Internet Engineering Task Force
INTERNET-DRAFT
draft-fenner-igmp-proxy-00.ps

W. Fenner

February 26, 1999
Expires August 1999

IGMP-based Multicast Forwarding (“IGMP Proxying”)

Status of this Memo

This document is an Internet Draft and is in full conformance with all provisions of Section 10 of RFC2026. Internet Drafts are working documents of the Internet Engineering Task Force (IETF), its Areas, and its Working Groups. Note that other groups may also distribute working documents as Internet Drafts.

Internet Drafts are draft documents valid for a maximum of six months. Internet Drafts may be updated, replaced, or obsoleted by other documents at any time. It is not appropriate to use Internet Drafts as reference material or to cite them other than as a "working draft" or "work in progress."

The list of current Internet-Drafts can be accessed at `http://www.ietf.org/ietf/1id-abstracts.txt`.

The list of Internet-Draft Shadow Directories can be accessed at `http://www.ietf.org/shadow.html`.

Distribution of this document is unlimited.

Abstract

In certain topologies, it is not necessary to run a multicast routing protocol. It is sufficient to learn group membership information and simply forward based upon that information. This draft describes a mechanism for forwarding based solely upon IGMP membership information.

This document is a product of an individual. Comments are solicited and should be addressed to the author.

1. Introduction

This document applies spanning tree multicast routing[Deering91] to an IGMP-only environment. The topology is limited to a tree, since we specify no protocol to build a spanning tree over a more complex topology.

1.1. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [Bradner97].

2. Definitions

2.1. Upstream Interface

A router's interface in the direction of the root of the tree.

2.2. Downstream Interface

Each of a router's interfaces that is not in the direction of the root of the tree.

2.3. Membership Database

The database maintained at each router into which the membership information of each of its downstream interfaces is merged.

2.4. Subscription

When using IGMPv2, a group membership on an interface. When using IGMPv3, an IGMPv3 membership on an interface.

3. Abstract protocol definition

Each router performing IGMP-based forwarding has a single upstream interface and one or more downstream interfaces. It performs the router side of the IGMP[Fenner97] protocol on its downstream interfaces, and the host side of IGMP on its upstream interface. The router MUST NOT perform the router side of IGMP on its upstream interface.

The router maintains a database consisting of the merger of all memberships on any downstream interface. When using IGMPv2, this is a simple union of all group memberships received. When using IGMPv3, the memberships are merged using the rules given in the IGMPv3 specification for merging multiple memberships heard on a single interface.

The router sends IGMP membership reports when queried, and sends unsolicited reports or leaves when the database changes.

When the router receives a packet destined for a multicast group, it builds a list consisting of the upstream interface and any downstream interface which has a subscription pertaining to this packet. It removes the interface on which this packet arrived from the list and forwards the packet to the remaining interfaces. A router MAY use a forwarding cache in order not to make this decision for each packet, but MUST update the cache using these rules any time any of the information used to build it changes.

4. Router Behavior

This section describes an IGMP-based multicast forwarding router's actions in more detail.

4.1. Membership Database maintenance

The router performs the router side of the IGMP protocol on each downstream interface. The output of this protocol is a set of multicast group memberships; this set is maintained seperately on each downstream interface. In addition, the memberships on each downstream interface are merged into the membership database.

When the composition of the membership database changes (e.g. the first downstream member joins or the last downstream member leaves, or a downstream member changes its IGMPv3 source subscriptions), the change in the database is reported as though this router were a host performing the action. For example, when an IGMPv2 group

member first appears on a downstream interface, and the router is performing IGMPv2 on its upstream interface, the router sends [Robustness Interval] IGMPv2 reports on the upstream interface.

4.2. Forwarding Packets

A router forwards packets received on its upstream interface to each downstream interface based upon the downstream interface's subscriptions. A router forwards packets received on any downstream interface to the upstream interface, and to each downstream interface other than the incoming interface based upon the downstream interfaces' subscriptions. (Note: the assumption is that the root of the spanning tree is connected to a wider multicast infrastructure, and that all multicast must be delivered to the root in order to connect to the wider infrastructure.)

5. Security Considerations

Must be filled in.

6. References

Bradner97 Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119/BCP 14, Harvard University, March 1997.

Deering91 Deering, S., "Multicast Routing in a Datagram Internetwork", Ph.D. Thesis, Stanford University, December 1991.

Fenner97 Fenner, W. ‘‘Internet Group Management Protocol, Version 2’’, RFC2236, Xerox PARC, November 1997.

7. Author's Address

William C. Fenner
Xerox PARC
3333 Coyote Hill Road
Palo Alto, CA 94304
Phone: +1 650 812 4816
Email: fenner@parc.xerox.com