



A Short Study on Routing and Traffic Engineering Design for Global Internetworking

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Abstract: Data networks exist to transport information at the behest of user across global computing environment. So the end user receives benefits on various properties of this transport such as latency, throughput, and reliability etc. These are all the basic constraint for optimized data routing that provide good quality of service and operational effectiveness in global perspective but looking outin current scenario internetworking environment surpasses a heavy computing traffic besides of including technology advancement day by day. According to a recent survey of global data routing the traffic will surpass 10 Exabyte's in 2017, it may be rise up more than the above mark in future this may due to use of internetworking resources in excess amount in a global view, so it is important to present a short outline study paradigm on network routing process& traffic engineering. Then as a conclusion based on the short study a prototype model for protocols, algorithm & traffic engineering design for well optimized trafficfree routing techniques is proposed that helps for the researchers to create an optimized network routing process for future perspective.

Keywords– Routing Protocols, Routing table, Routing Algorithm, MPLS&Traffic engineering, Traffic issues.

I. INTRODUCTION

Most commonly data traffic in global community is coined in two different aspects. One is delaying of data from source to destination and other is quality. The above issues may cause by various circumstances such as load on communication system or potentially increasing usage of resource in internetworking environment than the predictable amount. The solution for this issue is to create a logical way of effective routing process. So we present a shortlogical study on routing process besides of getting depth into it and also a proposal prototype model design for routing protocol, algorithm and traffic engineering model by considering current scenario consideration.

II. ROUTING

Routing is a process that involves delivery of datagrams between end systems located on different networks. Hence the routing process requires routers, routing table and protocol for the communication process [1].

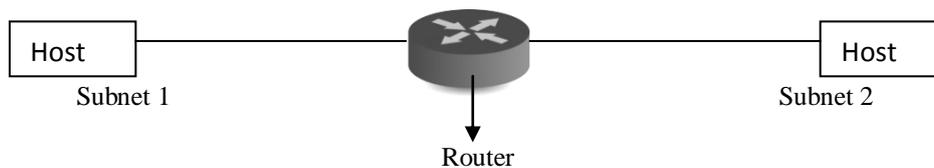


Fig1 Routing in computer networks

The above fig 1 is a logical representation of how a host in the internetwork region of subnet 1 wants to communicate with the host in a subnet 2 using routing algorithm and protocols that simulate the data from one point to another.

A Routing table

Routing table is a basic component in routing technology. To understand the working methodology of the routing table is the better way for providing an optimized routing process. The routers used for routing built the routing table for calculate the packet destination for forwarding process. The routing table is a memory table present on both hardware and software of the router. Routing table is operated by dedicated routing protocol. Generally the routing table classified in to two categorical structures depend up on theworking process they are static routing table and dynamic routing table. However the routing table is maintained by host computers as well as routers.

The below sample table been derived from one of the congested traffic flow internetworking environment [3].clearly pictures how a router build up routing table for data communication

TABLE I - Sample routing table for a Linux server in a WAN Network.

DestinationIP Address	Gateway Address	IP routing table Genmask	Flags	Metrics
192.16.172.245	135.170.192.245	255.255.255.255	UH	1000
162.16.172.0	135.170.162..245	255.255.255.0	U	100
Default	135.170.172.1	0.0.0.0	UG	0

U – Signifies that route is up G – Signifies that route is to a router (router) H – The route is set to a host

B. Routing methods

After having a short study on routing and routing table the next is forwarding data in data network it is accomplished by routing method. Logically the routing method is classified into two types as Inter domain & intra domain routing based on the policies and standards.

1) Intra domain routing

Routing occurs in a limited metrics for data simulation in a small medium of communication region is coined as intra domain routing else in other term it is said as routing takes place inside an autonomous system is referred to as intra domain routing.

2) Inter domain Routing

Routing with unlimited metrics policies and it taken place in a wide medium of communication is classified as inter domain routing or in other words routing taking place between different autonomous system is coined as interdomain routing.

C. Basic optimality principle in routing

To prepare for an effective communication it is need full for delivering the optimality principle for protocols that resulted in a performance based routing algorithm design that helps for delivering performance based protocol for routing algorithm that gives the best route with minimum cost by promoting traffic free in global computing.

1. Proper measurement been taken well for the routing process in the view of global environment i.e. it must be scalable
2. It must support different sub network types and multiple qualities of service.
3. It must adapt to topology changes quickly and efficiently
4. It must Provide controls that facilitate the safe connection of multiple organizations

D. Routing protocols

The routing protocols help in specifying how the router communicates with each other. There are many protocol used for router communication must be encapsulated with the below common classification are as follows,

1) Interior gateway routing protocol

The interior gateway protocol works on the basics of updating the routing table with the neighbour routers by sending the routing message frequently in an autonomous system. So it is easy for the routers to forward packet without time delay. Hence this type of routing protocol is not appropriate for internetworking environment we can use it for routing within an autonomous system. Some of the interior gateway protocol used in routing is RIP/RIP2/OSPF/IGRP/EIGRP [3].

IGRP

It is necessary to show about any one of the above protocol implementation. Hence we take IGRP for interior gateway routing process. To explain in a simple manner here we classified this in to two ways as equal and unequal cost load balancing using IGRP routing protocol [9].

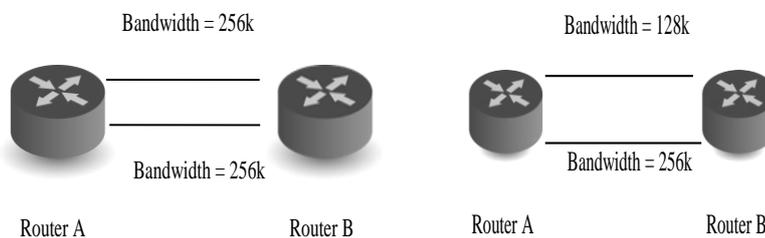


Fig 2 equal and unequal cost path

In the above fig 2 multi path exist between two routers in equal cost path with identical bandwidth values favour automatic load balancing that favour ease way of communication with less amount of traffic free access. In other hand unequal cost path the with variance bandwidth favour traffic engagement in the networking environment.

2) Exterior gateway protocol

The exterior gateway protocols works on the basics of periodic exchange of information for obtaining the nearest router information for updating the routing table for the data communication process in network routing outside the autonomous system. The best example for Exterior gateway protocol is BGP.

Border Gateway protocol

It updates the existing exterior gateway protocol and their policies by routers to prevent loops in the routing table, allows for robust set of policies with which routers are chosen for communication activity. The current version of BGP Protocol is BGP4. It normally used for routing with one autonomous system to other in a group of autonomous system [2]. The best example for studying the BGP is distance vector routing protocol operations as follows,

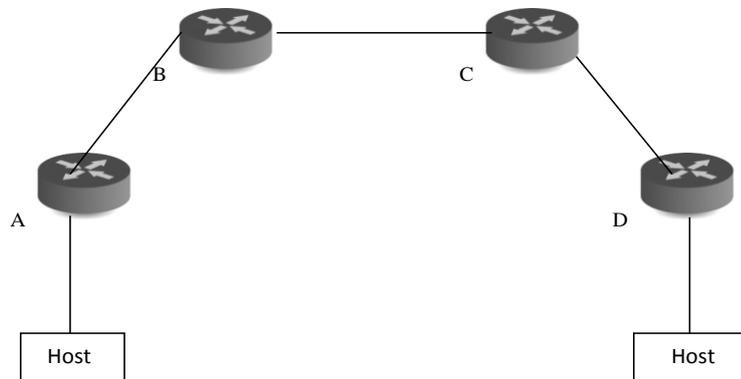


Fig 3 Border Gateway protocol

In the Fig 3 the host tend for communicating data from one point to another points are separated by five subnets or autonomous system i.e. five hops connected through routers. Hence the distance vector protocols i.e. BGP use distance (hops) to determine the best route between source and destination.

III. ROUTING ALGORITHMS

In Data networks the routing algorithm plays an important role in choosing an optimized path because the routing occur in global environment is widely classified in to two types. Non- Hierarchical is the first classifications (node keeps information about every other node in the network) and hierarchical routing (Networks can be organized in hierarchies of many levels). In Recent environment there are enormous number of routing algorithm in existence for routing beside of specifying the physical classification on different forms here we grouping all of them on the basis of logical properties, Centralized and decentralized algorithm, Static and Dynamic routing algorithm[4].

A. Centralized & Decentralized routing algorithm

In a centralized routing algorithm all the route choices are stored in a central node. The central node computes least-cost path, also called as the shortest path between a source and destination using complete, global knowledge about the network. In a Decentralized routing algorithm the computation made at each node by exchanging the necessary information in the form of calculating the least cost path carried on iterative and distributive manner.

B. Static Routing & Dynamic algorithm

Static Routing is otherwise called as deterministic routing or non-adaptive routing manually sets up the optimal paths between the source and destination computers. In that the selection of routes and the assignment of flow links are decide before the routing tables that are stored in network switches. In dynamic algorithm the selection of routes and assignment of flow links are continuously changing periodically between source and destination.

C. Desirable properties of routing algorithm for traffic optimization

If we need a traffic free network routing environment the following are some of the desirable properties that need for the algorithm to be used in the existing protocol in routing process are as follows,

1. Simplicity in nature
2. Robustness
3. Scalability of routing decisions
4. Fairness of resource allocation
5. Optimality for transportation
6. Loop Freedom
7. Convergence characteristics
8. Processing & Memory Efficiency

IV. TRAFFIC ISSUES & DESIGN MODELS

The main issue of internetworking is increasing of resource usage by the end user, so it leads to traffic in the global computing environment it can be observed by the following measurements are as,

1. Throughput
2. Average packet delay
3. Oscillation problem

Based on the above issues the internetworking traffic is comparatively explained as in physical usage process such as web, file sharing, video etc. by cisco in CISCO VNI, 2013[6] shown below in Fig 4.

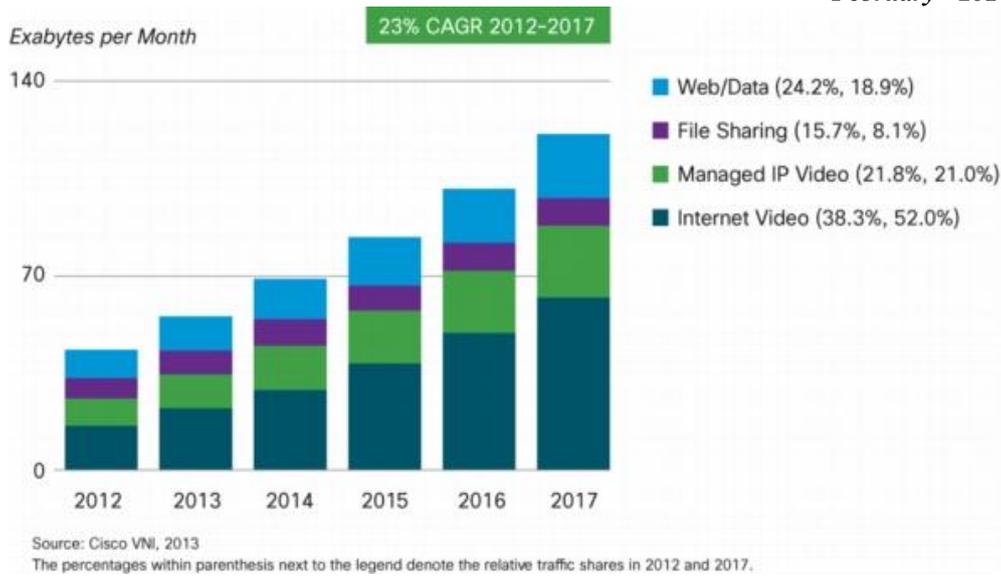


Fig 4 Comparison of traffic in global process

So by above comparison provide a need for a logical design model of protocol, algorithm and traffic engineering.

A. MPLS AND TRAFFIC ENGINEERING

Apart from classic routing process the rapid growth and increasing in usage have made traffic engineering and MPLS becomes a needful consideration in the design and operation of internet networks [7].

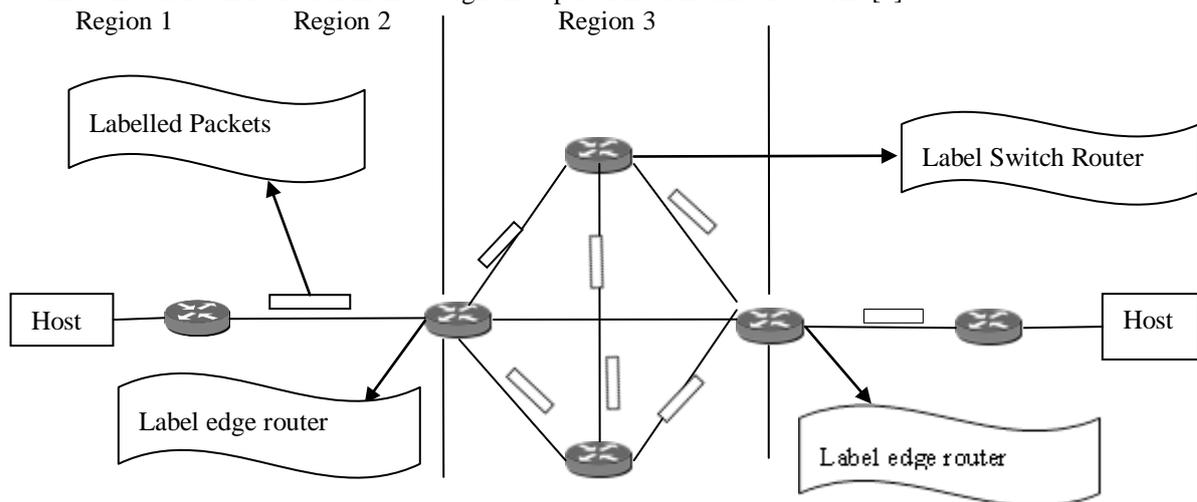


Fig 5 MPLS Routing

MPLS is a standard technology for traffic free data communication in internetworking background is neatly shown in the above fig 5 it works with the basic principle of labelling the packet in an internetworking backbone region with MPLS process performed by two routers LSR and LER periodically in internetworking favours traffic free process. The MPLS working also favours the following basic characteristics that promote traffic engineering design as,

1. Administrating the path
2. Traffic monitoring
3. Network state monitoring
4. Network Administration

B. Issues in MPLS Networking in Current Scenario

There are also certain issues in MPLS networking that act as hurdles for optimized traffic free form is listed below as [8],

1. Network architecture for framing MPLS process is still a challenging factor
2. Topological problems while configuring MPLS
3. Routers and routing table functional and features not been in a considerable resource for favouring MPLS
4. Policy issues still big quotes for the researcher in MPLS traffic engineering model
5. Cost wise implantation for global internetworking computing is still lacking in some aspect

So from all citation that mentioned here it is necessity to give a prototype model that favour traffic engineering design in routing.

C. Essential need for effective routing Design

Before proposing a prototype model it is necessary for find out the essential needs. In that the problem of routing assignment has been one of the most intensively studied areas in the field of computer network research areas. When we

take the process of convergence routing with the existing algorithm it ensure the packet will read the shortest destination to free from traffic being routed on the same link twice without the hops. So the expected computational time still is being a greater challenge to the network traffic issues. Hence to overcome the above difficulties we still need an optimized traffic engineering design in network routing that can change the routing decisions according to the traffic conditions at every intermediate node along the path from source to destination. It also computes the path cost by considering the number of hops to destination and available link capacity. The priority can be assigned to the path based on the path cost due to this shortest and lightly loaded path can be selected. Sometimes the adaptive routing algorithms may not be couple up with sudden change in traffic lead to oscillation problem. By considering all the above citation the algorithm must be framed to free from traffic issues in internetworking, that helps the protocol in routing to find the best path and traffic engineering design model for routing process.

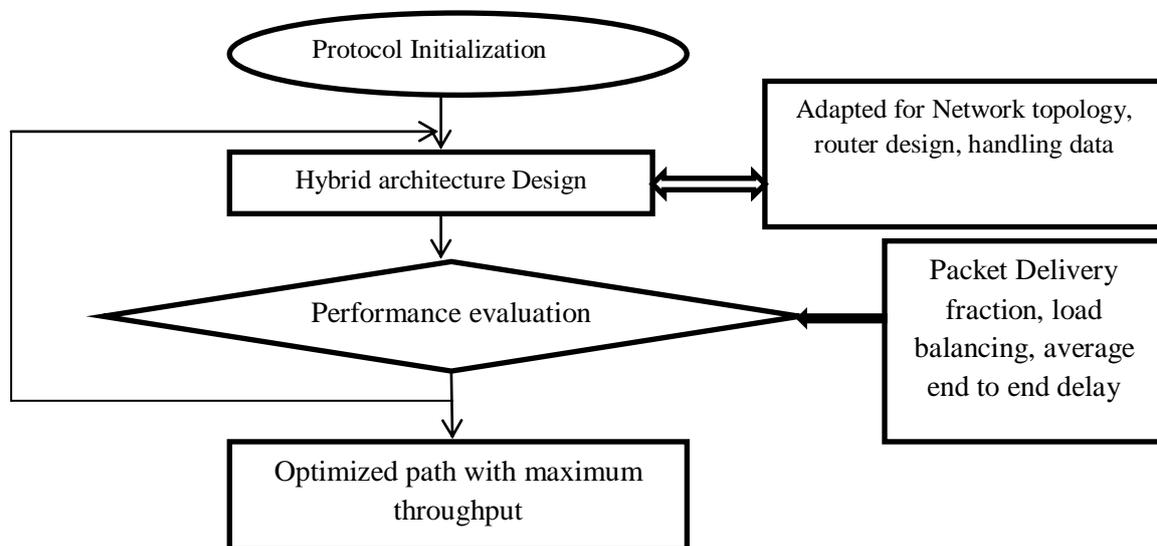
D. Prototype design model for traffic free global routing

By considering all the literature short study here we deriving an design model in to three main module of logical classification[5] for effective traffic free routing process in global communication as,

1. Protocol Design
2. Algorithm Design
3. Traffic Engineering Design

1) Protocol Design

The protocol in routing is like a blood for heart, Hence the proposed Design model of protocol for routing algorithm to communicate data in the internetworking is by the following flow representation,



The Design start with initialization of protocol with necessity requirements as mentioned above in desirable properties accomplished by a hybrid architecture design for protocols that comprises of Artificial intelligence technique to adopt for global topological classification, router design and handling the data flows. Then the design succeed by performance evaluation scheme for protocol design in which packet delivery fraction, load balancing, average end to end delay be calculated. If the performance result not satisfies the desirable properties requirement level the flow is set back to the architectural level for reconsideration else the flow obtained the optimized proximity for protocol design.

2) Algorithm Design

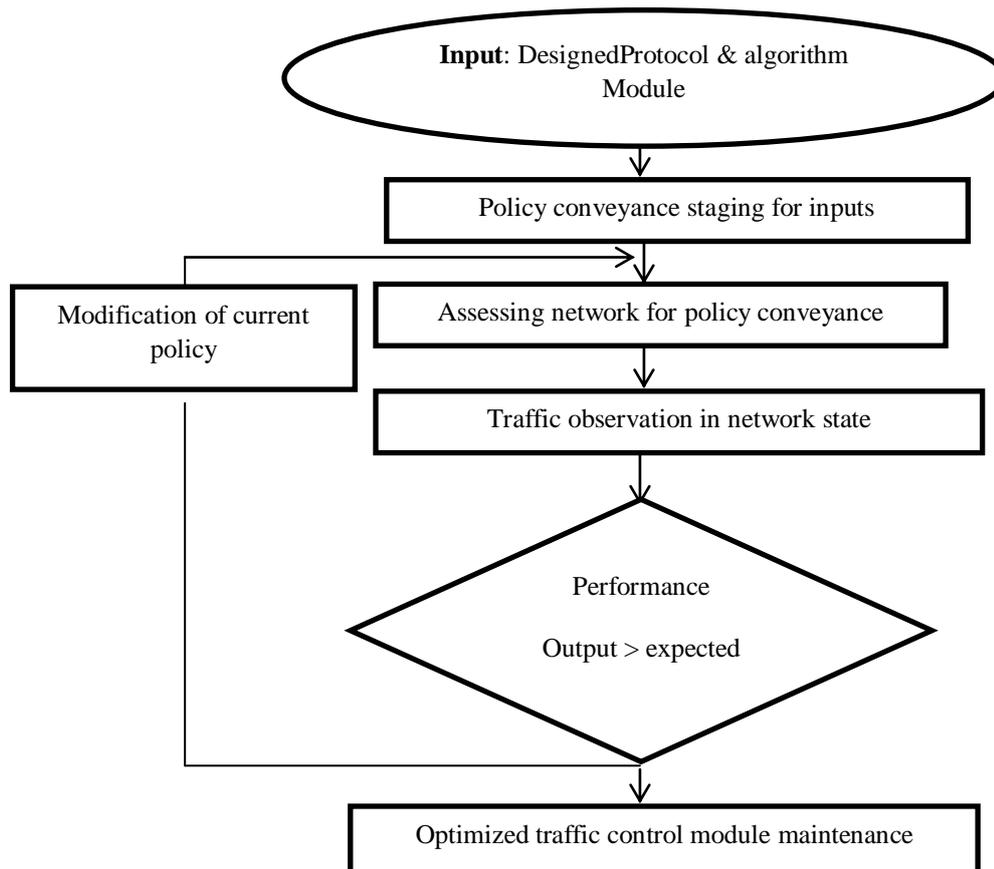
The prototype model for traffic free routing requires best algorithm. By considering all the literature study and issues in recent scenario the below algorithm is designed in to different stages of step representation are as follows,

- Step 1: Input the designed protocol in global data network form for routing process
- Step 2: Initialize all nodes in the networks for routing as a set of data for hybrid routing process
- Step 3: Using AI techniques trained the set of data in two ways
- Step 4: First way of computation is to train the data using Artificial intelligence techniques for learning the paths
- Step 5: Second way computation is to train the data in maximum traffic environment
- Step 6: Compute the two way of training for optimized best case in traffic free routing method.
- Step 7: Obtain the best case and transport the data in that path.
- Step 8: Repeat the process for various cases
- Step 8: Store the above cases for optimal routing output for future perspective
- Step 9: The resultant from above steps lead to an optimized traffic free routing algorithm for global network.

The above steps are deriving the best logical way of constructing an algorithm in routing process.

3) Traffic Engineering Design

Traffic Engineering Design model in Data Networks act as an administrative module for effective traffic free in communicating the data in global form is represent in a flow format as follows,



In Traffic Engineering design model the first step of flow is inputted with Designed protocol and algorithm design controlled by network traffic engineering polices that inputted in to assessment stage with monitoring state process for network and it is followed by observation state for identify the traffic and control the packet direct in to another optimized path using algorithm design input control, Then by passing the observation state in traffic engineering it is essential to calculate the performance. If Output obtaining the maximum expectation then the control is direct in to maintenance module for traffic free issues else the control is redirected to some modification policy to current state and again inputted in assessing state for traffic free engineering design module.

Hence by considering the entire three design module with technological consideration it will definitely help the global Data network to free from traffic issues in a considerable amount.

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