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Extensions to OSPF for Advertising Optional Router Capabilities

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Status of this Memo

Abstract

It is useful for routers in an OSPF routing domain to know the capabilities of their neighbors and other routers in the OSPF routing domain. This draft proposes extensions to OSPF for advertising optional router capabilities. A new Router Information opaque LSA is proposed for this purpose.

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].

1. Motivation

It is useful for routers in an OSPF routing domain to know the capabilities of their neighbors and other routers in the OSPF routing domain. This can be useful for various applications:

- In MPLS Traffic Engineering (TE), it can be used as a discovery mechanism [7, 8] to announce a LSR's TE capabilities like Path Computation Server capability (Capability of a LSR to be a Path Computation Server for TE LSP path computation) or the intention of a LSR to be part of a particular MPLS TE mesh group.

- For network management and troubleshooting. It gives operators a network wide view of OSPF capabilities on different routers. 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 misconfiguration or an incorrect software version. Hence, this capability information can be used to track problems resulting from misconfiguration or an incorrect software version.

OSPF uses the options field in the hello packet to advertise optional router capabilities [1]. However, all the bits in this field have been allocated and there is no way to advertise new optional or MPLS TE capabilities. This document proposes extensions to OSPF to advertise these optional capabilities. For existing OSPF capabilities, this advertisement will be used primarily for informational purposes. For MPLS TE features, it is used for advertisement and discovery. Future OSPF features could also use this mechanism for advertisement and discovery.

2. OSPF Router Information LSA

OSPF routers will optionally advertise their optional capabilities in an area-scoped, local scope, or AS-scoped Opaque-LSA [2]. 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 existing OSPF capabilities, this advertisement will be used primarily for informational purposes. For MPLS TE features, it is used for advertisement and discovery. Future OSPF features could also use this mechanism for advertisement and discovery. For current OSPF capabilities, the advertisement will be used for The Router Information opaque LSA will be originated at startup and reoriginated when router capabilities change or when the LSA is periodically refreshed.

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

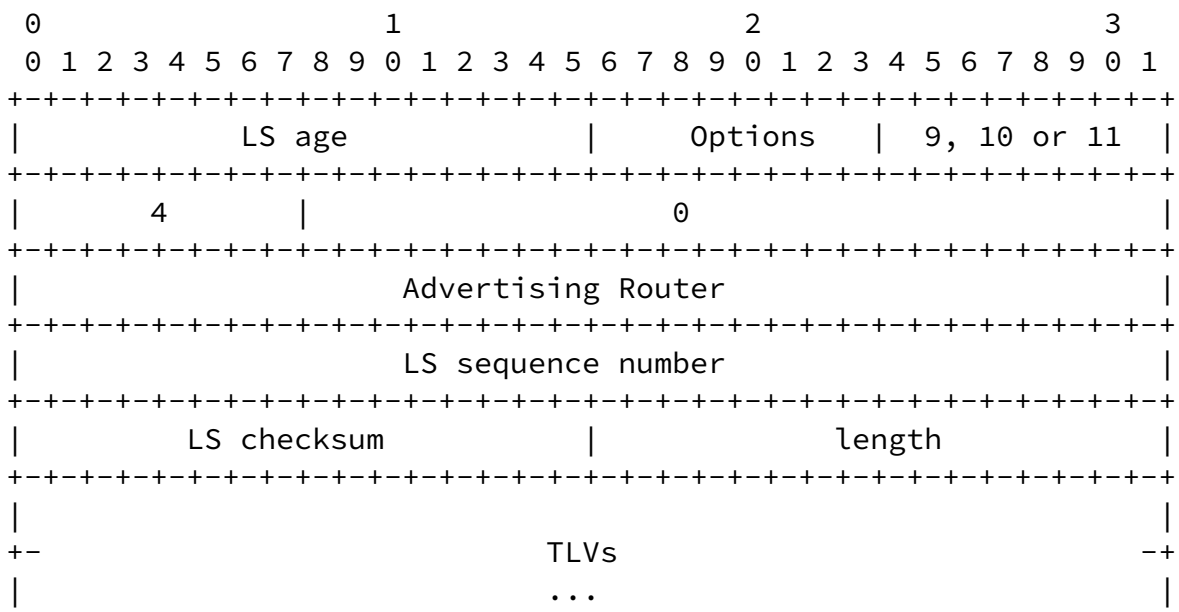

Figure 2. OSPF Router Information LSA

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.

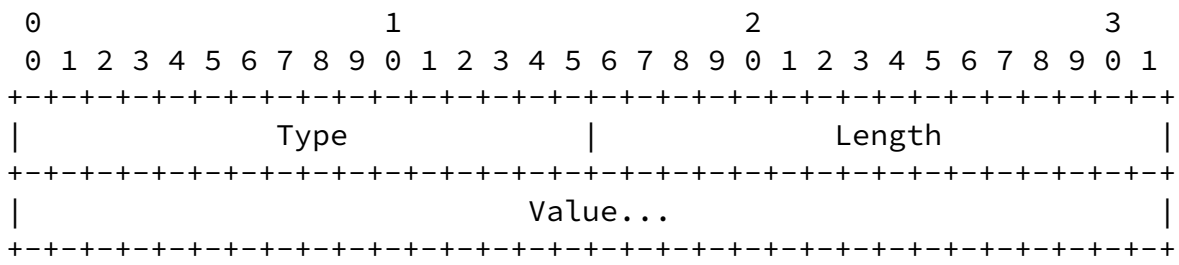

Figure 3. OSPF TLV Format

2.1 OSPF Router Capability TLV

The first TLV in the body of a Router Information LSA is the Router Capability TLV. It MUST be included. A router advertising an optional Router Information LSA SHOULD set 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 :

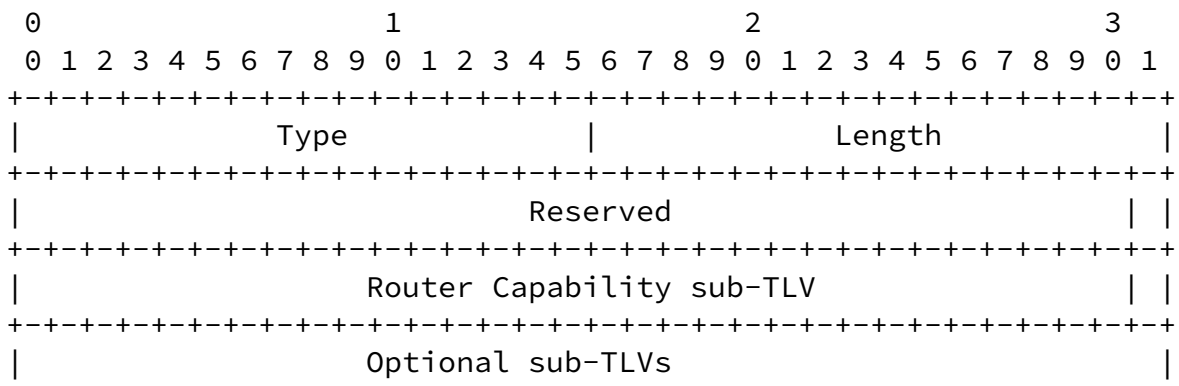

Figure 4. OSPF Router Capability TLV

Type A 16 bit field set to 1.
Length A 16 bit field that indicates the length of the TLV, other than the Type and the Length fields in bytes.

The first four bytes of the TLV are reserved. This is followed by a Router Capability sub-TLV that MUST be included. The format of the Router Capability sub-TLV is as follows :

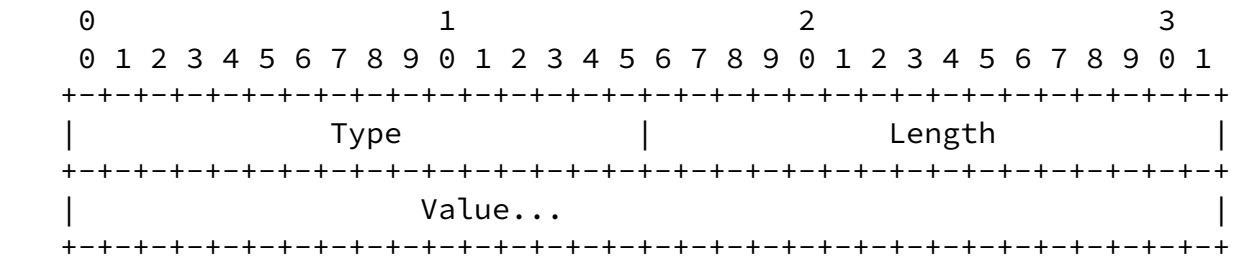

Figure 5. OSPF Router Capability Sub-TLV

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.

The Router Capability sub-TLV MAY be followed by optional sub-TLVs. In some cases it may be desirable to advertise additional information for a particular capability. This can be done by including other sub-TLVs.

2.2 Reserved OSPF Router Capability Bits

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

Bit	Capabilities
0-3	Reserved
4	OSPF graceful restart capable [5]

5	OSPF graceful restart helper [5]
6	Stub Router support [6]
7	Traffic Engineering support [4]
8	OSPF point-to-point over LAN [9]
9	OSPF Path Computation Server discovery [7, 8]
10-31	Future assignments

2.3 Flooding Scope of the Router Information LSA

The flooding scope of the Router Information opaque LSA is determined by the LSA type. A type 10 (area-scoped) opaque LSA or a type 11 (AS-scoped) LSA may be used. The choice of flooding scope is made by the advertising router and is a matter of local policy. A Router Information LSA must be announced using only one flooding scope.

3. Security Consideration

This memo does not create any new security issues for the OSPF protocol. Security considerations for the base OSPF protocol are covered in [1].

4. Acknowledgments

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

5. IANA Considerations

A new opaque LSA type will need to be assigned by IANA. Additionally, IANA will need to have registries for the Router Information opaque LSA TLVs. The TLV assignee will be responsible for allocation of any sub-TLVs for the IANA assigned TLV. All TLVs and sub-TLVs will

be subject to OSPF WG review.

6. References

Normative References

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

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

[3] Bradner, S., "Key words for use in RFCs to Indicate Requirement Level", BCP 14, RFC 2119, March 1997.

Informative References

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

[5] Moy, J., "OSPF Graceful OSPF Restart", Internet Draft, work in progress.

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

[7] Vasseur, Psenak, "Traffic Engineering Capability TLV for OSPF", Internet Draft, work in progress.

[8] Vasseur et al, "RSVP Path computation request and reply messages", draft-vasseur-mpls-computation-rsvp-te-03.txt, work in progress

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

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