IPv6 multicast over ATM
<draft-armitage-ipatm-ipv6mc-00.txt>

Status of this Memo

[This is a first cut at throwing together some section headings and sketching out the major points that an IPv6 over ATM implementor would want to know. Further input appreciated.]

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Abstract

The Internet Draft draft-ietf-ipatm-ipmc-05.txt ("Support for Multicast over UNI 3.1 based ATM Networks") describes a mechanism for handling IP multicast over ATM. Whilst the architecture is intended to support multiple protocols such as IP, IPX, AppleTalk, etc, the current examples apply only to IPv4 environments. This document describes the specific encodings that should be used when running IPv6 over ATM. It is expected that some of this text will influence
1. Introduction.

The examples given in Internet Draft draft-ietf-ipatm-ipmc-05.txt [1] ("Support for Multicast over UNI 3.1 based ATM Networks") are focussed specifically on running IPv4 over ATM. The next generation of IP (IPng or IPv6 [2]) is theoretically a simple version change from IPv4. However, recent events in the IPng working group have led to the decision that interworking between IPv6 and old IPv4 equipment will be improved if IPv6 can be treated as a new protocol at the link layer.

A new Ethertype of 0x86DD has been allocated to IPv6 [3]. As a consequence, IPv6 will be treated as a separate link level protocol by the Multicast Address Resolution Server (MARS) described in [1]. This document begins to specify exactly where this ethertype shows up (e.g. how IPv4 and IPv6 over ATM implementations respectively encode their MARS messages, and modifications to the LLC/SNAP encapsulation applied to IP packets).

2. Changes to values in MARS messages.

As no change has occurred to the MARS/ATMARP protocol the encapsulation of MARS messages remains as shown in section 4 of [1]:

```
[0xAA-AA-03][0x00-00-00][0x08-06][MARS message]
  (LLC)       (OUI)     (PID)
```

The ar$hrd field in every MARS messages remains 19.

However, the ar$pro field of every MARS message MUST be set to 0x86DD for MARS messages relating to IPv6 multicast groups, and 0x800 for MARS messages relating to IPv4 multicast groups.

When carrying IPv6 addresses the ar$spln and ar$tpln fields are either 0 (for null or non-existent information) or 16 (for the full IPv6 address).

The special ‘registration’ address used by hosts and MCSs to register as members of ClusterControlVC and ServerControlVC is now 16 bytes of zero (the <min,max> pair will be 32 bytes of zero). This does not represent a multicast address under IPv6.

Following the RFC1483 scheme, unicast IPv6 packets will be encapsulated as:

```
[0xAA-AA-03][0x00-00-00][0x86DD][IPv6 packet]
(LLC)       (OUI)     (PID)
```

Section 5.5 of [1] identifies a limitation of this encapsulation when ATM multicasting occurs using multicast servers. An extended encapsulation is likely to be adopted at the July 1995 meeting of the IP-ATM working group. This can be trivially applied to IPv6 multicast traffic.

Consider, for example, that the encapsulation for multicasting used a codepoint from the IANA OUI and encoded the ethertype within the new payload [4]. The encoding for IPv4 would be:

```
[0xAA-AA-03][0x00-00-5E][New PID][2 byte CMI][0x800][IPv4 packet]
(LLC)       (OUI)     (PID)  |-- new payload --|
```

The corresponding encoding for IPv6 would be:

```
[0xAA-AA-03][0x00-00-5E][New PID][2 byte CMI][0x86DD][IPv6 packet]
(LLC)       (OUI)     (PID)  |-- new payload --|
```

(The actual extended encapsulation has not yet been defined by the ip-atm WG at this time. The above encoding is purely by way of illustrative example.)

4. Routers and promiscuous listening on ‘all’ groups.

As described in section 9 of [1] for IPv4, routers should perform a block MARS_JOIN for the range of IPv6 multicast addresses they need each ATM interface (whether logical or physical) to listen on.

Other issues on this topic are for further study (e.g. the use of MARS_GROUPLIST_REQUEST to replace ICMPv6 messages used to determine what groups have members on the subnet).

5. Questions of a wider nature.

This section is not intended to go into a rewrite of [1]. It exists simply to re-assure people studying IPv6 over ATM that they are not imagining things if they perceive a certain amount of redundancy in running Neighbour Discovery using IP multicasting of ICMPv6 packets.
in an ATM environment.

It is interesting to note that ATM services offered by UNI 3.1 do not naturally provide us with Ethernet-like link level multicast support (hence the need for [1]). Multicasting must be emulated, and this emulation presupposes the existence of knowledge about the other ATM-attached IP hosts in your subnet. In [1] the MARS has a fairly good idea of what IP endpoints can be associated with what ATM endpoint addresses. However, Neighbour Discovery at the IP level uses link level multicasting to transmit ICMPv6 packets, which will enable the discovery of link-layer/IP-layer mappings.

If you are implementing a Classical IP/ATM model, your ARP Server probably already knows this information (and is most likely implemented by the same piece of software providing you with your MARS service that enables the discovery messages to be multicasted).

It remains for further study on what sort of short cuts an IP/ATM interface might make when faced with neighbour discovery requests. Perhaps trapping multicasted ICMPv6 General Solicitations and turning them into ATMARP requests (or MARS requests, if you’re experimenting with MARS support for unicast mappings [5]). The reply would then be used by the IP/ATM driver to fake the reception of a General Advertisement containing the information needed by the local IPv6 layer.

Security Consideration

Security considerations are not addressed in this memo.

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References.


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