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draft-atlas-rtgwg-mrt-mc-arch-02

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Introduction

- This draft documents various methods to achieve Multicast FRR using MRT.
- Many of these options make sense, not all of them.
- The draft has been updated to focus on the solutions that make most sense.
- First, lets try to demystify the options ☺

Demystify the options

Different technology options to achieve Multicast FRR.

1. P2P bypass tunnels (unicast and multicast)
2. P2MP repair trees (multicast specific)
3. P2MP repair tunnels (multicast specific)
4. Global protection (multicast specific)

Each of these solutions have their own pros, cons and applicability

1. P2P bypass Tunnel

- A P2P bypass tunnel is used to bypass a link failure from the PLR to the MP.
- P2P can be a RSVP-TE, LDP (r)LFA or MRT LSP.
- P2P tunnel is truly used a tunnel, meaning that Multicast is unaware of the underlying change when FRR happens.
  - Multicast protocols are not involved in setting up the bypass infrastructure.

1. P2P bypass Tunnel

Advantages

- The simplest model for to achieve FRR.
- All multicast flows sharing a Link inherit protection.
- Piggy-bags on existing unicast infrastructure.

Disadvantages

- Potential double bandwidth during FRR on the backup links.
- Applying this model to node protection, the PLR has to replicate the packets to the receivers of the protected node.
  - See draft-ietf-mpls-mldp-node-protection-00

2. P2MP repair trees

- A repair tree is explicitly built to protect a link or node per tree.
- A backup tree is NOT used as a tunnel, it's a 1:N protection.
  - N depends on the number of link/nodes protected in the network.
- Each primary tree has its own backup tree for a link/node.
- Multicast protocols are involved in building the repair trees, and can be based on MRT (draft-atlas-rtgwg-mrt-mc-arch)
- Using (r)LFA is less obvious.

2. P2MP repair trees

Advantages

- With node protection there is no need to replicate on the PLR.

Disadvantages

- Double (or more) the Multicast state requirements.
  - Each protected node will have its own repair tree (1:N).
- After failure, each primary LSP has to be moved to its own backup. Its not like a Tunnel where only one encapsulation has to be changed. This is a scalability concern.
- More complex compared to link protection.
- Complex on ring topologies.

3. P2MP repair tunnels

- Repair tunnels is a solution to address the scaling concerns of repair trees.
- Primary trees shared an aggregated repair tunnel per link/node, so its N:1.
- An upstream assigned label is assigned on the PLR for each primary tree.

3. P2MP repair tunnels

Advantages

- Single encapsulation rewrite after link failure, scales better.
- Less backup trees.

Disadvantages

- Requires upstream assigned labels.
- Aggregation causes flooding, the traffic on the backup tunnel goes to places it does not need to go.
- More complicated compared to backup trees.

4. Global protection MoFRR

- MoFRR is a topology aware method to FRR.
- The backup is not per link or node but per topology segment.
- Virtual topology can be created via MRT.
- 1:1 protection, where the MoFRR router provides merging based on failure detection in a topology.
- The MoFRR router is mostly on the edge of the network.
- Includes both link and node protection
- Different topology failure detections
  - Link failure
  - IGP notification
  - BFD
  - Flow based
  - draft-wijnands-rtgwg-mcast-frr-tn-01

4. Global protection MoFRR

Advantages

- Very simple model if the network has (virtual) dual plane topology.
- Is link or node failure agnostic (depends a bit on detection).

Disadvantages

- Double bandwidth usage
  - Whether this is an issue depends very much on the topology.
  - Solution in draft-wijnands-rtgwg-mcast-frr-tn-01
- Detecting a non directly connected failure.
  - Solution in draft-wijnands-rtgwg-mcast-frr-tn-01

Demystify conclusion

- P2P bypass tunnels
  - Is the simplest model.
  - Integrates very well if unicast protection is deployed.
  - Potential replication load of the PLR is in practice not a big concern.
- Bypass trees and tunnels
  - The push for these come from node protection to avoid replication on PLR.
  - The authors of this draft feel the complexity that comes with this solution does not justify the advantages of it.
  - It is much simpler to deploy a Global protection mechanism if the number of replication by a PLR is a concern.
  - MRT makes a Global protection mechanism because we're not dependent of the physical topology anymore to provide protection.

General guide lines for Multicast FRR

- If FRR is deployed with unicast MPLS, go with that, can be,..
  - RSVP-TE, (r)LFA, MRT
  - draft-wijnands-mpls-mldp-node-protection-04
  - draft-kebler-pim-mrt-protection-01
- If the unicast MPLS FRR method is not sufficient for multicast, go with a global protection mechanism specifically for Multicast.
  - draft-ietf-rtgwg-mofrr-02

Updates to the draft

- We moved the bypass tree solution to the appendix of the draft.

Questions?