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Holistic Approach For Traffic Engineering System On Virtual Routing Topologies

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ABSTRACT:

The dynamic and lassy nature of Catastrophic events may cause link and node failures in traffic engineering. This may cause problems related to loss, jitter, bandwidth utilization. So handling traffic and network dynamics in order to avoid loss links, network congestion and subsequent service disruptions is one of the key tasks performed by contemporary network management systems. We can consider Traffic Engineering in terms of its potential applications 1. Bandwidth Optimization making efficient use of bandwidth 2. Improving service availability (Faster recovery around failures). We propose a holistic approach to rectify the link failures and congestion based on ample. According to our evaluation with real network topologies and traffic traces, the proposed system is able to cope almost optimally with unpredicted traffic dynamics and, as such, it constitutes a new proposal for achieving better quality of service and overall network performance in IP networks and reduces the link failures.

Introduction

Our Traffic Engineering uses holistic approach in defining and designing traffic patterns and circuit maps for corporate and clients across private, public networks and the Internet. In today's world ever increasing use and reliance on public and Internet including corporate networks has become a commonplace scenario. With businesses now being more often conducted online over the web in its multi-faceted form such as electronic commerce, business critical applications, Voice(VoIP), Video, On-demand solutions, Multimedia applications or Live-streaming solutions, it has become never-than-before essential to ensure and assure the quality, reliability and performance of these usages. Holistic approach which consists of

1. Selecting good routes.
2. Neighbor management.
3. Discover & characterize connectivity.

We are going to use traffic engineering techniques such as traffic shaping, re-routing, AMPLE, policing and queuing. And also considering QoS techniques based on Classification & Marking, Congestion Avoidance and Prioritization.

MODULES:

1. Fast Re-Route Link Protection
2. Auto Bandwidth Allocation scheme.
3. Integrating Qos.

MODULE 1:

Fast Re-Route Link Protection:

FRR establishes a procedure that allows rerouting around a failed link in the event of a link failure. The LSP is routed to the next-hop using a pre-configured backup tunnel. The backup tunnel must be configured so the LSP can get to the next hop downstream router without traversing the protected link. FRR link protection does not offer any node resiliency support, but it does protect a specific link. Each router should be configured in the OSPF (Open Shortest Path First) area. The router sends out Link State Advertisement in regular intervals. All link information stored in topological database. After the SPF (Shortest Path First) algorithm applied in the data in database. The Process generates the SPF tree. It contains the listing all links with any destination in order of preference. The Preferred order stored in routing table. The router giving the best routing choice in those destinations.

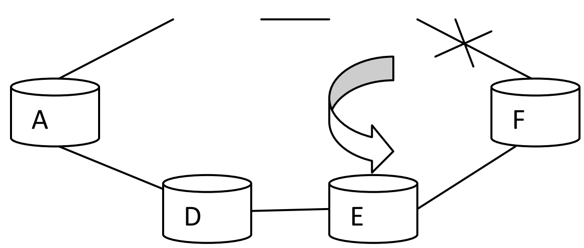


Figure :1 FRR LINK PRODUCTION

A Primary path configured from A to F via B,C and the secondary path or backup path configured from A to F via D,E. once enabled the Fast Reroute, all other routes will know the FRR is enabled. because the head end router informing the message to all routers along with the LSP. suppose the link break between the C and F, the C router knew that and informing the other routers and immediately the router will reroute the path and the traffic will continue along this path.

MODULE 2:

AutoBandwidth Allocation scheme:

AutoBandwidth allocator automatically adjusts the bandwidth size of Traffic Engineering (TE) tunnel, based on how much traffic is flowing through the tunnel.

RSVP-Resource Reservation Protocol(RSVP) is a transport layer protocol, it can be used either host or router to request or deliver specific levels of quality service. It is not routing protocol, but It was designed to inter operate with current and future routing protocols. It consists of two message types.

Path Message – defined the path and requests the bandwidth

Reservation Message – Reserve the bandwidth

LDP-Label Distribution Protocol is generating the labels and exchanges the labels between the routers. It Create the LSP(LABEL SWITCHED PATH) and used when the packets are forwarding. We will configure and calculate the bandwidth and using this variables.

A – Application frequency (24 hours for default value)

B- Tunnel bandwidth

C- Collection frequency (5 minutes for default value)

H- highest collected bandwidth

D- Delta(H-B)

When a tunnel is first configured with auto bandwidth, a timer A is started. After this timer is started, every C seconds, the output rate on that tunnel interface is collected, and D is calculated. When A expires, the tunnel is reconfigured (the value of B is modified) in accordance with D.

Suppose the auto bandwidth on an interface that has no bandwidth configured. Over A seconds, the highest bandwidth seen on that tunnel is 30 Mbps. The value of D is therefore 30 Mbps. The tunnel is resized to 30 Mbps, and the A timer starts again.

MODULE 3:

Integrating QoS(Quality of Service)

A network or protocol that supports Quality of Service. It manage the performance, the data rate, delay, and jitter and packet loss.

QoS Parameter Calculation

a) Delay

Delay or latency could be defined as the time taken by the packets to reach from source to destination. End to end delay could be measured as the difference of Packet arrival and packet start time

$$\text{Delay} = \sum \text{Packet arrival}_i - \text{Packet Start}_i$$

b) Packet Delay variance (Jitter) Jitter could be termed as the variation in delay or packet delay variation. The value of jitter is calculated from the end to end delay. It is the variation in the time between packets arriving.

$$\text{Jitter} = \frac{\sum_{i=0}^{n} \text{square}(\text{Delay}_i - \overline{\text{Delay}})}{N}$$

c) Throughput (Th) Throughput is measure of number of packets successfully delivered in a network. It is measured in terms of packets/second.

Application frequency

$$\text{Th} = \frac{\sum_i \text{Packet delivered}}{\sum_i \text{Packet Arrival-Packet start time}_i}$$

We are using the token bucket system for reduce the network congestion. The regulation of a transfer rate as a token bucket system, which is comprised of three parts:

Committed Information Rate (CIR) – specifies the traffic rate dictated by the SLA, measured in *bits per second (bps).*

Burst Rate (Bc) – specifies the amount of traffic to be sent within agiven time interval, measured in *bits*.

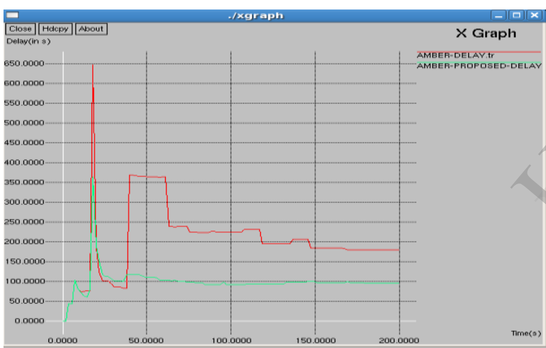
Time Interval (Tc) – identifies the time interval for each burst,measured in *seconds* or sometimes *milliseconds*.

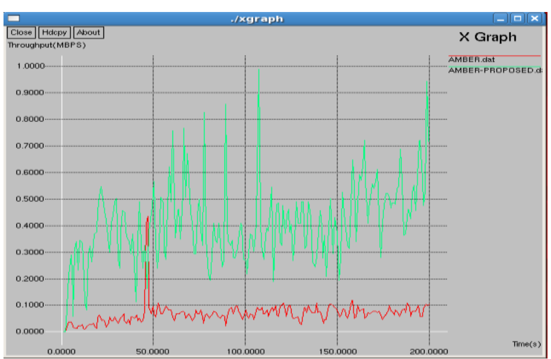
CIR (bps) = Bc (bits) / Tc (seconds)

With a token bucket system, the bucket is filled with tokens, and each token represents one byte. Thus, to transmit a 50-byte packet, the bucket must contain a minimum of 50 tokens. Tokens are consumed as traffic is transferred, and the bucket is refilled with tokens at the speed of the CIR. If the bucket is full, then excess tokens will spill out and are wasted. The capacity of the bucket is defined by the burst rate.If the data (in bytes) to be transmitted is less than the number of tokens currently in the bucket, then the traffic is conforming to the policy and is forwarded. If the data (in bytes) to be transmitted is more than the number of tokens currently in the bucket, then the traffic is exceeding the policy. This excess traffic can be shaped (buffered) or policed (dropped or re-marked), depending on the configured policy.

RESULTS

In order to evaluate the performance of holistic approach using the traffic engineering system on virtual routing topologies, We have used Network Simulator software version 2.32 for our simulations due to its ease of node deployment and network set up. Compare to existing paper the throughput is very high, delay is very low. It consider the link failures and to avoid the lossy links using OSPF routing protocols.





CONCLUSION :

In this article we have used holistic TE paradigm based on AMPLE, the OSPF routing protocols that enables Fast Reroute Link Production and MPLS & RSVP using the Auto bandwidth allocation to every path .we have used QoS Parameters and techniques to avoid the delay and congestion. Therefore our paper helps in understanding this holistic approach to handle both traffic and network dynamics simultaneously which helps in improving performance for instance network failures.

REFERENCES

[1] Ning Wang, University of Surrey,Kin Hon Ho, Hong Kong Polytechnic University George Pavlou, University College London "AMPLE: An Adaptive Traffic Engineering System Based on Virtual Routing Topologies" IEEE 2012 Transactions on Communications,Volume:55,Issue:3

[2] N. Wang, K-H. Ho, and G. Pavlou, "Adaptive Multitopology IGP Based Traffic Engineering with Near-OptimalPerformance," *Proc. IFIP Networking 2008*.

[3] S. Uhlig *et al.*, "Providing Public Intradomain Traffic
Matrices to the Research Community," *ACM Sigcomm Comp. Commun. Rev. (CCR)*, vol. 36, no. 1, Jan. 2006, pp. 83–86.

[4] B. Fortz and M. Thorup, "Optimizing OSPF/IS-IS Weights in a Changing World," *IEEE JSAC*, vol. 20, no. 4, May 2002, pp. 756–67.

[5] D. Xu, M. Chiang, and J. Rexford, "Link-State Routing With Hop-By-Hop Forwarding Can Achieve Optimal Traffic Engineering," *Proc. IEEE INFOCOM*, Apr. 2008.

[6] M. Caesar *et al.*, "Dynamic Route Computation Considered Harmful," *ACM Comp. Commun. Rev. (CCR)*, vol.40, no. 2, Apr. 2010, pp. 66–71.

[7] N. M. Mosharaf Kabir Chowdury and R. Boutaba, "A Survey of Network Virtualization," *Computer Networks*,vol. 54, issue 5, Apr. 2010, pp. 862–76.

[8] P. Psenak *et al.*, "Multi-Topology (MT) Routing in OSPF," RFC 4915, June 2007.

[9] A. Asgari *et al.*, "Scalable Monitoring Support for Resource Management and Service Assurance," *IEEE Network Mag.*, vol. 18, issue 6, Nov. 2004, pp. 6–18.

[10] A. Kvalbein *et al.*, "Multiple Routing configurations for Fast IP Network Recovery," *IEEE/ACM Trans. Net.*, vol.17, no. 2, 2009, pp. 473–86.