Enterprise PTP profile

Doug Arnold, Symmetricom

Heiko Gerstung, Meinberg

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Why an enterprise profile?

- Many IT organizations deploying PTP
  - Looking for ~ µs precision
  - Measuring 1 way network delays
  - Measuring duration of multi-device operations
  - Determining the age of time stamped data
  - E.g. financial transactions
  - Other applications may follow
- Current NTP not precise enough

Why the IETF?

- IEEE 1588 committee only defined default profile
  - Telecom Profile: ITU
  - Power Profile: Protection Relay Society in IEEE
  - Audio Visual Bridges: IEEE 802.1
  - Test and Measurement: LXI Consortium
- Enterprise Profile is for IT community
  - Layer 3
  - LAN/WAN
  - IETF has the most expertise in this application domain

Requirements

- Ordinary Clocks and Slaves can operate with no configuration with a predictable behavior based on the settings of the best master.
  - Auto discovery/Plug and play
  - Telecom Profile requires that all slaves are configured
- Can scale up to networks with many subnets
  - Layer 3
  - Power Profile is Layer 2 only and requires TCs
- Robust in the presence of malfunctioning PTP devices
- Accommodate complex servo-filters
  - To reduce queuing noise
  - Higher packet rates allowed

Hybrid PTP in the Field

- The following slides describe the behavior of hybrid PTP operation
- Independently developed by two equipment vendors
- Also independently developed by a Network Architect at a financial company
  - Who rolled his own PTP solution
- Something similar to this going to made into a standard by some organization
  - TICTOC is probably the best home for this

PTP settings: Required

- Hybrid mode PTP
  - End to End Delay Measurement Mechanism
  - Multicast Sync and Announce Messages
  - Unicast Delay Request and Delay Response Messages
  - Minimize PTP traffic
- Layer 3 IPv4 and/or IPv6
  - If both are present, they are treated like separate networks
- Slaves must be able to operate in a network with Alternate Masters
  - For redundancy, integrity checking, ensembling, …

PTP Management Messages

- PTP Management Messages are optional
- Any PTP Management Message which is relevant to only one PTP device must be sent in unicast to that device
  - To reduce multicast traffic generated by devices with management capability

Message Rates

- Default rates
  - Announce Interval: 1 sec
  - Announce Time Out: 3 Announce Intervals
  - Sync rate 1/sec
  - Delay Request rate = 1/sec
- Announce Interval, and Time Out must not change
  - To avoid master oscillating
- Sync and Delay Request rates can be set by the user to different rates

Message TLVs

- Announce Message should carry a TLV advertising hybrid or multicast/hybrid capability

- Sync and Delay Request Messages should have a source address TLV

  - In case of 1-step Transparent Clocks

- TLV details TBD

PTP Options

- Allowed
  - Alternate Master
  - Acceptable Master List
  - Boundary Clocks
  - Transparent Clocks
- Forbidden
  - Alternative Time Scales
  - Master Clusters
  - Unicast Discovery/Negotiation
  - Peer to Peer Timing

Time Domains

- We anticipate networks with pure multicast PTP and Enterprise Hybrid Profile PTP
- Any Enterprise Hybrid Profile Master which is not capable of pure multicast operation must be in PTP Time Domain 4-127
- Any Enterprise Hybrid Profile Master which is capable of mixed multicast and hybrid mode must be in PTP Time Domain 0-127
- A smaller range of Domains should be reserved for the Enterprise Profile.

The question is…

- Should TICTOC develop a hybrid mode Enterprise PTP Profile?