83rd IETF - Paris

draft-lzj-mpls-receiver-driven-multicast-rsvp-te-00.txt

Richard Li (renwei.li@huawei.com)
Quintin Zhao (quintin.zhao@huawei.com)
Christian Jacquenet (christian.jacquenet@orange.com)
Issues with P2MP RSVP-TE

- It is awkward to inter-operate with PIM:
  - P1 needs to process many messages
  - P1 maintains many soft states
- Slow to build up MDT
  - Time for finding leaves e.g. BGP for discovery
  - The higher the tree, the slower to build up the MDT
Issues with MP2MP Using P2MP RSVP-TE

- **No straightforward way to set up MP2MP**
  - Multiple P2MP LSPs are set up as an implementation for one MP2MP LSP

- **Scalability**
  - P maintains more states for more multicast LSPs. In the above example, P maintains at least 9 states for 3 multicast LSPs to implement MP2MP.
New Solution

• Let RSVP-TE Path Messages be originated by Receivers/Leaves instead of Senders/Roots
• A Path message will be terminated at an intermediate node if this node received another Path message for the “same” session
• LSPs will be set up in a reverse direction compared with the existing RSVP-TE
• It will work uniformly for both P2MP and MP2MP
• In-band signaling support: Information in PIM messages are encoded into mRSVP-TE messages and multicast LSPs are set up accordingly.
At each leaf, one Path message with a downstream-assigned label is sent to its upstream hop.
At each branch node, only the first received Path message is sent upstream.
For each received Path message, a Resv message is sent downstream.
Data Forwarding for mRSVP-TE P2MP LSP

R1 (Sender)

Downstream Forwarding Entry on R1
Action PUSH
Out label 102, out interface if-1
Out label 106, out interface if-2

R2

Downstream Forwarding Entry on R2
Incoming label 102, Action SWAP
Out label 103, out interface if-1
Out label 105, out interface if-2
Out label 107, out interface if-3

R4

Forwarding Entry on R4
Incoming label 103, Action POP

R5

R6

R7

R8

R3

Downstream Forwarding Entry on R3
Incoming label 106, Action SWAP
Out label 109, out interface if-1
Out label 111, out interface if-2

Label = 102 Data

Label = 106 Data

Label = 107 Data

Label = 109 Data

Label = 111 Data

Label = 103 Data

Label = 105 Data
At each leaf, one Path message with a label is sent to its upstream hop.
At each branch node, only the first received Path message is sent upstream.
For each received Path message, a Resv message with a label is sent downstream.
Data Forwarding on mRSVP-TE MP2MP LSP

Forwarding Entry on R1
- Incoming Label 102, Action SWAP
- Out label 106, out interface if-2

Forwarding Entry on R2
- Incoming label 103, Action SWAP
- Out label 102, out interface if-1
- Out label 105, out interface if-2
- Out label 107, out interface if-3

Forwarding Entry on R3
- Incoming label 106, Action SWAP
- Out label 109, out interface if-1
- Out label 111, out interface if-2

Forwarding Entry on R4
- Push Label 103

Forwarding Entry on R5
- Label = 105

Forwarding Entry on R6
- Label = 107

Forwarding Entry on R7
- Label = 109

Forwarding Entry on R8
- Label = 111
In-Band Signaling

- At the border router such as PE1 and PE2, PIM Join is translated into RSVP-TE Path Message.
- At the border router such as PE3, RSVP-TE Path Message is translated back into PIM Join.
Major Protocol Extensions

• SESSION
  – Different Objects for Different Applications
  – For Native IPv4/IPv6: Multicast Group Address

• SENDER_TEMPLATE
  – Path Sender’s Address (Leaf)
  – Better called PATH_SENDER_TEMPLATE

• L2S_SUB_LSP
  – Source Address or Root Address
Next Steps

• Seeking feedbacks
• A prototype is being developed
Questions?