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Extensions to IS-IS and OSPF for Advertising Optional Router Capabilities

draft-raggarwa-igp-cap-00.txt

1. Status of this Memo

2. Abstract

It is useful for routers in a IGP domain to know of the capabilities of their IGP neighbors and/or other routers in the domain. This draft proposes extensions to IS-IS and OSPF for advertising optional router capabilities. We define an optional Router Capability TLV for IS-IS, while for OSPF we define an optional Router Capability Opaque LSA.

3. Motivation

It is useful for routers in a IGP domain to know of the capabilities of their IGP neighbors and/or other routers in the domain. A domain refers to the IGP link state packet flooding domain. Hence for OSPF a domain implies the same area, while for IS-IS it implies the same level. It gives operators a domain wide view of IGP capabilities on different routers in the network. This can be fairly useful for network management and troubleshooting. Here IGP domain refers to the IGP link state packet flooding domain,

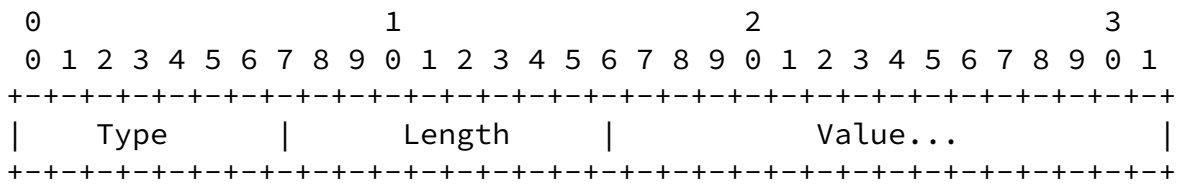
The presence of a capability on a given router implies that the software version supports the capability and the router is configured to support it. On the other hand the absence of an expected capability on a particular router can imply either mis-configuration or an incorrect software version. Hence this capability information can be used to track problems resulting from mis-configuration or an incorrect software version.

There is no existing mechanism in IS-IS to advertise optional router capabilities. On the other hand OSPF uses the options field in the hello packet to advertise optional router capabilities [2]. However this attribute is not extensible for advertising optional capabilities such as hitless graceful restart. We propose extensions to IS-IS and OSPF for advertising these optional capabilities. For current IS-IS and OSPF capabilities this advertisement will be used primarily for informational purposes. Conceivably, future IS-IS and OSPF capability advertisements could be used for other purposes.

4. IS-IS Router Capability TLV

IS-IS routers will optionally advertise their optional capabilities in an IS-IS Router Capability TLV of type 242. This optional TLV is included in the IS-IS LSP packet [6]. It SHOULD reside in fragment zero of the LSPs of each level. If a router does not advertise this TLV in any of its LSP packets, it does not imply that the router does not support one or more of the defined capabilities. If this TLV is included in a LSP, the router SHOULD set all the defined bits corresponding to the capabilities which the software supports, unless they are explicitly configured off.

The following figure depicts the format of the IS-IS Router Capability TLV.



Type A 8 bit field set to 242.
Length A 8 bit field that indicates the length of the Value portion in bytes. Its set to N x 4 octets. N starts from 1 and can be increased when there is a need. Each 4 octets are referred to as a capability flag.
Value This comprises one or more capability flags. For each 4 octets, the bits are indexed from the most significant to the least significant, where each bit represents one router capability. When the first 32 capabilities are defined, a new capability flag will be used to accommodate the next capability.

4.1 Reserved IS-IS Router Capability Bits

We have assigned some pre-determined bits to the first capability flag.

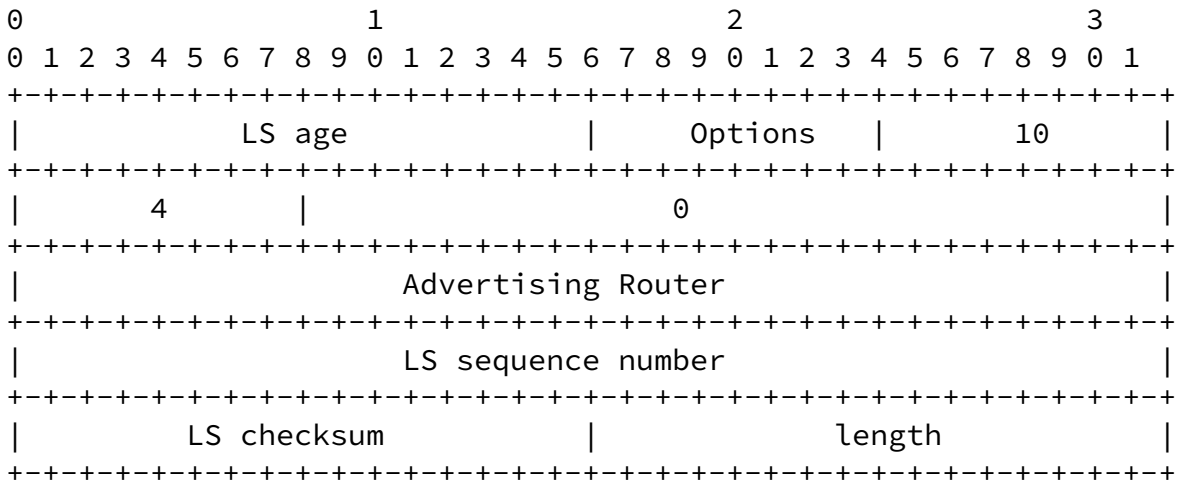
Bit	Capabilities
0-3	Reserved
4	IS-IS hitless graceful restart capable [9]
5	IS-IS and BGP blackhole avoidance capable [11]
6	IS-IS wide metric processing capable [8]
7	IS-IS hmac-md5 authentication capable [10]
8	IS-IS Traffic Engineering support [8]

9	IS-IS point-to-point over LAN [12]
10-31	For future assignments

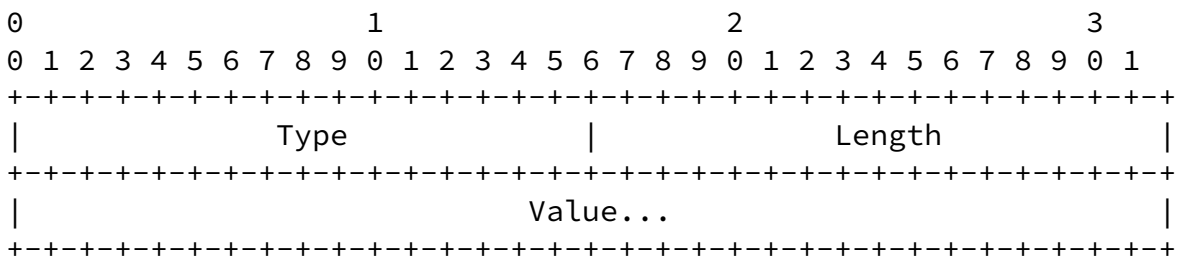
5. OSPF Router Information LSA

OSPF routers will optionally advertise their optional capabilities in an area-scoped Opaque-LSA [1]. If a router does not advertise this LSA, it does not imply that the router does not support one or more of the defined capabilities. For current OSPF capabilities, the advertisement will be used solely for information purposes. Conceivably, future OSPF capabilities could require other capability LSA advertisement. The LSA is area-scoped to be consistent with the scope of the OSPF router LSA [2]. The Router Information LSA will be originated at startup and re-originated when router capabilities change or when periodically refreshed.

The Router Information LSA will have an Opaque type of 4 and Opaque ID of 0.



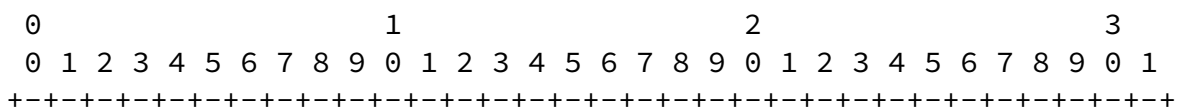
The format of the TLVs within the body of a Router Information LSA is the same as the TLV format used by the Traffic Engineering Extensions to OSPF [3]. The TLV header consists of a 16-bit Type field and a 16-bit length field, and is followed by zero or more bytes of value. The length field indicates the length of the value portion in bytes. The value portion is padded to four-octet alignment, but the padding is not included in the length field. For example, a one byte value would have the length field set to 1, and three bytes of padding would be added to the end of the value portion of the TLV.

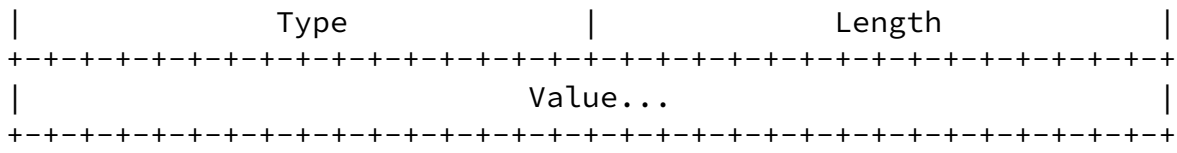


5.1 OSPF Router Capability TLV

Initially, only a single TLV may appear in the body of a Router Information LSA. This is the Router Capability TLV. It MUST be included. A router advertising an optional Router Information LSA SHOULD set defined its corresponding to the supported optional capabilities, unless they are explicitly configured off, in the Router Capability TLV.

The format of the Router Capability TLV is as follows :





Type	A 16 bit field set to 1.
Length	A 16 bit field that indicates the length of the Value portion in bytes. Its set to N x 4 octets. N starts from 1 and can be increased when there is a need. Each 4 octets are referred to as a capability flag.
Value	This comprises one or more capability flags. For each 4 octets, the bits are indexed from the most significant to the least significant, where each bit represents one router capability. When the first 32 capabilities are defined, a new capability flag will be used to accommodate the next capability.

5.2 Reserved OSPF Router Capability Bits

We have assigned some pre-determined bits to the first capability flag.

Bit	Capabilities
0-3	Reserved
4	Hitless graceful restart capable [4]
5	OSPF hitless graceful restart helper [4]
6	Stub Router support [5]
7	Traffic Engineering support [3]
8	OSPF point-to-point over LAN [12]
8-31	Future assignments

6. Security Consideration

This document does not introduce new security issues. The security considerations pertaining to the original IS-IS and OSPF protocols remain relevant.

7. Acknowledgments

The idea for this work grew out of a conversation with Andrew Partan and we would like to thank him for his contribution.

8. References

[1] Coltun, R., "The OSPF Opaque LSA Option", RFC 2370, July 1998.

[2] Moy, J., "OSPF Version 2", RFC 2328, April 1998.

[3] Katz, D., D. Yeung and K. Kompella, "Traffic Engineering Extensions to OSPF", Internet Draft, work in progress.

[4] Moy, J., "OSPF Hitless OSPF Restart", Internet Draft, work in progress.

[5] Retana, A., et al, "OSPF Stub Router Advertisement", RFC 3137, June 2001.

[6] Callon, R., "OSI IS-IS for IP and Dual Environment," RFC 1195, December 1990.

[7] 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.

[8] Li, T. et al, "IS-IS Extensions for Traffic Engineering", Internet Draft, work in Progress.

[9] Shand, M., "Restart Signaling for IS-IS", Internet Draft, work in Progress.

[10] Li, T., "IS-IS Cryptographic Authentication", Internet Draft, work in progress.

[11] McPherson, D., "IS-IS Transient Blackhole Avoidance", Internet Draft, work in progress.

[12] N. Shen, et al, "Point-to-point operation over LAN in link-state-routing protocols", Internet Draft, work in progress.

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