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A. Retana  
Hewlett-Packard Co.  
L. Nguyen  
A. Zinin  
Cisco Systems, Inc.  
R. White  
D. McPherson  
Verisign, Inc.  
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OSPF Stub Router Advertisement  
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## Abstract

This document describes a backward-compatible technique that may be used by OSPF (Open Shortest Path First) implementations to advertise unavailability to forward transit traffic or to lower the preference level for the paths through such a router.

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## Table of Contents

<a href="#">1.</a>	Motivation . . . . .	<a href="#">3</a>
<a href="#">2.</a>	Requirements Language . . . . .	<a href="#">3</a>
<a href="#">3.</a>	Solutions . . . . .	<a href="#">3</a>
<a href="#">3.1.</a>	OSPFv3-only Solution . . . . .	<a href="#">4</a>
<a href="#">4.</a>	Maximum Link Metric . . . . .	<a href="#">4</a>
<a href="#">5.</a>	Deployment Considerations . . . . .	<a href="#">4</a>
<a href="#">6.</a>	Security Considerations . . . . .	<a href="#">5</a>
<a href="#">7.</a>	Acknowledgements . . . . .	<a href="#">5</a>
<a href="#">8.</a>	References . . . . .	<a href="#">5</a>
<a href="#">8.1.</a>	Normative References . . . . .	<a href="#">5</a>
<a href="#">8.2.</a>	Informative References . . . . .	<a href="#">5</a>
<a href="#">Appendix A.</a>	Change Log . . . . .	<a href="#">6</a>
<a href="#">A.1.</a>	Changes between the -00 and -01 versions. . . . .	<a href="#">6</a>
<a href="#">A.2.</a>	Changes between the -01 and -02 versions. . . . .	<a href="#">6</a>
	Authors' Addresses . . . . .	<a href="#">6</a>

## 1. Motivation

In some situations, it may be advantageous to inform routers in a network not to use a specific router as a transit point, but still route to it. Possible situations include the following:

- o The router is in a critical condition (for example, has very high CPU load or does not have enough memory to store all LSAs or build the routing table).
- o Graceful introduction and removal of the router to/from the network.
- o Other (administrative or traffic engineering) reasons.

Note that the solution introduced in this document does not remove the router from the topology view of the network (as could be done by just flushing that router's router-LSA), but discourages other routers from using it for transit routing, while still routing packets to the router's own IP addresses, i.e., the router is announced as a stub.

It must be emphasized that the solution provides real benefits in networks designed with at least some level of redundancy so that traffic can be routed around the stub router. Otherwise, traffic destined for the networks reachable through such a stub router may still be routed through it.

## 2. Requirements Language

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 [[RFC2119](#)].

### [3.](#) Solutions

The solution introduced in this document solves two challenges associated with the outlined problem. In the description below, router X is the router announcing itself as a stub.

- 1) Making other routers prefer routes around router X while performing the Dijkstra calculation.

- 2) Allowing other routers to reach IP prefixes directly connected to router X.

Note that it would be easy to address issue 1) alone by just flushing router X's router-LSA from the domain. However, it does not solve problem 2), since other routers will not be able to use links to router X in Dijkstra (no back link), and because router X will not have links to its neighbors.

To address both problems, router X announces its router-LSA to the neighbors with the costs of all non-stub links (links of the types other than 3) set to MaxLinkMetric.

The solution above applies to both OSPFv2 [[RFC2328](#)] and OSPFv3 [[RFC5340](#)].

#### [3.1.](#) OSPFv3-only Solution

OSPFv3 [[RFC5340](#)] introduced additional options to provide similar, if not better, control of the forwarding topology; the R-bit provides a more granular indication of whether a router is active and should be used for transit traffic.

It is left to network operators to decide which technique to use in their network.

### [4.](#) Maximum Link Metric

[Section 3](#) refers to the cost of all non-stub links as MaxLinkMetric, which is a new fixed architectural value introduced in this document.

#### MaxLinkMetric

The metric value indicating that the link described by an LSA should not be used as transit. Used in router-LSAs (see [Section 3](#)). It is defined to be the 16-bit binary value of all ones: 0xffff.

## 5. Deployment Considerations

When using MaxLinkMetric, some inconsistency may be seen if the network is constructed of routers that perform intra-area Dijkstra calculation as specified in [[RFC1247](#)] (discarding link records in router-LSAs that have a MaxLinkMetric cost value) and routers that perform it as specified in [[RFC1583](#)] and higher (do not treat links with MaxLinkMetric cost as unreachable). Note that this inconsistency will not lead to routing loops, because if there are

Retana, et al.

Expires January 17, 2013

[Page 4]

---

Internet-Draft

OSPF Stub Router Advertisement

July 2012

some alternate paths in the network, both types of routers will agree on using them rather than the path through the stub router. If the path through the stub router is the only one, the routers of the first type will not use the stub router for transit (which is the desired behavior), while the routers of the second type will still use this path.

On the other hand, clearing the R-bit will consistently result in the router not being used as transit.

## 6. Security Considerations

The technique described in this document does not introduce any new security issues into the OSPF protocol.

## 7. Acknowledgements

The authors of this document do not make any claims on the originality of the ideas described. Among other people, we would like to acknowledge Henk Smit for being part of one of the initial

discussions around this topic.

We would also like to thank Shishio Tsuchiya, Gunter Van de Velde, Tomohiro Yamagata, Faraz Shamim and Acee Lindem who provided significant input for the latest version of this document.

## [8.](#) References

### [8.1.](#) Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

### [8.2.](#) Informative References

[RFC1247] Moy, J., "OSPF Version 2", [RFC 1247](#), July 1991.

[RFC1583] Moy, J., "OSPF Version 2", [RFC 1583](#), March 1994.

[RFC2328] Moy, J., "OSPF Version 2", STD 54, [RFC 2328](#), April 1998.

[RFC5340] Coltun, R., Ferguson, D., Moy, J., and A. Lindem, "OSPF for IPv6", [RFC 5340](#), July 2008.

## [Appendix A.](#) Change Log

### [A.1.](#) Changes between the -00 and -01 versions.

- o Defined a new architectural constant (MaxLinkMetric) to eliminate any confusion about the interpretation of LSInfinity.
- o Added a section to reference the R-bit and V6-bit in OSPFv3.
- o Updated acks and contact information.

### [A.2.](#) Changes between the -01 and -02 versions.

- o Took out references to not having a standard solution and incorporated the R-bit solution as part of the (renamed)

"Solutions" section.

- o Various minor edits and reordered sections.

#### Authors' Addresses

Alvaro Retana  
Hewlett-Packard Co.  
2610 Wycliff Road  
Raleigh, NC 27607  
USA

Email: [alvaro.retana@hp.com](mailto:alvaro.retana@hp.com)

Liem Nguyen  
Cisco Systems, Inc.  
3750 Cisco Way  
San Jose, CA 95134  
USA

Email: [lhnguyen@cisco.com](mailto:lhnguyen@cisco.com)

Alex Zinin  
Cisco Systems, Inc.  
Capital Tower, 168 Robinson Rd.  
Singapore, Singapore 068912  
Singapore

Email: [azinin@cisco.com](mailto:azinin@cisco.com)

Retana, et al.

Expires January 17, 2013

[Page 6]

---

Internet-Draft

OSPF Stub Router Advertisement

July 2012

Russ White  
Verisign, Inc.  
12061 Bluemont Way  
Reston, VA 20190  
USA

Email: [riwhite@verisign.com](mailto:riwhite@verisign.com)

Danny McPherson  
Verisign, Inc.  
21345 Ridgetop Circle  
Dulles, VA 20166  
USA

Email: [dmcpherson@verisign.com](mailto:dmcpherson@verisign.com)