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draft-wijnands-rtgwg-mcast-frr-tn-00

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What is the goal of TN

• A generic mechanism for a MoFRR router to detect a Tree failure.
• Independent of traffic rate.
• Implementable on any router platforms.
• Must be much faster then IGP convergence.
• Optional feature to optimize bandwidth usage on the MoFRR backup path.
What is Tree Notification

- An Tree Notification Packet is sent down the tree to indicate the upstream path is broken.
- A Tree notification Packet is sent up the tree to enable forwarding.
  - This is optional to avoid bandwidth use on the MoFRR backup path.
- A combination of both can be used.
- TN packets are forwarded using the multicast tree itself as real data.
- We’ll use a well defined UDP port number to identify the packets.
- Defined for both PIM and mLDP.
MoFRR Router D has Accepting path to C and Blocking path to B.

Router C detects failure upstream, inserts DFN.

Router D has received DTN on Accepting path, activate blocking.

DFN packet stops at D because D repaired the path.
Upstream Tree Notification (UTN)

- This is an MoFRR optimization to avoid pulling traffic down the backup path.
- The backup path is joined in **standby mode**.
  - New procedures are added to PIM and mLDP to achieve that.
- An upstream router populates forwarding as normal, but sets a **non-forwarding bit** to not forward data.
- The non-forwarding bit can be reset by HW upon receiving **UTN**.
- A UTN packet is forwarded upstream to the ingress of the tree.
- A UTN can be triggered due to detecting a **local** link failure or receiving a **DTN**.
MoFRR Router D joins backup path in standby mode.
Upon receiving a DTN, a UTN is triggered to router B.
The UTN is forwarded upstream to the ingress node.
Along the path the non-forwarding-bit is reset.
Data-plane processing

• This solution can only achieve Fast Convergence if the TN packets are originated and processed in the data-plane without requiring involvement of the control plane.

• The TN packets can be pre-populated by the data-plane.

• The TN packets must be flushed when the failure is detected.

• The TN packets are received on the tree itself.

• All the information necessary to react to the TN is available in the data-plane.

• Originating and processing may leverage BFD infrastructure.
Downstream Forwarding TN packets

• A TN packet has the IP/MPLS header set to the tree it has to be forwarded on.

• For each tree, a TN packet is triggered.
  – For simplicity reasons, can look at aggregation later if we want.

• Downstream this is relatively straight forward for both mLDP/PIM.
Upstream Forwarding TN packets

• The Upstream path is a bit more tricky because it does not exist for P2MP and SSM like trees.

• For mLDP it can be resolved via draft-ietf-mpls-mldp-hsmp-00

• For PIM each router in the path has to have special procedures to participate in forwarding.
Open items

• For mLDP we may want to use a reserved label to detect the TN.
Going forward

- We like to get feedback from the working group
- We’re open to co-authoring
Questions?
How fast is TN going to be?

- Delay depends on 3 factors.
  1. Originating delay
     - Depends on BFD or link event (~0-50ms)
  2. Forwarding delay
     - Forwarding delay (12 micro-seconds per hop 1Gbps)
  3. Receive delay
     - ?

- Forwarding delay and hop-count can likely be ignored.
- Would be good to prototype to get real data.
- Overall I think this can be really fast.
Conclusion

• The solution for mLDP node protection has to support the existing features as currently defined in the mLDP RFC 6388, like MP2MP, MBB, etc..

• Should not violate the LDP RFC 5036 due to not supporting Label Withdraw and Release for exchanged label bindings

• T-LDP is an architecturally clean way to address the problem. Don’t try to bypass it due to perceived scalability issues
Moving forward

• Working with the authors of draft-zhao-mpls-mldp-protections to resolve the difference of opinion.

• We are open to co-authoring