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Signalling Unnumbered Links in CR-LDP

[draft-ietf-mpls-crldp-unnum-00.txt](#)

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2. Abstract

Current signalling used by MPLS TE doesn't provide support for unnumbered links. This document defines procedures and extensions to CR-LDP, one of the MPLS TE signalling protocols, that are needed in order to support unnumbered links.

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[3.](#) Overview

Supporting MPLS TE over unnumbered links (i.e., links that do not have IP addresses) involves two components: (a) the ability to carry (TE) information about unnumbered links in IGP TE extensions (ISIS or OSPF), and (b) the ability to specify unnumbered links in MPLS TE signalling. The former is covered in [[ISIS-TE](#), [OSPF-TE](#)]. The focus of this document is on the latter.

Current signalling used by MPLS TE doesn't provide support for unnumbered links because the current signalling doesn't provide a way to indicate an unnumbered link in its Explicit Route Objects. This document proposes simple procedures and extensions that allow CR-LDP signalling [[CR-LDP](#)] to be used with unnumbered links.

[4.](#) Interface Identifiers

Since unnumbered links are not identified by an IP address, then for the purpose of MPLS TE they need some other identifier. We assume that each unnumbered link on a Label Switched Router (LSR) is given a unique 32-bit identifier. The scope of this identifier is the LSR to which the link belongs; moreover, the IS-IS and/or OSPF and CR-LDP modules on an LSR must agree on interface identifiers.

Note that links are directed, i.e., a link *l* is from some LSR A to some other LSR B. LSR A chooses the interface identifier for link *l*. To be completely clear, we call this the "outgoing interface identifier from LSR A's point of view". If there is a reverse link from LSR B to LSR A (for example, a point-to-point SONET interface connecting LSRs A and B would be represented as two links, one from A to B, and another from B to A), B chooses the outgoing interface identifier for the reverse link; we call this the link's "incoming interface identifier from A's point of view". There is no a priori relationship between the two interface identifiers.

5. Unnumbered Forwarding Adjacencies

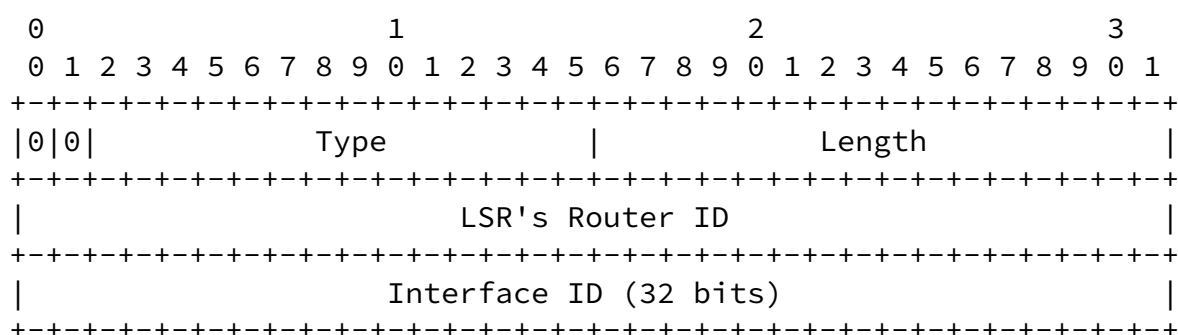
If an LSR that originates an LSP advertises this LSP as an unnumbered Forwarding Adjacency in IS-IS or OSPF [[LSP-HIER](#)], the LSR MUST allocate an interface ID to that Forwarding Adjacency. Moreover, the REQUEST message for the LSP MUST contain an INTERFACE ID object (described below), with the LSR's Router ID set to the head end's router ID, and the Interface ID set to the LSP's interface ID.

If the LSP is bidirectional, and the tail-end LSR (of the forward LSP) advertises the reverse LSP as an unnumbered Forwarding Adjacency, the tail-end LSR MUST allocate an interface ID to the reverse Forwarding Adjacency. Furthermore, the MAPPING message for the LSP MUST contain an INTERFACE ID object, with the LSR's Router ID set to the tail end's router ID, and the Interface ID set to the reverse LSP's interface ID.

5.1. INTERFACE ID Object

The INTERFACE ID object has Type to be determined by IETF consensus and length 8. The format is given below.

Figure 1: Interface ID TLV

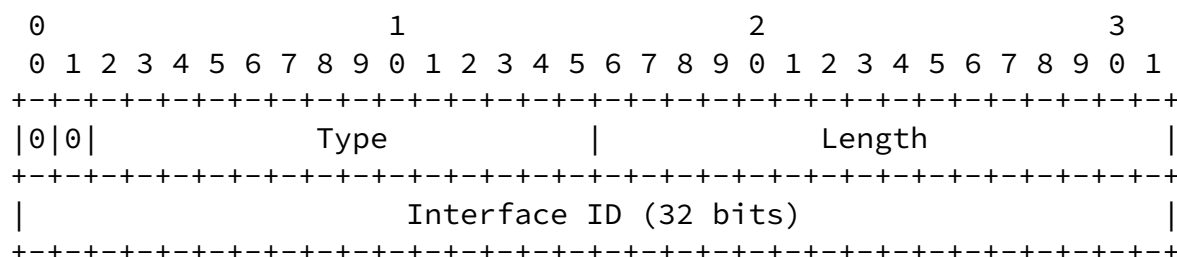


This object can optionally appear in either a REQUEST message or a MAPPING message. In the former case, we call it the "Forward Interface ID" for that LSP; in the latter case, we call it the "Reverse Interface ID" for the LSP.

6. Signalling Unnumbered Links in EROs

A new subobject of the Explicit Route Object (ERO) is used to specify unnumbered links. This subobject has the following format:

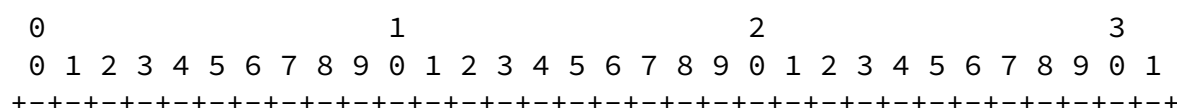
Figure 2: Unnumbered Interface ID Subobject



This subobject is strict. The Type is 0x0805 (Unnumbered Interface ID) and the Length is 4.

An LSR sending a Request message that includes an Unnumbered Interface ID subobject as the first subobject in the ERO MUST also include a PHOP TLV, specifying the Router ID of the sending LSR. This TLV is depicted in Figure 3.

Figure 3: PHOP TLV



for any link. If a match is found, the match identifies the link for which the node has to perform label allocation.

Otherwise, it is assumed that the node has to perform label allocation for the link over which the Request message was received. In this case the receiving node MAY validate that it received the Request Message correctly. To do so, the node must maintain a database of Traffic Engineering information distributed by IS-IS and/or OSPF.

To validate that it received the Request message correctly, the node looks up in its Traffic Engineering database for the node corresponding to the router ID of the sender of the Request message. It then checks that there is a link from the previous node to itself that carries the same Interface ID as the one in the ERO subobject. If this is not the case, the receiving node has received the message in error and SHOULD return a "Bad Initial ER-Hop" error. Otherwise, the receiving node removes the first subobject, and continues processing the ERO.

[6.3](#). Selecting the Next Hop

If, after processing and removing all initial subobjects in the ERO that refer to itself, the receiving node finds a subobject of type Unnumbered Interface ID, it determines the next hop as follows. The Interface ID MUST refer to an outgoing interface identifier that this node allocated; if not, the node SHOULD return a "Bad Strict Node" error. The next hop is the node at the other end of the link that the Interface ID refers to.

Furthermore, when sending a Request message to the next hop, the ERO to be used is the current ERO (starting with the Unnumbered Interface ID subobject).

7. Security Considerations

This document raises no new security concerns for CR-LDP.

8. Acknowledgments

Thanks to Rahul Aggarwal for his comments on the text.

9. References

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[ISIS-TE] Smit, H., and Li, T., "IS-IS extensions for Traffic Engineering", [draft-ietf-isis-traffic-02.txt](#) (work in progress)

[LSP-HIER] Kompella, K., and Rekhter, Y., "LSP Hierarchy with MPLS TE", [draft-ietf-mpls-lsp-hierarchy-01.txt](#) (work in progress)

[OSPF-TE] Katz, D., and Yeung, D., "Traffic Engineering Extensions to OSPF", [draft-katz-yeung-ospf-traffic-02.txt](#) (work in progress)

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