Shortest path bridging state machines

Clause 13 modifications for SPB/SPBB

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Agenda

• Why are we modifying Clause 13
• What are we changing, what stays the same
• Agreements – refresher and SPB additions
• Additional variables and procedures, state machine changes
Why modify Clause 13?

If IS-IS is being used can’t we just add the extra loop prevention stuff there?

Why does IS-IS for bridging have to have anything to do with Spanning Tree BPDUs?
Why we need to modify Clause 13 (1)

• Have to interoperate with existing bridges, and deploy in islands/network cores

• Network loop prevention requires synchronizing state at island/core boundaries with bridges that only understand RSTP/MSTP BPDUs

• That means:
  – using ISIS-SPB results in BPDUs
  – injecting BPDU information into ISIS-SPB
Why we need to modify Clause 13 (2)

ISIS-SPB can make some decisions faster, e.g. determine CIST Port Roles and priority vectors
- Stop existing mechanisms from overriding with temporarily incorrect information

Ports inside SPT Regions synchronize forwarding state with boundary ports
- Need to specify how, without reinvention
What to add/change

- Agreements for ISIS-SPB calculated CIST
- Agreements for SPTs (using Agreement Digest)
- ISIS-SPB calculates CIST in Region
- Match SPT state to CST at Region boundary
- Tweak Region boundary calculation
What to keep the same

Most things, including:
- No new state machines
- MSTI operation

Treat SPB and SPBB identically
- Differences in allocating frames to trees, not in calculating trees and forwarding transitions
CIST Agreements (1)

New connectivity created by Designated Ports becoming Forwarding. Allowed iff:

- Neighbour’s port is Root Port or Alternate Port
- Agreement received that is worse than any own Root Port has outstanding

- Agreement from Root/Alternate Port promises:
  - Each of my Forwarding Designated Ports has received an Agreement no better than this

- Designated Port discards old Agreements
CIST Agreements (2)

For RSTP/MSTP CIST every message from a Designated Port is an implicit discard:
- Distance vector propagation ensures parents have discarded old unusable Agreements

Link state neighbours can compute in any order:
- Check Root Port’s outstanding Agreements before making Designated Port Forwarding
- Block ports to ensure no connectivity to parents holding old Agreements
MSTI & SPT Agreements

Only one CST Root Port for Region (Master Port)
- Agreement sent by MSTI Designated Ports
- When all other ports (recursively) agree Master
- Master agreement differs from implicit discard, propagates up tree branches before down

Explicit discard provides same capability for SPTs
- Root Port possibly connected to old Master only when old Agreement outstanding
Agreements for ISIS-SPB

Use existing Proposal/Agreement variables: sync all ports after link state update, port is synced if Discarding or agreed, agree when Discarding or all other ports synced

- **Designated Port:**
  - agreed set when a received Agreement complements designatedPriority, and no Agreements are outstanding
  - When agree for CIST, discard unusable Agreements
  - When agree for all SPTs, transmit new TAP Digest

- **Root/Alternate Port:**
  - agreed set when all outstanding Agreements (if any) complement designatedPriority
  - When agree for CIST transmit Agreement, and discard received Agreements
  - When agree for all SPTs transmit new TAP Digest
New variables

No new timers (or extra uses of existing timers)

Per bridge variables: \texttt{agreementDigest}

Per port variables: \texttt{agreedN, agreedND, agreeN, agreeND, agreePending, agreedDigest, agreeDigest}

Per tree variables: \texttt{agreementOutstanding, neighbourPriority} (SPT only)
New or changed procedures

- **txRstp()** – can now transmit SPT BPDUs, updates agreeN, agreedND, agreePending before transmission.
- **updtRolesTree()** – ensure that ISIS-SPB makes the decisions on IST and SPT roles and priorities
- **rcvdMsgs()** – use **rcvAgreements()** if rcvd BPDU is internal to SPT Region
- **rcvAgreements()** – extract Agreement Digest and agreement number from received BPDUs.
- **updtAgreement()** – update the Agreement variables after link state computation or BPDU receipt
State machine changes

No new state machines. No changes to PTI, PRS\textsuperscript{1}, PPM, BDM, PIM\textsuperscript{2}, PRS\textsuperscript{3}, PST, TCM, L2GP\textsuperscript{4}

No new states in other machines apart from PTX (1).

- PTX – Updates \texttt{agreeDigest} and prompts transmission when all SPTs agree for the port.

- PRT:DESIGNATED\_AGREED – Rename \texttt{(_AGREE)}, also execute when C\textsc{IST} SPB Discarding.

- PRT:ROOT\_DISCARD – Use state added for dispute detection

- Initialization of new variables (not yet done).
Conclusion

The hard part was figuring it out, the changes are minor