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# Run Time Load Distribution over LSR Protocol

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***Abstract: The Quality of Service In Internet is decreasing day by day. As traffic increases very fast it cause difficulties to maintain quality and it decrease the quality of network. The most popular protocol which widely used in the network is Link state routing protocol which is based on link weight. In the consideration of today's network scenario we try to solve the problem of traffic which is unpredictable. As traffic is unpredictable in nature, any node can start transmitting data over wired link. As LSRP is using shortest path forwarding mechanism to send the data towards destination, though the data is more on the link still it will use only single shortest path. Which affect on Quality of Service. OSPF has its own packet forwarding mechanism: Hop-by-Hop and destination based. It split the traffic over shortest path based from source to destination. If traffic increases then it is difficult to transfer the packets from source to destination through single route. Because of that QoS is decreased and TE issues are increased.***

***Keywords: LSRP; OSPF; TE***

## 1. Introduction

We try to overcome from this problem as the concept is to distribute the real time traffic over multiple links but considering QoS. As the load increases on the link it distributes the real time load on different links. With this we can maintain the load on link in real time network. This will help to improve QoS& efficiency network.

The main contributions of this paper are:

1) Identify current link weight on every link in the network, as it is point to point network the traffic is unpredictable

2) Investigating if current link weight is more than its threshold value

3) Identify multiple paths from source to destination

4) Develop the technique than can split real time traffic on multiple path, and

5) Evaluating the proposed technique and any of the LSRP on a different traffic.Experimental results show the graph in the form of Delay, PDR & Throughput.

## 2. Literature Survey

In Existing System, We know, from last few years the importance of IP network has surprisingly increased. Because increasing use of network, number of unpredicted connections is increased so network is unable to manage traffic. Once the network protocol fails to manage traffic; automatically question arrives for quality of service. To manage the traffic, we have to watch on link capacity, current load on link & reduce to transfer unnecessary packets like LSA. Protocols like OSPF and IS-IS that selects the path based in link weights, with these protocols computing the right link weight is NP-hard. OSPF has its own packet forwarding mechanism: Hop-by-Hop and destination based. It split the traffic over shortest path based from source to destination. If traffic increases then it is difficult to transfer the packets from source to destination through single route. Because of that QoS is decreased and TE issues are increased.

There are various protocols in internet world which tried to achieve optimal traffic engineering in LSRP. The comparison of these types of protocols is shown in the following table 2.1.

Table 2.1: Comparisons with Existing Methodologies

| Sr. No. | Name of Mechanism | Concept Defined | Limitations |
|---|---|---|---|
| 1 | OSPF (mid of 1980) | 1.It uses Shortest path algorithm to reach destination.[2]<br><br>2.Use Flooding mechanism to synchronize routing database.[2] | 1.The chosen paths are not robust under change in traffic or network state.[7]<br><br>2.Offered traffic is well-known NP Hard Problem.[1]<br>3.Less utilization of resources.[4]<br>4.Does not think about the load on link.[1]<br>5.This protocol is not used for arbitrary traffic pattern.[5] |
| 2 | ECMP | 1.It split traffic over equal cost multiple paths.[8]<br><br>2.Tried to utilize resources.[8] | 1.Not able to split traffic equally.[2]<br><br>2.Does not think about the load on link.[6]<br><br>3.This protocol is not used for arbitrary traffic pattern.[2] |
| 3 | LB-SPR | 1.It is optimized for arbitrary traffic pattern.[5]<br><br>2.Uses Signaling mechanism of OSPF protocol whenever network topology changes.[5] | 1.Since LB-SPR is using OSPF signaling, it inherits its recovery speed which is insufficiently low. [5].<br><br>2.It required more time to find out next intermediate node with the consideration of current load on link.[5] |
| 4 | DEFT | 1.This is link based protocol[1]<br><br>2.Better than OSPF in minimizing the sum of link cost.[1] | 1.DEFT can split traffic arbitrarily over any paths.[1]<br><br>2.Database Synchronization is a big issue. |
| 5 | PEFT | 1.PEFT is path based protocol and It split traffic along all the paths reaches to destination.[2]<br><br>2.PEFT provably achieve optimal traffic engineering while retaining the simplicity of hop by hop for-warding.[2] | 1.In PEFT it split traffic on the basis of number of paths reaches to destination.[2]<br><br>2.Database synchronization is big issue. |

## 3.Objectives

The key objectives of current work are as given below:

- To minimize the maximum link utilization and also minimize the total link flow.
- To prove this mechanism is better than OSPF and IS-IS for different parameters like:
  - a) Packet Delivery Ratio
  - b) Delay
  - c) Throughputs

## 4. Methodology

To achieve above objective, following methodology is proposed.

Consider a wired IP network as directed graph G = <V,E>, where E is the set of links and V is the set of vertices (or node). As shown in fig. 1.1.



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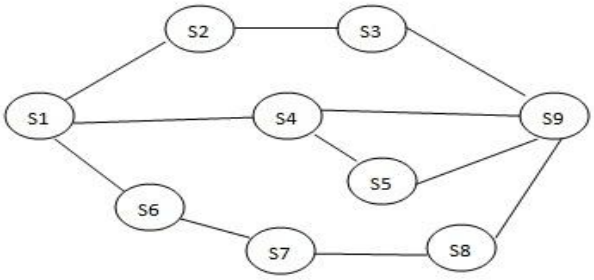


Fig. 1.1 An IP Network

We can consider S1 as a source and S9 is destination where the link (a,b) has traffic capacity tCa,b. Suppose S1 wants to send packet to S9, with the help of shortest path algorithm.

*Sd (a,b) = {min Co { ω (p): a -> b}* *if there is a path from a to b*

∞

*otherwise*

For traffic splitting, it will find out first two shortest path and sends the traffic through route $r_i$ and route $r_j$. If the traffic is more on any of these links then source node S1 will go for third shortest path. With consideration of same example S1 is source and S9 is destination, first shortest path is S1→ S4 → S9 and another one is S1 → S2 → S3 → S9. Now consider if traffic is more on route $r_j$, in our example S1 → S2 → S3 → S9 then traffic will shift to third shortest path which is S1 → S4 → S5 → S9. The capacity of any link is considered as tCa,b and the current load means current flow is considered as tfa,b on each link (a.b). If we need to maintain traffic engineering then out link cost function should be 0 <tCa,b / tfa,b> 1. It means our objective for traffic engineering is to minimize the maximum the utilization of link (a.b).

The most important issue in our protocol is we need to calculate link weight at runtime and then distribute the packets on link, split the traffic again check whether traffic is more on link if not continue with the transfer. As suggested in [2] for computation of link weight and link weight update, we refer those two algorithms as follows.

For Link Weights Calculation we have to set our flow up to necessary capacity of link means, algorithm for computing the necessary traffic capacity ${}_tc^N$

while$tf_{a,b} \neq tc^N_{a,b}$

do

w←Link_Weight_Updates (f)

tf←Traffic_Splitting (w)

end while

Return w

Then, the procedure increases the weight of each link (a,b) if the traffic flow exceeds the necessary traffic capacity, or decreases it otherwise. The parameter μ is a positive step-size, which can be constant or dynamically adjusted. For updating of link weight of any link (a,b)

do

$nW_{a,b} \leftarrow cW_{a,b} - \mu (tc^N_{a,b} - tf_{a,b})$

end for

Return new link weights${}^nW$

After updating traffic we have to split the traffic through first two shortest paths *d^(a,b) as per our example.*

To achieve optimal traffic engineering in IP network following approach is used:

1. Use hello packets for synchronization of database in network for calculating shortest path.
2. Network entropy maximization method is used for calculating link weight and traffic splitting function.
3. Multi-commodity method is used to find out multiple shortest path from source to destination.
4. Finally compare MPTS, LSR protocols with different parameters like delay, throughput and packet delivery ratio.

## 5. Implementation

6.3.1 Network Formation

1. The network contains 50 number of nodes.

2. In this module, constructing a topology to provide communication paths for wired network.

3. Here the node will give the own details such as Node ID and transmission protocol through which the transmission is done and similarly give the known nodes details such as Node ID, packet size and port number which are neighbors to given node.

6.3.2 Open Shortest Path First

1. Sending Hello packets are done according to OSPF protocol.



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2. This module is to calculate the delay time with single shortest path algorithm.

3. The packet delivery ratio is also calculated to check if there is more traffic on link then whether the packets gets drop.

4. The Performance is shown by graph of Packet delivery ratio, Delay, and Throughput.

6.3.3 Real Time Traffic Splitting

In this module, novel scheme is use to spit the traffic in real time environment. The scheme considers the information about the current weight on link. The RTTS protocol composed of two parts ,they are:

1. Calculating current link weight

2.Identifying multiple shortest path as per requirement

3. Update weight on link if load in less than threshold value.

4. Continuously applying NEM (Network Entropy Maximization) Method.

6.3.4 Comparative Analysis

Comparative analysis of above said protocols i.e. OSPF and RTTS is done for different parameters like,

1. Packet delivery ratio parameter.

2. Delay parameter.

3. Throughput parameter.

## 6. Conclusion

In the consideration of current situation of the network we introduce a new method called Real time traffic splitting & efficient flooding mechanism in network with the help of OSPF. I reduced the time required to compute the weight on link and find the best links to forward the packet within short time.This dissertation work can prove that, this new protocol is having better performance than OSPF with considering Delay, Throughput and Packet delivery ratio parameters.

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