Multicast in ROLL

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Work done in the Working Group

RFC 6550: RPL in Mode of Operation 3 supports Multicast

- MOP3 = storing mode (hop by hop routing) with multicast support
- RPL maintains a preferred parent tree for default route
- Uses preferred parent tree as multicast tree
- Leverages DAO for multicast, cannot use Path Sequence
- Routers maintain a DAO state per child till lifetime expires

Work done in the Working Group

RFC 7731: Multicast Protocol for Low-Power and Lossy Networks (MPL)

- MPL provides IPv6 multicast forwarding in constrained networks.
- MPL avoids the need to construct or maintain any multicast routing topology, disseminating multicast messages to all MPL Forwarders in an MPL Domain.
- MPL mainly uses the Trickle algorithm (RFC 6206) to manage control-plane and data-plane message transmissions:
 - The Trickle algorithm dynamically adjusts transmission windows, allowing to spread new information on the scale of link-layer transmission times while sending only a few messages per hour when information does not change.

Work done in the Working Group

RFC 7732: Forwarder Policy for Multicast with Admin-Local Scope in the Multicast Protocol for Low-Power and Lossy Networks (MPL)

 This document describes an "MPL4 router" that forwards MPL messages with a multicast address with Admin-Local scope to all interfaces connected to links that connect to other MPL-enabled interfaces.

RFC 7774: Multicast Protocol for Low-Power and Lossy Networks (MPL) Parameter Configuration Option for DHCPv6

• This document defines a way to distribute parameter sets for MPL Forwarders via a new DHCPv6 [RFC3315] option.

Work in Progress

<u>Draft-ietf-6lo-multicast-registration</u>: IPv6 Neighbor Discovery Multicast Address Listener Subscription

- Replacement for MLD, push model (by the 6LN) as opposed to pull (by the Edge 6LR)
- Clarifies use of path sequence and lifetime in RFC 6550 MOP3
 - Leverages ROVR in DAO (RFC 9010) to trace the origin of advertisements,
 - use the path sequence for same origin only
- Introduces MOP5 for non-storing mode,
 - using Ingress Replication Root -> Edge-6LR and link-level multicast Edge-6LR -> 6LNs
- 6LRs with listeners inject the multicast and anycast address to the Root
- Packets reach up to the Root as if unicast within the DODAG
- The Root performs Ingress Replication for multicast to all the 6LRs that registered
- Same encapsulation as external routes (RUL), SRH to the 6LR
- 6LR decapsulates and distributes to all 6LNs that <u>subscribed</u> (new term)
- The Root performs Destination Selection for anycast packets and forwards to only one 6LR

Work in Progress (held)

draft-ietf-roll-ccast: Constrained-Cast: Source-Routed Multicast for RPL (Expired 2018)

- This specification defines a protocol for forwarding multicast traffic in a constrained node network employing the RPL routing protocol in non-storing mode
- Constrained-Cast employs Bloom Filters as a compact representation of a match or non-match for elements in a large set: Each element to be included is hashed with multiple hash functions; the result is used to index a bitmap and set the corresponding bit.

draft-thubert-roll-bier: RPL-BIER (Expired 2019)

- This document provides unicast and multicast routing based on bitStrings such as used in Bit Index Explicit Replication and its source-routed Traffic Engineering variant, which correspond to RPL storing and Non-Storing Modes respectively.
- A bit is associated to an address, the leaf advertises the bit and the parents ORs the bits in one bitmap

draft-ietf-roll-mpl-yang: A YANG model for Multicast Protocol for Low power and lossy Networks (Expired 2019)

• The data model covers configuration of MPL parameters per interface. It also provides information about which Multicast addresses are operationally used