Rapid Spanning Tree

Mick Seaman
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Rapid Spanning Tree

• Revised State Machines
• Forwarding Spanning Tree Information
• Model Implementation Goals
• Topology Change Handling
• New PDU Formats
Revised State Machines

• 'No new states' (port roles or port states)
  – 'recent root' and 'recent backup' timers track role transitions, replacing Forwards/Forwarder

• 'Rapid' enhancements accelerate transitions
  – between existing states

• Port focused not bridge focused
  – Bridge is a collection of ports
  – Root bridge just bridge without root port
Revised State Machines

• Propose use of 802.3 state machine conventions
  – State tables sparse
  – State machines not on the basis of 'port state'
  – Very easy to transliterate to implementation
  – State tables can be done as a check
Forwarding Information

• Information propagated as soon as bridge update process changes it
• Transmit rate limited
• Independent 'hello timers' per port
  – Root and Branch Bridges do not differ
Model Implementation Goals

• Efficient for bridges with large #s of ports
• 'Immediate' change propagation
• Bounded compute load
  – Rate limited scheduling of bridge wide updates
  – Reception does not imply immediate compute
• Interrupt handling of 'disabled' ports
• 'Realistic' hardware handling
Processes, Interrupts, and Tasks

Model assumes:

- Processes run to completion
- Processes do not interrupt each other
- Interrupts interrupt processes arbitrarily
- Interrupts do not interrupt each other
- No interrupt disable/enable support
- No mutex, semaphore, or thread support
Processes, Interrupts, and Tasks

• Receive BPDUs
  – A scheduled process

• Bridge Update Task
  – A scheduled process with frequency limits

• Port Update Task
  – Executed by a process or an interrupt

• Transmit BPDUs
  – A scheduled process
BPDU Reception

• Compares received info with existing info
  – better information substituted
• Pending flags record other events
  – 'topology change notification', etc.
• Signals 'new info' if new or aged info.
• Initiates port update, schedules bridge update if 'new info'.
Bridge Update

- Selects 'root port' and 'alternate root port'
- Selects 'designated', 'alternate', and 'backup' ports
- Runs port update for root port
  - May generate signal for all other ports
- Runs port update for all other ports
  - May generate signal for root port
Topological Change Handling

• Topology change propagation per port
  – 'tc_while' timer per port
  – set for short time
  – for a long time on links to legacy bridges
• TCNs sent periodically on Root Port
• TCs sent on Designated Ports
New BPDU Formats

• State not commands
  – Add sender's port role and port state
  – Add 'sync' flag
  – Sufficient to encode 'designated indication' and 'designated confirmation'

• Add 'tcn' indication to config BPDU
  – Reduces # of PDUs sent, simplifies decisions
New BPDU Formats

• Migration
  – New version: problem from last meeting
  – New flags in existing version: illegal
  – Migration to Ethernet on pt-to-pt links?