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## What is routing?

Routing is the process of selecting a path for traffic in a network or between or across multiple networks. Broadly, routing is performed in many types of networks, including circuit-switched networks and computer networks.

## Data forwarding

A router forwards data to the next device on the selected path to eventually reach its destination.

## How does routing works?

- Data moves along any network in form of data
- Each data packet has a header that contains information about the packet's intended destinaition
- When a data packet arrives, the router first looks up its address in a routing table
- Then the router forwards the packet onward to the next point in the network towards the destination

## Path Determination

Router uses its IP routing table to determine which path(route) to use to forward a packet.

## Types of routing

Static Routing (manual).

## Advantages:

- No processing and added resources as in the case of dynamic routing protocols
- No extra bandwidth requirement caused by the transmission of excessive packets for the routing table update process
- Extra security by manually admitting or rejecting routing to certain networks

Dynamic Routing (autonomous)

Why choose dynamic routing instead of static routing?

A dynamically routed network can grow larger more quickly and is able to adapt to changes in the network topology brought about by this growth or by the failure of one or more network components.

Dynamic Routings: Distance Vector Routing

- Update the routing table based on cost given by their neighbors
- The best path to a given destination based on the distance, measured in hops
- Each time a packet goes through a router, it adds a hop in its routing table.

- The route with the least number of hops to a given network is the best route towards that network.
- The vector shows the direction to that specific network. Distance vector protocols send their entire routing table to directly connect neighbors.

Dynamic Routing: Link - State Routing

- Also called shortest - path - first protocols.
- Every router creates a map of the complete network and then calculates the shortest path for any data packet. Therefore, it has the complete picture of the network topology.
- It sends information about directly connected links to all the routers the network. Every router discovers all other routers in the network.
- It requires to maintain 3 separate tables containing:
- directly connected neighbors
- the topology of the entire internetwork
- the actual routing table.
- OSPF

**Which routing protocol to used?**

Border Gateway Protocol

- It is a path vector routing protocol and does not contain a complete topology of the network as the link - state routing protocols.
- It provides scalability, flexibility, and network stability.
- It exchanges only the summaries network. routes.

Autonomous System

- The outside world views an AS (autonomous system) as a single entity, even though it could be a collection of IGPs working together to provide routing within its interior.
- Each AS has an identification number provided by an Internet registry or by an Internet service provider (ISP) that uniquely identifies it to the outside world
- Currently, the BGP routing tables have over 300,000 active forwarding entries, which is the summarization of over 2 billion addresses.