

Paper Analyses

Paper: "The Evolution of Multicast: From the MBone to Inter-Domain Multicast to Internet2 Deployment"

This paper talks about the evolution of MBone, the early development of intradomain routing protocols, needs and current solutions for interdomain multicast, set of next-generation protocols, and how far the deployment has come.

The deployment of multicast has been slow. This is the first deployment that requires additional "intelligence" in the network. From 1992 to 1997, a single flat topology was the base for deployment and standardization. In 1997, they realized that this was not the way to go. A hierarchical structure was needed, as well as interdomain routing.

A great accomplishment was achieved in March 1992 when 20 sites received audio from the meeting of the IETF. This was done by virtual multicast. Workstations were running a daemon called mrouted. Machines were connected by using point-to-point, IP-encapsulated tunnels.

Some intradomain multicast protocols were presented: MOSPF (Multicast Extensions to OSPF), CBT (Core Based Trees), and PIM (Protocol Independent Multicast) that were divided into two protocols: PIM-DM which is the dense mode version, and PIM-SM which is the sparse mode version. Intradomain multicast brought some problems with it. The large, flat networks were inherently unstable. Scalability became a bigger problem as it grew. The MBone became harder to manage as it has no central management, coordination were done via mailing lists, and tasks were handled on a per-site basis.

The interdomain multicast was more scalable, hierarchical, Internet-wide multicast. Both long-term proposals and near-term solutions were provided.

The paper has some good figures to go along with the text. I found the figures quite helpful during the reading, and there were sufficiently many.

There was no easy way to measure the success of interdomain deployment. Therefore, a description of the plan being implemented was presented. In Internet2, guidelines were set by the Internet2 Multicast Working Group. The guidelines required all multicast deployment to be native and sparse mode, no tunnels, and all routers had to support interdomain multicast routing using MBGP/MSDP.

Paper Analyses

Paper: "A Comparative Study of Application Layer Multicast Protocols"

Different types of application layer multicast are presented in this paper. The positive thing about application layer multicast, is that they do not require any infrastructural support and is therefore easy to deploy. Approaches like this have come forth as the deployment of IP multicast is rather low.

The paper argues that IP multicast requires increased overheads and complexity at routers. Application layer multicast does not need any additional complexity at the routers, and no extra overhead. The replication is done at the end-hosts.

Mesh-first, tree-first and implicit approaches are the three categories.

Mesh-first: Group members first distributively organize themselves into the overlay mesh topology. For any pair of nodes, multiple paths may exist. Narada is the protocol presented in this category.

Tree-first: Members discover some of the other members of the multicast group who are not its neighbors in the overlay tree. Additional control links are established and maintained to these members. Yoid and HMTP is discussed.

Implicit approaches create a control topology with some specific properties. Packet forwarding rules define the data delivery path in the control topology. Implicit approach protocols have been designed to scale to multicast groups with a large number of members. Approaches explained are NICE, CAN-multicast and Scribe.

It is well organized, and some good figures. Especially the table comparing different application layer multicast was helpful. The comparative study could be more extensively explained.