Multicasting in the Internet

Kilnam Chon
Korea Advanced Institute of Science and Technology
chon@cosmos.kaist.ac.kr

Abstract: The Internet offers multicasting applications for interactive multimedia applications. MBone and CU-SeeMe are notable systems, and are introduced here as examples of the multicasting systems on the Internet. They are available globally now, and numerous applications are appearing on these systems and others.

Various multicast networking technologies are available in the Internet now. These technologies bring us interactive multimedia applications globally. They are available both at offices and home.

There are several forms of *casting* to serve interactions between humans, and between human and machine. They are

- Broadcasting one-to-all
- Multicasting many-to-many
  one-to-many
- Unicasting one-to-one

The broadcasting is normally one way. On the other hand, the unicasting is normally interactive, i.e., two ways. The multicasting can be either one way, or two ways.

The Internet is the network of networks with five million computers and fifty million users.[Internet Society] It is available throughout the world now, and is growing 50 to 100 percents each year.

In the Internet, there are two models on information access and distribution mechanism.[Kumar]

(1) *You go to the information model,* and

(2) *The information source come to you* model

The World Wide Web, file transfer(ftp), and news are good examples of the former model. MBone[Eriksson, Kumar, Macedonia] and CU-SeeMe[Satter] as well as email are good examples of the latter model.

The Multicast Backbone, or MBone is a technology that enables distribution of and access to real-time interactive multimedia on the Internet. Distributing such isochronous media in a large-scale manner over packet networks such as the Internet was not feasible before the MBone was invented.[Kumar] MBone subnetworks with the tree and mesh topology offers many-to-many communications. There are over 1000 MBone subnetworks in 20 or more countries in four continents. See Figure 1 for further information.

CU-SeeMe developed at Cornell University is a video conferencing system, which works on the Internet or any network that uses Internet Protocol(IP).[Satter] CU-SeeMe offers the

following communication modes;

- many-to-many
- one-to-many

The multicasting mechanism is based on the reflector, which allows multi-party connections. See Figure 2 on the connection based on the reflector.

CU-SeeMe can be combined with MBone to offer broader coverage of users globally. There are many more video conferencing systems for the Internet. See [Satter] or others for the listing.

Many online service providers use video distribution softwares for one-to-many video delivery; both real-time and non-real-time traffic. Mirroring of contents and large number of dialup ports provide multicasting capability.

There are various interactive multimedia applications based on the above Internet multicasting systems. They can be classified by the contents; video, audio, document. See [Kumar], [Scatter], [Weiss] and others for the listing.

The current research and development on the multicasting in the Internet includes

(1) Higher resolution and speeds

(2) Three dimension and virtual reality

(3) Quality of services

(4) Conference control

(5) Scalability

Many of the above topics are discussed at Internet Engineering Task Force(IETF), and are standardized for the Internet. Various documents including the standards are delivered as Request For Comment(RFC).[IETF]

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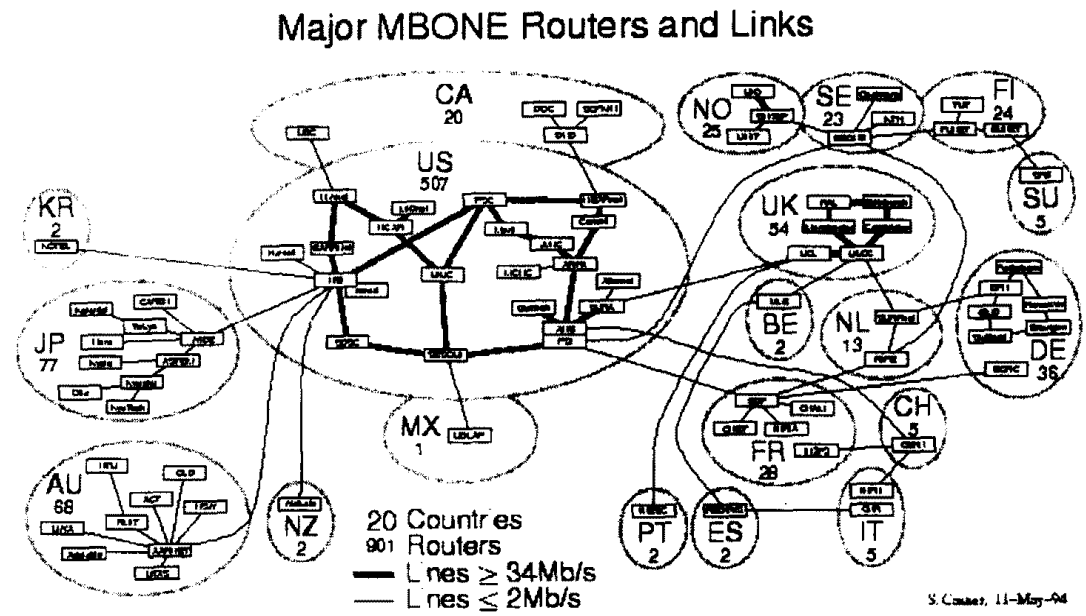

Figure 1. MBone Topology

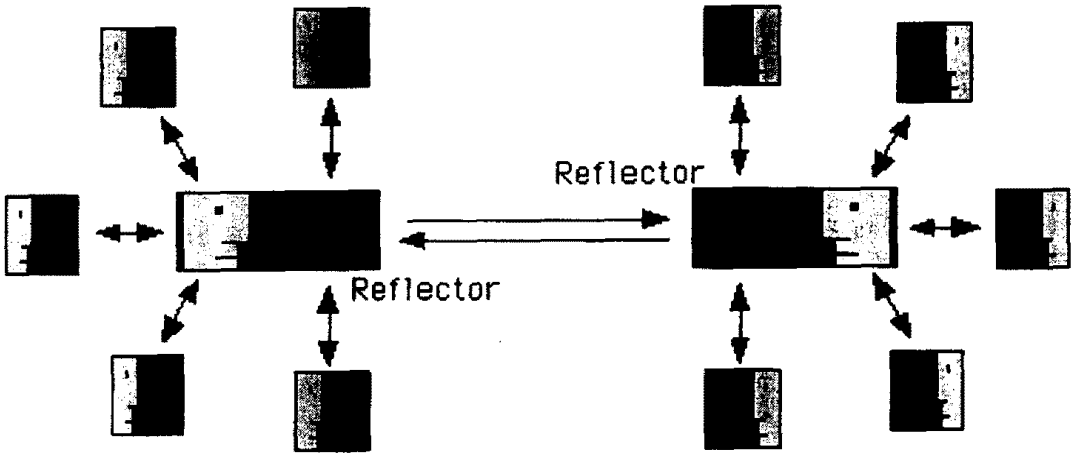

Figure 2. CU-SeeMe Reflecter