



Optibase White Paper Internet Group Management Protocol

Introduction 2

Why not use IP Broadcast or Unicast? 2

IP Multicasting over IGMP – The most Efficient Way to Stream Rich Media 3

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Introduction

Streaming video over the broadband Internet and IP networks can be costly in terms of bandwidth and networking resources. IP multicasting, based on the IGMP protocol, is designed to make video streaming as efficient as possible. The following paper describes IP multicasting based on IGMP.

IGMP (Internet Group Management Protocol) is how IP Multicasts are enabled on an IP network. IGMP allows broadcasters or webcasters to send content to a large number of subscribers effectively without choking the network, because traffic is sent only to a Group Destination Address (GDA). Clients use IGMP to register themselves as receivers of certain Multicast Groups. Through IGMP, clients can announce their willingness to join, accept, or leave, Multicast streaming from the multicast group. Clients may join and leave the group at will. Only receivers that are registered to a specific GDA are influenced by the multicast traffic, which generally has no impact on other hosts using the network.

Why not use IP Broadcast or Unicast?

Were webcasters or broadcasters to stream content as an IP broadcast, every host on the network, even those that don't want or need the information, would still have to process it. IP broadcasts are handled on each host as a Level III event, in its own broadcast domain. Thus, every event involves the CPU of the receiving hosts, forcing these to process unnecessary information. Another problem associated with IP broadcasts is that not all routers support this type of transmission. As a result many clients are unable to receive content.

One way of solving the lack of router support for IP broadcasts is by transmitting a Unicast stream. When using Unicast, a copy of the same content is sent to everyone on the network. Although this method solves the problem of broadcasts that do not cross routers, it creates a serious bandwidth problem. Networks, unlike radio or RF domains, have a limited amount of available bandwidth. It is therefore important to ensure that the network is used efficiently and that transmissions take up only the bandwidth needed. Some applications, such as video-on-demand, which do not share networking resources with other services, use the Multiple Unicast to distribute content.

The IGMP version in use today is version 2. The major difference between IGMP version 1 and version 2 is in how clients are dropped from multicast groups. IGMP version 1 specified that routers would continue to release the stream to the receiver for a number of minutes, even after the receiver had ceased listening to the stream. In IGMP version 1, receivers couldn't tell routers when they wanted to stop receiving the stream. IGMP version 2 lets receivers send a message telling the router to stop releasing packets if there are no other receivers present. In this way version 2 enhances bandwidth conservation over version 1.