Unicast-Prefix-based IPv6 Multicast Addresses

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Abstract

   This specification defines an extension to the multicast addressing
   architecture of the IP Version 6 protocol. The extension presented
   in this document allows for unicast-prefix-based allocation of
   multicast addresses.

1. Introduction

   This document specifies an extension to the multicast portion of the
   IPv6 addressing architecture [RFC 2373]. The current architecture
   does not contain any built-in support for dynamic address
   allocation. This proposal introduces encoded information in the
   multicast address to allow for dynamic, network prefix-based
   allocation of IPv6 multicast addresses, as well as allocation of
   source-specific multicast addresses.

2. Multicast Address Format

   Section 2.7.2 of RFC 2373 defines the following operational format

of IPv6 multicast addresses:

```
| 8    | 4 | 4 |              80                | 32    |
+--------+----+----+------------------------------+-----------+
|11111111|flgs|scop|    reserved must be zero      | group ID  |
+--------+----+----+------------------------------+-----------+
```

This document introduces a new format that incorporates unicast
prefix information in the multicast address. The following
illustrates the new format:

```
| 8    | 4 | 4 | 8  |      plen     |72 - plen | 32    |
+--------+----+----+------+---------------+----------+----------+
|11111111|flgs|scop| plen | network prefix | reserved | group ID |
+--------+----+----+------+---------------+----------+----------+
```

```
                              +-+-+-+-+
flgs is a set of 4 flags:     |0|0|P|T|
                              +-+-+-+-+
```

        o P = 0 indicates a multicast address that is not assigned
           based on the network prefix.
        o P = 1 indicates a multicast address that is assigned
           based on the network prefix.
        o The setting of the T bit is defined in Section 2.7 of RFC
           2373

plen indicates the length of the network prefix portion of the
address when P = 1. This field is required in order to determine
the number of bits to include as part of the unicast prefix.

network prefix identifies the network prefix of the unicast subnet
owning the multicast address. If P = 1, this field contains the
unicast network prefix defined in [RFC 2374] and assigned to the
domain owning the multicast address.

The reserved field MUST be zero.

While this limits the number of unicast prefix-based IPv6 multicast
groups to 2^32 per prefix, this is unlikely to be a limitation in
the future. If it becomes necessary to exceed this limit in the
future, multicast will still work but the processing will be

slightly slower.

With the network prefix-based architecture and the current unicast
address architecture [RFC 2374], the network prefix portion of the
multicast address will be at most 64 bits. This allows for the
group ID field to be at least 40 bits.

3. Source-Specific Multicast Addresses

The network prefix-based IPv6 multicast address format supports
Source-specific multicast addresses, as defined by [IANA]. This is
accomplished by:

         o Setting P = 1
         o Setting plen = 0
         o Setting network prefix = 0

4. Security Considerations

Using unicast network-prefix based multicast addresses can sometimes
aid in identifying the allocation domain of a given multicast
address, although no guarantee is provided.

Using source-specific multicast addresses can sometimes aid in the
prevention of denial-of-service attacks by arbitrary sources,
although no guarantee is provided.

5. References

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