MAYAH Communications

Application Note 9

Multicast

1   Introduction

Multimedia transmission via the internet has become more and more popular in recent years. The audio and video signals are captured, compressed and transmitted to a group of receiving hosts. This generates several problems in organizing the whole procedure. Multicasting could be a way to distribute multimedia data to the receivers, while these may join or leave an audio-cast or a video-cast at any time. The flexibility in joining or leaving a group provided by multicast could make the varying membership much easier to handle.

While Unicast stands for a communication pattern that sends data from one host to another and Broadcast represents the transmitting from one host to all others inside a network, the principle of Multicast is to send data from one source host to a varying number of destination hosts, whereas these hosts must have the possibility to request these particular data by transmitting a specific Multicast-address to the next router or „prune" an existing Multicast connection.

The problems with Multicast arise when you think about how data will find the way from sender to receiver. While normal radio or television reach their receivers by spreading data all over the world like a watering can, transmitting through the net has some significant restrictions, like bandwidth and workload. The watering can principle would cause the net to collapse as much as transmitting a data stream via a point-to-point connection for each receiver. Another problem is getting the senders or routers to know which hosts want to receive their data and which don't.

The intention of Multicast is to need as little bandwidth as possible in order to keep the workload of the net as small as possible. This means not wasting any bandwidth by sending unnecessary data, but only sending to hosts that request data and sending it via the shortest and/or most efficient way. In general this means that the sender delivers the data only once and it is then duplicated by a router as close to the receiver as possible.

2   The process of Multicast

The organizing of transmitting and receiving multimedia data is managed by a protocol called IGMP (Internet Group Management Protocol), by which clients can tell a router that they want to join or leave a multicast-group. This multicast-group is a quantity of sender/receiver, registered at their routers for a special Multicast-IP.

At IP level there is a specific range of Class D addresses reserved for Multicast. The four significant bits of the class-D addresses are set to `1 1 1 0`. The 28-bit number following these four bits is called "multicast group ID" which ranges from `224.0.0.0` to `239.255.255.255`.

Each specific Multicast data stream is defined by a Multicast group ID. If a host wants to join a certain Multicast group for transmitting or receiving specific data, it has to inform its immediate neighbour router by sending the specific Multicast ID via an IGMP-telegram. This ID will then be forwarded from router to router for to see if there are other Multicast group members (see *Figure 1: Request for Multicast*).

Figure 1 : Request for Multicast
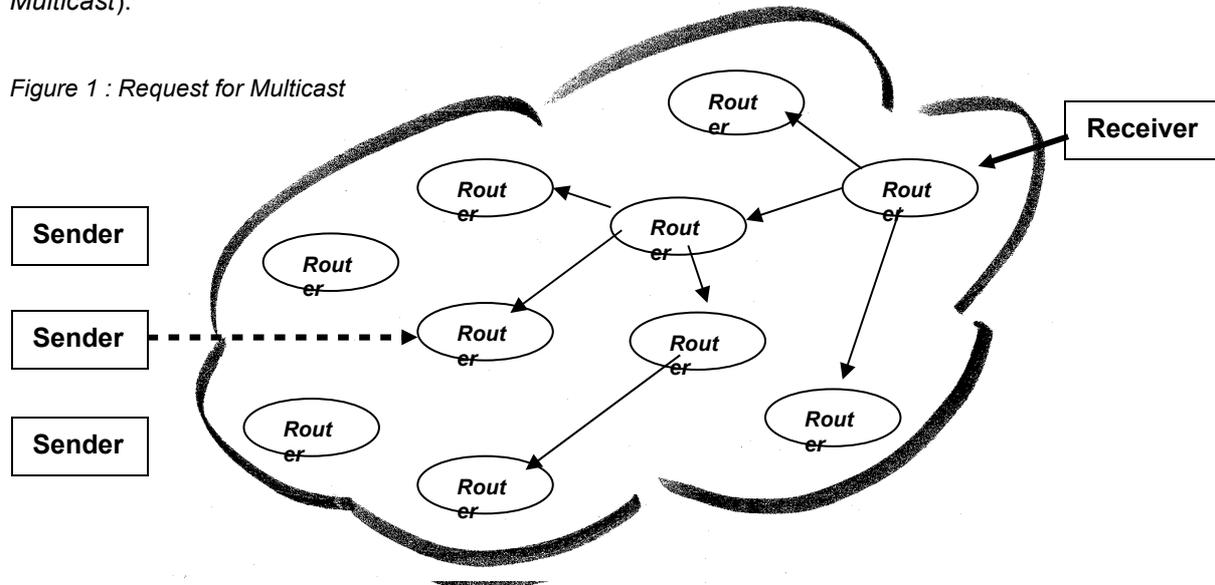
If the hosts neighbouring router now gets data from the requested Multicast group, it will forward it to the demanding host (see *Figure 2: Sending Multicast*). Of course the same host is able to act as a sender, too. In this case the neighbouring-router will transmit its data to all the other group members.

Figure 2 : Receiving Multicast
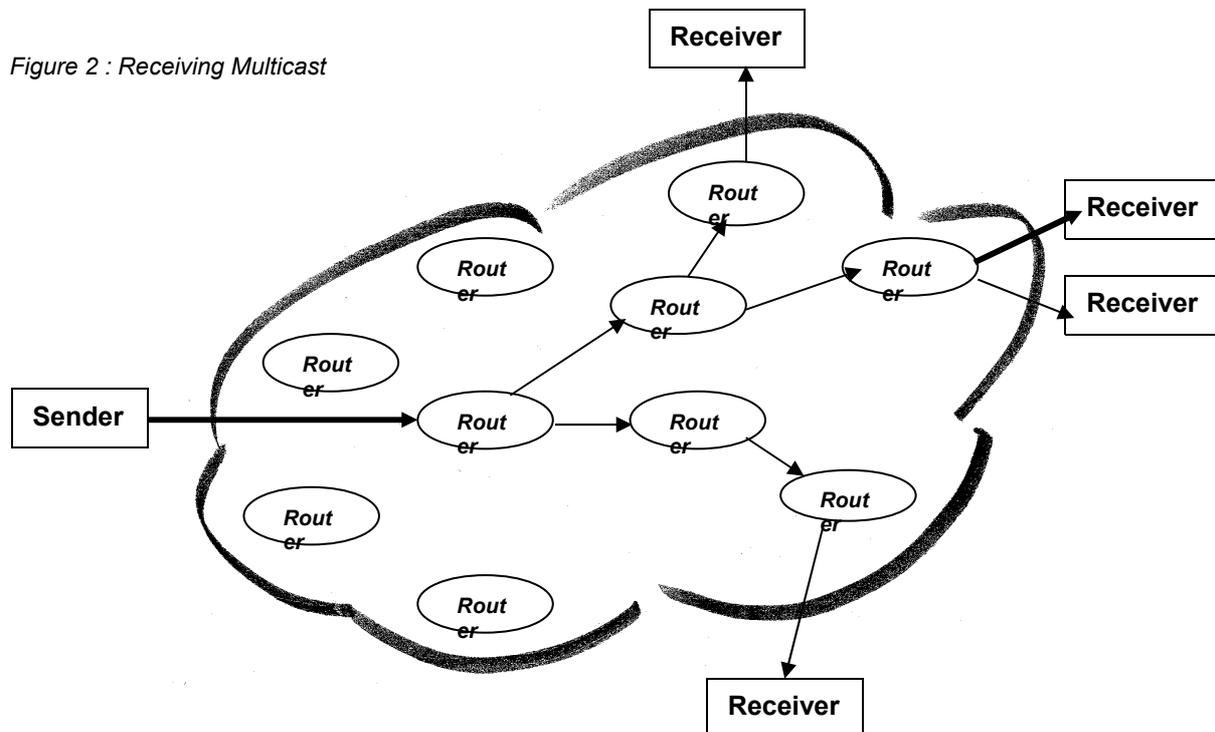
To leave a Multicast group the host has to „prune" a Multicast ID, which means that it has to tell its neighbouring router not to forward data of the specific group any more.

3. MAYAH codec and Multicast

Multicast is available for all MAYAH codecs which supports IP Audio.

Only for older firmware versions: To act as a Multicast sender the "Dependency" parameter of the Audio Encoder has to be set to `local`. To receive Multicast data the dependency has to be `remote`, so that the MAYAH codec is able to synchronize its settings with the transmitting host. In both cases the broadcast mode has to be disabled. This is to be controlled via front panel with `Setup->Network->Broadcast` or with direct command `ip_broadcast ?`

3.1 Front panel

For preparing the encoder for sending or receiving Multicast data you have to choose
`Setup->Audio Encoder->Dependency`

and set the required parameter. Then choose
`Connect`

and set the Multicast address via
`Direct Dial`, `Last` or `Phonebook`.

3.2 Direct Command

For setting the parameter with the Centauri Direct Command you have to use the command
`enc_slave [dependency]`

`Enc_slave local :`   sending Multicast
`Enc_slave remote:`   receiving Multicast

Then use
`Com_connect [Multicast address]`
for connecting.

3.3 Remote Control

Using the Centauri Remote Control you have to click
`Settings->Codec->Encoder follows`

and set the required parameter (see pict.). Then click
`Expert->Direct Command`

and enter the Multicast address. Or click
`Phonebook`
and choose the Multicast address.