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PIM Join/ Prune Attributes for LISP Environments using Underlay Multicast

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Abstract

This document specifies an extension to PIM Receiver RLOC Join/ Prune attribute that supports the construction of multicast distribution trees where the root and receivers are located in different Locator/ ID Separation Protocol (LISP) sites and are connected using underlay IP Multicast. This attribute allows the receiver site to signal the underlay multicast group to the control plane of the root ITR (Ingress Tunnel Router).

Status of This Memo

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1. Introduction

The construction of multicast distribution trees where the root and receivers are located in different LISP sites [RFC6830] is defined in [RFC6831].

[RFC6831] specifies that (root-EID, G) data packets are to be LISP-encapsulated into (root-RLOC, G) multicast packets. [RFC8059] defines PIM J/P attribute extensions to construct multicast distribution trees. This document extends the Receiver ETR RLOC PIM J/P attribute [RFC8059] to facilitate the construction of underlay multicast trees for (root-RLOC, G).

Specifically, the assignment of the underlay multicast group needs to be done in consonance with the downstream xTR nodes and avoid unnecessary replication or traffic hairpinning.

Since the Receiver RLOC Attribute defined in [RFC8059] only addresses the Ingress Replication case, an extension of the scope of that PIM J/P attribute is defined by this draft to include scenarios where the underlay uses Multicast transport. The scope extension proposed here complies with the base specification [RFC5384].

This document uses terminology defined in [RFC6830], such as EID, RLOC, ITR, and ETR.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2. The case for extending the Received ETR RLOC Attribute of RFC 8059

When LISP based Multicast trees can be built using IP Multicast in the underlay, the mapping between the overlay group address and the underlay group address becomes a very crucial engineering decision:

Flexible mapping of overlay to underlay group ranges:
Three different types of overlay to underlay group mappings are possible: Many to one mapping: Many (root-EID, G) flows originating from a RLOC can be mapped to the same underlay (root-RLOC, G-u) flow. One to many mapping: Conversely the same overlay flow can be mapped to two or more flows e.g. (root-RLOC, G-u1) and (root-RLOC, G-u2) to cater to the requirements of downstream xTR nodes. One to one mapping: Every (root-EID, G) flow is mapped to a different (root-RLOC, G-u) flow. The overlay can use ASM while the underlay can use SSM ranges.

Multicast Address Range constraints:
It is possible that under certain circumstances, different subsets of xTRs subscribing to the same overlay multicast stream would be constrained to use different underlay multicast mapping ranges. This definitely involves a trade-off between replication and the flexibility in assigning address ranges and could be required in certain situations further below.

Inter-site PxTR:
When multiple LISP sites are connected through a LISP based transit, the site border node interconnects the site-facing interfaces and the external LISP based core. Under such circumstances, there could be different ranges of multicast group addresses used for building

the (S-RLOC, G) trees inside the LISP site and the external LISP based core. This is desired for various reasons:

Hardware resource restrictions:
Platform limitations could force engineering decisions to be made on restricting multicast address ranges in the underlay.

Other Use-cases:
TBD

Editorial Note: Comments from Stig: There should be some text indicating that the group address used should ideally only be used for LISP encapsulation (if ASM), and perhaps that it is preferrable to use an SSM group. Also, that the group obviously must be a group that the underlay supports/allows. I think it is also worth noting that ideally, different ETRs should request the same group.

3. Acknowledgements

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5. IANA Considerations

No new requests to IANA

6. Security Considerations

There is perhaps a new attack vector where an attacker can send a bunch of joins with different group addresses. It may interfere with other multicast traffic if those group addresses overlap. Also, it may take up a lot of resources if replication for thousands of groups are requested. However PIM authentication (?) should come to the rescue here. TBD Since explicit tracking would be done, perhaps it is worth enforcing that for each ETR RLOC (the RLOC used as the source of the overlay join), there could be a configurable number of maximum permissible group(s). TBD

Ed Note: To be addressed - Comments from Stig: Regarding security considerations and PIM authentication. The only solution we have here is to use IP-Sec to sign the J/P messages. I don't know if anyone has tried to us IPSec between LISP RLOCs. Are there any LISP security mechanisms that would help here for authenticating LISP encapsulated messages between xTRs?

7. Normative References

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