OSPF MaxAge LSA Flushing
Problem Statement and Mitigation
Solution

draft-dong-ospf-maxage-flush-problem-statement-01
draft-dong-ospf-flush-mitigation-00

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Motivation

• Typical cases of OSPF MaxAge LSA flushing
  – LSA naturally reaches MaxAge
    • Originator of the LSA is not reachable
  – Premature Aging
    • Sequence number wrapping
    • DR changes to non-DR
    • Withdrawal of routes

• Experience of improper MaxAge LSA flushing
  – All LSAs are flushed by some misbehaved router
  – Continuous MaxAge flushing has severe impact to the network and services
Consequence of LSA Flushing

- MaxAge LSA flushing can be initiated by any router
  - This is allowed by OSPF
- MaxAge LSA is flooded in the routing domain/area, replaces the old LSA instance on each router and triggers route calculation and installation
- Originator of LSA advertises a new LSA instance with (Seq# +1)
- Continuous LSA flushing brings a lot of pain to the network
  - Overhead of flooding, route calculation & installation
  - All protocols relying on IGP would flap
  - All services are interrupted
Requirements on Solutions

- Solution for impact mitigation
  - Alleviate the impact of the problem before the root cause can be identified
  - Improve the robustness of OSPF
  - Should not slow down normal route convergence
  - Incremental deployment is needed

- Solution for problem localization
  - Need to identify the misbehaved router and fix the problem
  - Backward compatibility should be considered
    - Something similar to IS-IS POI TLV does not apply to OSPF legacy LSAs
Changes in v-01

• Revise the problem statement according to comments received
• Provide a solution to mitigate the impact of LSA flushing
  – Improve robustness of OSPF
  – Do not slow down normal route convergence
  – Can be deployed incrementally
Principle of Solution

• MaxAge router-LSA should be treated more carefully
  – In normal case, it means the originator is no longer reachable, which is a significant change to network, and
  – Removal of a node can also be informed by LSA updates of its adjacent routers

• Consequent LSA flushing of the same originator should be checked
  – As the state of the originator is questionable
Proposed Mechanism

- Two types of timers
  - T1: examination time of suspicious LSA flushing of a particular router. When a MaxAge router-LSA is received, the originator of the router-LSA is marked as in Restrain state, and for T1 time subsequent MaxAge LSAs of the same originator are further checked.
  - T2: examination time of a received MaxAge LSA when the originator is in Restrain state. The LSA would not trigger route calculation until T2 expires or stops.

- MaxAge LSAs would still be flushed in the network, while route calculation for LSAs in examination is delayed
Proposed Mechanism (cont.)

- Detailed procedures

MaxAge router-LSA

1. Receive MaxAge router-LSA
2. Check whether the LSA originator is in Restrained state?
   - Yes: Restart T1 for the LSA originator, starts T2 for the LSA if T2 does not exist
   - No: Mark the LSA originator as in Restrained state, starts T1 for the router, starts T2 for the LSA
3. T2 expires
4. T1 expires
5. Mark the LSA originator as in Normal state

MaxAge non-router-LSA

1. Receive MaxAge non-router-LSA
2. Check whether the LSA originator is in Restrained state?
   - Yes: Starts T2 for the LSA if T2 does not exist
   - No: The MaxAge LSA is processed according to RFC 2328
3. T2 expires
4. The MaxAge LSA triggers route calculation
Deployment Considerations

- The proposed mechanism can be incrementally deployed into the network
  - Avoid impacts to the deployed routers

- When deployed on all routers in the OSPF domain, the impacts to network and services can be eliminated
Conclusions

• LSA flushing may cause severe impact to network and services
• A solution for impact mitigation is proposed
• Solution for problem localization needs further study
• Solicit comments on both the problem statement and the solutions