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Non PHP Behavior and out-of-band mapping for RSVP-TE LSPs
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Abstract

There are many deployment scenarios which require Egress LSR to receive binding of the RSVP-TE LSP to an application, and payload identification, using some "out-of-band" (OOB) mechanism. This document proposes protocol mechanisms to address this requirement. The procedures described in this document are equally applicable for point-to-point (P2P) and point-to-multipoint (P2MP) LSPs.

Conventions used in this document

In examples, "C:" and "S:" indicate lines sent by the client and server respectively.

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 0.

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1. Introduction

When RSVP-TE is used for applications like MVPN [MVPN] and VPLS [VPLS], an Egress LSR receives the binding of the RSVP-TE LSP to an application, and payload identification, using an "out-of-band" (OOB) mechanism (e.g., using BGP). In such cases, the Egress LSR cannot make correct forwarding decision until such OOB mapping information is received. Furthermore, in order to apply the binding information, the Egress LSR needs to identify the

incoming LSP. Therefore, non Penultimate Hop Popping (non-PHP) behavior is required at the Egress LSR to apply OOB mapping.

There are other applications that require non-PHP behavior. When RSVP-TE P2MP LSPs are used to carry IP multicast traffic, non-PHP behavior enables a leaf LSR to identify the P2MP TE LSP on which traffic is received. Hence, the egress LSR can determine whether traffic is received on the expected P2MP LSP and discard traffic that is not received on the expected P2MP LSP. Non-PHP behavior is also required to determine the context of upstream assigned labels [UPSTREAM] when the context is a MPLS LSP.

This document defines two new bits in the Attributes Flags TLV of the LSP_ATTRIBUTES object defined in [RFC5420]: one bit for communication of non-PHP behavior, and one bit to indicate that the binding of the LSP to an application and payload identifier (payload-Id) needs to be learned via an out-of-band mapping mechanism.

The procedures described in this document are equally applicable for P2P and P2MP LSPs. Specification of the OOB communication mechanism(s) is beyond the scope of the document.

2. RSVP-TE signaling extensions

This section describes the signaling extensions required to address the above-mentioned requirements.

2.1. Signaling non-PHP behavior

In order to request non-PHP behavior for RSVP-TE LSP, this document defines a new bit in the Attributes Flags TLV of the LSP_ATTRIBUTES object defined in [RFC5420]:

Bit Number 6 (TBD): non-PHP behavior desired bit.

This bit SHOULD be set by Ingress node in the Attributes Flags TLV of the LSP_ATTRIBUTES object in the Path message for the LSP that desires Non-PHP behavior. This bit MUST NOT be modified by any other nodes in the network. Nodes other than the Egress nodes SHOULD ignore this bit.

If an egress node receiving the Path message, supports the LSP_ATTRIBUTES object and the Attributes Flags TLV, and also recognizes the "non-PHP behavior desired bit", it MUST allocate a non-NULL local label. If the egress node supports the LSP_ATTRIBUTES object but does not recognize the Attributes Flags TLV, or supports the TLV as well but does not recognize this particular bit, then it SHOULD simply ignore the above request.

An ingress node requesting non-PHP behavior MAY examine the label value corresponding to the Egress node(s) in the RRO, and MAY send a Path Tear to the Egress which assigns a Null label value.

2.2. Signaling OOB Mapping Indication

In order to indicate to the Egress LSR that binding of RSVP-TE LSP to an application and payload identification is being communicated by an OOB mechanism, this document defines a new bit in the Attributes Flags TLV of the LSP_ATTRIBUTES object defined in [RFC5420]:

Bit Number 7 (TBD): OOB mapping indication bit.

This bit SHOULD be set by Ingress node in the Attributes Flags TLV of the LSP_ATTRIBUTES object in the Path message for the LSP that desires OOB mapping. This bit MUST NOT be modified by any other nodes in the network. Nodes other than the Egress nodes SHOULD ignore this bit.

If an egress node receiving the Path message, supports the LSP_ATTRIBUTES object and the Attributes Flags TLV, and also recognizes the "OOB mapping indication bit", it MUST wait for the OOB mapping before accepting traffic on the P2MP LSP. This implies that the egress node MUST NOT setup forwarding state for the P2MP LSP before it receives the OOB mapping, though it SHOULD proceed with RSVP-TE signaling and send RESV messages as per regular RSVP-TE procedures [RFC3209]. It MUST also ignore L3PID in the Label Request Object [RFC3209]. If the egress node supports the LSP_ATTRIBUTES object but does not recognize the Attributes Flags TLV, or supports the TLV as well but does not recognize this particular bit, then it SHOULD simply ignore the above request.

2.3. Relationship between OOB and non-PHP bits

Non-PHP behavior desired and OOB mapping indication bit can appear and be processed independently of each other. However, as mentioned earlier, in the context of application discussed in this draft, OOB mapping require non-PHP behavior. An Ingress node requesting OOB mapping MAY also set non-PHP behavior desired bit in the LSP_ATTRIBUTES object in the Path message.

2.4. Egress Procedure for label binding

RSVP-TE signaling completion and the OOB mapping information reception happen asynchronously at the Egress. As mentioned in

Section 2, Egress waits for the OOB mapping before accepting traffic on the P2MP LSP.

In order to avoid unnecessary use of the resources and possible block-holing of traffic, if the OOB mapping information is not received within a reasonable time, Egress MAY trigger a Path Error message with the error code/sub-code "Notify Error/ no OOB mapping received" for all affected LSPs. If available, and where notify requests were included when the LSPs were initially setup, Notify message (as defined in [RFC3473]) MAY also be used for delivery of this information to the Ingress node. Egress node may implement a cleanup timer for this purpose. The time-out value is a local decision at the Egress, with recommended default value is to be added later.

3. Security Considerations

This document does not introduce any new security issues above those identified in [RFC3209], [RFC5420] and [RSVP-TE-P2MP].

4. IANA Considerations

4.1. Attribute Flags for LSP_ATTRIBUTES object

The following new bit is being defined for the Attributes Flags TLV in the LSP_ATTRIBUTES object. The numeric value is to be assigned by IANA.

- Non-PHP behavior desired bit - Bit Number 6 (Suggested value).
- OOB mapping indication bit - Bit Number 7 (Suggested value).

These bits are only to be used in the Attributes Flags TLV on a Path message.

The following new error sub-code for Error Code = 25 "Notify Error" (see [RFC3209]) is needed. The numeric value for this sub-code is to be assigned by IANA.

- No OOB mapping received.

5. Acknowledgments

The authors would like to thank Yakov Rekhter for his suggestions on the draft.

6. References

6.1. Normative References

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[RFC3209] D. Awduche, L. Berger, D. Gan, T. Li, V. Srinivasan, and G. Swallow, "RSVP-TE: Extensions to RSVP for LSP Tunnels", RFC 3209, December 2001.

[RSVP-TE-P2MP] R. Aggarwal, D. Papadimitriou, S. Yasukawa, et al, "Extensions to RSVP-TE for Point-to-Multipoint TE LSPs", RFC4875.

[RFC3473] L. Berger, Editor, "Generalized Multi-Protocol Label Switching (GMPLS) Signaling Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) Extensions", RFC 3473, January 2003.

6.2. Informative References

[MVPN] E. Rosen, R. Aggarwal et al, "Multicast in MPLS/BGP IP VPNs", draft-ietf-l3vpn-2547bis-mcast-07.txt.

[VPLS] R. Aggarwal, et al, "Propagation of VPLS IP Multicast Group Membership Information", draft-raggarwa-l2vpn-vpls-mcast-ctrl-00.txt, work in progress.

[UPSTREAM] TBA.

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