2 primary function
1) — determine best path
2) — forward packets

Routing: when router receives an IP packet on one interface, it determines which interface (next hop) to use to forward the packet to the destination.

1 no)
a) use its IP routing table to determine path.

b) Best path (longest match)

Dest IP address: 192.168.2.82

Binary: 11000000.10101000.00000010.01010010

Prefix: 192.168.2.80

Binary: 11000000.10101000.00000010.01000000

c) How Router building routing table?

→ 1) Directly connected networks

2) Remote Networks → not directly connected with router
   - static
   - dynamic

Default routing ..../0
no bits to match the dest. IP address for this route entry to be used

→ using protocol : static and dynamic

Static
- ip address of remote net.
- sub. mask " "
- next hop router's ip add

manually configure the routing table on each router

manually enters the routes and associated next hop info.

complexity: increases with net. size.

when topology changes, administraton intervention needed.

less scalable

small network

no. additional resource needed

explicitly defined by administraton

Dynamic

automate the process of building and maintaing routing table by allowing routers to exchange routing info.

complexity doesn't depend on size.

automatically adapts to change.

more scalable

large network

use cpu, memory and link b/w

auto. determine best path.

Routing Table Entries: (7)

1) Route source
2) destination network
3) administrative distance
4) metric
5) next hop
6) route timestamp
7) exit interface

Default routing? specify a next hop en route to use routing table doesn't contain a specific route that matches dest. IP add.

— dynamic / static

IPv4 route entry: 0.0.0.0/0

IPv6 : ::/0

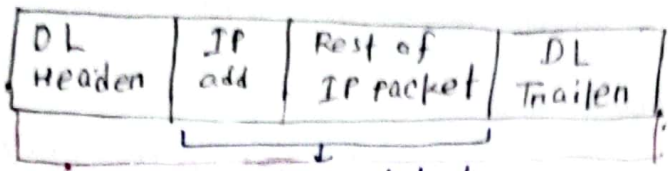
Some formats of DL frame
- PPP
- HDLC
- Layer 2

encapsulate packets in the appropriate DL frame type for outgoing interface

Packet Forwarding Decision Process:

Router do this

1)



1) Process switching
2) Fast "
3) Cisco Express forward

2) Router examines IP address of packet header then consults its IP routing table.

3) finds longest matching prefix

4) encapsulates packet, forwards it to next hop / next connected device (remote network, LAN)

5) If no route entry matches, packet drops.

* What is IP routing table? → a data structure used by routers to determine the next hop router for forwarding packets to their destinations.
  - contains a list of routes to known networks

* Source of route → identified by code.
* Some codes:
  - L → identifies router interface address
  - C → directly connected network
  - S → static route
  - O → dynamically learned net (ospf routing protocol)
  - * → default route

* 3 routing principles:

1) routers make own decision based on its own routing table's info.

2) one router's routing table info may not match info of other one.

3) routing info about a path → not provide return routing info

→ know how to forward packets to dest

→ may not know how to route packets back to source

* ICMP — Internet Control Message Protocol.
  - ICMPv4
  - ICMPv6
  — provides feedback about IP packet processing issues.

* Host reachability test: → ICMP Echo Message do this

- local host sends request to host
- if host available, the dest. host responds with a echo reply.