Network Working Group	S. Previdi	
Internet-Draft	M. Shand, Ed.	
Intended status: Standards Track	Cisco Systems	
Expires: May 22, 2008	C. Martin	
	Verizon	
	B. Neal	
	Broadwing Communications	
	November 19, 2007	

A Policy Control Mechanism in IS-IS Using Administrative Tags
draft-ietf-isis-admin-tags-04.txt

Status of this Memo

Abstract

This document describes an extension to the IS-IS protocol to add operational capabilities that allow for ease of management and control over IP prefix distribution within an IS-IS domain. This document enhances the IS-IS protocol by extending the information that adraft-ietf-isis-wg-multi-topology Intermediate System (IS) [router] can place in Link State Protocol Data Units (LSPs) for policy use. This extension will provide operators with a mechanism to control IP prefix distribution throughout multi-level IS-IS domains.

Table of Contents

---

1. Conventions used in this Document   [TOC](#)

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 BCP 14, [RFC2119]
(Bradner, S., "Key words for use in RFCs to Indicate Requirement
Levels," March 1997.).

---

2. Introduction   [TOC](#)

As defined in [RFC1195] (Callon, R., "Use of OSI IS-IS for routing in
TCP/IP and dual environments," December 1990.) and extended in
[RFC3784] (Smit, H. and T. Li, "Intermediate System to Intermediate
System (IS-IS) Extensions for Traffic Engineering (TE)," June 2004.),
the IS-IS protocol [ISO10589] (International Organization for
Standardization, "Intermediate system to Intermediate system intra-
domain routeing information exchange protocol for use in conjunction
with the protocol for providing the connectionless-mode Network Service
(ISO 8473)," Nov 2002.) may be used to distribute IPv4 prefix
reachability information throughout an IS-IS domain. In addition,
thanks to extensions made in [I-D.ietf-isis-wg-multi-topology]
(Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS,"

November 2007.) and [I-D.ietf-isis-ipv6] (Hopps, C., "Routing IPv6 with IS-IS," October 2007.), IS-IS may be used to distribute IPv6 reachability information.

The IPv4 prefix information is encoded as TLV type 128 and 130 in [RFC1195] (Callon, R., "Use of OSI IS-IS for routing in TCP/IP and dual environments," December 1990.), with additional information carried in TLV 135 as specified in [RFC3784] (Smit, H. and T. Li, "Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)," June 2004.) and TLV 235 as defined in [I-D.ietf-isis-wg-multi-topology] (Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," November 2007.). In particular, the extended IP Reachability TLV (TLV 135) contains support for a larger metric space, an up/down bit to indicate redistribution between different levels in the hierarchy, an IP prefix, and one or more sub-TLVs that can be used to carry specific information about the prefix. TLV 235 is a derivative of TLV 135, with the addition of Multi-Topology membership information [I-D.ietf-isis-wg-multi-topology] (Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," November 2007.).

The IPv6 prefix information is encoded as TLV 236 in [I-D.ietf-isis-ipv6] (Hopps, C., "Routing IPv6 with IS-IS," October 2007.) and TLV 237 in [I-D.ietf-isis-wg-multi-topology] (Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," November 2007.).

This draft proposes 2 new sub-TLVs for TLV 135, TLV 235, TLV 236 and TLV 237 that may be used to carry administrative information about an IP prefix.

---

3. Sub-TLV Additions

This draft proposes 2 new "Administrative Tag" sub-TLVs to be added to TLV 135, TLV 235, TLV 236 and TLV 237. These TLVs specify one or more 32 or 64 bit unsigned integers that may be associated with an IP prefix. Example uses of these tags include controlling redistribution between levels and areas, different routing protocols, or multiple instances of IS-IS running on the same router, or carrying BGP standard or extended communities.

The methods for which their use is employed is beyond the scope of this document and left to the implementer and/or operator.

The encoding of the sub-TLV(s) is discussed in the following subsections.

3.1. 32-bit Administrative Tag Sub-TLV 1

The Administrative Tag SHALL be encoded as one or more 4 octet unsigned integers using Sub-TLV 1 in TLV-135 [RFC3784] (Smit, H. and T. Li, "Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)," June 2004.), TLV 235 [I-D.ietf-isis-wg-multi-topology] (Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," November 2007.), TLV 236 [I-D.ietf-isis-ipv6] (Hopps, C., "Routing IPv6 with IS-IS," October 2007.) and TLV 237 [I-D.ietf-isis-wg-multi-topology] (Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," November 2007.). The Administrative Tag Sub-TLV has following structure:

   *1 octet of type (value: 1)

   *1 octet of length (value: multiple of 4)

   *one or more instances of 4 octets of administrative tag

On receipt, an implementation MAY consider only one encoded tag, in which case the first encoded tag MUST be considered and any additional tags ignored. A tag value of zero is reserved and SHOULD be treated as "no tag".

3.2. 64-bit Administrative Tag Sub-TLV 2

The Administrative Tag SHALL be encoded as one or more 8 octet unsigned integers using Sub-TLV 2 in TLV-135 [RFC3784] (Smit, H. and T. Li, "Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)," June 2004.), TLV 235 [I-D.ietf-isis-wg-multi-topology] (Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," November 2007.), TLV 236 [I-D.ietf-isis-ipv6] (Hopps, C., "Routing IPv6 with IS-IS," October 2007.) and TLV 237 [I-D.ietf-isis-wg-multi-topology] (Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," November 2007.). The 64-bit Administrative Tag Sub-TLV has following structure:

   *1 octet of type (value: 2)

   *1 octet of length (value: multiple of 8)

   *one or more instances of 8 octets of administrative tag

On receipt, an implementation MAY consider only one encoded tag, in which case the first encoded tag MUST be considered and any additional tags ignored. A tag value of zero is reserved and SHOULD be treated as "no tag".

4. Ordering of Tags

The semantics of the tag order are implementation-dependent. That is, there is no implied meaning to the ordering of the tags that indicates a certain operation or set of operations need be performed based on the order of the tags. Each tag SHOULD be treated as an autonomous identifier that MAY be used in policy to perform a policy action. Whether or not tag A precedes or succeeds tag B SHOULD not change the meaning of the tag set. However, when propagating TLVs containing multiple tags between levels, an implementation SHOULD preserve the ordering such that the first tag remains the first tag, so that implementations which only recognise a single tag will have a consistent view across levels.
Each IS that receives an LSP with TLV(s) 135 and/or 235 and/or 236 and/or 237, that have associated SubTLV(s) 1 and/or 2, MAY operate on the tag values as warranted by the implementation. If an implementation needs to change tag values, for example, when propagating TLVs between levels at an area boundary, then the TLV(s) SHOULD be copied to the newly generated Level-1 or Level-2 LSP at which point, the contents of the SubTLV(s) MAY change as dictated by the policy action. In the event that no change is required, the SubTLV(s) SHOULD be copied in order into the new LSP, such that ordering is preserved.

5. Compliance

A compliant IS-IS implementation MUST be able to assign one tag to any IP prefix in any of the following TLVs: TLV 135, TLV 235, TLV 236, TLV 237. It MUST be able to interpret a single tag present in the sub-TLV, or the first tag where there is more than one tag present in the sub-TLV
A compliant IS-IS implementation MAY be able to assign more than one tag to any IP prefix in any of the following TLVs: TLV 135, TLV 235, TLV 236, TLV 237. It MAY be able to interpret the second and subsequent tags where more than one tag is present in the sub-TLV
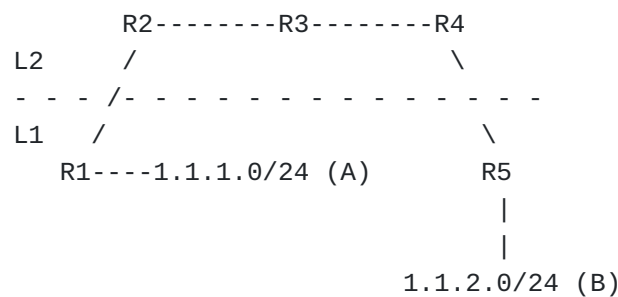A compliant IS-IS implementation MAY be able to rewrite or remove one or more tags associated with a prefix in any of the following TLVs: TLV 135, TLV 235, TLV 236, TLV 237 when propagating TLVs between levels.

6. Operations

An administrator associates an Administrative Tag value with some
interesting property. When IS-IS advertises reachability for some IP
prefix that has that property, it adds the Administrative Tag to the IP
reachability information TLV for that prefix, and the tag "sticks" to
the prefix as it is flooded throughout the routing domain.
Consider the network in Figure 1 (Example of usage). We wish to "leak"
L1 prefixes [RFC2966] (Li, T., Przygienda, T., and H. Smit, "Domain-
wide Prefix Distribution with Two-Level IS-IS," October 2000.) with
some property, A, from L2 to the L1 router R1. Without policy- groups,
there is no way for R2 to know property A prefixes from property B
prefixes.

```
          R2--------R3--------R4
    L2      /                    \
    - - - /- - - - - - - - - - - - - - - -
    L1    /                        \
       R1----1.1.1.0/24 (A)       R5
                                   |
                                   |
                          1.1.2.0/24 (B)
```

Figure 1: Example of usage

We associate Administrative Tag 100 with property A, and have R5 attach
that value to the IP extended reachability information TLV for prefix
1.1.2.0/24. R2 has a policy in place to "match prefixes with
Administrative Tag 100, and leak to L1."
The previous example is rather simplistic; it seems that it would be
just as easy for R2 simply to match the prefix 1.1.2.0/24. However, if
there are a large number of routers that need to apply some policy
according to property A and large number of "A" prefixes, this
mechanism can be quite helpful.
Implementations which support only a single tag and those which support
multiple tags may co-exist in the same IS-IS domain. An
implementatation supporting multiple tags SHOULD therefor assign any
tag which is required to be interpreted by all systems as the first
tag in any set of multiple tags.

---

7. Security Considerations

This document raises no new security issues for IS-IS, as any
annotations to IP prefixes should not pass outside the administrative

control of the network operator of the IS-IS domain. Such an allowance
would violate the spirit of Interior Gateway Protocols in general and
IS-IS in particular

8. IANA Considerations   [TOC]

The authors have chosen "1" as the type code of the 32-bits
Administrative Tag Sub-TLV and "2" as the type code of the 64-bits
Administrative Tag Sub-TLV. These values must be allocated by IANA.

9. Manageability Considerations   [TOC]

These extensions which have been designed, developed and deployed for
many years do not have any new impact on management and operation of
the ISIS protocol via this standardization process.

10. Acknowledgements   [TOC]

The authors would like to thank Henk Smit for clarifying the best place
to describe this new information, Tony Li and Tony Przygienda for
useful comments on this draft, Danny McPherson for some much needed
formatting assistance.

11. References   [TOC]

11.1. Normative References

[TOC]

[ISO10589]	International Organization for Standardization, "Intermediate system to Intermediate system intra-domain routeing information exchange protocol for use in conjunction with the protocol for providing the connectionless-mode Network Service (ISO 8473)," ISO/IEC 10589:2002, Second Edition, Nov 2002.
[RFC1195]	Callon, R., "Use of OSI IS-IS for routing in TCP/IP and dual environments," RFC 1195, December 1990 (TXT, PS).
[RFC2119]	

Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," BCP 14, RFC 2119, March 1997 (TXT, HTML, XML).

11.2. Informative References

[I-D.ietf-isis-ipv6]	Hopps, C., "Routing IPv6 with IS-IS," draft-ietf-isis-ipv6-07 (work in progress), October 2007 (TXT).
[I-D.ietf-isis-wg-multi-topology]	Przygienda, T., "M-ISIS: Multi Topology (MT) Routing in IS-IS," draft-ietf-isis-wg-multi-topology-12 (work in progress), November 2007 (TXT).
[RFC2966]	Li, T., Przygienda, T., and H. Smit, "Domain-wide Prefix Distribution with Two-Level IS-IS," RFC 2966, October 2000 (TXT).
[RFC3784]	Smit, H. and T. Li, "Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)," RFC 3784, June 2004 (TXT).

Authors' Addresses

	Stefano Previdi
	Cisco Systems
	Via Del Serafico, 200
	00142 Rome,
	Italy
Email:	sprevidi@cisco.com
	Mike Shand (editor)
	Cisco Systems
	250, Longwater Avenue.
	Reading, Berks RG2 6GB
	UK
Phone:	+44 208 824 8690
Email:	mshand@cisco.com
	Christian Martin
	Verizon
	1880 Campus Commons Dr
	Reston, VA 20191
	USA
Email:	cmartin@verizon.com

	Brad Neal
	Broadwing Communications
	1835 Kramer Lane - Suite 100
	Austin, TX 78758
	USA
Email:	bneal@broadwing.com

Full Copyright Statement

Intellectual Property