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Unicast-Prefix-based IPv4 Multicast Addresses
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Status of this Memo

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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.

1. Introduction

RFC 2770 [GLOP] defined an experimental allocation mechanism 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:

- only 256 addresses are automatically available per AS, and obtaining any more requires administrative effort.
- 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 [MADCAP].
- during debugging, identifying the AS does not immediately identify the owning organization, when an AS covers multiple organizations.

More recently, a mechanism [V6UPBM] 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 latter three disadvantages above are avoided (and the first disadvantage does not apply to IPv6 due to the extended size of the address space).

Two significant advantages of providing multicast space to every

subnet (rather than just to an entire AS) are that:

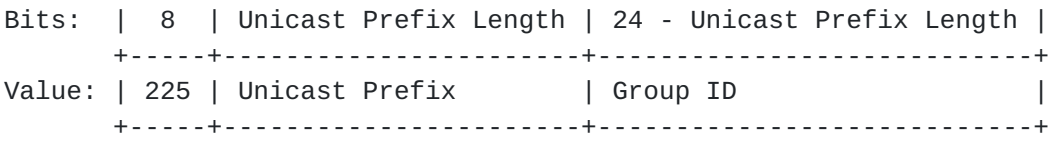
- multicast address allocation within the range need only be coordinated within the subnet (e.g., via ZMAAP [ZMAAP]), and hence can be done with zero configuration.

- bidirectional shared tree routing protocols may easily locate the direction to the root by doing a route lookup on a unicast address derived from the multicast group address.

This draft specifies a mechanism similar to [V6UPBM], 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.

2. Address Space

IANA should assign a /8 for this Unicast-Based Multicast (UBM) mechanism (e.g., the 225/8 which was previously leased to MASC). The remaining 24 bits will 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, or ZMAAP). Individual subnets with a prefix length longer than 24 do not receive any multicast address space from this mechanism; in such cases, MADCAP may 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

Since dynamic assignment does not cross domain boundaries, the same well known intra-domain security techniques can be applied as with GLOP. Furthermore, the approach described here may have the effect of reduced exposure to denial of space attacks based on dynamic allocation, since the area of dynamic allocation is reduced from an entire AS to only within individual subnets.

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[V6UPBM]
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6. Full Copyright Statement