Flex-Algo Bandwith Constraints

draft-hegde-lsr-flex-algo-bw-con

IETF 110

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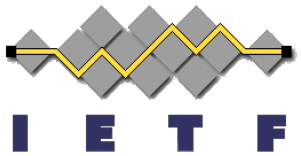


Agenda

- Introduction
- Bandwidth Based Flex-Algo
- Additional FAD constraints
- Automatic Bandwidth Metric Calculation Modes
  - Simple Mode
  - Interface Group Mode
- Automatic Bandwidth Metric Calculation Methods
  - Reference Bandwidth method
  - Bandwidth Thresholds method

Introduction

- Flex-Algo provides mechanisms to compute paths based on various constraints.
- This draft introduces additional constraints and a new metric-type to define a bandwidth-based Flex-Algo.

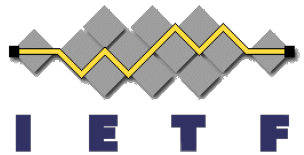
Bandwidth Based Flex-Algo

- New metric-type in FAD: bandwidth metric
- New Bandwidth Metric link attribute
  - New optional sub-sub-TLV under ASLA
  - Configured per link by network operator
  - *Should we make this a generic metric?*
- FAD constraints to define automatic metric derivation.
- Additional FAD constraints applicable for all types of Flex-Algo are also defined.

Additional FAD constraints

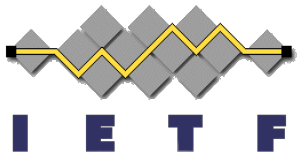
- Two new FAD sub-TLVs applicable for all types of Flex-Algo are defined.
- Exclude Minimum Bandwidth constraint
  - Exclude any link whose advertised Maximum Link Bandwidth is lesser than the Minimum Bandwidth defined by this constraint.
- Exclude Maximum Link Delay constraint.
  - Exclude any link whose advertised Min Unidirectional Link Delay is greater than the Maximum Link Delay defined by this constraint.

Automatic Bandwidth Metric Calculations



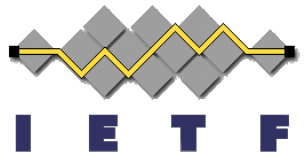
- Metric Calculation parameters advertised in FAD and used by each participating node to derive bandwidth metric.
- Applicable for bandwidth metric.
- For links which do not advertise Bandwidth Metric sub-TLV.
- Two modes (a FAD can advertise only one)
  - Simple Mode
  - Interface group mode

Automatic BW Metric – Simple Mode



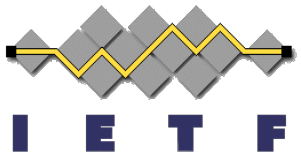
- Suitable for deployments using layer 2 bundles for parallel links.
- The Maximum Link Bandwidth advertised per link is used to derive Bandwidth Metric.

Automatic BW Metric – Interface Group Mode



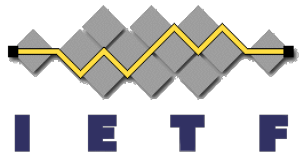
- Flex-Algo will identify and group parallel links participating in that flex-algo.
- The sum of Maximum Link Bandwidth advertised by each parallel link is used to derive Bandwidth Metric.
- The derived metric is then assigned to each parallel link participating in that Flex-Algo.
- Suitable for deployments having parallel links advertised in IGP.

Automatic BW Metric Calculation Methods



- Parameters to derive bandwidth metric from link bandwidth
- Two methods (a FAD can advertise only one)
  - Reference bandwidth-based method
  - Bandwidth thresholds-based method

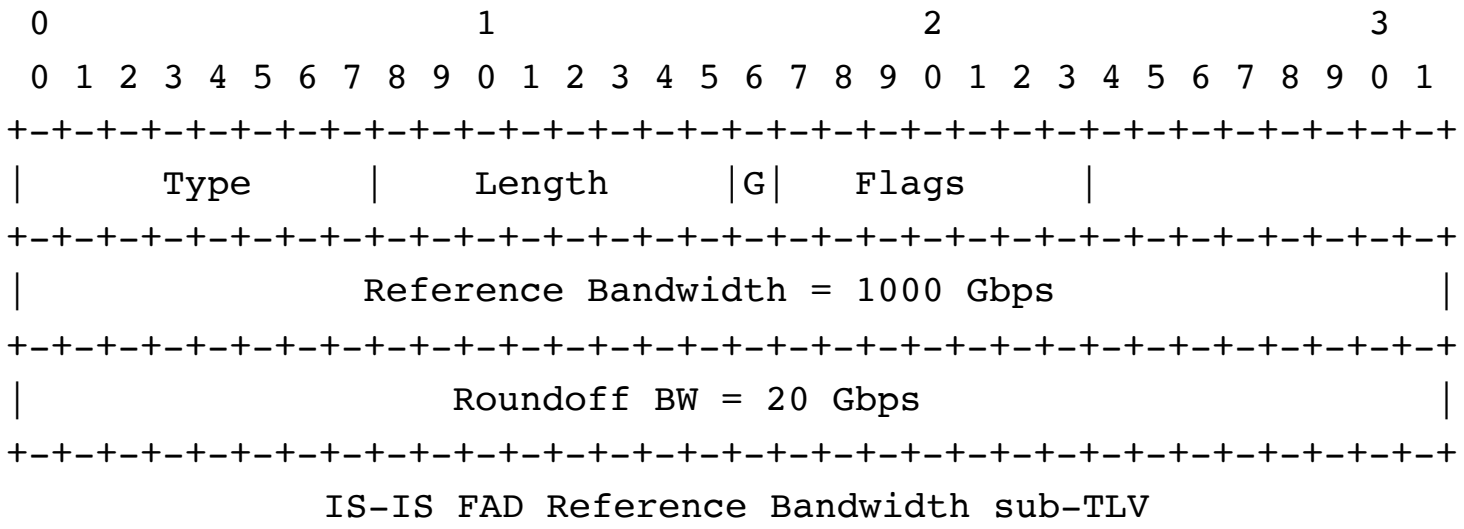
Reference bandwidth method



- Defined via FAD Reference Bandwidth sub-TLV
- Flag to select simple OR interface-group mode.
- Reference bandwidth to derive metric proportional to the link bandwidth.
- Roundoff Bandwidth : round-off the link bandwidth to previous multiple of this value.
  - Metric will remain the same for a small range of link bandwidths

```
Metric = Reference_bandwidth /
         (Total_link_bandwidth –
          (Modulus of(Total_link_bandwidth, roundoff_bw)))
```

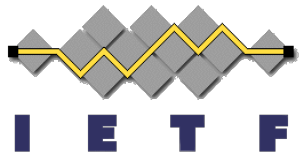
Reference bandwidth method example



IS-IS FAD Reference Bandwidth sub-TLV

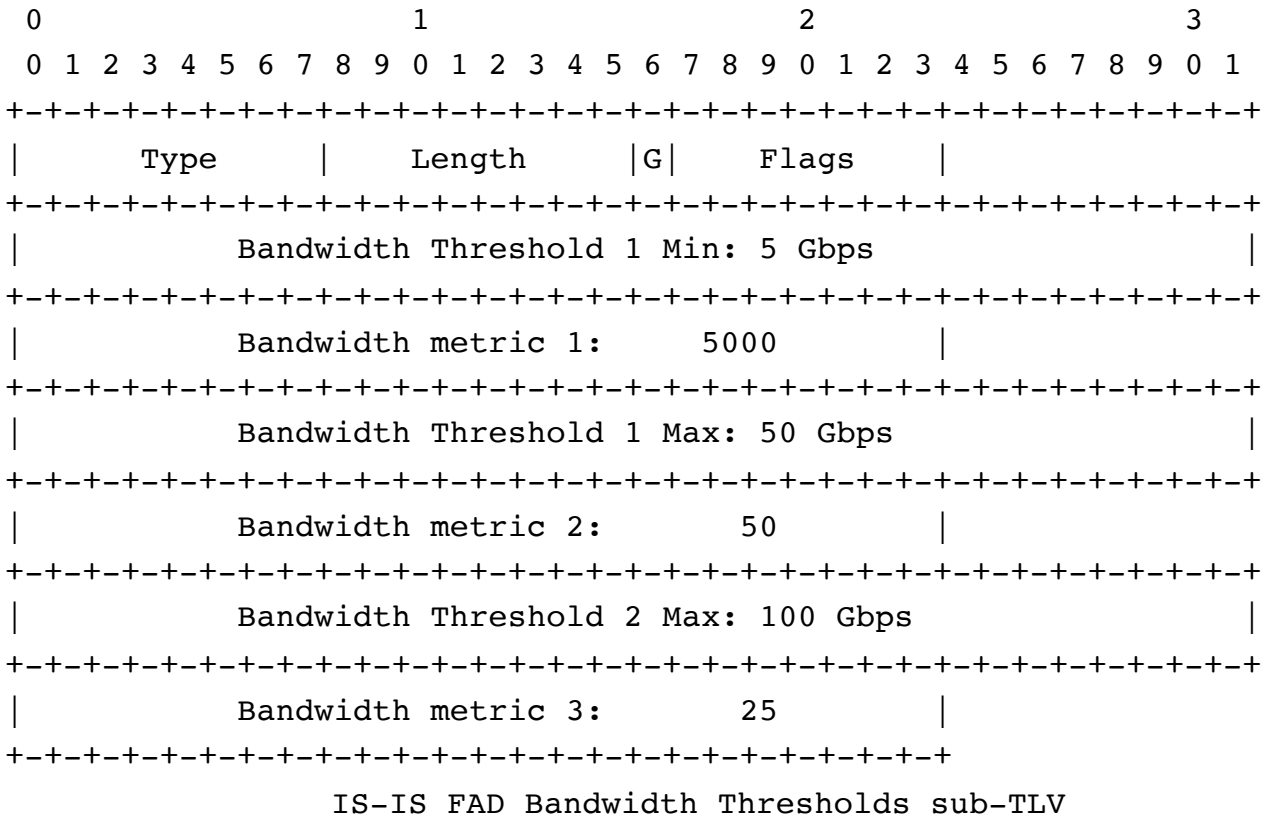
- Link bandwidth will be rounded off to multiple of 20G
- Derived metric will remain 10 when :
  - 100G <= link bandwidth < 120G

Bandwidth thresholds method



- Defined via FAD Bandwidth Thresholds sub-TLV
- Flag to select simple OR interface-group mode.
- Assign non-proportional metric values for varying ranges of link bandwidth.
- Staircase metric values based on bandwidth thresholds.

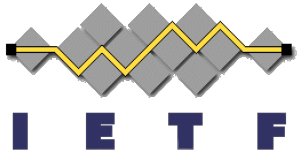
Bandwidth thresholds method example



IS-IS FAD Bandwidth Thresholds sub-TLV

Next steps

- Call for WG adoption.



Thank you