# LFA selection for Multi-homed Prefixes

*draft-psarkar-rtgwg-multihomed-prefix-lfa-00*

Pushpasis Sarkar psarkar@juniper.net
Shraddha Hegde shraddha@juniper.net
Hannes Gredler hannes@juniper.net
Chris Bowers cbowers@juniper.net

# Agenda

- Background
- Motivation
- LFA selection for Internal MHPs
- LFA selection for External MHPs

# Background

- MHP (Multi-Homed-Prefix)
  - Sourced from network devices outside the current IGP domain.
  - Mostly re-originated by multiple border routers.
- Use Cases of MHP
  - Increase Coverage for FRR
  - Tail-end Protection

# Motivations

- Lack of specific inequalities for MHPs
  - Diferrent scenarios need different handling
    - Specially external MHPs.
  - Erroneous implementations
    - Less coverage than feasible.
    - Backup path chosen may still loop.
- Share experience gained from existing implementations and provide future guidance
  - Propose MHP LFA inequalities
    - For all types of MHPs
      - Internal Prefixes
      - External Prefixes
    - For all applicable protocols(ISIS, OSPF)

# Notations

| | |
|---|---|
| P | - The Multi-homed prefix being evaluated. |
| S | - The computing router |
| N | - The alternate router being evaluated |
| E | - The primary next-hop on shortest path from S to MHP prefix P. |
| PO_i | - The specific prefix-originating router being evaluated. |
| PO_best | - The prefix-originating router on the shortest path from the computing router S to prefix P. |
| Cost (X,P) | - Cost of reaching the prefix P from prefix originating node X. |
| D_opt(X,Y) | - Distance on the shortest path from node X to node Y. |

# Inequalities for Internal MHPs

- Link-Protection:

  D_opt(N,PO_i)+ **Cost(PO_i,P)** <

  D_opt(N,S) + **D_opt(S,PO_best) + Cost (PO_best,P)**

- Link-Protection + Downstream-paths-only:

  D_opt(N,PO_i)+ **Cost(PO_i,P)** <

  **D_opt(S,PO_best) + Cost (PO_best,P)**

- Node-Protection:

  D_opt(N,PO_i)+ **Cost(PO_i,P)** <

  D_opt(N,E) + **D_opt(E,PO_best) + Cost (PO_best,P)**

# LFA Selection for External MHPs

- ISIS
  - Same as LFA selection for internal MHPs
- OSPF
  - Multiple Considerations to ***select and trim alternate ASBRs***
    - ***RFC1583Compatibility*** is required or not
    - ***Cost Type*** advertised by the ASBR
    - ***Route-type*** advertised by the ASBR
    - Primary ASBR and Alternate ASBR ***belonging to different areas***
      - ASBR is permitted as per the ***pruning rules of OSPF*** [RFC2328 section 16.4.1].
  - Apply Inequalities on selected ASBRs.

# OSPF Inequalities for External MHPs

**Forwarding Address set to non-zero**

- Link-Protection:
  ***F_opt(N,PO_i) + Cost(PO_i,P)*** <
  D_opt(N,S) + ***F_opt(S,PO_best) + Cost(PO_best,P)***

- Link-Protection + Downstream-paths-only:
  ***F_opt(N,PO_i) + Cost(PO_i,P)*** <
  ***F_opt(S,PO_best) + Cost(PO_best,P)***

- Node-Protection:
  ***F_opt(N,PO_i) + Cost(PO_i,P)*** <
  D_opt(N,E) + ***F_opt(E,PO_best) + Cost(PO_best,P)***

***F_opt(X,Y)*** - Distance on the shortest path from node X to Forwarding address specified by ASBR Y.

# OSPF Inequalities for External MHPs

**ASBRs advertising Type 1 and Type 2**

- Link-Protection:

  D_opt(N,PO_i)+ **Cost(PO_i,P)** <

  D_opt(N,S) + **D_opt(S,PO_best) + Cost (PO_best,P)**

- Link-Protection + Downstream-paths-only:

  D_opt(N,PO_i)+ **Cost(PO_i,P)** <

  **D_opt(S,PO_best) + Cost (PO_best,P)**

- Node-Protection:

  D_opt(N,PO_i)+ **Cost(PO_i,P)** <

  D_opt(N,E) + **D_opt(E,PO_best) + Cost (PO_best,P)**

# Next Steps

- Invite members review and feedback
- Questions ?
- Adoption as a WG draft ?