Standards Update & Actions

Time Sensitive Networking

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With the help of many others!

Audio Video Bridging or Generation 1 AVB

- IEEE 802.1BA-2011 – AVB Systems
  - Profiles of what constitutes an AVB Device (Talker, Listener or Bridge)
- IEEE 802.1AS-2011 – gPTP (generic Precise Timing Protocol)
  - Profile of IEEE 1588
- IEEE 802.1Qav-2009 – Credit based shaper
  - Part of IEEE 802.1Q-2011 Section 34
- IEEE 802.1Qat-2010 – SRP
  - Stream Reservation Protocol – Part of IEEE 802.1Q-2011 Section 35
- All IEEE 802 Standards are Free after 6 months (but not IEEE 1722)
  - See http://standards.ieee.org/about/get/

- IEEE 1722-2011 - AVTP
  - Audio Video Transport Protocol
- IEEE 1722.1-2013 – AVDECC
  - Audio Video Discovery Enumeration Connection and Control

Gen 2 AVB – Now Called TSN - Time Sensitive Networking

- 802.1ASbt Precise Timing Protocol Gen 2 (gPTP Gen 2)
  - At Draft 0.7 Nov 2014 – but no ballot yet
  - Improve performance & supports redundancy & Link Agg & other media
  - D5 was 1st Revision PAR & taking Bridge out of the title (as it has more applications)
- 802.1Qbu Preemption
  - At Draft 1.1 Oct 2014 – Task Group ballot ended 8/31/2014
  - IET (Interspersed Express Traffic) 802.3br – At Draft 0.7 Oct 2014
- 802.1Qbv Time Aware Shaper (TAS)
  - At Draft 2.1 Oct 2014 – Working Group ballot ends 11/24/2014
  - Adds windows where non-scheduled traffic is blocked insuring lowest latency
- 802.1Qca Shortest Path Control & Reservations
  - At Draft 1.1 Sept 2014 – Working Group ballot ended 8/26/2014
  - Uses IS-IS to find all Paths through a Network – for Redundancy
- 802.1CB Frame Replication & Elimination
  - At Draft 0.4 Sept 2014. Shows proposed layering for AVB Layer 3
  - Bridges in a Ring automatically Replicate & Eliminate Duplicate frames

Other AVB/TSN Standards Updates

- P802.1Qcc Stream Reservation Protocol Gen 1.1 (SRP Gen 1.1)
  - PAR was approved July 2013 – Draft 0.1 March 2014 – Goals are to:
    - Support more Streams
    - Have configurable SR Classes and Streams
    - Support Better Descriptions of Stream Characteristics
    - Support IP Streaming
    - Have Deterministic Stream Reservation Convergence
    - Support a UNI (User Network Interface) for Routing and Reservations
    - Support 'Flashed' configurations
    - And do all this while being backwards compatible with SRP Gen 1.0
- 1722a Audio Video Transport Protocol Gen 2 (AVTP Gen 2)
  - At Draft 10 Oct 6 2014 – Goal is to be Sponsor Feb 2015 (at Draft 11 or 12)
  - PAR to change document to a Revision instead of an Amendment – Aug 2014
  - Adds frame support for LIN, CAN, FlexRay & Most (for automotive)
  - Adds enhanced Video & Audio formats
  - Adds House Clock definition (for any clock type: audio, video, control, etc.)
  - Adds Event bits for application dependent real time event information.
  - 1722 over UDP-IP Encapsulation was added to Draft 10.

Other 802.1 Updates

- 802.1Qch CQF - Cyclical Queuing & Forwarding
  - Old Peristaltic Shaper
  - PAR to be voted on Nov 2014
  - Gives worst case latency that is known even with conflicts on the wires.
- 802.1?? Urgency Based Shaper
  - PAR has not been proposed yet
  - Requires a shaper per flow – but need a shaper per flow else same as today.
  - This shaper appears to be of lower interest as Cyclical Queuing & Forwarding starts to move ahead – do we really need another shaper?
- 802.1?? The PCE (Path Computation Element) Box
  - PAR has not been proposed yet
  - Defines the entity that sets up the paths and schedules
- 802.1?? The TSN Profiles
  - PAR has not been proposed yet
  - The TSN equivalent of IEEE 802.1BA

Items of Concern

- AVB Gen 1 had 4 IEEE 802.1 Projects:
  - 802.1AS – PTP
  - 802.1Qat – SRP
  - 802.1Qav – Credit based shaper
  - 802.1BA – AVB Systems
- TSN (AVB Gen 2) Already has 6 open IEEE 802.1 Projects:
  - 802.1ASbt – PTP Gen 2
  - 802.1Qbu – Preemption
  - 802.1Qbv – Time Aware Shaper
  - 802.1Qca – Shortest Path Control & Reservations
  - 802.1CB – Frame Replication & Duplicate Removal
  - 802.1Qcc – SRP Gen 1.1
- With more being asked for:
  - 802.1Qch – Cyclical Queuing & Forwarding
  - ??? – Policing
  - ??? – TSN Systems
  - …

So what is the Concern?

- With 6 Projects currently open, I feel we need to close out/complete some of the existing Projects before I can support starting any new Projects
- This has nothing to do with the topics of the proposed Projects
- It has everything to do with “We have too much to do already”
  - There is not enough meeting time at F2F meetings or calls for all these projects
  - Members won’t have time to do quality reviews of the drafts
- The TSN group will not be going away after the 6 current open Projects are completed
- As with 802.1, the TSN group will continue to work on new standards as I am sure we have not solved all the problems yet

What can we do?

- Focus on the open Projects until we have fewer active ones
- Re-examine the Scope of the open Projects not nearing Working Group ballot
- Maybe some of the original goals are currently too difficult & need to be deferred
- Things change – We learn new things and some adjustments are needed
- Put goals that don't have content for them "on notice" that they will be dropped if no content is received by date xx/yy/zz
- Maybe its time for some "features" to be part of TSN Gen 3
- PARs do not need to be modified if "features"/goals are removed from the Scope

A Specific Example – 802.1Qcc – My Opinion

- IEEE 802.1 Qcc is sometimes referred to a SRP Gen 1.1 or Gen 1.5
- That was because some of its goals were targeted to be “easier” improvements so the AVB markets could be expanded
- Other Goals were to help connect SRP with 802.1Qca’s multi-path and to add Layer 3 support
- I think the “not so easy” goals have affected the speed of completion of the “easier” ones
- This is NOT the Editor’s fault – if the committee wants progress in certain areas, they have to contribute
- But everyone is busy, so Deadlines for contributions really help!

Looking back on 802.1Qcc's Scope

5.2 Scope:

This amendment provides protocols, procedures and managed objects for bridges and end stations that are compatible with existing mechanisms and provide:

- Support for more streams
  <EDITOR'S NOTE: MRP timer work and refresh reduction (including timer negotiation?). Talker VLAN pruning. Talker Pruning per port. Speed up make/break reservation time. Support reservations on aggregated links.>
- Configurable SR classes and streams
  <EDITOR'S NOTE: Configurable Priority, VID, Observation interval, Max latency. More SR classes. Per stream selection of Qav or Qbv, Q??, or CB. Configuration of new Qbv time-aware Shaper. Modify clause 12 and 17 to allow creation of reservations from a management interface(MIB should not say "persistent over power-up"). Energy Efficient Ethernet and its affects on latency. Effects on latency in the presence of Qbu.>
- Better description of stream characteristics
  <EDITOR'S NOTE: Configure max latency per bridge port. Lock-down current latency. Talkers and/or Listeners specify acceptable stream characteristics. Multiple talkers per stream. Two-way reservations. Tear-down rank bit. Allow latency changes from network reconfiguration. Unicast address Stream DA (is locally administered good enough?) or is this a layer 3 IP address problem? >
- Support for Layer 3 streaming
  <EDITOR'S NOTE: Interoperability with RSVP. Layer 3 IP addressing problem with multiple VLANs (PVID & SR_PVID). 268M IP multicast -> 8M Ethernet multicast: 32 IP multicasts addresses for every allocated Ethernet multicast address (01:00:5e:00:00:00 through 01:00:5e:7f:ff:ff).>
- Deterministic stream reservation convergence
  <EDITOR'S NOTE: Avoid flapping. A reboot results in restoration of same reservations (although not persistent in MIB).>
- UNI (User Network Interface) for routing and reservations
  <EDITOR'S NOTE: Connect reservation to path created by Qca, including redundant paths. IETF PCE (Path Computation Element)>

From: http://www.ieee802.org/1/files/public/docs2013/new-tsn-cgunther-SRP-enhancements-PAR-5C-0513-v05.pdf

Qcc – Reviewing each goal in detail

- Green means continue & finish up
- Black means needs contribution or it will get dropped
- Defer unless someone screams

Qcc – Support More Streams

- MRP timer work and refresh reduction (including timer negotiation?)
  - Finish up
- Talker VLAN pruning.
  - Finish up
- Talker Pruning per port.
  - Finish up
- Speed up make/break reservation time.
  - Defer
- Support reservations on aggregated links.
  - Defer

Qcc – Configurable SR Classes and Streams

- Configurable Priority, VID, Observation interval, Shaper(s).
  - Finish up – just need a MIB?
- Configurable Max latency.
  - Need text on how this is to be used – just need a MIB?
- More SR classes.
  - 1 more class? Solved by Configurable? Isn't this an amendment to 802.1BA?
- Configuration of new Qbv time-aware Shaper.
  - Finish up – just need a MIB? Is this Qcc now?
- Modify clause 12 and 17 to allow creation of reservations from a management interface (MIB should not say "persistent over power-up").
  - Need text – this is the "SR" part of "SRP" without the "P"
- Effects on latency & bandwidth – EEE, Qbu, Qbv, etc.
  - Need analysis

Qcc – Better Description of Stream Characteristics

- Configure max latency per bridge port.
  - Need text on how this is to be used – just need a MIB?
- Lock-down current latency.
  - Need text on how this is to be used – need a Protocol?
- Talkers and/or Listeners specify acceptable stream characteristics.
  - Need text on how this is to be used – need a Protocol?
- Multiple talkers per stream.
  - Defer
- Two-way reservations.
  - Defer
- Tear-down rank bit.
  - Defer

Qcc – Better Description of Stream Characteristics

- Allow latency changes from network reconfiguration.
  - Defer
- Unicast address Stream DA (is locally administered good enough?) or is this a layer 3 IP address problem?
  - Is this solved with Encaps/Decaps?

Qcc – Support for Layer 3 Streaming

- Interoperability with RSVP. Layer 3 IP addressing problem with multiple VLANs (PVID & SR_PVID).
  - Defer until the IETF work is better understood

Qcc – Deterministic Stream Reservation Convergence

- Avoid flapping. A reboot results in restoration of same reservations (although not persistent in MIB).
  - Defer? – use “Modify clause 12 and 17 to allow creation of reservations from a management interface”?

UNI (User Network Interface) for routing & reservations

- Connect reservation to path created by Qca, including redundant paths. IETF PCE (Path Computation Element)
  - Draft 0.2 has an initial proposal that is protocol independent

Thank You!

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