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RSVP- A Fault Tolerant Mechanism in MPLS Networks

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Abstract:
The data transmission over the Internet (IP) takes an increasingly central role in our communications infrastructure. Here there may be the slow convergence of routing protocols after a network failure becomes a growing problem. To minimize this problem in this paper I am introducing a concept called Multi-protocol label switching (MPLS) will reduce the time convergence and network recovery is limited process when compared to IP. In this paper presents a new efficient fault-tolerance approach for MPLS. And we used a protocol in MPLS based networks to evaluate fast reroute maintain which is RSVP (Resource reservation protocol). And it uses RIP (Routing Information Protocol) algorithm based on distance vector routing and is supported on a wide variety of systems to overcome all the defects in IP. In this paper we simulated the scenarios by using GNS3 (Graphical Network Simulator 3).

Keywords: ***RSVP, RIP, MPLS, LER, LER, LDP, LSP,GNS3 (Graphical Network Simulator 3)***

1. Introduction:

Multi-Protocol Label Switching (MPLS) is a protocol-agnostic mechanism for transporting data using either a connection-oriented approach (based on MPLS plus RSVP) or connectionless (IP/MPLS with LDP). MPLS is the best of Everything allows us to combine the forwarding efficiency of virtual circuit Technology, with the excellent dynamic routing Capabilities of IP.Great of converging voice and data packets on a single IP network. MPLS has become an attractive technology for the next generation backbone networks to provide high quality service; fault tolerance should be taken into account in the design of backbone network. MPLS is a packet-switching network technology generally seen as residing at layer 2.5 of the OSI model (between the Data Link Layer at layer 2; and the Network Layer at layer 3) hence it is a Layer2.5 protocol. MPLS Security, which protectors against Denial of Service attacks and unauthorized network access, includes both control and data plane protection capabilities.

1.1 IP vs. MPLS

IP (Internet Protocol)	MPLS (Multi-protocol label switching)
In IP it uses address to route the data	In MPLS Labels used to route the data
It presents in Network layer (Layer3)	It presents between Network layer and Data link layer hence it is a layer 2.5 protocol
In IP Latency is more	In MPLS latency is Less
Network recovery is a large process	In this network recovery is Very easy
Time consumption is more	Time consumption is Less

MPLS is a scalable, protocol-independent transport. In an MPLS network, data packets are assigned labels Multiprotocol Label Switching (MPLS) is a mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table. The labels identify virtual links (paths) between distant nodes rather than endpoints. Multi-Protocol Label Switching (MPLS) was originally presented as a way of improving the forwarding speed of routers but is now emerging as a crucial standard technology that offers new capabilities for large scale IP networks.

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In MPLS terminology, the packet handling nodes or routers are called Label Switched Routers (LSRs). Multiprotocol Label Switching, MPLS is the process of data packets labels. When data packets are transmitted over a network connection, their labels are examined instead of having to examine the contents, thus determining the network destination in a more efficient manner. This method can improve data transmission speeds because there is no Need to use a routing table to do a lookup on where the data packet is being sent. Due to the virtual paths between network nodes, MPLS is not dependent on an OSI model data link layer. It also virtually eliminates the necessity to use layer-2 networks for different types of network traffic. By including the MPLS header, containing one or more labels, to each data packet, networks gain a much needed improvement in data transmission efficiency, helping to decrease costs in the end.

The Evolving Role of MPLS:

- A high performance forwarding mechanism
- Connection Establishment
- Mapping on to Various lower layer technology
- Data Path Protection
- OAM (Operations ,Administration and Maintenance)
- Scalability
- Cost Efficiency

2. Related work (Terminology in MPLS with RSVP):

LER:

A Label edge router (LER, also known as edge LSR) is a router that operates at the edge of an MPLS network and acts as the entry (Ingress) and exit (Egress) points for the network. Push an MPLS label onto an incoming packet and pop it off the outgoing packet.

LSR:

A MPLS router that performs routing based only on the label is called a Label switch router (LSR) or transit router. This is a type of router located in the center of a MPLS network. It is responsible for switching the labels used to route packets.

LDP:

Labels are distributed between LERs and LSRs using the Label Distribution Protocol (LDP). LSRs in an MPLS network regularly exchange label and reachability information with each other using standardized procedures in order to build a complete picture of the network they can then use to forward packets.

LSPs:

Label-switched paths (LSPs) are established by the network operator for a variety of purposes, such as to create network-based IP virtual private networks or to route traffic along specified paths through the network. In many respects, LSPs are not different from permanent virtual circuits (PVCs) in ATM or Frame Relay networks, except that they are not dependent on a particular layer-2 technology.

RSVP:

Resource reservation protocol is a transport layer protocol designed to reserve resources to the network for integrated service internet. It is fast-rerouting algorithm. It is used Dynamips with IOS coding compiler.

3. Problem Statement:

Existing System:

In the Existing System we used IP based networks where the latency is very high. Because each and every router opens the header information and forwards to the next hop. And The explosive increase of data circulation over the Internet in conjunction with the complexity of the provided Internet services have negatively affected the quality of service and the data flow over this global infrastructure

Proposed System:

For this we proposed an MPLS based networks where only LERs open the header information

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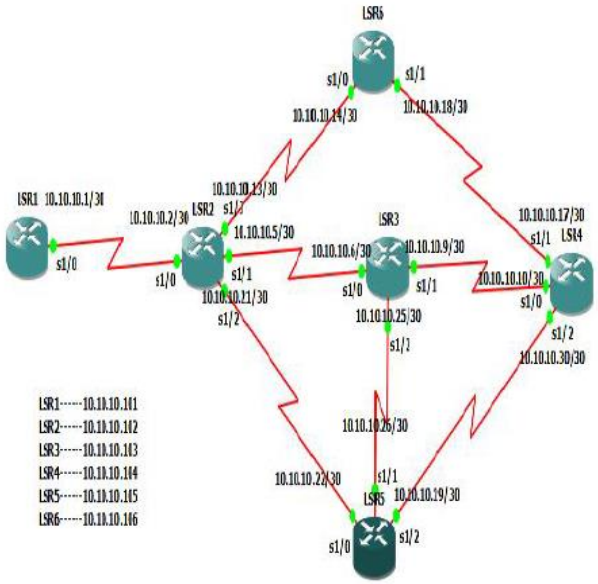
and LSR forwards. So the Latency is reduced and For Fast Re-Routing we used a mechanism Called RSVP (Resource Reservation Protocol).

4. Configuration Diagram:



5. about GNS3:

GNS3 is excellent alternative or complementary tool to real labs for network engineers, administrators and people studying for certification such as CISCO, CCNA, CCNP and CCIE as well as Junior JNCIA and JNCIE. It can also be used to experiment with features or to check configuration that need to be deployed later on real device. GNS3 is an open source, free program for us to use. However, due to licensing restrictions, we will have to provide our own Cisco IOSs to use with GNS3. Also, GNS3 will provide around 1,000 packets per second throughput in a virtual environment. A normal router will provide a hundred to a thousand times greater throughput. GNS3 does not take the place of a real router, but is meant to be a tool for learning and testing in a lab environment.

6. RIP (Routing information Protocol) Algorithm:

RIP is a Basic algorithm for sending the entire routing table to all neighboring nodes and compute the new routing table from the information received from the neighboring nodes. RIP is a standardized Distance Vector protocol, designed for use on smaller networks. Routing protocol configuration occurs in Global Configuration mode. The RIP routing protocol uses UDP because it is particularly efficient, and there are no problems if a message gets, which is fine for router updates where another update will be coming along shortly anyway. RIP (Routing Information Protocol) is a widely-used protocol for managing router information within a self-contained network such as a corporate local area network (LAN) or an interconnected group of such LANs.

RIP adheres to the following Distance Vector characteristics:

- RIP sends out periodic routing updates (every 30 seconds)
- RIP sends out the full routing table every periodic update
- RIP uses a form of distance as its metric (in this case, hop count)
- RIP uses the Bellman-Ford Distance Vector algorithm to determine the best “path” to a particular destination
- RIP utilizes UDP port 520
- RIP has a maximum hop count of 15 hops.

6. Fault Tolerances in MPLS Networks:

If a failure occurs in a network, recovery is achieved by moving traffic from the failed part of the network to another portion of the network. It is important that this recovery operation can be performed as fast as possible to prevent too many packets from getting dropped at the failure point. If this is achieved fast the failure can be unnoticeable (resilient) or minimal for end-users.

RSVP Link Failure:

When the link fails, the upstream node switches traffic from the physical link to the virtual link so that data continues to flow with a minimal disruption. Means whenever we want to send the data packets from one hop to another Hop Sometimes the link may be failed in between these Hops. For this we proposed link

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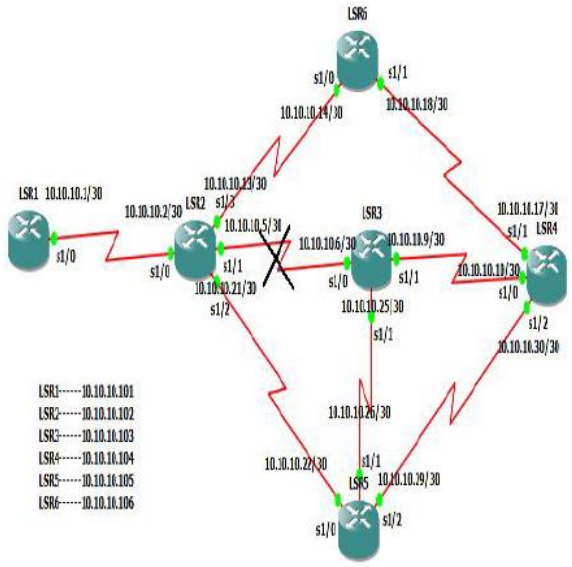
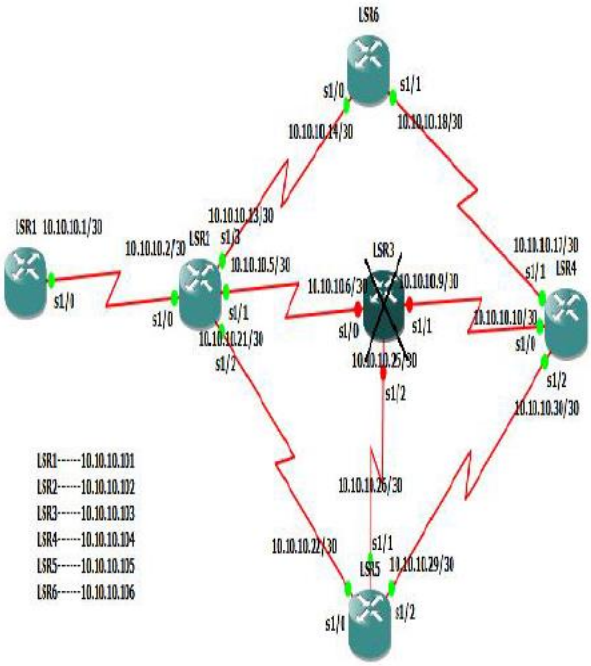
protection the simplest form of fast re-route is called Link Protection.



RSVP Node failure:

When node fails it can choose alternate path by using Link protection only handles the case where a single link between two LSRs has failed. However, it is also possible that an entire LSR will fail. Here enter Ping and Trace route to verify the reachability of the destination.



7. Conclusion:

Multi-protocol Label Switching (MPLS) has become an attractive technology of choice for Internet backbone service providers. Current recovery mechanisms are either employing protection switching or rerouting technique. This mechanism (local protection) provides faster recovery because the decision of recovery is strictly local. Method(s) used must be chosen carefully with regard to the requirements of the network and the users; fault tolerance should be taken into account in the design of backbone network.in an MPLS based backbone network, the fault tolerant issue concerns how to protect traffic in a carried path(LSP) against Node and Link failures. When a node and link failure occurs in a working LSP, the traffic of the faulty LSP (the affected traffic) is distributed to be carried by other failure-free working LSPs. Finally extensive simulations are performed to quantify the effectiveness of the proposed approach over previous approaches.

8. References:

[1] "Deploying IP and MPLS QoS for Multiservice Networks: Theory and Practice" by John Evans, Clarence Filsfils (Morgan Kaufmann, 2007, ISBN 0-12-370549-5)

[2] MPLS Fundamentals, By Luc De Ghein Nov 21, 2006 (ISBN-10 1-58705-197-4)

[3] The Synchronization of Periodic Routing Messages, S. Floyd & V. Jacobson,April 1994

[4] "Port Numbers" (PLAIN TEXT). The Internet Assigned Numbers Authority (IANA). 22 May 2008. Retrieved 25 May 2008.

[5] RFC 1058, Routing Information Protocol, C. Hendrik, the Internet Society (June 1988).

[6] FangL.; Bita N.; Le R.; Miles J.,"InterproviderIP-MPLS:services: requirements, implementations, and

ISSN No: 2348-4845
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A Peer Reviewed Open Access International Journal

Challenges". Communications Magazine, IEEE , vol.43, no.6, pp.119-128,June 2005.

[7]PeterkinR.;IonescuD.,"AHardware/Software Co-Design for RSVP-TE MPLS". Electrical and Computer Engineering, Canadian Conference on, pp.1409-1412, May 2006.

[8] F. Gonzales, C. H. Cheng, L. W. Chen, C. K. Lin, Using Multiprotocol label Switching (MPLS) to Improve IP Network Traffic Engineering,

[9] Multiprotocol Label Switching (MPLS), The International Engineering Consortium, http://www.iec.org

[10] J. M. Chung, "Analysis of MPLS Traffic Engineering," Proceedings of the IEEE Midwest Symposium on Circuits and Systems, USA, Aug. 2000.