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OSPF Stub Router Advertisement
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Abstract

This memo 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. In some cases, it is desirable not to route transit traffic via a specific OSPF router. However, OSPF does not specify a standard way to accomplish this.

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Table of Contents

1.	Motivation	3
2.	Requirements Language	3
3.	Proposed Solution	3
4.	Deployment Considerations	4
4.1.	Other Solutions	4
5.	Maximum Link Metric	4
6.	Security Considerations	5
7.	Acknowledgements	5
8.	References	5
8.1.	Normative References	5
8.2.	Informative References	5
Appendix A.	Changes between the -00 and -01 versions.	5
	Authors' Addresses	6

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 proposed solution 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 prevents 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 proposed 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 will be still 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. Proposed Solution

The solution described 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](#)].

4. 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 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.

[4.1.](#) Other Solutions

This document describes a technique that has been implemented and deployed in a wide variety of networks. OSPFv3 [[RFC5340](#)] introduced additional options to provide similar, if not better, control of the forwarding topology; the R-bit and the V6-bit provide a more granular indication of whether a router is active and/or whether it should be used specifically for IPv6 traffic, respectively.

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

[5.](#) 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.

Retana, et al.

Expires December 31, 2012

[Page 4]

Internet-Draft

OSPF Stub Router Advertisement

June 2012

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.

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

Retana, et al.

Expires December 31, 2012

[Page 5]

Internet-Draft

OSPF Stub Router Advertisement

June 2012

- 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.

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Retana, et al.

Expires December 31, 2012

[Page 6]

Internet-Draft

OSPF Stub Router Advertisement

June 2012

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