Tda Routing for Internet Backbone to Ensure Optimized Computing in Networks

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Abstract
Internet usages in global view raises significantly due to technological revolution respect of growing population and Economic level growth it is frequently accessed by common man in recent scenario. As a result traffic issues in internet promote significantly traffic in a high ratio, so the service provider increases the capacity for traffic free flow. Hence the network is subject to increase rapid as it facilitates congestion attitude and not optimized in finding effective traffic free routing for the consumers because of traditional methods existence for huge internet backbone. So by considering all the observation we here proposing an optimized method that ensures traffic routing for the real world scenario to meet the essential demands.

Keywords:
Congestion, Qos, Traffic Engineering, TDA Algorithm, Traffic index.

1. Introduction

The internet backbone requires effective traffic flow mechanism for sharing traffic in the network routing and resource sharing availability for operational demands in internet backbone [5]. In traditional mechanism of traffic flow and resource utilization activity doesn't meet the required demands in network computing environment. So as to ensure Quality of service in traffic engineering here we are making a simple simulative Comparison analysis on traditional Mechanism of routing with proposed Traffic Distribution Routing algorithmic method [TDA] in terms of their routing policies such as traffic distribution and necessities for computing process.

1.1 Traditional Routing Using Open Shortest Path

Let us take a traditional simple network graph model and use OSPF routing method to show the routing path and traffic distributions. While Simulating the Network model with OSPF Computing we observe some cases to demonstrate Operational demands in terms of traffic necessity in current scenario traffic engineering essentials for internet backbones to provide quality of service. The"Fig.1, "shows the network model for traditional OSPF routing is represented as G= (V, E) where 'V' is the set of nodes and 'E' is the set of links with optimal link weight [1]

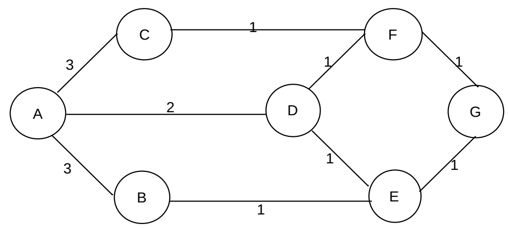

Fig. 1 Simple Network Graph

The graph below show cause the deficiencies for traffic engineering issues when routed with OSPF the observed results taken for traffic distribution and flow is classified into three different cases as shown in "Fig.2, ".

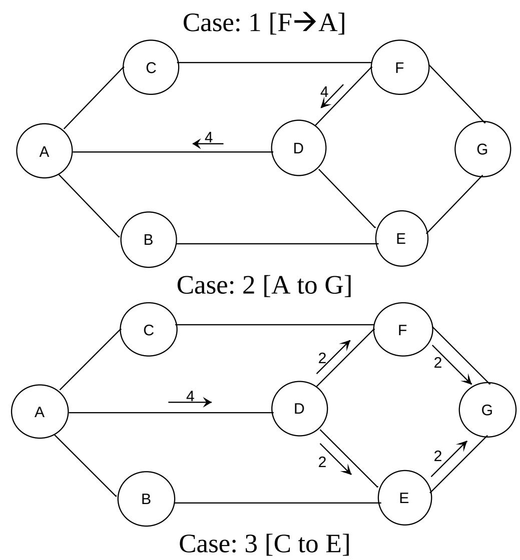

Fig. 2 Open Shortest Path Routing Cases

The Cases for OSPF routing clearly indicates the path depend on choice of weights without taking any knowledge of either the demand or existing traffic in to account [4]. As an overall analysis of the traditional model shows some paths are over utilized and some remain unused. Implementing and using this traditional model in Large IP Network backbone [2] cause traffic rise situation

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and resource utility state in a high ratio. The cases in "Fig.2, "classifies two different aspects i.e. Traffic necessity and Routing paths with traffic distribution shown in below table as follows,

Table I: OSPF Case Analysis

Traffic Necessity		Routing Paths & Traffic distribution
Case 1:		
F to A	4	F to A=4[F→D→A]
Case 2:		
A to G	4	A to G=2 [A→D→F→G]
		A to G=2 [A→D→E→G]
Case 3:		
C to E	4	C to E=2 [C→F→D→E]
		C to E=2 [C→F→G→E]

2. Traffic Distribution Routing Algorithm [TDA]

TDA is a traffic distribution algorithm proposed for traffic engineering issues. Initially TDA finds the path between source and destination. The path selection for a particular demand is done based on the existing traffic flows in the network and maximum unused capacity available for the feasible paths. Once the path are selected the traffic demand is then distributes optimally. The brief illustration of Traffic Distribution Routing Algorithm is shown below.

2.1. TDA ALGORITHM

Step 1: Input the network graph model for TDA.
Step 2: Derive the path from source to destination
Step 3: Initialize the arrays I, O and L to zero and T to 1 (Where I represent IN, O represent OUT, L represent Load, T represent Traffic index).
Step 4: Discover the set of possible path i.e.) Possible _path(S, D) with minimum traffic index T of link in paths (Where S represent source, D is destination).
Step 5: Let considering all possible path is as PathZ $\in$ all possible path
Step 6: Calculate the minimum unused PathZ i.e. Minz = Min [$\sum$ (N(x, y) - L(x, y))]
Step 7: If there is one path between S to D then allot traffic necessity to path.
Step 8: Calculate PO, ZE, NE if there is more than one path from source to destination (where PO, ZE, NE are no of path with positive, zero & negative of unused path Minz).
Step 9: Enumerate if PO > 0 &$\sum_{min_z>0}(min_z)$ >= necessity, then allocate traffic necessity to the path having positive Minz Flow allotted (Pathz) = necessity * $\frac{Minz}{\sum_{min_z>0}(min_z)}$ then Go to Step14
Step 11: Enumerate if PO > 0 & $\sum_{min_z>0}(min_z)$ < necessity, then allocate traffic necessity to the path having positive Minz Flow allotted (Pathz) = necessity * $\frac{1}{PO}$ then Go to Step14
Step 12: Enumerate if ZE > 0 & $\sum_{min_z>0}(min_z)$ >= necessity, then allocate traffic necessity to the path having zero Minz Flow allotted (Pathz) = necessity * $\frac{1}{ZE}$ then Go to Step14
Step 13: Assign the traffic necessity to the path having negative min_z as follows
Flow allotted (Pathz) = necessity * $\frac{1}{NE}$
Step 14: Then update {Congestion index, I, O, T, and L}
Step 15: Return.

2.2 TDA Approach

TDA approach proposed for traffic engineering is constructed on the basis of all impossibilities identified from the traditional model. The network model for TDA is shown in "Fig.3, ". To explain the TDA approach we express the network model as a digraph G= (V, E) where 'V' is the set of nodes and 'E' is the set of links. The link and capacities are directional, where x & y representing nodes I(x), O(y) gives no of edges get into and out of respectively. Let N(S, D) is set of proposed necessity from source to destination. T(x, y) gives the traffic index of the edges(x, y) then L(x, y) denotes Load that represent exist traffic between x & y [10]. The process of TDA starts initially from finding traffic indexes(x, y).Then TDA set all the traffic index for all edges to one and existing traffic flows load L(x, y) of all the edges in network are zero. When there is a new traffic flow from source to destination the path with minimum traffic index is selected for transmission if there may be one or more feasible paths. Let (S, D) be set of feasible path from source to destination. Let Minz represent minimum unused capacity of path Pathz $\in$ all possible path where 'z' is used to as a subscript, if there exist more than one feasible path. The traffic index of the path z $\in$ possible path is summation of traffic index of all edges in the path is given in the following equation for TDA is shown in equation (1).

$$\text{Traffic index}_z = \sum_{x \to y \in path_z} T(x, y) \quad -(1)$$

Among feasible paths the path for data transmission is done using Traffic index equation in TDA. Once the path is selected the next process is allocation of traffic flows to the paths based on the minimum unused capacities available on each path. In continuation the TDA algorithm computes traffic distribution process in two ways. First it compute the available of only one feasible path having minimum traffic index between source and destination otherwise the next stage it provide an overlook on more than one feasible path. So by this way the proposed method will distribute the traffic based on minimum unused capacity as shown in the given equation (2) as follows,

$$MINz = Min[\sum (N(x,y) - L(x,y))] \quad -(2)$$

The value of MINz i.e. Minimum unused capacity may be positive, if the path is having some unused capacity. The value may be zero, if the entire capacity of the path is already used by other flows the value may be negative, if there are packets already waiting in queue for that path. The values of Minz fall under any of the category that stated in TDA algorithm.

1. Combination of positive, zero and negative minimum unused capacity values
2. The path with zero minimum unused capacity values alone
3. The path with negative minimum unused capacities alone. After the Necessity allotment the load matrix must be updated to show the current traffic in the network. Likewise for all the edges a new traffic index is calculated. Hence it's obvious that while calculating the traffic index of a link both the inflow and outflow of the node are taken into consideration. So the allotting the demand for the feasible path the existing flow and proposed necessity are taken into consideration. These two considerations of Traffic Distribution Routing Algorithm clearly pictures optimal traffic distribution across the network and there by avoid congestion spot compared to traditional method.

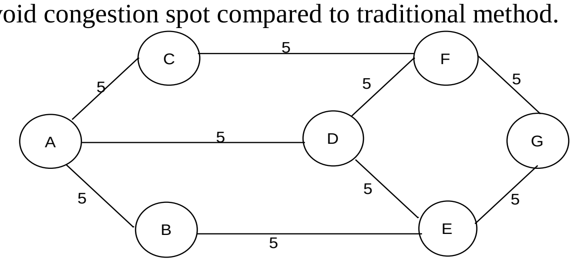

Fig.3 Network Model for TDA

TDA approach routing computation gives us positive indications for the quality routing issues in Traffic engineering. When we simulate the TDA in the digraph for the cases that already observed in OSPF routing to represent the construction method of the proposed algorithm well suited for any network topologies in the network computing environment as shown in the table as follows,

Table II. TDA CASES ANALYSIS

Case 1: F→A

Routing Paths	Traffic distribution index
F to C to A	2
F to D to A	2
F to G toE to B to A	4
F to D to E to B to A	4

Case 2: A→G

Routing Paths	Traffic distribution index
A to B to E toG	3
A to D to E toG	3.5
A to C to F to G	4
A to D to F to G	4

Case 3: C→E

Routing Paths	Traffic distribution index
C to A to B to E	4
C to F to D to E	4
C to F to G to E	4

In TDA approach Case 1: F→A computes two feasible paths with minimum traffic index value [9]. Then for Case: 2 A→G using TDA resulted with one feasible path with minimum traffic index value 3 and rest with 3.5.When coming to last Case 3: C→E using TDA derives more than one feasible path with minimum unused capacity is obtained [8]. Hence the network using TDA algorithmic approach routed with optimized traffic sharing in the desired path promotes traffic engineering mechanism to improve quality of service when it is implemented for large internet backbone [6].

3. Comparison Of Traditional Routing Approach With TDA

The efficiency of TDA algorithm is obtained by comparing the simulation analysis of the above algorithm through network simulator for traffic engineering [11] to ensure quality of service. The results obtain is shown in "Fig.4,'' represents the minimum Load capacities for various flows of iteration and "Fig.5,''shows the maximum link load capacities for various flows of iteration [12]. The comparison factors of OSPF with TDA clearly indicate the OSPF Minimum and Maximum flows is relatively consist of insufficiency in terms of demand while routing in the network that really affects the quality of service in traffic distribution in existing scenario when it's compared with TDA. Hence the TDA approach promotes optimized quality of service in Traffic Engineering in global perspective observation [13].

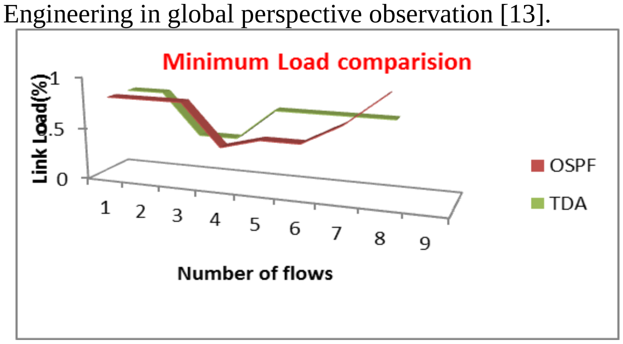

Fig. 4 TDA & OSPF for Minimum Load (%)

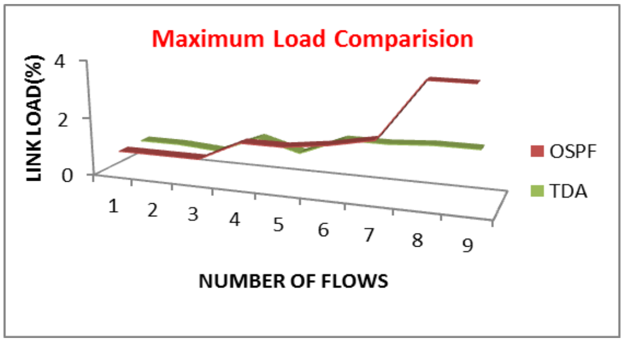

Fig. 5 TDA & OSPF for Maximum Load (%)

4. Conclusion

We are having variety of algorithmic approach and methods for internet traffic engineering mechanism in real world scenario. In that TDA approach stated here having a distinguish feature from the rest of them because here we keenly make an observation note on all the possibilities of producing optimized quality of traffic distribution flows in the network .This TDA algorithmic is also scalable to very larger network because here we laying down the logic of identifying the congestion occurrence and redirects the traffic towards minimum link load. Hence from the above observations in TDA algorithmic approach for traffic distribution properties in network environment promisingly reflects in data transmission by reducing the time about average of 20% than the rest. The future scope for this existing algorithm can be upgraded and used for Wireless Ad-hoc networks due to its reliable and scalable in nature for ensuring the quality of services.

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