Abstract: When the given sets of machines are interconnected by wired or wireless means, it forms a network. Computer networks are generally formed in order to assist in data sharing, resource sharing, complex computations etc [1]. When it comes to communication through a network, routing is a concept of finding the efficient path from source machine to destination machine through which data is sent. Between the given set of nodes, there might exist multiple paths of different costs. Selecting the efficient path is one of the crucial aspects of computer networking [2]. Various routing algorithms exist in literature which differs from each other from various perspectives. This paper provides a brief survey and comparison of various types of routing algorithms.

Keywords: adaptive, broadcasting, hierarchy, non-adaptive, routing.

1. Introduction

Routing algorithms can be broadly classified into two categories, Static and Dynamic. Static routing algorithms also known as Non-adaptive algorithms, works on the basis of static/fixed routing tables which doesn’t adapt themselves in accordance with the changes in network topology or a load factor in the network. Dynamic routing algorithms which are also called as Adaptive routing algorithms takes into consideration the load factor in the network and the topological changes, and adjusts its routing decisions accordingly. Adaptive algorithms are employed in the scenarios where the network traffic is unpredictable and the network is subjected to frequent changes in its topology. Correctness, simplicity, robustness, stability and efficiency are some of the desirable properties of routing algorithms. Correctness means the path computed by the algorithms should be correct. Simplicity says that, algorithm should be easy to understand and implement. Algorithm should be robust in the sense that it should be able to cope up with hardware failure or high traffic. Stability means algorithm should converge quickly to equilibrium/stable state and stay over there. And finally, efficiency deals with the cost factor of estimated path [2].

2. Routing Algorithms

A. Flooding

Flooding [2] is one of the simplest routing algorithms which do not involve any computational steps in order to find the path from source to destination. A node/router after getting a packet, forwards the packet to all its outgoing links except the one onto which the packet arrived. In Selective flooding, packet is sent only on those output lines which are approximately going in the right direction.

Advantages:

• Robust. Even if some routers are blown-off, flooding will find the alternative path if it exist. Hence, used in military applications.
• Simple and easy to implement.

Disadvantages:

• Flooding generates large number of duplicate packets in the network which leads to network congestion. Hop-counter method is used to reduce the duplication of packets in the network.
• Consumes lot of bandwidth hence not suitable for sending large number of packets.

B. Dijkstra’s Shortest Path routing

This iterative algorithm [2] computes the least cost (shortest) path from one source node to all other nodes in the given network. This algorithm is said to be global/centralized because the source node needs to have the global knowledge of all other nodes in the network in order to compute the shortest path.  

Advantages:

• Computes the shortest path from one source to all other destinations. Used in Google maps.

Disadvantages:

• It does a blind search there by consuming a lot of time, leading to waste of necessary resources.
• Due to its inability to handle negative edges, acyclic graphs are obtained from which right shortest paths cannot be computed.

C. Distance Vector Routing

Also known as Bellman Ford or Routing Information Protocol [2], which was originally used in ARPANET. It is dynamic algorithm and is more efficient because it computes the shortest path by taking current topology into consideration. Each router maintains a routing table containing one entry for each router in the network. Each entry has two parts; preferred outgoing line to use for that destination and an estimate of the distance to that destination. Distance metric can be either number of hops or delay. Each router takes some information
Routing algorithms can be broadly classified as adaptive and non-adaptive. Various routing algorithms are studied and discussed in this paper along-with their advantages and disadvantages.

### References
