IGP Flexible Algorithm with Link Loss

draft-wang-lsr-flex-algo-link-loss

LSR WG, IETF 119,
Brisbane

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Motivation & Problem Statement

- The link loss is an important performance metric that directly impacts the quality of service. It is necessary to avoid using links with a high packet loss rate.

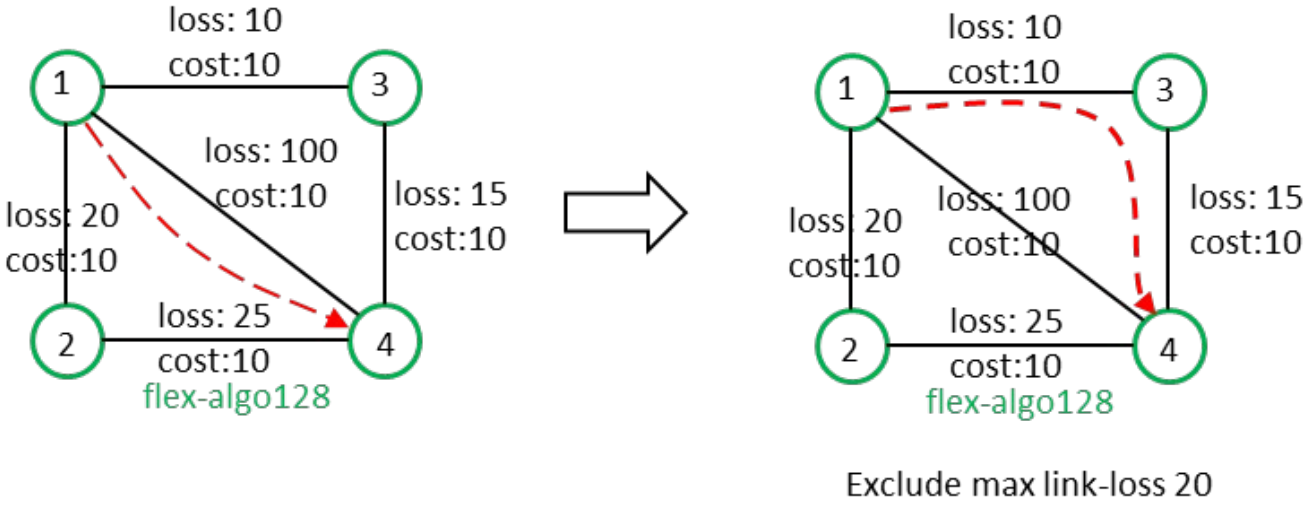
- The link loss is advertised by the Unidirectional Link Loss Sub-TLV defined in [RFC8570] for IS-IS and [RFC7471] for OSPF, which describes the loss (as a packet percentage) between two adjacent nodes.

- The flexible algorithm currently cannot support path computation based on link loss, since link loss cannot be described as general addable metrics like IGP cost.

- This document defines new FAD constraints to exclude links that do not meet the link loss requirements during flex-algo path calculation.

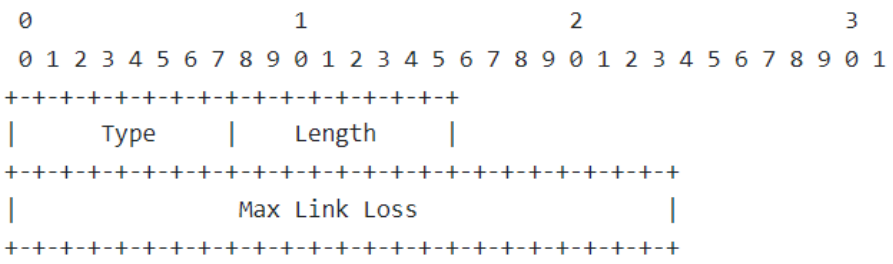
Path Computation with Link Loss Constraint

- Goal: Pruning links with a high packet loss rate (in percentage) during path computation.
- The link loss is used as a link constraint for path computation. That is, the links whose loss rate exceeds the specified value are excluded.
- There is no change to metric type.



Flex-Algo Extensions

- The Flex-Algo Exclude Maximum Link Loss (FAEML) Sub-TLV is defined to specify the upper limit of the link loss rate. It is a sub-TLV of the FAD TLV.



Type: 252(TBA)

Length: 3 octets

Max Link Loss: This 24-bit field carries link packet loss as a percentage of the total traffic sent over a configurable interval. The basic unit is 0.000003%, where (2^24 - 2) is 50.331642%. This value is the highest packet-loss percentage that can be expressed. Therefore, measured values that are larger than the field maximum SHOULD be encoded as the maximum value.

IS-IS FAEML Sub-TLV

- In flex-algo path computation, the maximum link loss rate in FAEML Sub-TLV MUST be compared with the actual link loss.
- If the actual link loss rate is larger, the link MUST be excluded from the Flex-Algorithm topology.

Comments and Discussions

- The source of link loss information
  - Unidirectional Link Loss Sub-TLV is defined in RFC7471 and RFC8570.
  - Link loss rate used in Flex-algo should be obtained from the existing Unidirectional Link Loss Sub-TLV defined in RFC9479 and RFC9492.
  - The measurement of link loss rate could use the existing IETF solutions, such as TWAMP [RFC5357] and STAMP [RFC8762]. The specific measurement method depends on the operators' choice.
- How to suppress the frequent advertisement of link status
  - In some scenarios, the link packet loss rate may fluctuate around the threshold value. Consequently, the link status can be frequently changed between available and unavailable, which could lead to frequent flex-algo calculation. To solve this problem, a suppression mechanism should be used. For example: when the packet loss rate is detected on a frequent change, a timer can be set to delay the update process.

Next Steps

- Thanks for the feedback from WG. We have addressed the comments in an updated version.
- Welcome review and collaborations
- Request WG Adoption

Thanks