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Number of Generic Associated Channel Labels in the MPLS Label Stack

Abstract

This document describes the requirements for using multiple Generic Associated Channel Labels (GALs) in an MPLS label stack. As a result, the document updates RFC 5586 by removing the restriction imposed on the usage of GAL that limits the number of GAL in the MPLS label stack to one.

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Table of Contents

1. Introduction

[RFC5085] defined the associated channel mechanism and the Associated Channel Header (ACH) for exchange of control, management, and Operations, Administration, and Maintenance (OAM) messages in Pseudowires (PWs). [RFC5586] generalized that associated channel mechanism and the ACH for use in Sections, Label Switched Paths (LSPs), and PWs as the Generic Associated Channel (G-ACh) and introduced the generalized label-based exception mechanism using the Generic Associated Channel Label (GAL).

[RFC5586] restricted the number of GALs present in the MPLS label stack to not more than one appearance. This document updates [RFC5586] by removing that restriction for non-MPLS-TP networks.

2. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. Number of GAL in the MPLS Label Stack

[RFC5586] has limited the number of GALs in an MPLS label stack:

> Furthermore, when present, the GAL MUST NOT appear more than once in the label stack.

In some MPLS networks, e.g., when realizing Service Function Chaining with MPLS-based forwarding plane [RFC8595], putting more than a single GAL in the MPLS label stack can simplify the processing of OAM packets and, as a result, improve the performance. An extension of the MPLS Echo Request and Reply protocol [RFC8029] in such an environment is discussed in [I-D.lm-mpls-sfc-path-verification]. Because it is expected that a general Service Function does not support processing of MPLS echo request messages, a GAL being used within a basic unit of MPLS label stack to indicate that the payload is ACH-encapsulated OAM message. And in the label-stacking case, multiple basic units on the MPLS label stack, and, consequently, GALs could be placed in an MPLS label stack. Thus, this document removes the limit on the number of GALs present in an MPLS label stack by changing the statement in [RFC5586] as follows:

> Furthermore, in non-MPLS-TP networks, when present, the GAL MAY appear more than once in the label stack.

[RFC5586] requires that when GAL is at the bottom of the label stack, it is followed by an ACH:

> Where the GAL is at the bottom of the label stack (i.e., S bit set to 1), then it MUST always be followed by an ACH.

This document updates [RFC5586] by extending that requirement for environments when GAL is not at the bottom of the label stack as follows:

> Where GAL is present in the label stack, the label element at the bottom of the label stack (i.e., S bit set to 1) MUST always be followed by an ACH.

4. Processing GAL when not at the Bottom of the Label Stack

[Ed.note: Describe GAL processing by transit and egress nodes. Illustrate the transformation of the MPLS label stack as a packet transits through the domain.]

5. IANA Considerations

This document has no requests for IANA, and this section can be removed before the publication.

6. Security Considerations

There are no further security considerations than those in [RFC5586].

7. Acknowledgments

TBA

8. References

8.1. Normative References

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8.2. Informative References

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