ROUTING BASICS

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ROUTING

- In computer networking the term routing refers to selecting paths in a computer network along which to send data. Routing directs forwarding, the passing of logically addressed packets from their source toward their ultimate destination through intermediary nodes (called routers). The routing process usually directs forwarding on the basis of routing tables within the routers, which maintain a record of the best routes to various network destinations. Thus the construction of routing tables becomes very important for efficient routing.

Different Strategies for ROUTING:

- FIXED-STATIC
- FLOODING
- RANDOM
- ADAPTIVE/DYNAMIC
- Flooding
  - In this strategy, incoming packets retransmitted on every link except incoming link. Packet sent by node to all its adjacent nodes

    Properties of this Strategy are :- No network info required Eventually a number of copies will arrive at destination Each packet is uniquely numbered so duplicates can be discarded Nodes can remember packets already forwarded to keep network load in bounds Can include a hop count in packets Very heavy load on traffic, but good in getting out emergency messages All possible routes are tried Very robust At least one packet will have taken minimum hop count route Can be used to set up virtual circuit All nodes are visited Useful to ditribute information(e.g routing)
- Random Routing
  - Same simplicity robustness as flooding BUT for less traffic load Operation Node select only 1 outgoing path for retransmission of packet (chosen at random excluding source node)
  - Note: If all links have equal probability of being chosen it will select them in a round-robin fashion
  - However assigning different probabilities to the links based on data rate for example can

enhance this method

- Observations: Random rating does not require any network information (if equal probabilities)
- Due to randomness - route taken will not be optimal one i.e. least-cost or leas
- Due to 2. The network must carry a higher than optimal load (not as high as flooding through). Because of the unpredictability of the delay in delivering packets and increase traffic load - this technique (random routing) is not in common
- Routing strategies 1, 2 and 3 do not react to changing conditions within the network (or atmost react infrequently as the result of operator intervention).

- Adaptive Routing
  - Adaptive routing describes the capability of a system, through which routes are characterized by their destination, to alter the path that the route takes through the system in response to a change in conditions. The adaptation is intended to allow as many routes as possible to remain valid (that is, have destinations that can be reached) in response to the change Properties characterized by the fact that they adapt to measurable changing conditions Drawbacks: Routing decision is more complex-processing burden on network increases In most cases, this strategy depends on status information collected at one place but used at another traffic burden increases The strategy may react too quickly - causing congestion and producing oscillation or too slowly-being irrelevant Despite these drawbacks adaptive routing is the most prevalent, because An adaptive strategy can impose performance from point of view of users An adaptive strategy can aid in traffic control
- Classifications of Adaptive Routing
  - Based on information sources -Local (isolated) Route to outgoing link with shortest queue Can include bias for each destination Rarely used -do not make use of easily available info -Adjacent nodes -All nodes Isolated Adaptive Strategy Also called Hot-potato routing, forwards the packet towards the path with the lowest delay (as opposed, for example, to the more commonly used metric of least number of hops).