Description of possible multicast tests

This document describes topology, device, tool and script essential to achieve some multicast test. It is based on the technical paper supplied by ETSI Plugtests Interoperability Service.

1- Multicast Routing short presentation.

a- PIM-SM

PIM-SM is the main multicast routing protocol used today in IPv6 networks.
PIM Sparse Mode (PIM-SM) uses a pull model to deliver multicast traffic. Only networks that have active receivers that have explicitly requested the data will be forwarded the traffic.
PIM-SM uses a shared tree to distribute the information about active sources. Depending on the configuration options, the traffic can remain on the shared tree or switch over to an optimized source distribution tree. The traffic starts to flow down the shared tree, and then routers along the path determine whether there is a better path to the source. If a better, more direct path exists, the designated router (the router closest to the receiver) will send a join message toward the source and then reroute the traffic along this path.
PIM-SM has the concept of an Rendezvous Point, since it uses shared trees—at least initially. The RP must be administratively configured in the network. Sources register with the RP, and then data is forwarded down the shared tree to the receivers. If the shared tree is not an optimal path between the source and the receiver, the routers dynamically create a source tree and stop traffic from flowing down the shared tree.
To ensure a good control of all tests, the RP must be located in ETSI's AS. In this way, ETSI will be able to make a map of the multicast network, to be aware of all problems, and to retrieve all results.

b- PIM-SSM

In PIM-SSM (Source Specific Multicast), delivery of datagrams is based on (S, G) channels. S stands for source, G for group. Traffic for one (S, G) channel consists of datagrams with an IP unicast source address S and the multicast group address G as the IP destination address. Systems will receive this traffic by becoming members of the (S, G) channel. No signalling is required to become a source. However, in SSM, receivers must subscribe or unsubscribe to (S, G) channels to receive or not receive traffic from specific sources. In other words, receivers can receive traffic only from (S, G) channels that they are subscribed to, so a RP is not necessary.

As this implementation is not wildly used, It could be interesting to test it in such a complex topology.
It would be better if at least one source is monitored by ETSI.

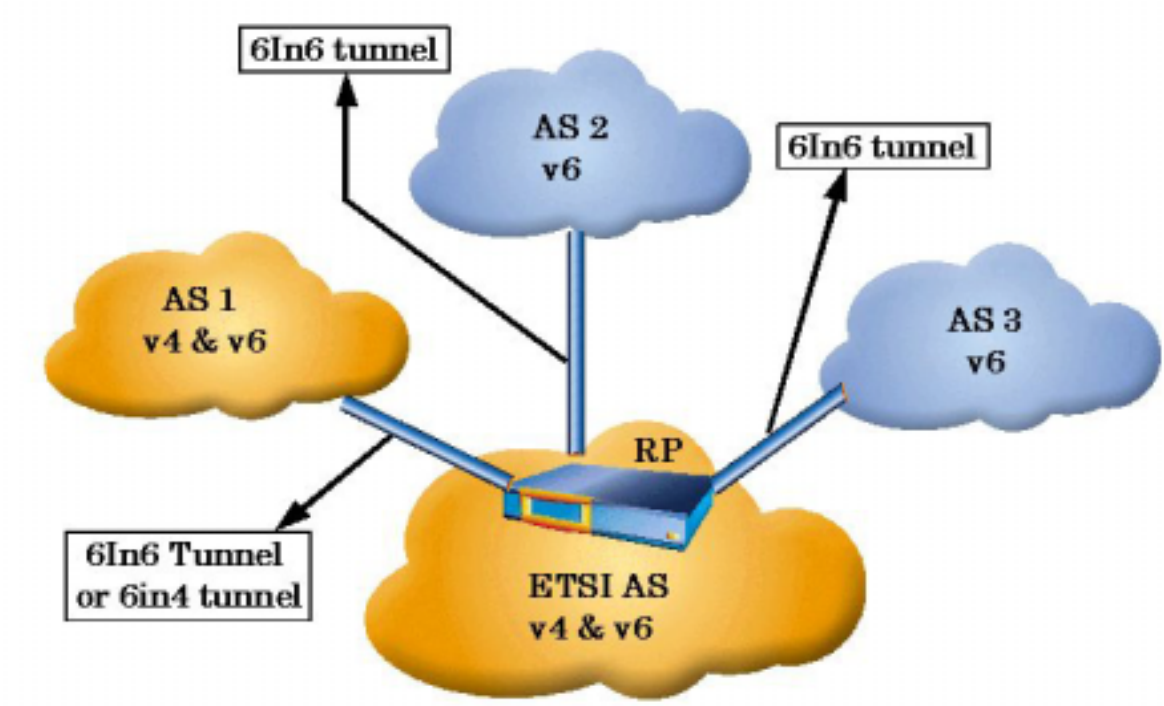
2- Overlay topology

Knowing that multicast traffic can not be routed by unicast routers, it is necessary to split unicast and multicast topology. The simplest way to achieve this is to build an overlay multicast topology above the unicast topology, for instance using 6in6 or 6in4 tunnels.

As the multicast topology is much less complex than a unicast one, RIPng can be used to discover the network. So all routers will activate RIPng on each tunnel's interface, and will announce all the required prefixes.

a- PIM-SM

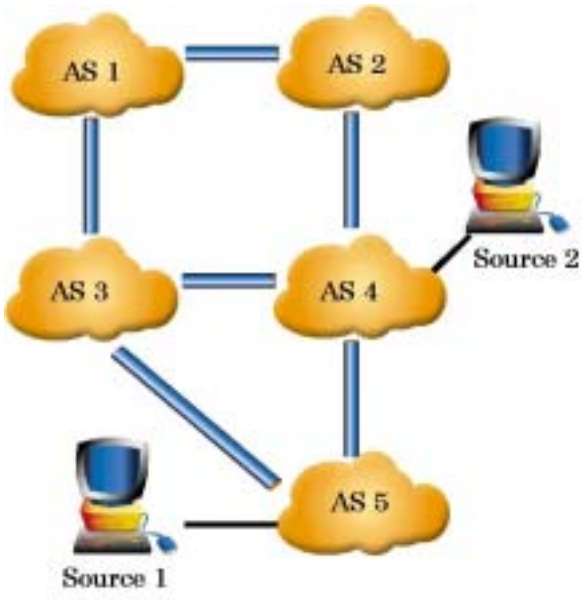
Like in the M6bone, all multicast router will be connected to the RP by a 6in6 or a 6in4 tunnel.



This kind of topology is frequently used and works well.

b- PIM-SSM

In PIM-SSM, there is no need for a RP, so the multicast topology doesn't have to be focused on ETSI's AS. So multicast routers will be connected to several other multicast routers in other ASes.
Sources will have to be on different AS and at least one will be on the ETSI's AS, to be sure that at least one source will be permanently monitored (i.e. will be always sending).



3- Tools

a- Pim6sd

For SM tests, each router involved in the multicast topology MUST have pim6 running.

For SSM tests, pim6 should:

- perform MLDv2 functions (not necessary if no Client around)
- support SSM forwarding

Routers that don't support such functions MUST be removed from the topology for SSM tests.

b- SDR, VIC, RAT

Sdr is a session directory tool designed to allow the advertisement and joining of multicast conferences on the M6bone. It was originally modelled on sd written by Van Jacobson at LBNL, but implements a later version of the session description protocol than sd does.

VIC is a video conferencing application developed by the Network Research Group at the Lawrence Berkeley National Laboratory in collaboration with the University of California, Berkeley.

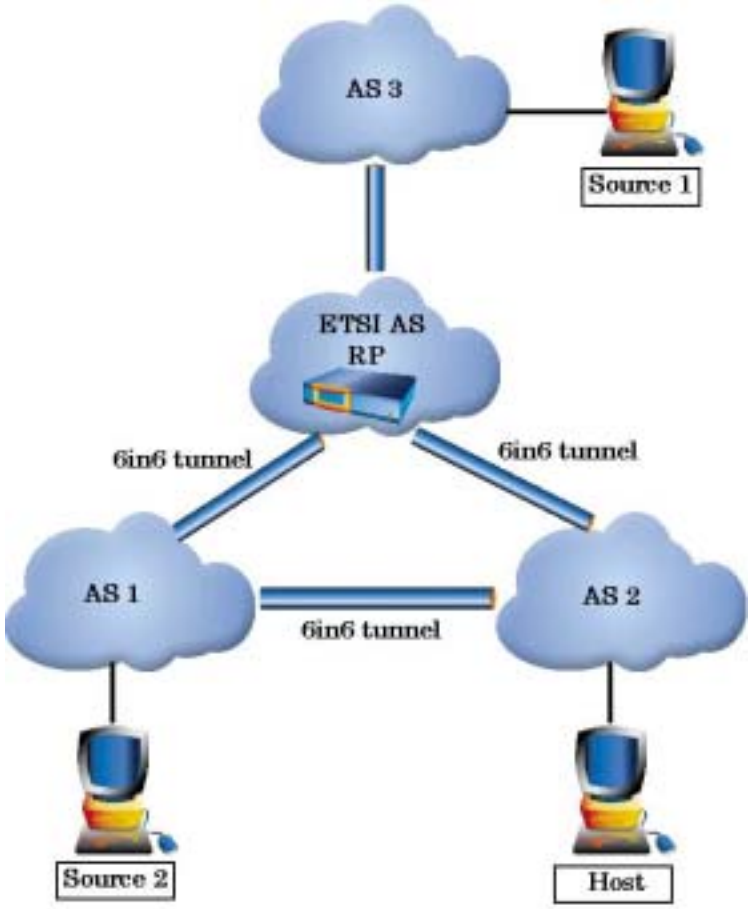
The Robust Audio Tool (RAT) is a an open-source audio conferencing and streaming application that allows users to participate in audio conferences over the internet. These can be between two participants directly, or between a group of participants on a common multicast group.

ISABEL could also be used, but the set-up requires more work. ISABEL should be preferred for demonstrations as it looks much better, but it is not well adapted to first technical tests.

4- Possible Tests

1- PIM-SM

Once the RP receives the first packet from the source, a Source Path Tree have to be created from the host toward the source. It would interesting to check the transition from the Share Past Tree to the Source Past Tree. To make this observation, we will configure this topology :



We will build a 6in6 tunnel between Source 2 and the host, and we will observe transition mechanisms checking traffic from the RP. The Source 1 will be here to ensure that the RP support both Source Path Tree, and Share Path Tree at the same time.
For this test we will use VIC or RAT tool with a specific SM-address.

Keeping this configuration, the host will leave the multicast group (shutting down VIC or RAT). So we will be able to monitor prune mechanism, checking join messages of the first and last router from the host to the RP.

2- PIM-SSM

SSM is not currently used on networks, so the first step is to make it work properly. A simple topology based on one source and several hosts, using VIC or RAT to send and receive traffic to a SSM-address, will be a good start.

Then, it would be interesting to test a host connecting two sources at the same time. Here the DR will have to build two source past tree, and we can monitor this behaviour.

Finally, we will control the prune mechanism checking join message on the path from the host toward the source.