

Network Working Group  
Internet Draft  
Expiration Date: December 2003

Acee Lindem (Redback Networks)  
Naiming Shen (Redback Networks)  
Rahul Aggarwal (Juniper Networks)  
Scott Shaffer (Genuity, Inc.)  
JP Vasseur (Cisco Systems, Inc)

## Extensions to OSPF for Advertising Optional Router Capabilities

[draft-lindem-ospf-cap-01.txt](#)

### Status of this Memo

This document is an Internet-Draft and is in full conformance with all provisions of [Section 10 of RFC2026](#), except that the right to produce derivative works is not granted.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as ``work in progress.''

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/lid-abstracts.txt>

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>.

### 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 (RI) 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:

- o 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 an LSR to be a Path Computation Server for TE LSP path computation) or the intention of an LSR to be part of a particular MPLS TE mesh group.
- o 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 (RI) Opaque 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. The RI opaque LSA will be originated when one of the advertised capabilities is configured or changed.

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

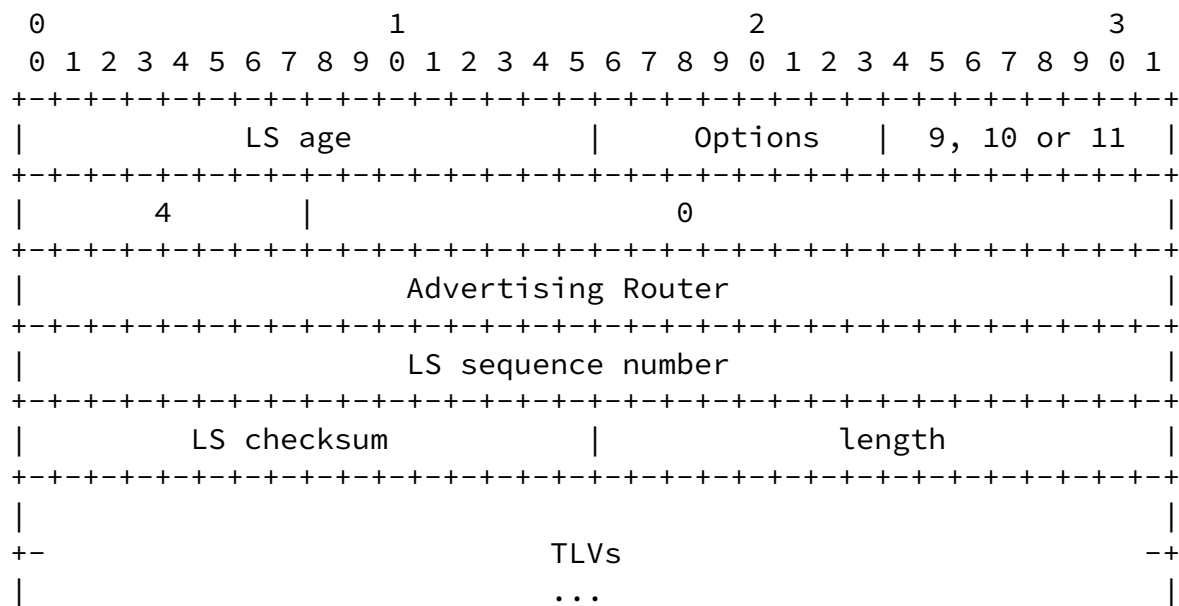


Figure 2. OSPF Router Information LSA

The format of the TLVs within the body of a router information LSA is the same as the format used by the Traffic Engineering Extensions to OSPF [4]. The LSA payload consists of one or more nested Type/Length/Value (TLV) triplets. The format of each TLV is:

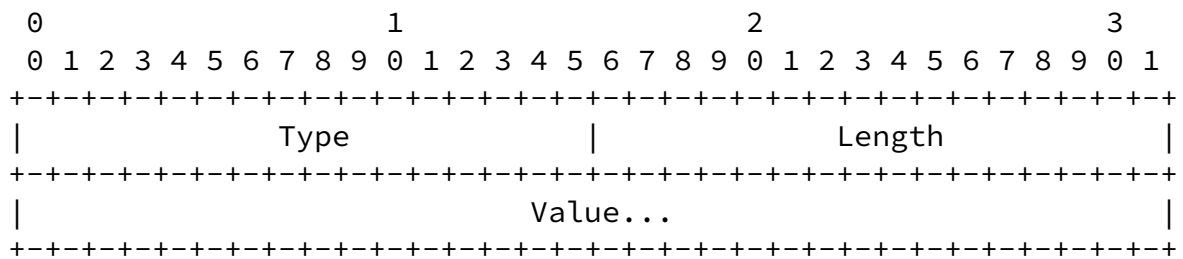


Figure 3. TLV Format

The Length field defines the length of the value portion in octets (thus a TLV with no value portion would have a length of zero). The TLV is padded to four-octet alignment; padding is not included in the length field (so a three octet value would have a length of three, but the total size of the TLV would be eight octets). Nested TLVs are also 32-bit aligned. 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. Unrecognized types are ignored.

## 2.1 OSPF Router Capabilities TLV

The first defined TLV in the body of a RI opaque LSA is the Router Capabilities TLV. A router advertising a RI opaque LSA SHOULD include the Router Capabilities TLV and SHOULD correctly identify the status of the capabilities defined in [section 2.2](#).

The format of the Router Capabilities TLV is as follows:

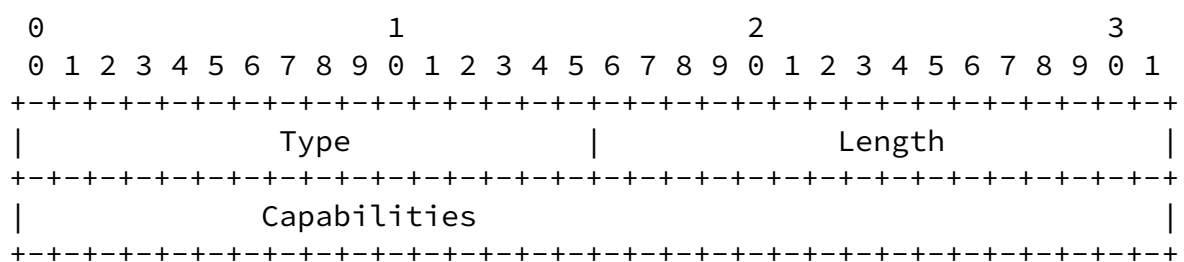


Figure 4. OSPF Router Capabilities TLV

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 Capabilities TLV MAY be followed by optional TLVs that further specify a capability.

## [2.2](#) Reserved OSPF Router Capability Bits

The following bits in the first capability flag have been assigned:

Bit	Capabilities
0-3	Reserved
4	OSPF graceful restart capable <a href="#">[5]</a>
5	OSPF graceful restart helper <a href="#">[5]</a>
6	Stub Router support <a href="#">[6]</a>
7	Traffic Engineering support <a href="#">[4]</a>
8	OSPF point-to-point over LAN <a href="#">[9]</a>
9	OSPF Path Computation Server discovery <a href="#">[7, 8]</a>
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 9 (link-scope), type 10 (area-scoped), or a type 11 (AS-scoped) opaque LSA may be used. If a type 11 opaque LSA is chosen, the originating router should also advertise type 10 LSA(s) into any attached NSSA/stub area(s). The choice of flooding scope is made by the advertising router and is a matter of local policy. The originating router MAY advertise multiple Router Information LSAs as long as the flooding scope differs. TLV flooding

scope rules will be specified on a per-TLV basis.

### [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. The authors would like to thanks Peter Psenak for his review and helpful comments early versions of the draft.

[draft-lindem-ospf-cap-01.txt](#)

[Page 6]

---

Internet Draft      [draft-lindem-ospf-cap-01.txt](#)

June 2003

### [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.

[draft-lindem-ospf-cap-01.txt](#)

[Page 7]

---

Internet Draft      [draft-lindem-ospf-cap-01.txt](#)

June 2003

## [9.](#) Author Information

Acee Lindem  
Redback Networks  
[350](#) Holger Way  
San Jose, CA 95134  
e-mail: [acee@redback.com](mailto:acee@redback.com)

Naiming Shen  
Redback Networks  
[350](#) Holger Way  
San Jose, CA 95134  
e-mail: [naiming@redback.com](mailto:naiming@redback.com)

Rahul Aggarwal  
Juniper Networks  
[1194](#) N. Mathilda Ave.  
Sunnyvale, CA 94089 USA  
e-mail: [rahul@juniper.net](mailto:rahul@juniper.net)

Scott Shaffer  
Genuity, Inc.  
[3](#) Van de Graaff Drive  
PO Box 3073  
Burlington, MA 01803  
e-mail: [sshaffer@genuity.com](mailto:sshaffer@genuity.com)

JP Vasseur

Cisco Systems, Inc.  
[300](#) Apollo Drive  
Chelmsford, MA 01824  
e-mail: [jpv@cisco.com](mailto:jpv@cisco.com)

[draft-lindem-ospf-cap-01.txt](#)

[Page 8]