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Allocating and Retiring MPLS Reserved Labels
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Abstract

There are a limited number of reserved labels defined for Multi-Protocol Label Switching. Thus one must be cautious in the allocation of new reserved labels, yet at the same time allow forward progress when a new reserved label is called for. This memo suggests some procedures to follow in the allocation and retirement of reserved labels.

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1. Introduction

[RFC3032] defined four reserved label values for Multi-Protocol Label Switching (MPLS), namely, 0 to 3, and set aside values 4 through 15 for future use. These labels have special significance in both the control and data plane. Since then, two further values have been allocated, leaving ten unassigned values from the original space of sixteen.

While the allocation of two out of the remaining twelve reserved label values in the space of about 12 years is not in itself a cause for concern, the scarcity of reserved labels is. Furthermore, many of the reserved labels require special processing by forwarding hardware, changes to which are often expensive, and sometimes impossible. Thus, documenting a newly allocated reserved label value is important.

This memo outlines some of the issues in allocating and retiring reserved label values, and will eventually suggest mechanisms to address these. Furthermore, this memo proposes a means of extending the space of reserved labels.

1.1. Conventions used

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 [[RFC2119](#)].

2. Questions

1. How should reserved labels be allocated? The current IANA number space for "MPLS Label Values" has the allocation policy of "IETF Consensus". Would "Expert Review" be better? Should the name of this space be changed to reflect its use? Should there be Early Allocation? Experimental Use? Private Use?
2. What documentation is required for reserved labels allocated henceforth?
3. Should a reserved label ever be retired? What criteria are relevant here? What procedures and time frames are appropriate?
4. The reserved label value of 3 is only used in signaling, never in the data plane. Could it (and should it) be used in the data plane? If so, how?
5. What is a feasible mechanism to extend the space of reserved labels, should this become necessary?

3. Proposal

To answer question 5 from the previous section, the following proposal is made: set aside label value 15 (the "extension" label) for the purpose of extending the space of reserved labels. An extension label 15 MUST be followed by another label L (and thus MUST have the bottom-of-stack bit clear). L MUST be interpreted as an "extended reserved label". Furthermore, the interpretation and special processing of such labels MUST be documented, and they MUST be registered with IANA (policies TBD).

A further question to be settled in this regard is whether a "plain" reserved label retains its meaning if it follows the extension label. That is, does a label value of 0 mean "Explicit IPv4 NULL" whether or not it is preceded by an extension label? The suggestion here is "yes" for the currently allocated reserved labels (i.e., 0-3, 7, 13, and 14). The documentation accompanying a newly allocated reserved label MUST say whether or not it retains its meaning if preceded by the extension label.

4. IANA Considerations

There is already an IANA registry for MPLS label values. This memo may eventually suggest:

1. a change in the name of the registry to "Reserved MPLS Label Values"
2. some changes to the procedures for allocating values
3. a new registry for "Extended Reserved MPLS Label Values".

5. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC3032] Rosen, E., Tappan, D., Fedorkow, G., Rekhter, Y., Farinacci, D., Li, T., and A. Conta, "MPLS Label Stack Encoding", [RFC 3032](#), January 2001.

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