Zero-Configuration Multicast Address Assignment

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Document Split Into Three

• draft-karstens-pim-ipv6-zeroconf-assignment-01
  1) draft-karstens-pim-zeroconf-mcast-addr-alloc-ps
     Problem statement and requirements
     Criteria for evaluating proposed solutions
     Ready for advancement
  2) draft-karstens-pim-updt-ipv6-dyn-mcast-addr-grp-id
     Updates to IPv6 multicast group ID allocation
     Minor changes and then ready for advancement
  3) draft-karstens-pim-ipv6-zeroconf-assignment-TODO
     mDNS-based zeroconf protocol
1) Problems

• Distribute multicast traffic
  • Efficiency
  • High-bandwidth traffic overwhelming low-bandwidth links

• Multicast snooping
  • Streams differentiated only by Ethernet destination address
  • Address collisions at Ethernet layer (33:33:XX:XX:XX:XX)

• No single point of failure

• Cannot rely on user configuration
1) Desired Solution

• Decentralized, zero-configuration protocol for dynamically assigning multicast addresses.
1) Requirements

• Does not rely on a single point of failure
• Does not depend on user configuration
• Coexists with other multicast address assignment protocols
• Supports operation on a single subnet
• Supports multiple applications on the same host
• Detects and resolves address collisions
  • Extreme case: network partition and repair
• Does not require an Internet connection
1) Extra Credit

• Supports operation across multiple subnets
• Does not require significant changes to existing standards
• Uses functionality commonly available on a variety of platforms
• Uses capabilities commonly provided to unprivileged applications
• Avoids depending on configuration data loaded during device manufacture
• Minimizes network traffic
1) IPv6 Considerations

• Well-structured
  • Suited for assigning ranges of addresses

• Group ID ranges overlap
  • Addressed by draft-karstens-pim-updt-ipv6-dyn-mcast-addr-grp-id
1) IPv4 Considerations

• Guidelines for allocating IPv4 multicast addresses do not avoid address collisions
• Recommend all new designs use IPv6
1) Excluded Solutions

- Different Ethernet prefixes (platform support would be slow)
- Reserve 32 address ranges in IPv4 (limited address space)
2) New “Dynamic Multicast Group IDs” Registry

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x80000000-0x8FFFFFFF</td>
<td>MADCAP</td>
<td>[RFC2730]</td>
</tr>
<tr>
<td>0x90000000-0xFEFFFFFF</td>
<td>Unassigned</td>
<td></td>
</tr>
<tr>
<td>0xFF000000-0xFFFFFFFF</td>
<td>Solicited-node multicast addresses</td>
<td>[RFC4291], Section 2.7.1</td>
</tr>
</tbody>
</table>

• MADCAP allocation reduced
• Room for developing zeroconf protocols
2) TODO

- Add Dave Thaler to acknowledgements
- Understand relationship to [Unicast-based (Including SSM) Multicast Group IDs](#) registry in IPv6 Multicast Address Space Registry registry group.
3) Develop proof-of-concept

- [https://github.com/nkarstens/mdns-zeroconf-mcast](https://github.com/nkarstens/mdns-zeroconf-mcast)

- iptables rules to simulate network partition and repair
3) TODO

• Remove sections covered by other drafts
• Incorporate improvements from proof-of-concept
• Address feedback from IANA
Thank You!