IS-IS V6/MT Deployment Considerations
draft-chunduri-lsr-isis-mt-deployment-cons-02

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• This work was presented in LSR WG (@IETF 103)

• Based on the feedback/suggestions, we are presenting here (V6OPS)
Background

- There are lot of IPv4 IS-IS deployments
- Few more folks are seeking “IPv6 only” IS-IS deployments
- This is based on talks with multiple operators in
  - Mobile backhaul (5G, SRv6??)
  - L3 DC undelays
What’s the goal & What can be done

- Goal of this document is to lay out the nuances around IS-IS IPv6

- IS-IS MT != IS-IS IPv6

- Provide various options and limitations with IS-IS
  - For transitioning from IPv4 to IPv6
  - For IPv6 only deployments

- Doesn’t provide any protocol extensions
  - Seek inputs from the community if anything more to be done to simplify things

- Non-Goal: Covering ISIS-MT use cases or applications
IPv6 in IS-IS

- IPv6 first introduced in IS-IS through RFC 5308
  - New Reachability TLV \(\text{TLV236}\)
  - It works in Single Topology Mode

- Later Multi-Topology IS-IS \(\Rightarrow\) RFC 5120 (IS-IS MT)
  - Introduces Topology Specific Adjacencies (222), MT aware reachability TLVs (235, 237)
  - Topology specific Decision process
  - ...and defined Multi-Topology ID #2 for "Reserved for IPv6 routing topology"
  - Safe alternative to deploy IPv6 on legacy network
Network Congruency

- IPv6 with RFC 5308 → yes, simple and straight forward
- But network congruency MUST be maintained, i.e.,
  - Network Can be only IPv6 (all links and nodes MUST support) or
  - “All” Links and Nodes MUST support both IPv4 and IPv6
- Else one will have routing black holes like below

Assume all links metrics are 1; Direct link from Rx to R2 is Shortest Path from Rx to R2
V6 Traffic block hole from R2 to Rx → even though alternate path available (Rx, R1, Ry, R2)
This gets fixed
  - Either by enabling V6 on that link (making network congruent)
  - Use RFC 5120, MT-ID #2
Single Topology Mode – with multiple AFs

- Restrictions: network MUST be congruent (as seen above)
  - i.e., all routers in the topology MUST support only IPv4, only IPv6 or both IPv4 and IPv6 address families on all links and node.

- Some examples where congruency is not possible as follows:
  
  a. When IPv6 is getting introduced in the network legacy nodes that are IPv6 incapable.

  b. Implementation issues causing IPv6 to be disabled on some nodes.

  c. Hardware scale limitations causing IPv6 to be disabled on some low-end nodes.
A Note on IS-IS MT

- Single ADJ with supported MT-IDs

- MT-ID specific decision process and route computation (common RIB/FIB)

- MT Deployments?
  - One of the main use case for IS-IS MT is MT-ID #2 (IPv6)
  - while MT can be generically be used for other topologies (IPv6 or otherwise), not much deployed
  - Not all vendors support extensible sub-topologies with different MT-IDs
Topology & Address Family Confusion?

- Terminology is fully intertwined in IS-IS

- MT ID #2 is called "Reserved for IPv6 routing topology"

- Yes, one can define other MT's for IPv6 other than above.

- Tiring conversation !!
  - Want IPv6 only ✗ Use MT ID #2
  - I don’t want Multi-Topology, just want IPv6 IS-IS ✗ yes, use MT-ID #2

- One of the goals of this document is to ease this conversation.

- MT Deployments: A note
  - One of the main use case for IS-IS MT is MT-ID #2 (IPv6)
  - while MT can be generically be used for other topologies (IPv6 or otherwise), not much deployed
  - Not all vendors support extensible sub-topologies with different MT-IDs
Summary & Next Steps

- In summary, this document only provides various options available for
  - Deploying IPv6 only topology
  - Transitioning to IPv6 from IPv4 (pitfalls to avoid)
  - Demystifies what’s been deployed with IS-IS MT

- Comments/Feedback from operators?

- Planning to ask for adoption of this draft at LSR WG