

Network Working Group
Internet Draft
Expiration Date: February 2002

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IS-IS Extensions in Support of Generalized MPLS

[draft-ietf-isis-gmpls-extensions-03.txt](#)

1. Status of this Memo

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2. Abstract

This document specifies encoding of extensions to the IS-IS routing protocol in support of Generalized Multi-Protocol Label Switching (GMPLS). The description of the extensions is specified in [GMPLS-ROUTING].

3. Summary for Sub-IP Area

3.1. Summary

This document specifies encoding of extensions to the IS-IS routing protocol in support of Generalized Multi-Protocol Label Switching (GMPLS). The description of the extensions is specified in [GMPLS-ROUTING].

3.2. Where does it fit in the Picture of the Sub-IP Work

This work fits squarely in either CCAMP or IS-IS boxes.

3.3. Why is it Targeted at this WG

This draft is targeted at either the CCAMP or IS-IS WGs, because this draft specifies the extensions to the IS-IS routing protocols in support of GMPLS, because GMPLS is within the scope of CCAMP WG, and because IS-IS is within the scope of the IS-IS WG.

3.4. Justification

The WG should consider this document as it specifies the extensions to the IS-IS routing protocols in support of GMPLS.

4. Introduction

This document specifies extensions to the IS-IS routing protocol in support of carrying link state information for Generalized Multi-Protocol Label Switching (GMPLS). The set of required enhancements to IS-IS are outlined in [[GMPLS-ROUTING](#)].

5. IS-IS Routing Enhancements

In this section we define the enhancements to the TE properties of GMPLS TE links that can be announced in IS-IS TE LSAs. In this document, we enhance the sub-TLVs for the extended IS reachability TLV (see [3]) in support of GMPLS. Specifically, we add sub-TLVs for: Outgoing/Incoming Interface Identifier, Link Protection Type, and Interface Switching Capability Descriptor. This brings the list of sub-TLVs of the extended IS reachability TLV to:

Sub-TLV Type	Length	Name
3	4	Administrative group (color)
4	4	Outgoing Interface Identifier
5	4	Incoming Interface Identifier
6	4	IPv4 interface address
8	4	IPv4 neighbor address
9	4	Maximum link bandwidth
10	4	Reservable link bandwidth
11	32	Unreserved bandwidth
18	3	TE Default metric
20	2	Link Protection Type
21	variable	Interface Switching Capability Descriptor
250-254	-	Reserved for cisco specific extensions
255	-	Reserved for future expansion

We further add one new TLV.

TLV Type	Length	Name
138 (TBD)	variable	Shared Risk Link Group

5.1. Outgoing Interface Identifier

An Outgoing Interface Identifier is a sub-TLV of the extended IS reachability TLV with type 4, length 4 and value equal to the assigned identifier.

5.2. Incoming Interface Identifier

An Incoming Interface Identifier is a sub-TLV of the extended IS reachability TLV with type 5, length 4 and value equal to L's incoming interface identifier.

5.3. Link Protection Type

The Link Protection Type is a sub-TLV (of type 20) of the extended IS reachability TLV, with length two octets, the first of which is a bit vector describing the protection capabilities of the link. They are:

0x01 Extra Traffic

0x02 Unprotected

0x04 Shared

0x08 Dedicated 1:1

0x10 Dedicated 1+1

0x20 Enhanced

0x40 Reserved

0x80 Reserved

5.4. Interface Switching Capability Descriptor

The Interface Switching Capability Descriptor is a sub-TLV (of type 21) of the extended IS reachability TLV. The length is the length of value field in octets. The format of the value field is as shown below:

										1										2										3									
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Switching Cap										Encoding										Reserved																			
										Max LSP Bandwidth at priority 0																													
										Max LSP Bandwidth at priority 1																													
										Max LSP Bandwidth at priority 2																													
										Max LSP Bandwidth at priority 3																													
										Max LSP Bandwidth at priority 4																													
										Max LSP Bandwidth at priority 5																													
										Max LSP Bandwidth at priority 6																													
										Max LSP Bandwidth at priority 7																													
										Switching Capability-specific information																													
										(variable)																													

The Switching Capability (Switching Cap) field contains one of the following values:

- | | |
|-----|---------------------------------------|
| 1 | Packet-Switch Capable-1 (PSC-1) |
| 2 | Packet-Switch Capable-2 (PSC-2) |
| 3 | Packet-Switch Capable-3 (PSC-3) |
| 4 | Packet-Switch Capable-4 (PSC-4) |
| 51 | Layer-2 Switch Capable (L2SC) |
| 100 | Time-Division-Multiplex Capable (TDM) |
| 150 | Lambda-Switch Capable (LSC) |
| 200 | Fiber-Switch Capable (FSC) |

The Encoding field contains one of the values specified in [Section 3.1.1](#) of [GMPLS-SIG].

Maximum LSP Bandwidth is encoded as a list of eight 4 octet fields in the IEEE floating point format, with priority 0 first and priority 7 last.

The content of the Switching Capability specific information field

depends on the value of the Switching Capability field.

When the Switching Capability field is PSC-1, PSC-2, PSC-3, PSC-4, or L2SC, there is no specific information.

When the Switching Capability field is TDM, the specific information includes Minimum LSP Bandwidth, which is encoded in a 4 octets field in the IEEE floating point format.

When the Switching Capability field is LSC, there is no specific information.

5.5. Shared Risk Link Group TLV

The proposed SRLG (of type 138 TBD) contains a new data structure consisting of:

- 7 octets of System ID and Pseudonode Number
- 1 octet Flag
- 4 octets of IPv4 interface address or 4 octets of an Outgoing Interface Identifier
- 4 octets of IPv4 neighbor address or 4 octets of an Incoming Interface Identifier

and a list of SRLG values, where each element in the list has 4 octets. The length of this TLV is $16 + 4 * (\text{number of SRLG values})$. The Least Significant Bit of the Flag octet indicates whether the interface is numbered (set to 1), or unnumbered (set to 0). All other bits are reserved and should be set to 0.

6. Security Considerations

The extensions proposed in this document does not raise any new security concerns.

7. Acknowledgements

The authors would like to thank Suresh Katukam, Jonathan Lang and Quaizar Vohra for their comments on the draft.

8. References

[ISIS-TE] Smit, H., Li, T., "IS-IS Extensions for Traffic Engineering",
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[GMPLS-SIG] Generalized MPLS Group, "Generalized MPLS - Signaling Functional Description", [draft-ietf-mpls-generalized-signaling-04.txt](#) (work in progress)

[GMPLS-ROUTING] "Routing Extensions in Support of Generalized MPLS",
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