Clause 13
Changes Summary

Don Fedyk

Mick Seaman

Janos Farkas

Clause 13 Highlights

- Clause 13 was MSTP formerly
- Incorporation of 802.1D Clause 17 (RSTP)
- Addition of SPB and SPBB
- Harmonization of RSTP, MSTP, SPB (SPB & SPBB)
- STP supported for compatibility only
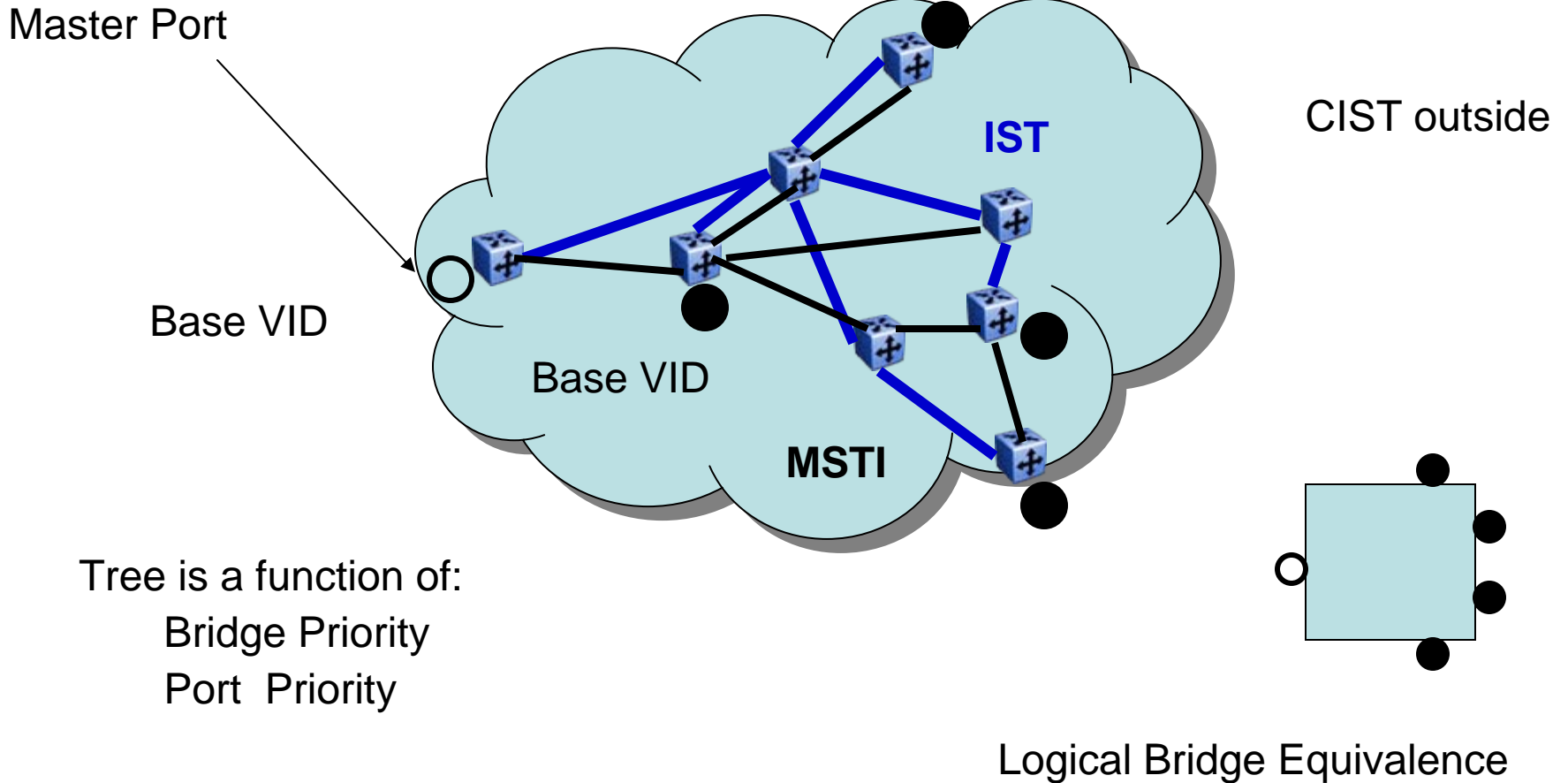- Behavior and State machines

Key Concepts

- Active Topology
- Filtering and Forwarding
- RSTP has a CST (CST is single spanning tree)
- MSTP and SPB, SPBB have an IST
  - IST is the spanning tree for the active topology of the MSTP Region or she SPB region.
    Have a CIST when considering Regions

MSTP Review

- IST
- CIST
- MSTI port roles
  - Root, Designated, Alternate, Backup
- CIST port roles
  - Root, Designated, Alternate, Backup
- Modeling a MSTP Region as a Bridge
  - CIST modeled as a single bridge

MSTP Spanning Tree

Master Port

CIST outside

IST

Base VID

Base VID

MSTI

Tree is a function of:
    Bridge Priority
    Port Priority
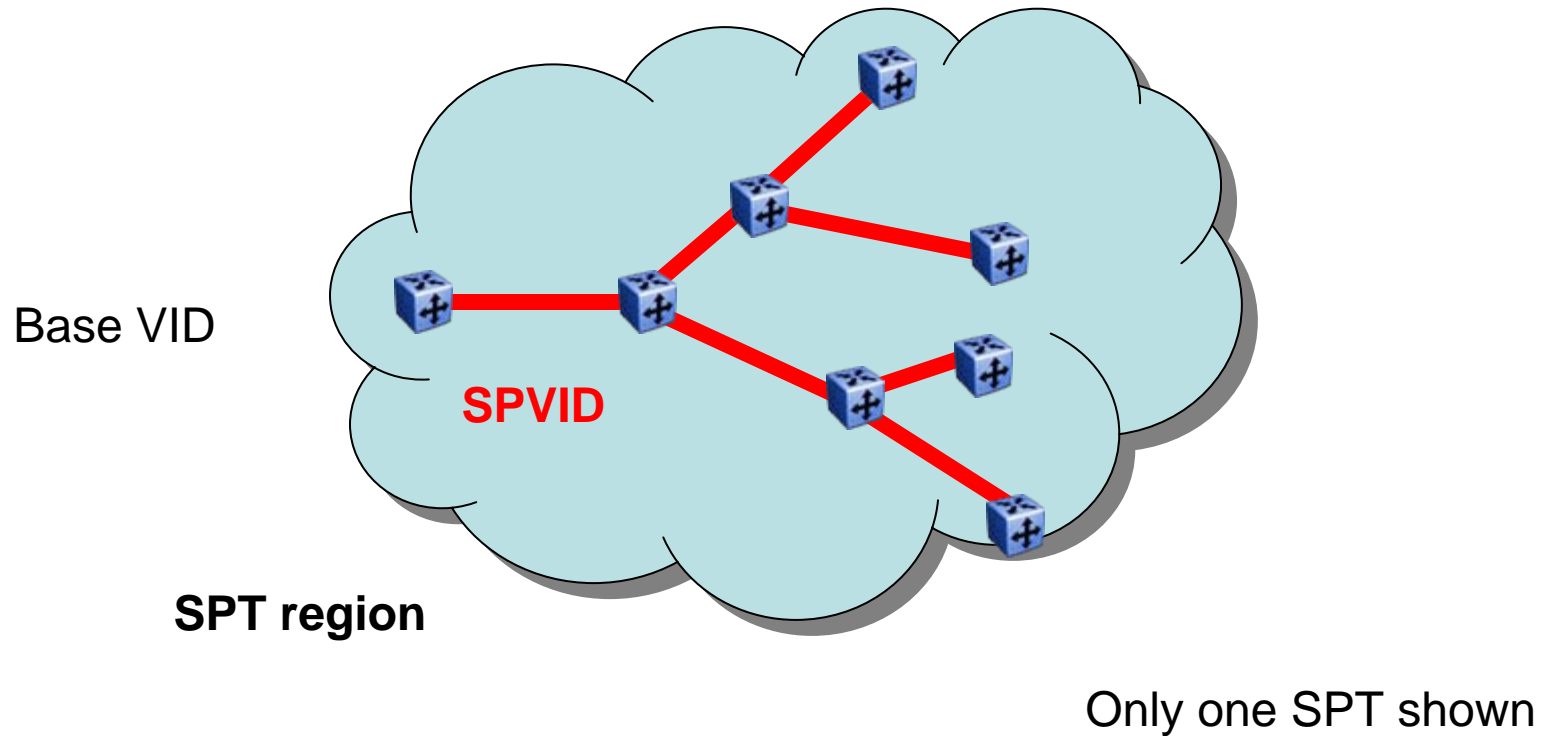
Logical Bridge Equivalence

Not Shown CST port Roles and MSTI port Roles

SPB New

- Follows MSTP model
- ISIS-SPB used for SPB, SPBB topology
- BDPUs used for CIST
  - Shadowing Behavior
  - For TAP messages on the IST
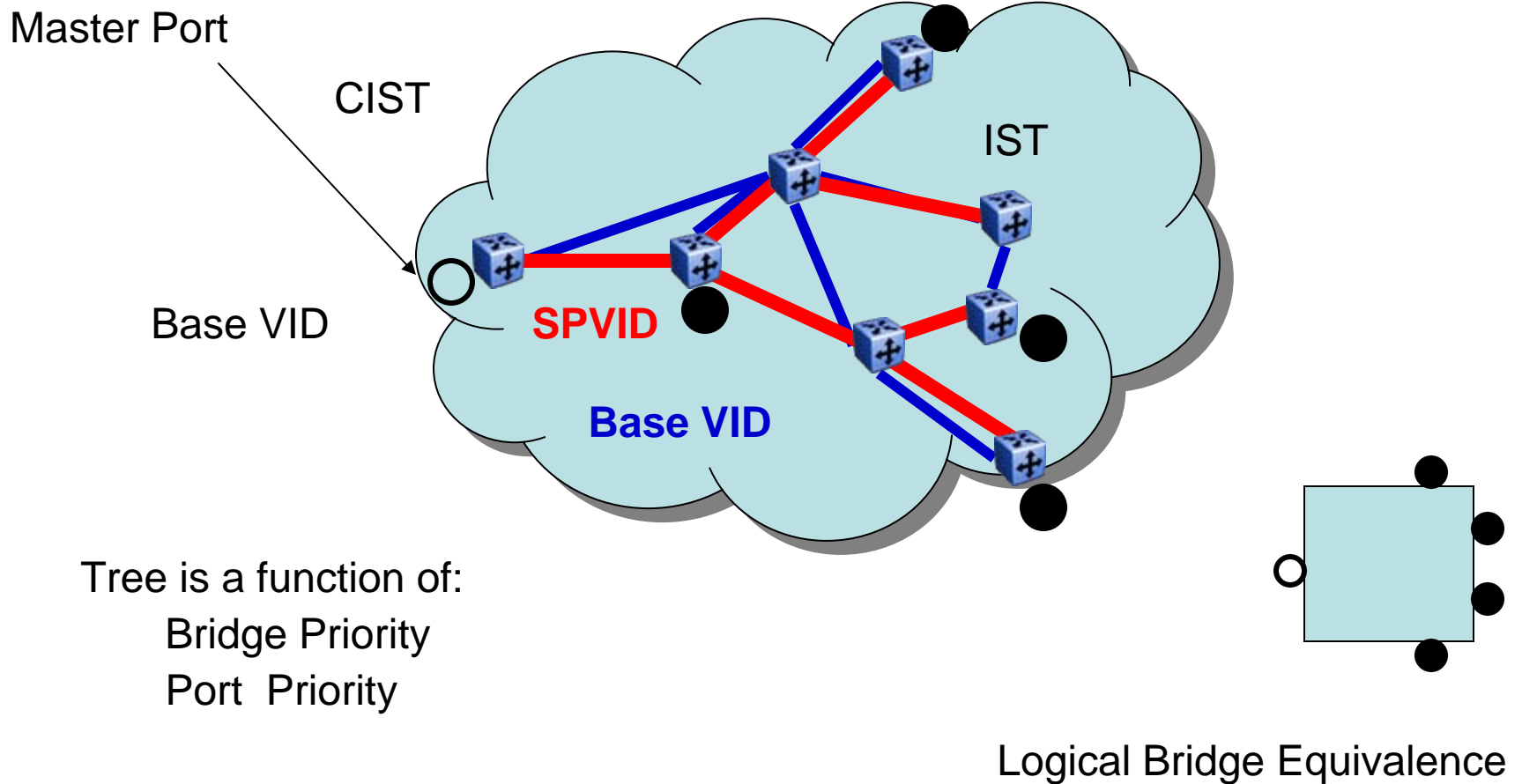 - For BDPUs outside the SPT Region

MSTI

Shortest Path Tree

Base VID

SPVID

SPT region

Only one SPT shown

CIST for SPT: Same concepts

Master Port

CIST

IST

Base VID

SPVID

Base VID

Tree is a function of:
  Bridge Priority
  Port Priority

Logical Bridge Equivalence

Interconnecting RSTP to SPT Regions

- SPT Region model as a Bridge based on the CIST port roles

- Common Topologies combinations
  - All permutations work however
  - When SPB is deployed it will typically be SPB and RSTP legacy
  - When SPBB is deployed it will typically be solely SPBB
    - Other VLANs may use RSTP

- BPDUs Promiscuous

Other ways to redundantly connect to a region (802.1aq out of scope)

- Use L2GP

- Other protocol options
  - See Future work items

  http://www.ieee802.org/1/files/public/docs2008/new-bottorff-redundant-if-0908-v01.pdf

SPB Interworking

- SPB regions establishment
- Interworking

SPT Regions

- Two bridges exchange BPDUs indicating SPB capability

  - Force Protocol Version 4

- The region is established when two bridges can both support SPB and ISIS-SPB exchanges Hellos

- They must determine their respective SPVIDs (SPTID Allocation)

Results

SPT BDPUs

- For the CIST (IST)

- All ports send Full BDPUs learned from ISIS-SPB with:

  - Configuration Messages

  - MST Configuration Identifiers

  - TAP Messages

Tree Agreement Protocol

- Introduced for RSTP, MSTP, SPB, SPBB
- Exchanged in BDPUs
- RSTP
  - Per port agreement (per tree)
- MSTP
  - Per port agreement for IST
  - Per port agreement per MSTI
- SPB, SPBB
  - Per port agreement for IST
  - Per port agreement per IS-IS instance for all SPTs (IS-IS database digest)

TAP & SPB Interworking

- SPB interworks with RSTP (and STP, MSTP) via the regions using the CIST.
- TAP is use both in the SPB region and external to the SPB region
  - Within the SPT region TAP BDPUs on all ports but is an IS-IS database digest
  - TAP is supported from the CIST to RSTP
  - TAP is not used on reciept between two regions

Partial and disputed connectivity

- Handling of asymmetric failures
  - To ensure that the active topology remains loop-free, a Designated Port will recognise that a dispute is in progress and stop learning from or forwarding frames, if it receives a BPDU with a worse message priority and the learning or forwarding flag set from another port that claims to be Designated.
  - If two (Designated) ports attached to the same LAN cannot communicate with each other at all, but can each communicate with a third (Root) port, there is also the potential for a loop if one of the Designated Ports has a priority vector that is worse than that of the Root Port. Receipt of better priority vector from a Root Port is therefore treated as a dispute.

In-service upgrades

- IS-IS Supports Graceful restart
- RSTP and MSTP can support similar capabilities
  - There are implementations that are capable of storing operational snapshots of BPDUs
  - Uses conditions that you can continue forwarding without sending BPDUs

State Machines

- 50% of Clause 13 is state machines
- Mick has a tool that verifies these.
- How can we ensure the tool is accurate?