IMPLEMENTATION OF MULTICAST VPN SUPPORT FOR MPLS VPN CUSTOMER

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Abstract:

Multicast communication on the internet has been growing rapidly over the last few years. Internet applications transmit data from one sender to many receivers, In Multicast protocols while packet broadcasts to a group of receivers the total numbers of packets swamped in a network decrease. Multicast communication reduces both the time it takes to send data to a large no of receivers and the number of network resources. It has some drawbacks on added overhead occupied in maintaining globally unique group identifiers and in order to enable addressing a subset of the group the massive amount of state establishment tasks are required. PIM-SM is a multicast routing protocol that can use the underlying unicast routing information base or a separate multicast-capable routing information base. It builds unidirectional shared trees rooted at a Rendezvous Point (RP) per group, and optionally creates shortest-path trees per source. It has some advantages considering the number of packets sent and the simplicity of routing decisions. In this paper, we make an analysis of PIM-SM using NS according to different message types, finding that the register message and join/prune message cause most router processing load, while the join/prune message and bootstrap message consume most network bandwidth. This report presents the prominent features of a tree-based architecture (PIM-SM) by associating with MPLS protocols. Using simulation experiments in ns2, we compare the overhead of multicast signaling of PIM-SM with MPLS.

Index Terms - PIM-SM,Rendezvous Point

I. INTRODUCTION

At present almost all the traffic is moving from circuit switch or cell-based networks to packet switch network. Packet switch networks create new demands such as Multimedia on Demand, Video Conferencing, Distance Learning, distributed network games, distributed virtual collaborations (with real-time visualization and remote experiment steering), distance lectures with student participation Home Shopping, etc. For transferring real-time voice or video through a TCP/IP-network with good quality, with no missing video frames or syllables, special adjustments to the networks are needed. There always has to be guaranteed bandwidth, low latency and no jitter for these kinds of applications. Increasing the efficiency of Internet resources utilization is very important. Several evolving applications like WWW, video/audio-on-demand services, and teleconferencing consume a large amount of network bandwidth. By reducing the number of packets transmitted across the network, the multicast service essentially increases the QoS given to users due to the additional available bandwidth in the network, which increases network performance.

Protocol Independent Multicast-Sparse Mode (PIM-SM) routes multicast packets to efficiently establish distribution trees across wide area networks. Sparse mode means that the protocol is designed for situations where multicast groups are thinly populated across a large region. Sparse-mode protocols can operate in LAN environments, but they are most efficient over WANs. PIM-SM is called "protocol independent" because it can use the route information that any routing protocol enters into the Multicast Routing Information Base (RIB).PIM-SM improved the protocol by eliminating the dependence on the core (called the Rendezvous Point in PIM-SM), and also minimized the number of packets sent in a multicast transmission, along with maintaining a unidirectional routing tree.

II. EXISTING SYSTEM

All tree-based protocols had to ensure the global uniqueness of the broadcast addresses, which imposed a huge coordination overhead on them. Also, they were highly inefficient if a subgroup of the multicast group had to be addressed. To overcome these disadvantages, a mesh-based protocol has been proposed which eliminates the need for globally unique multicast addresses and decouples the mechanisms used for group addressing group creation and management, and multipoint communication within a group.

Literature Survey

Jannu and Deekonda looked at OPNET simulation of voice over MPLS with considering traffic engineering. The study used voice packet end-to-end delay performance metric as an approach to estimate the minimum number of VoIP calls that can be maintained, in MPLS and conventional IP networks with acceptable quality. Comparative analysis was done on a conventional IP network and MPLS network. Some performance metrics such as voice jitter, voice packet end-to-end delay, voice delay variation, voice packet sent and received were used for simulation. The results analyzed showed that the MPLS based solution provides better performance in implementing the VoIP application.

Abdel-Azim et al studied MPLS performance evaluation by comparing VOIP and VOMPLS. In their study, they used OPNET 14.5 to simulate the results.They started by looking at the signaling protocols for IP networks and MPLS. Session Initiation Protocol (SIP) was used for VOIP and Constraint-based routing (DRLDP) which supports TE was used for VOMPLS. The study revealed that according to ITU voice performance is measured based on different parameters like delay, jitter and packet loss. Two scenarios were set up, one for sending voice using SIP-based IP network and the other model using LDP-based MPLS. Results from the two scenarios proved that VOMPLS has greater performance as compared to VOIP which causes some delays in the transmission.

Technique and Disadvantages

MPLS is the latest technology used for speeding up data communication over IP networks by forwarding packets based on labels. MPLS is currently applied to IP-based networks. MPLS technology is extremely beneficial to enterprises. MPLS simplifies the network infrastructure by allowing the consolidation of multiple technologies and applications such as voice, video, and data. An MPLS based network consists of routers and switches interconnected via transport facilities such as fiber. The MPLS labels are advertised between routers so that they can build a label-to-label mapping. These labels are attached to the IP packets, enabling the routers to forward the traffic by looking at the label and not the destination IP address. The packets are forwarded by the label switching instead of IP switching. The label switching technique is not new. Frame relay and ATM use it to move frames or cells throughout a network. MPLS incorporates a variety of protocols such as IP, Frame Relay and ATM. MPLS has become popular because of the label switched technique that reduces the overhead information. To enable smooth communication, time taken for packet forwarding or processing plays a vital role. The key feature of MPLS is its Traffic Engineering (TE), which is used for controlling the congestion and managing the networks resources. MPLS provides high-speed packet switching, forwarding, and great scalability and in addition to this, MPLS provides various features such as Quality of Service (QoS) and Virtual Private Networks (VPNs).

III. PROPOSED SYSTEM

We are concerned mainly in one MPLS multicast routing protocol: PIM-MPLS. We propose the use of one (or more) control points in the network called Rendezvous Points (RP) in a manner similar to PIM-SM shared trees. Senders of the multicast session have to register with the RP and establish unicast LSPs with the RP. Receivers who join the session have to send their join requests to the RP which acts as root (and the sender) of a one-to-many trees by establishing a Point-to-Multipoint (P2MP) LSP between the RP and the receiver. This architecture utilizes more than one RP to implement RP failure recovery, to provide load balancing within the domain, and to enable the extension of this framework to multiple domains by establishing LSPs between RPs in different domains. This architecture also has the advantage of using existing MPLS techniques and existing routing protocols and requires only the addition of more management capabilities at the RPs.

Advantages

MPLS (Multi-Protocol Label Switching) as a traffic engineering tool has emerged as an elegant solution to meet the bandwidth management and service requirements for next-generation Internet Protocol (IP) based backbone networks. MPLS shows several advantages over conventional network layer forwarding. Focusing on the advantages of the layer two switching protocol, Multicasting over MPLS networks can be benefited from the multicast reduce traffic on one hand, and MPLS flexibility, speed and quality of service on the other hand.

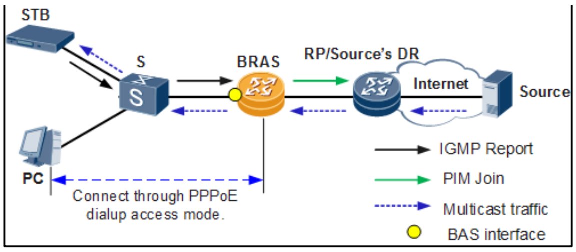


Fig 1 : Architecture

IV. IMPLEMENTATION RESULTS

Below the topology is created using NS2 so that multicast packets can efficiently follow distribution trees across the networks. The simulation has been developed to emphasize the impact of PIM-SM protocol over the MPLS network. In this experiment, one shared tree, rooted at node 0 acts as Rendezvous Point 0 and all members join with it. Two sources: node 3 and node 9 are generating CBR traffic through this shared tree. A couple of seconds' later one member joins with one source and another one joins with the other, creating two source-based trees. Destination nodes are considered as Node1, 4,5,10 and Node11. The following parameters have used in the configuration: Access-link bandwidth: 1.5 Mbps Access-link delay: 10 ms Packet size: 1460, 830 and 180 (in bytes) Queue management: DropTail in the access link. Total Simulation time is considered 5 unit times. The starting times of the sources are evenly distributed in the interval 0s – 1s.

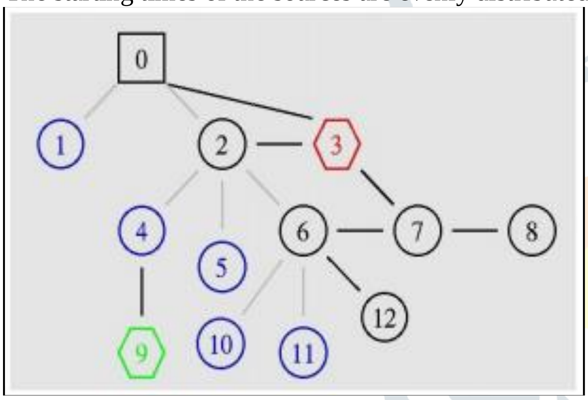
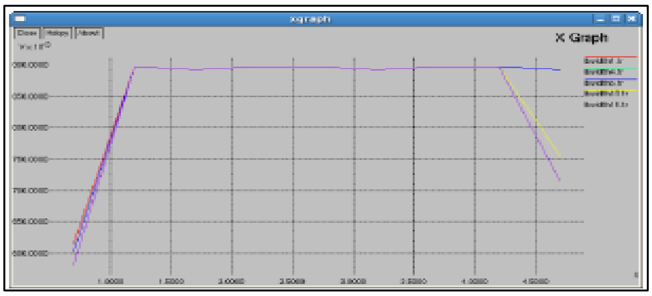


Fig 1 : Topology

It is observed that for traffic congestion, a significant amount of packets are dropped during transmission without applying the PIM-SM protocol. that the level of received packets (in megabytes) at the destination nodes 1,4,5,10 and node 11.The received packets are fluctuating for MPLS network whereas a consistent level of packets are received when PIM-SM protocol is used. As a result, packets received level improved when PIM-SM protocol applied

It shows the characteristics of transmission delay of two different situations. One is: when PIM-SM protocol is not applied transmission delay increases and another reduces the delay after applying PIM-SM protocol. PIM-SM needs less congestion window size to transfer data to the destination node; as a result, PIM-SM able to hold the same window size after the dropping of data.



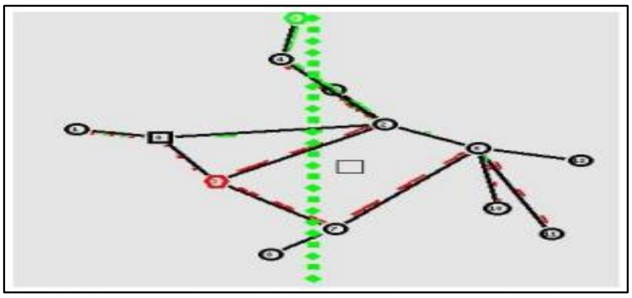


Fig 2: MPLS Net work

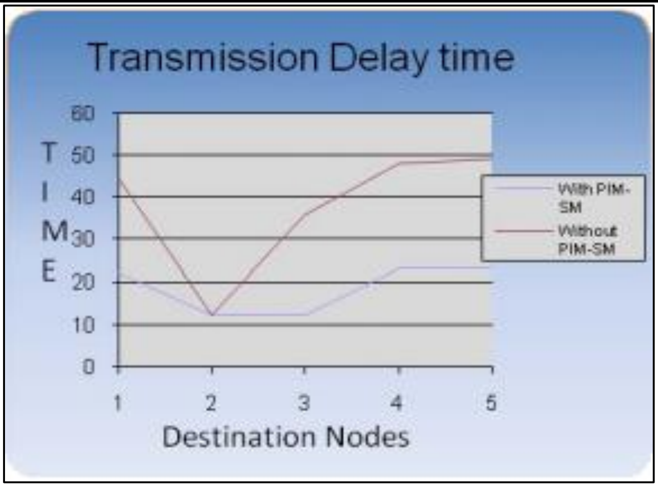


Fig 3: Comparision Graph

1V.CONCLUSION

We showed the framework of PIMSM protocol in a simple manner using MPLS LSP between the branching node routers of a multicast tree in order to reduce routing states in intermediate routers and to increase scalability. We defined multicast traffic engineering and compared it with uncast traffic engineering. We associated MPLS which reduces the massive amount of state establishment tasks to enable addressing a subset of the group identifiers. We studied merging multicast and MPLS as traffic engineering tool. It built unidirectional shared trees rooted at a Rendezvous Point (RP) per group, and optionally created shortest path trees per source. On one hand we used the best paths tree (which coincides with the shortest paths tree in absence of any traffic engineering constraints) to forward packets and on the other hand we used the fast label switching technique of MPLS in the routers. We noticed a reduction in size of the multicast routing tables compared to the other multicast MPLS approaches. We also noticed a faster packet processing time due to the use of the label switching technique of MPLS routers. Finally we conclude that the PIM-SM protocol seems to be promising and can adapt a possible implementation of the multicast traffic engineering in the Internet.

V. Future Enhancement

Firewalls will continue to advance as the attacks on IT industry and infrastructure become more and more sophisticated. Firewalls that scan for viruses as they enter the network and several firms are currently exploring this idea, but it is not yet in wide use.

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