Internet Engineering Task Force
INTERNET DRAFT

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TLV for Experimental Use
<draft-ietf-isis-experimental-tlv-05.txt>

Status of this Memo

1. Abstract

This document defines a TLV that may be used by any individual, company or other organisation for experimental extensions to the IS-IS routing protocol, and defines the format of the TLV.

2. Conventions used in this document

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 RFC 2119.

3. Introduction

IS-IS as defined in [1] has always been an extensible routing protocol. Extensions to IS-IS are encoded as a TLV. Critically [1] has always defined that when an IS-IS router receives an LSP, that it SHALL process the parts of the LSP that it understands, and SHALL flood the entire LSP, including all TLVs whether they are understood or not, on to other routers in the network.

Thus information that is encoded into a TLV and placed in an LSP by a router will be propagated to every other router in an IS-IS level-1 area or level-2 subdomain, even by implementations that were never designed with that particular TLV in mind.

The basic function of an IS-IS TLV is identified by the first byte of the TLV (the code). Thus there are only 256 possible TLV codes. Certain TLVs have been defined to include sub-TLVs so that a single TLV code can be used for multiple functions.

During 2003 an agreement was reached between ISOC/IETF and ISO/IEC JTC1/SC6 on how enhancements to IS-IS would be developed and documented. This agreement is documented in [7]. Before this agreement it was not clear which authorities could or could not assign TLV codes. Also no TLV was defined for experimental purposes. The extensible nature of IS-IS has made the use of TLVs for non-standard purposes so useful that vendors have occasionally simply chosen a number and hoped for the best. The risk is that such a TLV code may then be chosen by another organization at a later time for a different function, thus creating an interoperability problem. Also this accelerates the depletion of the 256 possible TLV codes. [3] lists TLV codes that are known to have been used.

This document specifies a TLV that may be used for experimental purposes, and a mechanism that insures that different implementations using this TLV can exist in the same network without creating interoperability problems.

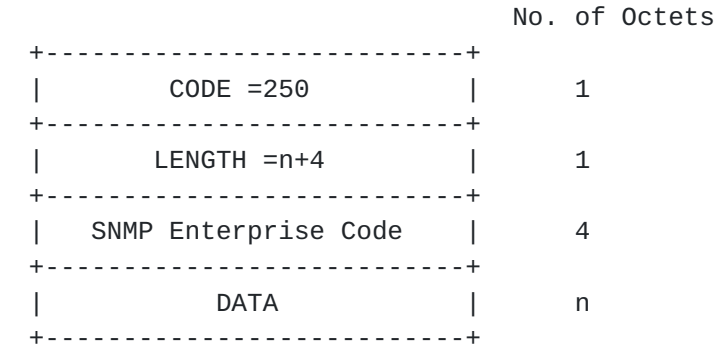
By using this new TLV, companies, individuals or institutions may use extensions to IS-IS without fear of interoperability problems with other organizations in the future, and the available pool of TLV codes will no longer be diminished by experimental use.

4. TLV code for experimental use

The code for this TLV SHALL be 250.

TLVs that use 250 for the code field MUST include a valid IANA assigned SNMP Enterprise Code (EC) as the first four bytes of the value of the TLV.

The structure of the TLV is shown in the diagram below.



Structure of the Experimental TLV

The four octet SNMP EC plus the data octets together constitute a normal IS-IS variable length value field. The length field MUST be set to the number of octets of data plus four.

For more information about SNMP ECs refer to [4].

The Experimental TLV MAY be used in LSPs, IIHs and/or SNPs.

On receipt of an LSP a router MAY ignore TLVs of type 250 that include an SNMP EC from a different organization, but MUST flood the LSP onwards as per [1]. IIHs and SNPs that contain TLVs of type 250 MUST also be handled as per [1].

After the first four bytes of the value field of the TLV subsequent bytes MAY be used freely for any purpose (within the limitations set out in this document) provided that the resultant TLV is conformant with [1].

Many organizations will have access to only one or a few SNMP ECs. Implementers are free to format the value field after their SNMP EC into sub-TLVs so that the TLV may be used for multiple purposes, and would be well advised to do so.

5. Using experimental information to modify SPF

All routers in an IS-IS routed network need to calculate routes such that they all arrive at the same shortest path for a given destination. If this does not happen then routing loops and blackholes are likely to occur.

Therefore a router MUST NOT calculate a route differently due to information that it receives in an experimental TLV. Shortest paths MUST continue to be calculated as per [1] and [2].

6. Correct use of Experimental TLV in LSPs

Some implementations recalculate SPF each time that they receive a new LSP. In the least case an implementation needs to decide whether a new LSP is significant or not. If one router constantly transmits LSPs into the network then others may not perform well.

Additionally LSPs are flooded to every router in a level-1 area or level-2 subdomain, and are therefore not a particularly efficient way of carrying a piece of information simply from router A to router B.

Consequently the experimental TLV SHOULD NOT be used within LSPs as any kind of general transport mechanism, and the experimental TLV SHOULD NOT cause frequent transmission of LSPs into the network.

In general it would be preferable to transmit information in an experimental TLV at such time as an LSP would be normally be transmitted anyway, if this is possible.

These particular restrictions do not apply to use of the experimental TLV in IIHs and SNPs.

7. Authentication of PDUs

If HMAC authentication of IS-IS PDUs that contain an experimental TLV is used then the experimental TLV MUST be included in the HMAC calculation.

8. Documenting an Experimental TLV

Without an understanding of what an experimental TLV has been used for an operator is not able to make an informed decision as to whether or not to deploy it in their network.

Implementors SHOULD document the use of an Experimental TLV in an experimental status RFC. Experimental RFCs MAY be submitted directly to the RFC editor and do not necessarily need to discussed by the workgroup. Details may be found in section 4.2.3 of RFC 2026 [6].

If such documentation is not available then an operator SHOULD consider the interoperability and security of an implementation to be unknown.

9. Security Considerations

The contents of IS-IS PDUs are not protected by encryption, so the contents of TLVs in LSPs are visible throughout the routing area or domain, while the contents of Hello Packets, CSNPs, and PSNPs are visible to observers on the link they are sent to. The addition of MD5 authentication, as described in [5] can increase the integrity of TLVs, while encryption could increase their confidentiality.

The general extensibility of the TLV mechanism has always allowed the addition of new information, and the possibility of conflicting interpretations of such information by different implementations. This proposal does not introduce a new quality of information; it simply allows an increase in the quantity of such additions. As such, it represents no new security issues for IS-IS.

10. IANA Considerations

[3] currently lists TLV 250 as refering to an IETF draft. At such time that this document becomes an RFC then the entry for TLV 250 in [3] will need to refer to the RFC number of this document.

11. References

11.1 Normative References

[1] ISO, "Intermediate system to Intermediate system routeing information exchange protocol for use in conjunction with the Protocol for providing the Connectionless-mode Network Service (ISO 8473)", ISO/IEC 10589:1992.

[2] RFC 1195, Use of OSI IS-IS for Routing in TCP/IP and Dual Environments, R Callon, December 1990

[3] IS-IS TLV Codepoints per [RFC3563]
IANA, http://www.iana.org/assignments/isis-tlv-codepoints

[4] Private Enterprise Numbers
IANA, http://www.iana.org/assignments/enterprise-numbers

11.2 Informational References

[5] RFC 3567, Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
Tony Li, RJ Atkinson, July 2003

[6] RFC 2026, The Internet Standards Process -- Revision 3
Scott O. Bradner, October 1996

[7] RFC 3563, Cooperative Agreement Between the ISOC/IETF and ISO/IEC Joint Technical Committee 1/Sub Committee 6 (JTC1/SC6) on IS-IS Routing Protocol Development, A. Zinin, July 2003

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