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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.

Status of this Memo

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Table of Contents

1. Introduction

   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. 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].

2.1. 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.

3. Maximum Link Metric

Section 2 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 2). It is defined to be the 16-bit binary value of all
   ones: 0xffff.

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.

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

[5](#). Security Considerations

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

[6](#). IANA Considerations

This document has no actions for IANA.

[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](#). 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.

A.3. **Changes between the -02 and -03 versions.**

   o Updated contact information.

   o Renamed the 'Motivation' section to 'Introduction' becuase of an
      error in idnits.

   o Took out the rfc2119 references as none of the keywords are used
      in the text.

   o Added an 'IANA Considerations' section to indicate that there are
      no actions required.

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