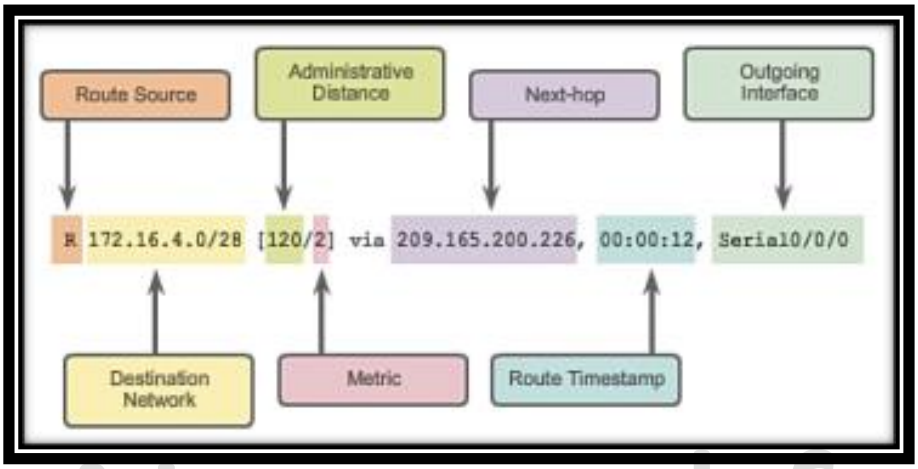
Components of a Routing Table:



Routing Protocol Code:

- It is called Route source identifies how the route was learned.
- Common Codes include O (OSPF), D (EIGRP), R (RIP), S* (Static Default), S (Static) and B (BGP) as show above picture.

Routing Prefix and Network Mask:

- A subnetwork or subnet is a logical subdivision of an IP network.
- Expressed in CIDR (Classless Inter Domain Routing) notation written as the first address of a network followed by a slash character (/).
- Like Example: 192.168.1.1/24

Next Hop:

- A next hop is the next router to which a packet is sent from any given router (Identifies the IP address of the next router to forward the packet to it).
- Example in the above pic next hop is 209.165.200.226

Administrative Distance:

- Administrative distance is the feature that routers use to select the best path when there are two or more different routers to the same destination from two different routing protocols.
- Administrative distance defines the reliability of a routing protocol.
- The Administrative number is from 0 to 255. Lowes AD is most preferred.

Route Source	Administrative Distance
Directly Connected	0
Static	1
EIGRP	90
EIGRP Summary route	5
OSPF	110
RIP	120

Metric:

- Routers use various metrics and calculations to determine the best route for a packet to reach its final network destination.
- Each routing protocol uses its own algorithm with varying weights to determine the best possible path.
- Identifies the values assigned to reach the remote network and Lower values indicate preferred routes.

Gateway of Last Resort:

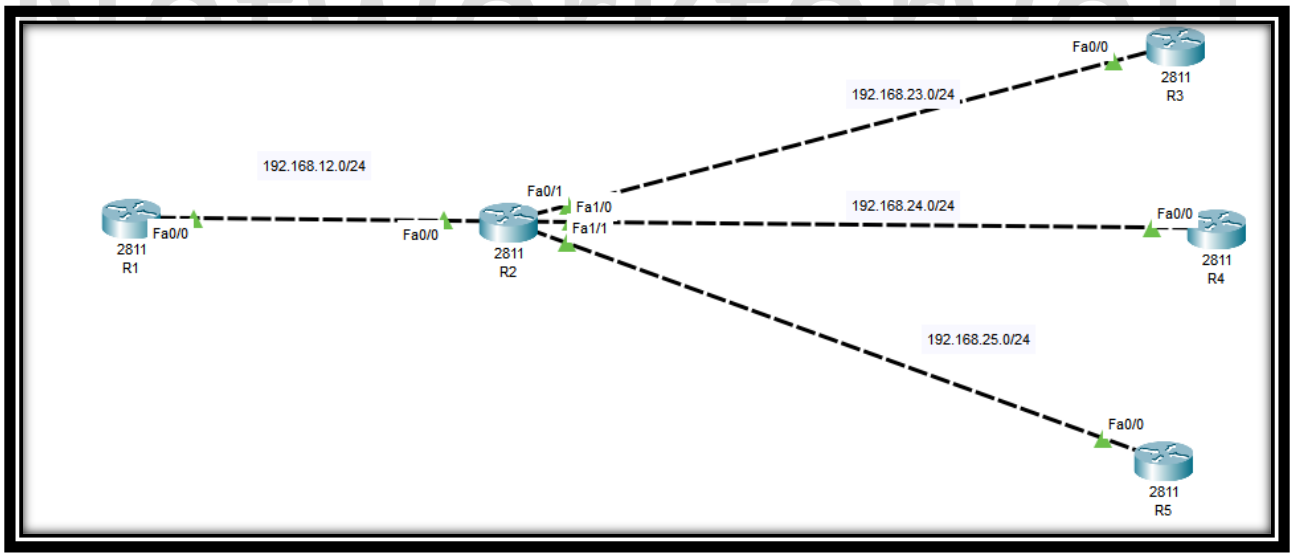
- A Gateway of last Resort or Default Gateway is route used by the router when no other known route exists to transmit the IP packet.
- Known routes are present in the routing tables.
- Any route not known by the routing table is forwarded to the default route.

Packet Handling and Forwarding Decision:

- When any IP packet arrives on a router interface the router de- encapsulates the Layer 2 frame and examines the Layer 3 IP Header.
- The router identifies the destination IPv4 address, and proceeds through the route lookup process.
- The router checks the routing table to find a best match for the destination IPv4 address. The best match is the longest match in the table.

Example if the destination IPV4 address is 192.168.0.10 and the entries in the routing table are for 192.168.0.0/8, 192.168.0.0/16 and 192.168.0.0/24 the longest match and the entry used for the packet is 192.168.0.0/24

Lab to check longest route:



We are considering 8.8.8.8 network with 8.8.8.8/8, 8.8.8.8./16 and 8.8.8.8/24 and checking which router is prefer.

Configuration:

Router Configuration	Router Configuration
en config t hostname R1 int f0/0 ip add 192.168.12.1 255.255.255.0 no sh router rip version 2 network 192.168.12.0 no auto-summary	en config t hostname R2 int f0/0 ip add 192.168.12.2 255.255.255.0 no sh int f0/1 ip add 192.168.23.1 255.255.255.0 no sh int f1/0 ip add 192.168.24.1 255.255.255.0 no sh int f1/1 ip add 192.168.25.1 255.255.255.0 no sh router rip version 2 network 192.168.12.0 network 192.168.23.0 network 192.168.24.0 network 192.168.25.0 no auto-summary
en config t hostname R3 int f0/0 ip add 192.168.23.2 255.255.255.0 no sh int lo 0	en config t hostname R4 int f0/0 ip add 192.168.24.2 255.255.255.0 no sh int lo 0

ip add 8.8.8.8 255.0.0.0 router rip version 2 network 8.0.0.0 network 192.168.23.0 no auto-summary	ip add 8.8.8.8 255.255.0.0 router rip version 2 network 8.8.0.0 network 192.168.24.0 no auto-summary
en config t hostname R5 int f0/0 ip add 192.168.25.2 255.255.255.0 no sh int lo 0 ip add 8.8.8.8 255.255.255.0 router rip version 2 network 8.8.8.0 network 192.168.25.0 no auto-summary	If you do trace route in R1 R1#traceroute 8.8.8.8 Type escape sequence to abort. Tracing the route to 8.8.8.8 1 192.168.12.2 1 msec 0 msec 0 msec 2 192.168.25.2 1 msec 0 msec 0 msec When we shut R5 port then it taken R4 R1#traceroute 8.8.8.8 Type escape sequence to abort. Tracing the route to 8.8.8.8 1 192.168.12.2 1 msec 0 msec 0 msec 2 192.168.24.2 1 msec 0 msec 0 msec

```
R1#traceroute 8.8.8.8
Type escape sequence to abort.
Tracing the route to 8.8.8.8

  1   192.168.12.2    0 msec    0 msec    0 msec
  2   192.168.25.2    0 msec    0 msec    0 msec
R1#traceroute 8.8.8.8
Type escape sequence to abort.
Tracing the route to 8.8.8.8

  1   192.168.12.2    1 msec    395 msec  0 msec
  2   192.168.24.2    1 msec    0 msec    0 msec
R1#
R1#traceroute 8.8.8.8
Type escape sequence to abort.
Tracing the route to 8.8.8.8

  1   192.168.12.2    1 msec    0 msec    0 msec
  2   192.168.25.2    1 msec    0 msec    0 msec
```