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Performance and Energy Efficient of Comparing Routing Algorithms

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Abstract- The essential purpose an information network is incredibly trouble-free: delivering data from one network node to a different. Achieving this goal needs several network parts, together with physical computers and links, communication protocols between computers, and knowledge packaging. This paper mainly focusing the large scale network. Large scale networks play a important role in the world. The large scale is comprised of packet-processing nodes, called routers, that route packets towards their destinations, and physical links that transport packets from one router to another. Many researchers are trying to make a efficient routing algorithm to face challenges in network. Various types of routing algorithms available in the network paradigm. This paper analysis the only three types of routing algorithms based on various parameters. The three types of routing algorithm discussed: Multi-path, Dynamic, and Hierarchical.

Keywords - Multipath, Dynamic, Hierarchical, routers, nodes, packet switching, Adaptive, Non-adaptive, Network topology,

I. INTRODUCTION

The main perform of the network layer is routing packets from supply to destination. The algorithms that beat the routes and also the knowledge structures that they use space major space of network layer style. The routing algorithmic rule is that a part of the network layer code chargeable for deciding that output line associate incoming packet ought to be transmitted on. If the subnet uses information grams internally , this call should be created afresh for each incoming information packet since the most effective route could have modified since last time. within the subnet victimisation virtual circuits such call is formed ones per session.

Routing algorithms in today's net base their implementations on the static metric single shortest path routing model. Single shortest path implies that routing algorithms offer, at any given time, the least-cost path between nodes. Static metric refers to link value assignments that area unit supported static properties of a link, like its information measure or latency. As shown later, the most disadvantage of this model is that static metric shortest ways don't continuously offer sensible network performance.

Although Internet routing algorithms use static metrics, this does not imply that the paths themselves are static. On the contrary, current Internet routing algorithms are adaptive , meaning they are able to recomputed paths and reroute packets when network components (nodes or links) fail or recover. Therefore, even if routers or links fail, as long as a path exists between a node pair, Internet routing algorithms ensure that these two nodes can communicate with each other.

Routing algorithms can be grouped into two major classes: non adaptive and adaptive.

A. Nonadaptive algorithms do not base their routing decisions on measurements or estimates of the current traffic and topology. Instead , the choice of the route to use to get from I to J is computed in advance , of-line, and downloaded to the routers when the network is booted. This procedure is sometimes called **static routing**.

B. Adaptive algorithms, in contrast, change their routing decisions to reflect changes in the topology, and usually the traffic as well. Adaptive algorithms differ in where the get their information, when they change the routes , and what metric is used for optimization . They are also called **dynamic**.

II. ROUTING ALGORITHMS

There are 3 types of algorithm has been focused in this paper. Multipath, Dynamic and Hierarchical routing.

Multipath Routing:

This routing has been assumed that there is a single best path between any pair of nodes and that all traffic between them should use it. In many networks however there are several paths between pairs of nodes that are almost equally good. Sometimes in order to improve the performance multiple paths between single pair of nodes are used. This technique is called multipath routing or bifurcated routing. In this each node maintains a table with one row for each possible destination node. A row gives the best, second best, third best, etc outgoing line for that destination, together with a relative weight. Before forwarding a packet, the node generates a random number and then chooses among the alternatives, using the weights as probabilities. The tables are worked out manually and loaded into the nodes before the network is brought up and not changed thereafter.

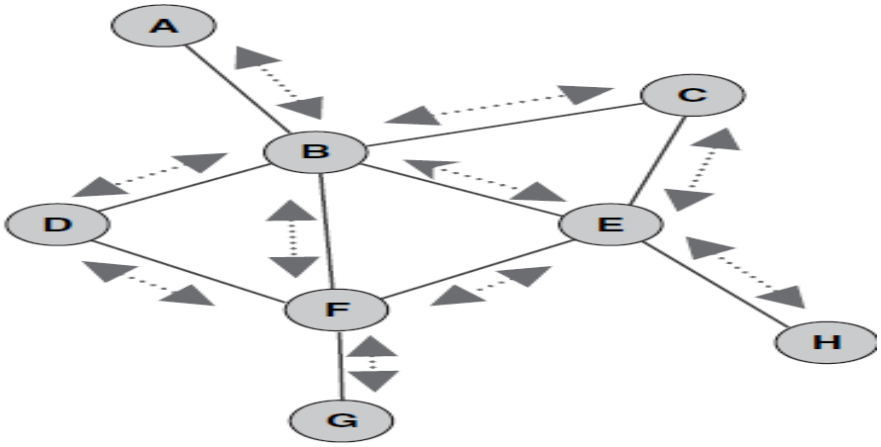

Figure 1.1 Multipath Routing

III. DYNAMIC ROUTING

Dynamic metric routing, a unique rule is developed that outperforms previous dynamic metric algorithms and needs lower routing prices. For multipath routing, the main contributions area unit associate economical path for-warding technique and a multipath transport protocol that maximizes end-to-end turnout.

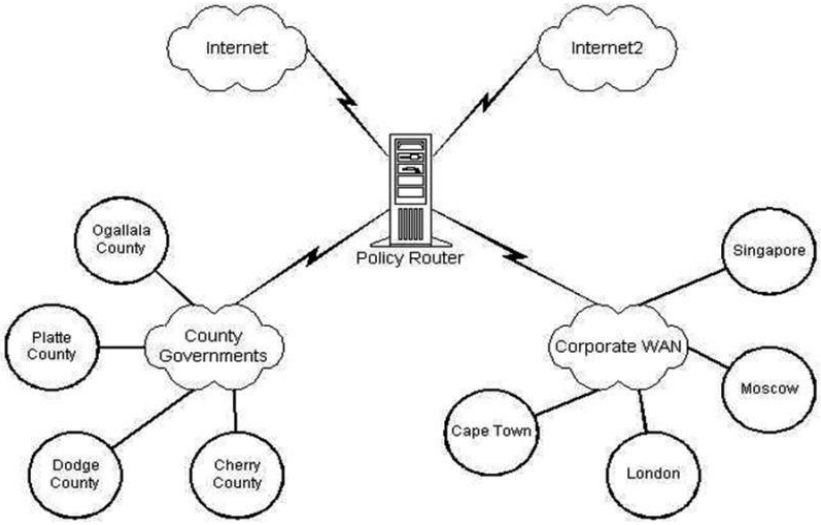

Figure 1.2 Dynamic Routing

IV. HIERARCHICAL ROUTING

As the network grows larger the amount of resources necessary to take care or routing table becomes enormous and makes routing impossible. Here appears the idea of hierarchical routing that suggests that routers should be divided into regions, with each router knowing all the details about how to route packets within its own region, but knowing nothing about the internal structure of other regions. Unfortunately the gains in routing table size & CPU time are not free, the penalty of increasing path length has to be paid. It has been discovered that the optimal number of nested levels for an N router subnet is *ln N*, requiring a total of *eln N* entries per router.

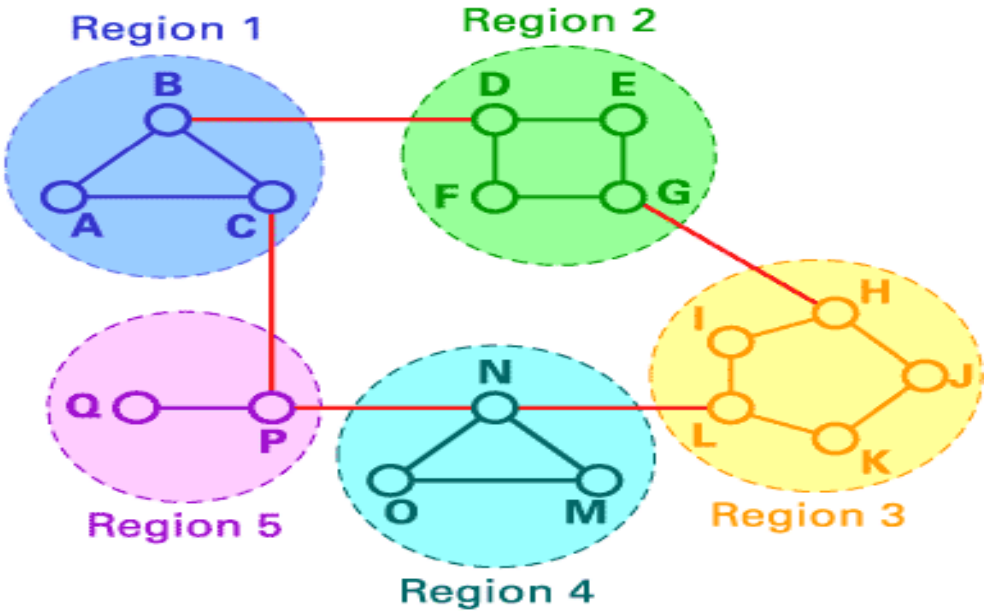

Figure 1.3 Hierarchical Routing

COMPARISON OF THREE TYPES OF ROUTING METHODS

Table 1. Comparison of three types of routing methods

Different types/Properties	Multipath routing	Dynamic routing	Hierarchical routing
Characterization	Spreading of traffic from a source node to a destination node over multiple paths through the network.	Dynamically discover network destinations	Routing the nodes are divided into regions based on hierarchy.
Protocols	End-Host Protocol	Distance vector routing protocols	Link-state routing protocol
Speed	Support to high speed	Not supported	supported
Type of routing	Non –adaptive routing	Adaptive routing	Non-adaptive routing
Network topology	Increase the complexity	Static	Decrease the complexity
Optimization of path	good	good	not guaranteed
Bandwidth	Increased bandwidth	Not support to high bandwidth	Decreased the bandwidth
Fault tolerance	High fault tolerance	Low	medium

In this analysis the three methods based on the following factors: Characterization of routing, protocols, speed of routing, type of routing, Network topology, optimization of path, Bandwidth and Fault tolerance. These factors are used to decide and select a optimized routing algorithm. Multi path routing spreading the traffic from a source node to destination node through multiple paths. Multiple path will increase the speed of network. Multipath routing follows the End host protocol it distribute the data to end node through multipath. When compare with other routing it increase the complexity of network topology. But it select more optimized path than other routing methods. It support to high fault tolerance. Dynamic routing discover instant path to reach destination. It uses distance vector routing protocols. It is adaptive in nature. It gives good optimized path but it is not support to high band width and low fault tolerance level. The hierarchical routing distributes the packets based on region. It follows link state routing protocol. It is a non adaptive type of routing method. It decreases the complexity of network topology. But it not guarantee to the optimized path. It decreased the bandwidth.

V. RESULT AND DISCUSSION

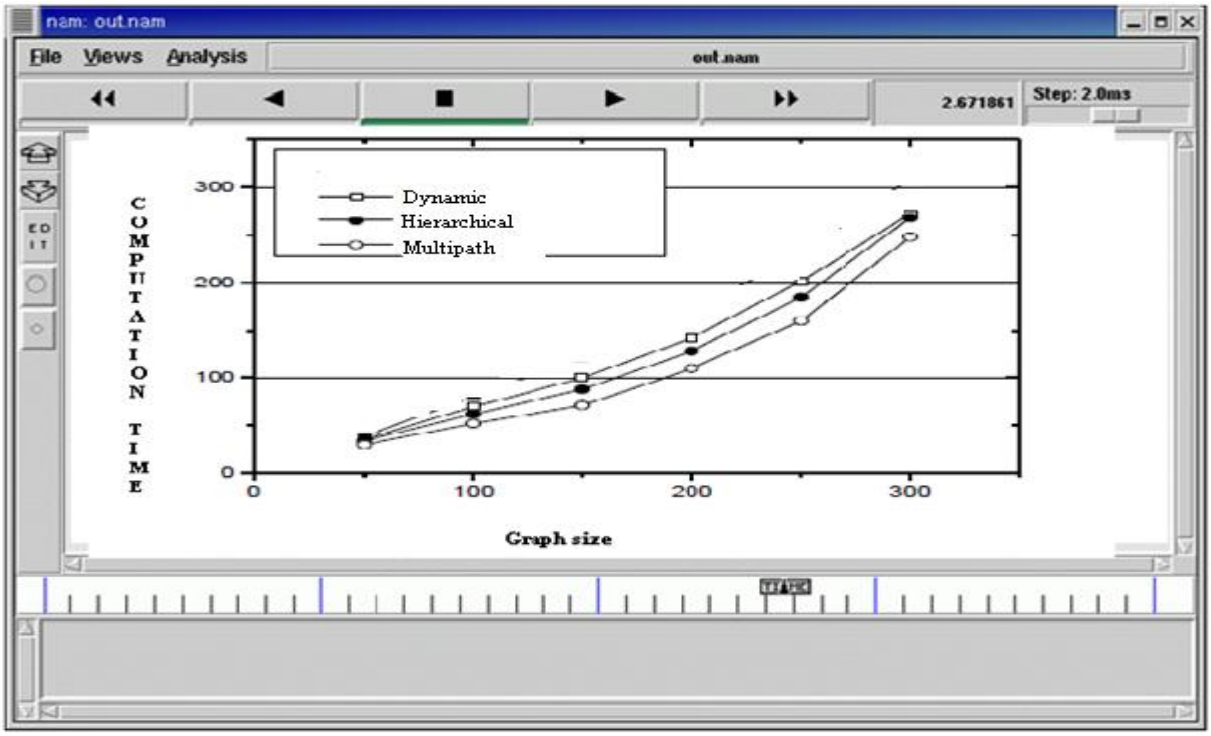

Figure 1.4: Total Computation Time with Respect to the Number of Nodes and the Changed Rate of Link Weights 100

Figure 1.4 shows that the computation time of multipath routing is comparatively low than the other algorithm. As long as the number of nodes is increased, the computation time for shortest paths takes longer. If the changed rate of link weights is low, then the computation time for shortest paths becomes longer linearly

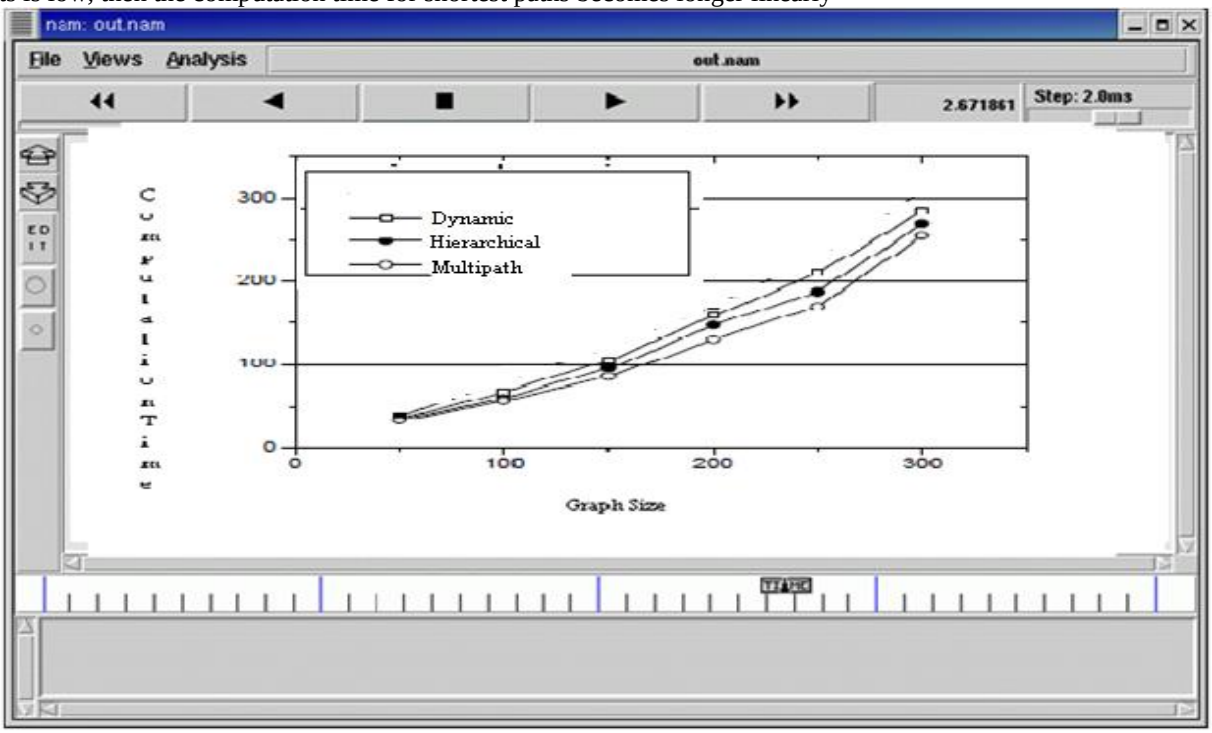

Figure 1.5: Total Computation Time with Respect to the Number of Nodes and the Changed Rate of Link Weights 200

Figure 1.5 shows that the computation time of multipath routing is comparatively low than the other algorithm. As long as the number of nodes is increased, the computation time for shortest paths takes longer. If the changed rate of link weights is low, then the computation time for shortest paths becomes longer linearly

Comparing all the three routing methods multipath routing gives good result and also give more optimized path. It support to all factors of networks.

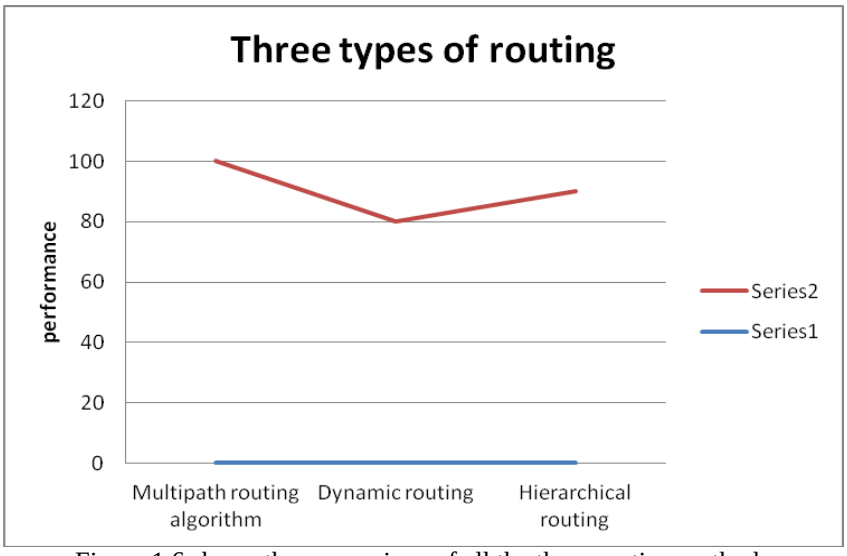

Figure 1.6 shows the comparison of all the three routing methods

The Figure 1.6 shows the comparison of all the three routing methods. It shows that the performance of multipath routing method is giving good result than the other three.

VI. CONCLUSION

Routing algorithms also are designed to be as simple as possible. In other words, the routing algorithm must offer its functionality efficiently, with a minimum of software and utilization overhead. Efficiency is particularly important when the software implementing the routing algorithm must run on a computer with limited physical resources. This paper compare the three methods and conclude that the multipath routing method gives good result than other two methods.

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