85th IETF – Atlanta

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

IJ. Wijnands	ice@cisco.com
A. Csaszar	Andras.Csaszar@ericsson.com
J. Tantsura	jeff.tantsura@ericsson.com

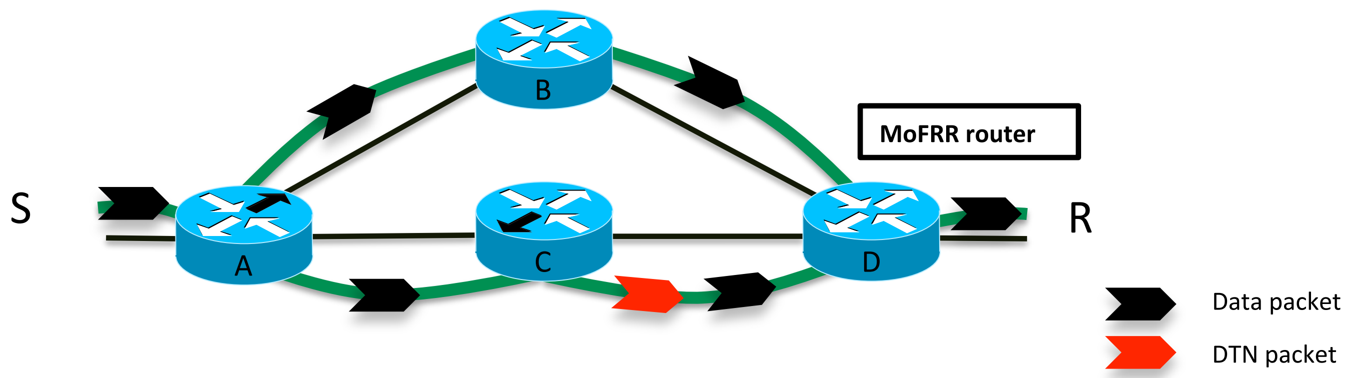
What is the goal of TN

- 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.

DTN simple example

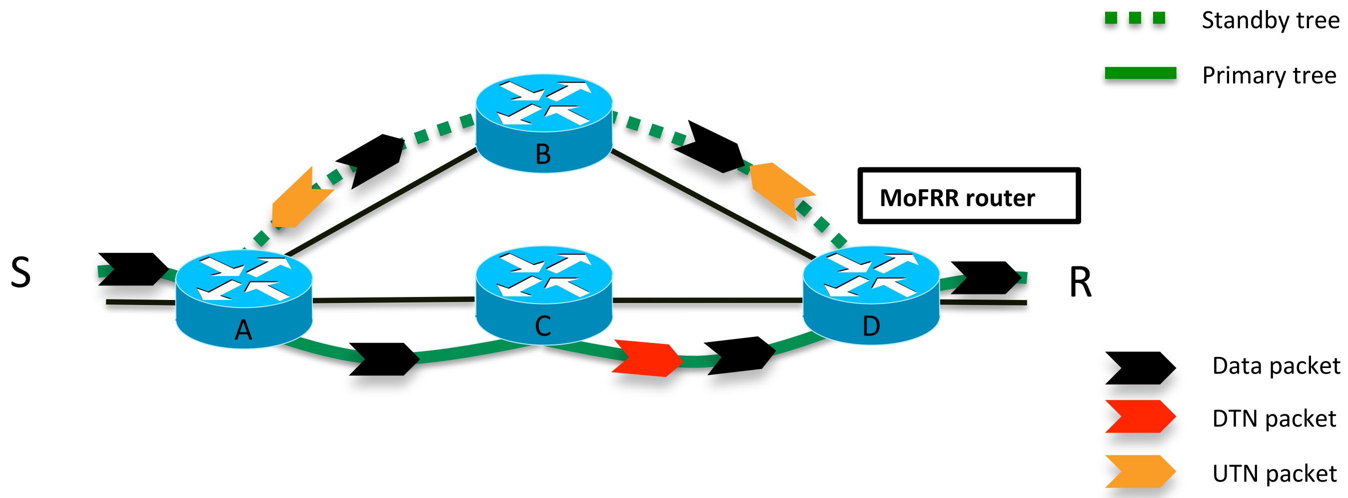


- MoFRR Router D has Accepting path to C and Blocking path to B.
- Router C detects failure upstream, inserts DFN.
- Router D has received DTN on Accepting path, activate blocking.
- DFN packet stops at D because D repaired the path.

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.

UTN simple example



- 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 it self.
- 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