***Static Routing***	***Dynamic Routing***
PATH SELECTION	One pre-configured route to destination.	Multiple available routes to destination.

ROUTE UPDATES	Engineers must reconfigure to make route changes.	Algorithms automatically update with preferred route changes.
ROUTING TABLES	Smaller routing table with only one entry for each destination.	Routers send out entire routing tables to identify route availability.
PROTOCOLS AND ALGORITHMS	Does not use protocols or algorithms for pre-configured route.	Distance vector algorithms (RIP,IGRP) and link state algorithms (OSPF,IS-IS) adjust routes.
COMPUTATION AND BANDWIDTH	Requires less computation time and bandwidth.	Requires more computation and bandwidth.
SECURITY	Better security	Less security
USE CASES	Used in smaller networks with fewer routers and unchanging network architecture.	Used in larger networks and in networks that change frequently.

References:

- https://www.catchpoint.com/dynamic-routing-protocols/.
- https://ieeexplore.ieee.org/abstract/document/6141697