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Unicast-Prefix-based IPv4 Multicast Addresses
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Abstract

This specification defines an extension to the multicast addressing architecture of the IP Version 4 protocol. The extension presented in this document allows for unicast-prefix-based allocation of multicast addresses. By delegating multicast addresses at the same time as unicast prefixes, network operators will be able to identify their multicast addresses without needing to run an inter-domain allocation protocol.

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1. Introduction

RFC 3180 [RFC3180] defined an experimental allocation mechanism (called "GLOP") in 233/8 whereby an Autonomous System (AS) number is embedded in the middle 16 bits of an IPv4 multicast address, resulting in 256 multicast addresses per AS. Advantages of this mechanism include the ability to get multicast address space without an inter-domain multicast address allocation protocol, and the ease of determining the AS of the owner of an address for debugging and auditing purposes.

Some disadvantages of GLOP include:

- there is work in progress [AS4B] on expanding the size of an AS number to 4 bytes, and GLOP cannot work with such AS's.
- when an AS covers multiple sites or organizations, administration of the multicast address space within an AS must be handled by other mechanisms, such as manual administrative effort or MADCAP [RFC2730].
- during debugging, identifying the AS does not immediately identify the owning organization, when an AS covers multiple organizations.
- only 256 addresses are automatically available per AS, and obtaining any more requires administrative effort.

More recently, a mechanism [RFC3306] has been developed for IPv6 which provides a multicast range to every IPv6 subnet, which is at a much finer granularity than an AS. As a result, the first three disadvantages above are avoided (and the last disadvantage does not apply to IPv6 due to the extended size of the address space).

Another advantage of providing multicast space to every subnet (rather than just to an entire AS) is that multicast address allocation within the range need only be coordinated within the subnet.

This draft specifies a mechanism similar to [RFC3306], whereby a range of IPv4 multicast address space is provided to most IPv4 subnets. A resulting advantage over GLOP is that the mechanisms in IPv4 and IPv6 become more similar.

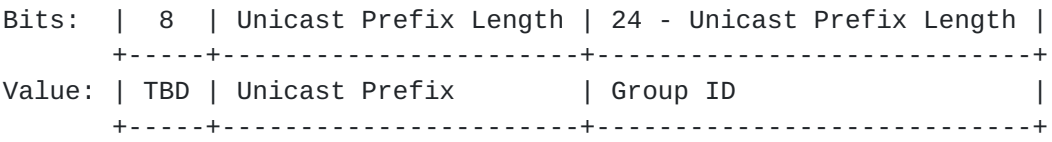
This document proposes an experimental method of statically allocating multicast addresses with global scope. As described in section Section 4, this experiment will last for a period of one year, but may be extended.

2. Address Space

(RFC-editor: replace TBD below with IANA-assigned value, and delete

this note.)

A multicast address with the prefix TBD/8 indicates that the address is a Unicast-Based Multicast (UBM) address. The remaining 24 bits can be used as follows:



For subnets with a /24 or shorter prefix, the unicast prefix of the subnet is appended to the common /8. Any remaining bits may be locally assigned by hosts within the link (e.g., using manual configuration). Individual subnets with a prefix length longer than 24 do not receive any multicast address space from this mechanism; in such cases, another mechanism must be used.

Compared to GLOP, an AS will receive more address space via this mechanism if it has more than a /16 for unicast space. An AS will receive less address space than it does from GLOP if it has less than a /16.

The owner of a UBM address can be determined by taking the multicast address, shifting it left by 8 bits, and identifying the owner of the address space covering the resulting unicast address.

3. Security Considerations

The same well known intra-domain security techniques can be applied as with GLOP. Furthermore, when dynamic allocation is used within a prefix, the approach described here may have the effect of reduced exposure to denial of space attacks, since the topological area within which nodes compete for addresses within the same prefix is reduced from an entire AS to only within an individual subnet.

4. IANA Considerations

IANA should assign a /8 in the IPv4 multicast address space for this purpose.

This assignment should timeout one year after the assignment is made. The assignment may be renewed at that time.

5. Informative References

[AS4B] Vohra, Q. and E. Chen, "BGP Support for Four-octet AS Number Space", February 2007, <http://www.ietf.org/internet-drafts/draft-ietf-idr-as4bytes-13.txt>.

[RFC2730] Hanna, S., Patel, B., and M. Shah, "Multicast Address Dynamic Client Allocation Protocol (MADCAP)", RFC 2730, December 1999.

[RFC3180] Meyer, D. and P. Lothberg, "GLOP Addressing in 233/8", BCP 53, RFC 3180, September 2001.

[RFC3306] Haberman, B. and D. Thaler, "Unicast-Prefix-based IPv6 Multicast Addresses", RFC 3306, August 2002.

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