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

Range	Description	Reference
0x80000000-0x8FFFFFFF	MADCAP	[RFC2730]
0x90000000-0xFEFFFFFF	Unassigned	
0xFF000000-0xFFFFFFFF	Solicited-node multicast addresses	[RFC4291], Section 2.7.1

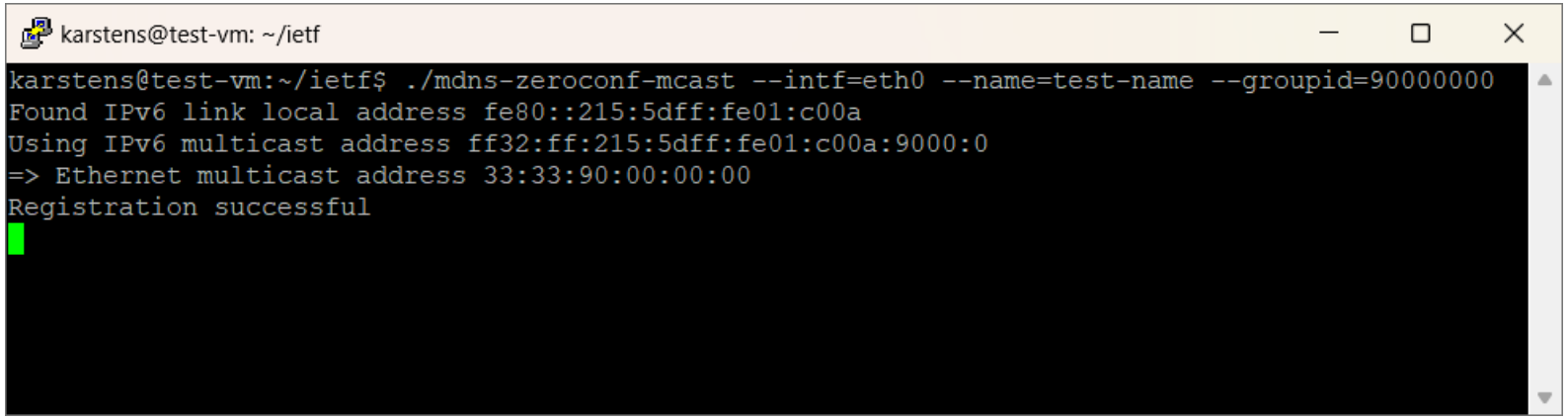
- MADCAP allocation reduced
- Room for developing zeroconf protocols

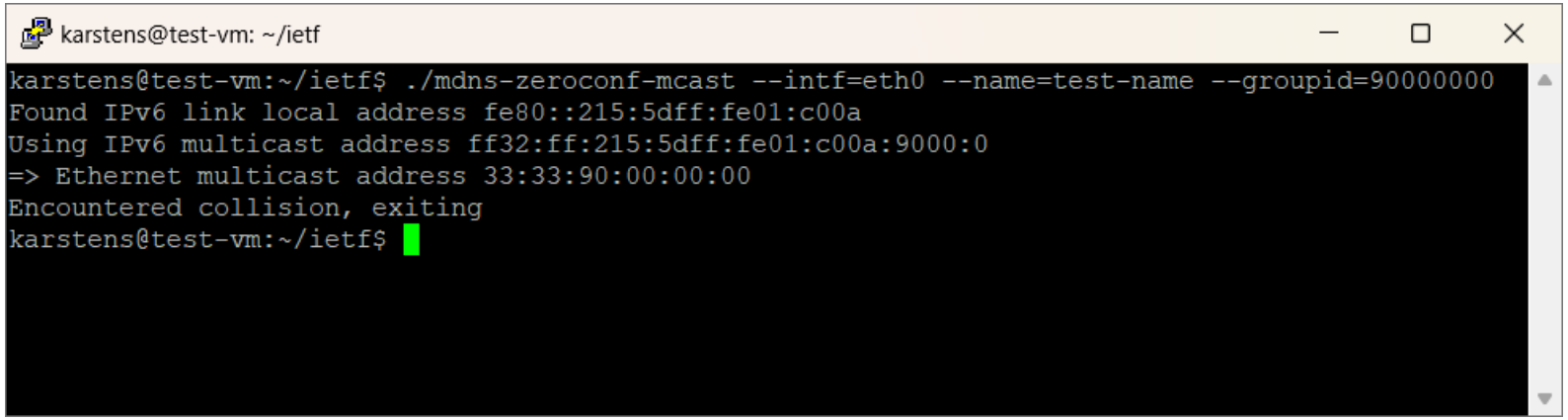
2) TODO

- 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
- 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!