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LSA Flushing Problem Mitigation in OSPF Networks
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Abstract

In OSPF protocol, LSAs with the LS age at MaxAge are not used in routing table calculation and MUST be flushed in the network. In some cases, the flushing of OSPF MaxAge LSAs may cause flooding storm of OSPF packets and severely impact network stability and the services provided by the network. This document specifies a backward compatible mechanism to mitigate the impact of MaxAge LSA flushing in OSPF networks.

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 [RFC 2119](#) [[RFC2119](#)].

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[1.](#) Introduction

In OSPF protocol [[RFC2328](#)], Link State Updates (LSAs) are exchanged in Link State Update (LSU) packets to achieve link-state database (LSDB) synchronization and consistent route calculation. LSAs with the LS age at MaxAge are not used in routing table calculation and MUST be flushed in the network. In some cases, the flushing of MaxAge LSAs can cause flooding storm of OSPF packets and severely impact network stability and the services provided by the network. [[I-D.dong-ospf-maxage-flush-problem-statement](#)] analyzes the problem of MaxAge LSA flushing, and gives the requirements on potential solutions.

This document proposes a backward compatible mechanism to mitigate the impacts of MaxAge LSA flushing in OSPF networks.

2. Proposed Solution

In normal cases, the flushing of router-LSA indicates that the originator of the LSA is no longer reachable in the network and is unable to refresh the LSA. The flushing of other types of LSAs indicate the routing information carried in the LSAs is no longer applicable. Since usually the removal of a node is a significant change to the network and can also be informed by the update of LSAs of its adjacent routers, the flushing of router-LSA MUST be processed carefully to avoid unnecessary routing churns caused by improper LSA flushing.

The proposed solution aims to distinguish persistent LSA flushing from normal LSA flushing, so that the impact of persistent flushing can be alleviated without slowing down normal route convergence. Specifically, the flushing of router-LSA and the subsequent flushing of LSAs belonging to the same originator are further examined. During the examination time, the old instance of the LSAs and the MaxAge LSAs are kept in LSDB and the route recalculation is postponed.

Two types of timers are used in this solution:

- o T1: the examination time of the suspicious persistent LSA flushing of a particular router. When a MaxAge router-LSA of a particular router is received, timer T1 fires and the originator of the router-LSA is marked as in Restrain state. The value of timer T1 is configurable, and the RECOMMENDED value is 1800 seconds.
- o T2: the examination time of a received MaxAge LSA, the originator of which is currently in Restrain state. When a Maxage LSA is received and the originator of the LSA is in Restrain state, timer T2 fires and the old instance of the LSA is still in use, which means the Maxage LSA does not trigger route recalculation. The value of timer T2 is configurable, and the RECOMMENDED value is 10 seconds.

The detailed procedures are described as follows :

- a. When a MaxAge router-LSA is received,
 - o If the originator of the LSA is not in Restrain state, mark the originator of the LSA as in Restrain state, timer T1 is started for that router, and timer T2 is started for the router-LSA. The MaxAge LSA is flushed further in the newtork, while the old instance of the LSA is still in use in route calculation until T2 expires.

- o If the originator of the LSA is already in Restrained state, then T1 is restarted for that router. If timer T2 does not exist for this LSA, timer T2 is started for the LSA.
- b. When a MaxAge LSA with LSA-type other than router LSA is received,
 - o If the originator of the LSA is in Restrained state, timer T2 is started for the LSA. The MaxAge LSA is flushed further in the network, while the old instance of the LSA is in use in route calculation.
 - o If the originator of the LSA is not in Restrained state, the processing is according to [[RFC2328](#)].
- c. When a newer LSA instance originated by a router in Restrained state is received,
 - o If timer T2 for this LSA exists, the newer instance replaces the old LSA instance in link-state database and triggers route recalculation, timer T2 for this LSA is stopped.
 - o If timer T2 for this LSA does not exist, the processing is according to [[RFC2328](#)].
- d. When timer T2 for a particular LSA expires, the MaxAge LSA triggers route recalculation and is removed from link-state database.
- e. When timer T1 for a particular router expires, the router is marked as in normal state.

3. Deployment Considerations

While it is RECOMMENDED that the proposed mechanism deployed on all the routers in the same OSPF network, this mechanism can also be deployed into the network incrementally.

4. IANA Considerations

This document makes no request of IANA.

Note to RFC Editor: this section may be removed on publication as an RFC.

5. Security Considerations

TBD

6. Acknowledgements

TBD

7. References

7.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.
- [RFC2328] Moy, J., "OSPF Version 2", STD 54, [RFC 2328](#), DOI 10.17487/RFC2328, April 1998, <<http://www.rfc-editor.org/info/rfc2328>>.

7.2. Informative References

- [I-D.dong-ospf-maxage-flush-problem-statement]
Dong, J., Zhang, X., and Z. Li, "OSPF Corrupted MaxAge LSA Flushing Problem Statement", [draft-dong-ospf-maxage-flush-problem-statement-00](#) (work in progress), March 2016.

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