

Introduction to Routing:

The process of sending packets from one network to another is called routing. Routing is of two types of static and dynamic. Routes are based on the destination network. Routing is to find the best path for the network from one network to another. The best path is chosen on the basis of Metric, Prefix-Length and Administrative Distance. Routing is performed by Routers. For this routers make routing tables.

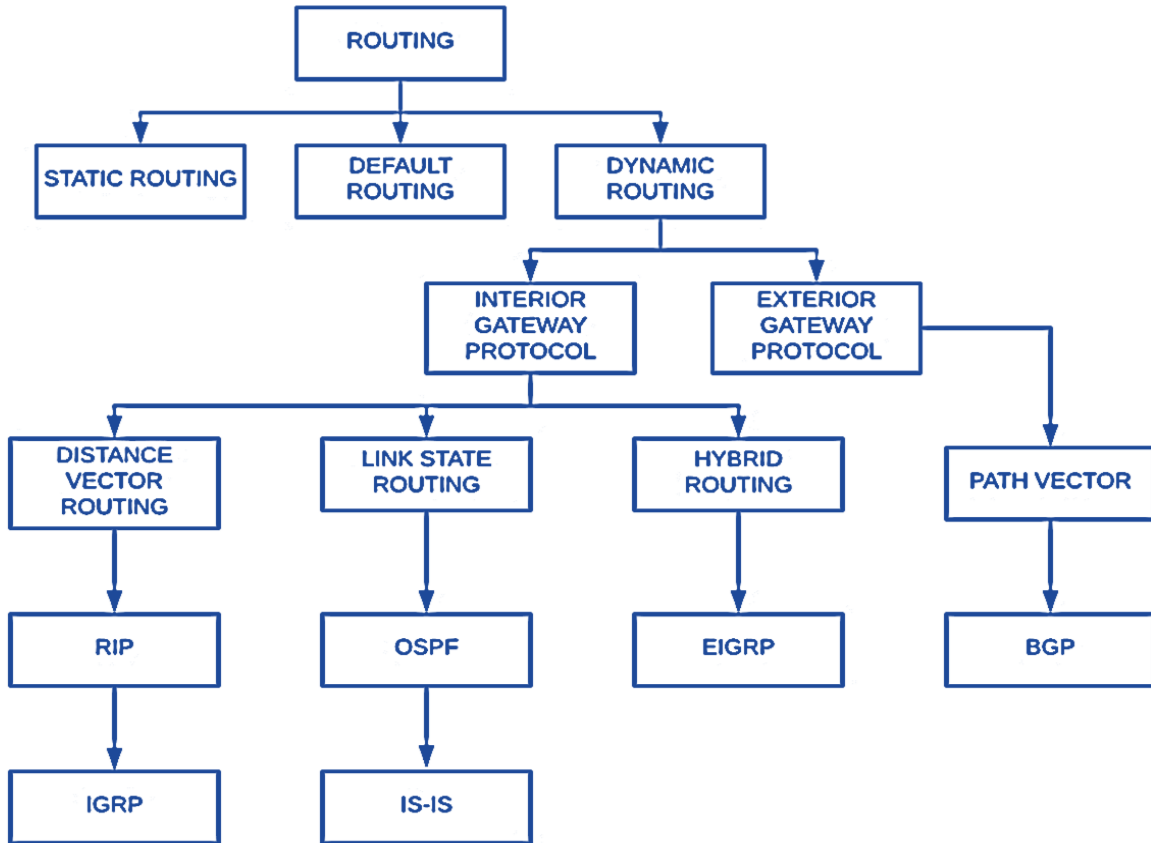
Routed Protocols:

- o Network layer protocols, routed protocols attach to logical address with devices.
- o These protocols are responsible for sending data from one network to another.
- o End devices use routed protocols to send & receive data packets in the network.
- o Routed protocols provide addressing to end devices or end points in the network.
- o Routed protocols encapsulate and de-encapsulate data packets in the network.
- o It does not care which route the packet takes to reach the remote destination.
- o Routed protocols are the actual data that is transferred from router to router.
- o Examples of routed protocols are Internet Protocol (IP) such as IPV4 and IPV6.
- o Routed Protocol is used to send user data from one network to another network.
- o Routed Protocol carries user traffic such as e-mails, file transfers, web traffic etc.
- o Used between routers to direct user traffic, it is also called network protocols.
- o That are signs at intersections that point to nearby cities, giving mileage to each.

Routing Protocols:

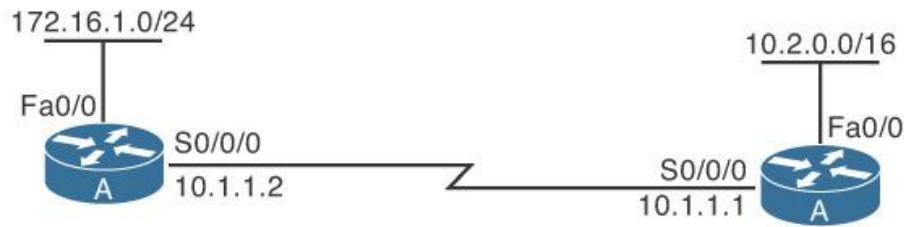
- o These protocols build networks, topology and next hop information in routing tables.
- o Routing protocols are used by routers to exchange information about known networks.
- o Routers will initially only know the existence of directly connected or attached networks.
- o With the use of routing protocols routers communicate with & learn from other routers.
- o Routing protocols are used to distribute routing information across routers on a network.
- o Routing protocol is Google Maps: It tells you the best way to get where you want to go.
- o Routing protocols continuously update and manage routing tables in the given network.
- o Routing protocols store discovered routes in routing tables and manage Routing tables.
- o Routers to communicate between source & destination is called by routing protocols.

Routed Protocol	Routing Protocols
IP, IPV4, IPV6	RIPV1, RIPV2, OSPF, EIGRP, BGP, ISIS



Static Routing:

- o Static Routing administrator manually inputs all routing table information.
- o A static route is a route that is created manually by a network administrator.
- o Router's routing table entries are populated manually by network administrator.
- o Static route tells the network devices about exact location for the routes.
- o Static routes are typically and can only be used in the smaller networks.
- o Configure static routes between routers to allow data transfer between routers.
- o The command used in static is IP route network, mask address/interface [distance].
- o Example: IP route 2.0.0.1 255.0.0.0 1.0.0.2. Here, 2.0.0.0 is destination network.
- o In example, 255.0.0.0 is subnet mask and 1.0.0.2 is the default gateway ip address.
- o Major advantages of static routing are reduced routing protocol router overhead.
- o Another advantage of static routing it reduced routing protocol network traffic.
- o Disadvantages of static routing are network changes require manual reconfiguration.
- o Easy to Configure, High Secure, Use Low Resources, Bandwidth & Use in Small Network.
- o Static Routing does not require Advanced Knowledge of routing to configure them.
- o Static Routing are not able to support VLSM It is only support class full Network.
- o Not Scalable also Administrator should know the destination IP-address to configure.
- o When changes occur in the network Configured by the administrator manually only.

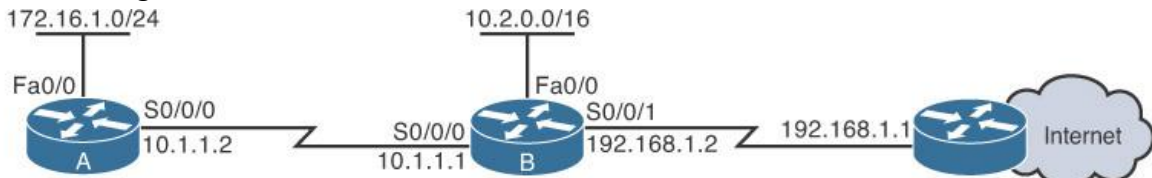


ip route 10.2.0.0 255.255.0.0 S0/0/0

ip route 172.16.1.0 255.255.255.0 10.1.1.2

Default Routing:

- o A Default Route also known as the gateway of last resort is a special type of static route.
- o This method where all routers are configured to send all packets towards single router.
- o Default Route is Network Route used by router when there is no other known route exists.
- o All the IP datagrams with unknown destination address are sent to the default route.



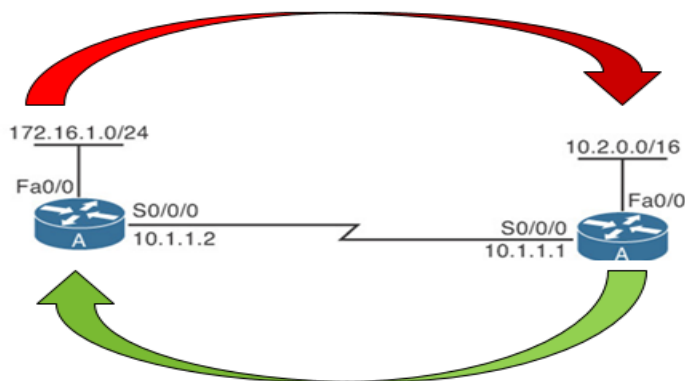
ip route 0.0.0.0 0.0.0.0 10.1.1.1

ip route 172.16.1.0 255.255.255.0 S0/0/0

ip route 0.0.0.0 0.0.0.0 192.168.1.1

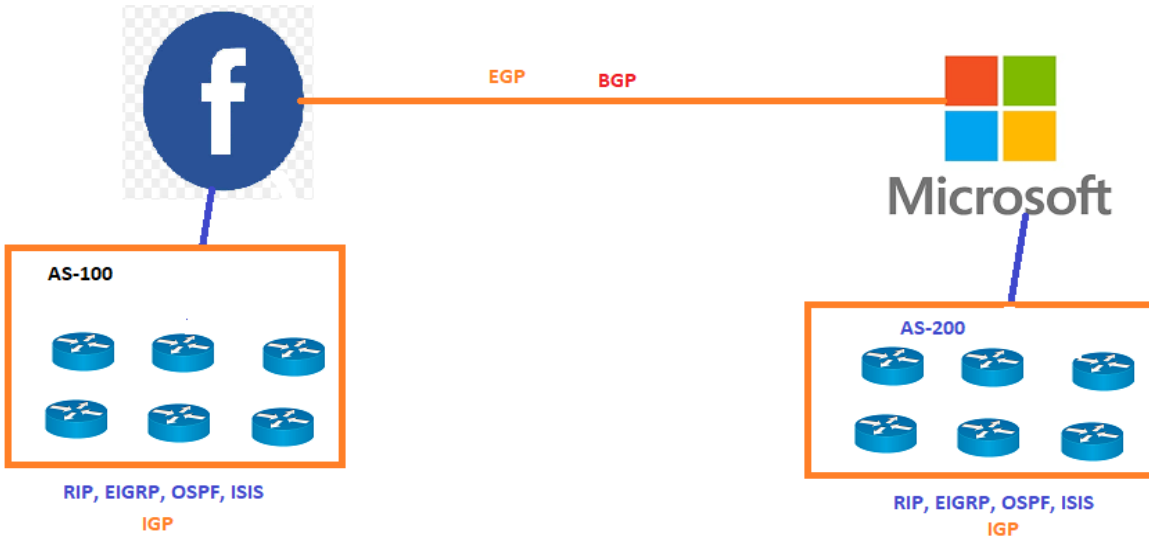
Dynamic Routing:

- o Dynamic routing protocols can dynamically respond to changes in the network.
- o Routing protocol is configured on each router & router learn about both each other.
- o Dynamic routing table is created, maintained and updates by the routing protocol.
- o Examples of routing protocols includes RIPv1, RIPv2, ISIS, EIGRP, and OSPF and BGP.
- o Dynamic routing protocols share routing updates with neighbors and find best path.
- o Dynamically choose a different route if a link goes also Updates are dynamically.
- o Also, Dynamic Protocols has the ability to load balance between multiple links.
- o Dynamic Routing protocols put additional load on the Router CPU and RAM.
- o The choice of the best route is on the hands of the dynamic routing protocol.



Exterior Gateway Protocol (EGP):

- o A routing protocol operating between different Autonomous System (AS).
- o Exterior Gateway Protocol is usually used on Internet, between different AS.
- o EGP is used to exchange routing info between different autonomous systems.
- o Border Gateway Protocol (BGP) is the only EGP used nowadays in the network.
- o Commonly used for ISP to exchange routing with other ISPs or Upstream.
- o EGP is commonly used between hosts on Internet to exchange routing table info.



IGP (Interior Gateway Protocol):

- o Usually routers running IGP are under the same administration of a company.
- o IGPs are used to exchange routing information within same Autonomous system.
- o IGP are basically routing protocols used internally into company to exchange info.
- o Commonly used in LAN/Private networks where private IP addresses are used.
- o Corporation or individual, or ISP. Example RIPV1, RIPV2, OSPF, EIGRP, and ISIS.

