Audio Video Bridging Gen 2 Assumptions

IEEE 802.1 AVB/TSN Interim

Nov 2013 – Dallas, TX

Light Blue = Moved to respective Standard's Annex Z

Green Text = Agreed to at a Plenary (was Blue or Red)

Blue Text = Newly Agreed to (was Red at last Face 2 Face)

Black Text = Not Decided

Changes Marked with Red from last version

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Revision History

- avb-pannell-gen2-assumptions-1113-v17: Work done in Dallas – Removed ASbt & Qcc items to their respective Annex Z's
- avb-pannell-gen2-assumptions-0713-v16: Work done in Geneva
- avb-pannell-gen2-assumptions-0313-v15: Work done in Orlando
- avb-pannell-gen2-assumptions-0113-v13 & v14: Work done in Vancouver & before
- avb-pannell-gen2-assumptions-1112-v12: Work done in San Antonio
- avb-pannell-gen2-assumptions-0912-v11: Work done in Santa Cruz
- avb-pannell-gen2-assumptions-0512-v10: Work done in York & edited afterward
- avb-pannell-gen2-assumptions-0312-v9: Work done in Hawaii – partial update
- avb-pannell-gen2-assumptions-0112-v8: Work done in Munich
- avb-pannell-gen2-assumptions-1111-v7: Work done in Atlanta
- avb-dolsen-gen2-assumptions-0920-v6: Work done in Nanjing
- avb-pannell-gen2-assumptions-0511-v5: Work done in San Francisco
- avb-pannell-gen2-assumptions-0311-v4: Work done in Singapore
- avb-pannell-gen2-assumptions-0111-v3: Work done in Kauai – not finished
- avb-pannell-gen2-assumptions-1110-v2: Work done in Dallas
- avb-pannell-gen2-assumptions-0910-v1: 1st grouping of all STDs – stolen from below
- at-cgunther-srp-rev2-assumptions: First draft presented July 2010, San Diego, CA

Overview

This document is a collection of concepts and ideas for *possible* inclusion in the next versions of SRP (802.1Qat Gen 2) and/or the Gen 2 AVB Shaper (802.1Qbv) and/or Gen 2 gPTP (802.1ASbt) or some other new standard.

It should not be considered as a Work Item list until the entries are Green. Each non-Green item needs contributions (i.e., presentations) before it can be agreed to and considered an item to be added to a draft standard. These presentations are needed immediately.

PAR Status

- AS Amendment PAR – Approved (IEEE 802.1ASbt)
- AS Corrigendum PAR – Approved (IEEE 802.1AS-2011/Cor 1)
- Time Aware Shaper PAR – Approved (IEEE 802.1Qbv)
  - Add in Deterministic Distributed Delays (TAS part 2)? [11/12]
- Preemption PARs –
  - Approved in 802.1 (IEEE 802.1Qbu)
  - Distinguished Minimum Latency Traffic (DMLT) in a Converged Traffic Environment – IEEE 802.3 CFI was done in Nov 2012 (Winkel) [11/12]
- Multipath/Redundant SRP PAR – (Philippe/Oliver)
  - Topology Discovery & Device Capabilities – Use IS-IS - part of IEEE 802.1Qca [11/12]
  - Seamless Failover via Frame Replication and Duplicate Frame Elimination for Scheduled Traffic (IEEE 802.1CB) [11/12]

PAR Status

- SRP Amendment PAR (Rodney)
  - MACSec bandwidth & latency issue (other frame overhead)
  - Dynamic changes to bandwidth & latency
  - Report worst cast latency assuming no new reservations
  - Configurable Max Latency – per hop new way to say ‘no’ to a reservation
  - Pre-configure a reservation via MGMT/Flash (lock this down?)
  - Link Aggregation & LAN Aggregation (by Multipath?) [11/12]
  - Remove MMRP/MVRP periodic timers
  - Multiple Talkers per Stream
  - More SR Classes? or at least programmable SR Class Observation Intervals [11/12]
  - Configurable SR class priorities and VIDs ? (did we miss the MIB?)
  - Deadlock (Norm)
  - Make SRP an ISIS application (Norm)
- Use SPB-V or SPB-M?

Requirements

All performance goals are to degrade gracefully over increasing hops

General [11/12]

- Gen 2 devices need to co-exist w/Gen 1 devices - in ASbt
  - Don't want to need to modify Gen 1 Talkers & Listeners when connected to a Gen 2 cloud (of bridges) i.e., Backwards compatibility is required - in ASbt
- Need to support islands of Gen 2 bridges connected to Gen 1 or through Gen 1 bridges - in ASbt
- Need to keep IS-IS (Intermediate System to Intermediate System) parameters to a minimum - in ASbt
  - E.g., Talkers reservations need to be kept to a minimum size., but enough insure the protocol is stable – not in ASbt
  - Talker Reservations are made infrequently [1/13] – not in ASbt
    - Especially needed when they are communicated with IS-IS – not in ASbt
- Do not want to be required to run one single big instance of IS-IS for SPB (Shortest Path Bridging – IEEE 802.1aq) and every thing else that we will need for TSN – in ASbt
- Would like to be able to limit the use of IS-IS to only those features that require it such that most of the enhanced features of TSN can be used without needing IS-IS? [11/13]

General

- Goal is to allow to use the use of a slightly longer path if the shortest path is out of bandwidth or other resources – added to ASbt
  - Something like this is needed for multipath in the home over wireless & powerline
- Need to support more steams than supported by Gen 1
  - SRP today is limited to ~500 streams worst case (~4000 if the DA's and Stream IDs are consecutive)
  - Would like to see support for ?? (CraigG 1/13)
  - With IS-IS in the core with higher stream support, and Gen 1 compatibility requirements, then the Gen 1 Listeners should only get the Stream ID's of the devices they are interested in.
  - This will require Talker Pruning per port to be supported on Gen 2 bridges when talking to Gen 1 Listeners.
- Need to clearly define behavior at the TSN to/from an AVB boundary port [11/13].
- Want to support non-homogeneous TSN networks?
  - To allow easier adoption of the technology in Brown Field applications.
  - Will likely need to define how much the network degrades.
- Want to remove the need of SR_PVID 0x002 being the default SR VLAN and fix 802.1Q so that VID 0x001 is tagged for AVB/TSN ports?

Automotive Needs [7/11]

- Max Latency: 100 uSec w/5 FE hops for Control Frames
- Other Automotive Needs:
  - Max cable hop count: 7
  - Max number of nodes (bridges & end stations): 64 [3/12]
  - Max cable length: 24m
  - Max end to end cable length: 30m
- Control data attributes (assuming Coordinated Transmission) [1/12]
  - Max data size (payload/Layer 2 Data size): 128 bytes (FE), 256 bytes (GE)
  - Max number of simultaneous transmissions: 8 (FE), 32 (GE)
  - Transmission period: 500 uSec
- Payload (Layer 2 Data) size for other traffic:
  - 256 bytes (FE), 1500 bytes (GE)
- Compatibility with Bandwidth reserved Traffic [1/12]
  - Preemption helps extend the use cases [1/12]
- Where these #'s came from [1/12]:
  http://www.avnu.org/files/static_page_files/9F0A4E3F-1D09-3519-ADBA4F0C747D7640/Contributed%20Automotive%20Whitepaper_April%202011.pdf

Industrial Needs [7/11]

- Max Latency:
  - Interfering Frames (includes other same PCP frames) + Bridge Latency (not including Store Forward Latency) < 3 uSec / hop (GE only)
- Other Needs:
  - Fixed Transmission Periods – 31.25u Sec to 1 mSec
  - Max 50% of Period for Low Latency Transmissions
  - An HRM (hypothetical reference model) of 64 hops [1/12] – in ASbt
  - At most 512 devices off one controller – in ASbt
  - +/- 1uSec time sync between all nodes w/max 3ppm/sec w/125 MHz gPTP timestamp clock [1/12] (believed to be currently met by AS, but should be verified from Garner simulations) – in ASbt
  - At most 4096 streams
  - 10 to 300 byte control frame size
  - Sending ordering of frames from the Talker needs to be included?
    - Something needed in bridges too? Need a presentation on a proposed solution (Franz)
  - Meet the Redundancy requirements per given presentations [1/12]
    - Need to bring the recovery times requirement from the presentation here from Oliver (Franz) – in ASbt

Consumer Needs

- Max Latency: Does not need to be better than Gen 1 AVB [1/12]
- Other Needs:
- The maximum time to make or break an SRP reservation in the absence of a topology change or dropped SRP packets is:
  - This goal is defined per hop assuming a max of 7 hops
  - For consumer remote control applications this must not exceed 100 mSec?
- Are there new requirements to enhance interoperability between 802 and CSN networks? (Philippe's white paper)
  - Need to extend the notion of DMN in CSN to other 802.1 protocols related to AVB [1/12]
- Explicit support of heterogeneous media networks (eg. Multipath & Load Balancing [1/12]) (Philippe)
- A non-access point 802.11 station that is also a bridge to other 802 media (currently not supported in 802.11) [3/12] (Norm)
- Policing? [3/12]

Professional Needs

- Max Latency: Will use whatever gains received from other work [3/12]
- Other Needs:
- The maximum time to make or break an SRP reservation in the absence of a topology change or dropped SRP packets is:
  - This goal is defined per hop assuming a max of 7 hops
  - For professional video applications this must not exceed 20 mSec?
- Redundancy – Need to know the time requirement
- Link Aggregation
- Policing? [3/12]
- Need presentations in order to proceed [1/12]

gPTP Generation 2
IEEE 802.1ASbt

gPTP New Work - in PAR

- ~~Support for Link Agg (IEEE 802.1AX) – in ASbt~~
- ~~Support for other media:~~
  - ~~IEEE 1901 (if changes are needed) – in ASbt~~
  - ~~WiFi Direct (if changes are needed) – in ASbt~~
  - ~~Others?~~
- ~~Alternate Timescales (e.g., transport time zone information) – in ASbt~~
  - ~~Agreed to two time domains (domain 0 for universal time; any one of the 1 – 127 can be for working clock) – in ASbt~~
- ~~One Step Tolerant on receive – in ASbt (but problems with pDelay as you don't see t3)~~
- ~~Look at improving performance for long daisy-chained time-aware systems (or long networks) that may be in a large ring~~
- ~~Look at Faster Grand Master change over~~
  - ~~Pre select a failover Grand Master so the selection when needed is faster~~
  - ~~Support both Hot and Cold standbys [11/12]~~
- ~~Redundancy~~
  - ~~Short reconfiguration w/redundant paths when one path fails~~
  - ~~Look for the holes/issues in a redundant/failover system?~~
- ~~Automatic measurement of link delay asymmetry~~

gPTP New Work - in PAR

- ~~Detect buffered repeaters on other than 802.3 copper links~~
  - ~~Add in a variable latency in the link delay as an enhanced mechanism? Maybe a MAC address discovery?~~
  - ~~Need an alternate mechanism for long (fiber) links~~
- ~~Create an Annex to show Grand Master Re-election time~~

gPTP Possible New Work

- ~~Reduce BMCA convergence time/work for large (>64 node) networks &/or when a loop exists~~
  - ~~Use IS-IS for this [5/12]? But maybe not part of Qca so gPTP can be self contained?~~
  - ~~See Mick Seaman's work on loop detection – Will not consider unless a contribution is supplied [1/11]~~
  - ~~Large (64+) node networks force a lot of data examinations~~
- ~~Provide L2 timing information for 1588v3~~
  - ~~Update L2 abstract interface information for 1588v3~~
  - ~~Goal is to meet/liaison with 1588v3 [1/12] Michael is it ←!~~
- ~~Work with 1588v3 to provide end-to-end quality information~~
  - ~~Common service interface and information exchange~~
  - ~~Is there a way to report clock quality and how shall clock quality be defined over the path it took? [1/12]~~
- ~~Remove the word 'bridge' from 802.1AS title & elsewhere [3/12]~~
  - ~~It can work through routers too and other devices [3/12]~~
  - ~~This will require a revision PAR to get this done [9/12]~~

gPTP Possible New Work

- ~~AS Reconfiguration Times [1/12]~~
  - ~~Define What a reconfiguration is?~~
    - ~~Death of a Master~~
    - ~~Loss of a path to a Master~~
    - ~~Multiple simultaneous Masters?~~
    - ~~Pre configured paths? (Franz)~~
  - ~~Grand master change over time is 200 mSec [3/12]~~
    - ~~Time interval between loss of old Grand Master and locking to the new Grand Master by the slave?~~
    - ~~Multiple Grand Masters transmit timing trees at exactly the same time?~~
- ~~Add full (within reasonable limits) support for TLV rate changes from Slave port to its Master port & modify figure10-8 accordingly [5/12]~~
- ~~Each bridge to report its worst case Time Stamp accuracy – i.e. what clock rate is it sampling on and what is the worst case uncertainty of PHYs, etc. [5/12]~~
- ~~Fig 10-3 problem with current GM when its PRI 1's is downgraded lower than another node in the network? Not sure what it does. [5/12]~~
  - ~~The current GM won't stop being the GM? [11/12]~~

gPTP Possible New Work

- ~~No requirement for a higher priority GM joining a network to 1st sync to the existing GM – this causes a jump in time – solve this? [11/12]~~
- ~~Avoidance of BMCA Thrashing vs. Faster Switchover to a GM [11/12]~~
  - ~~Need to know what is more important – or do we make this selectable – Default is?~~
- Geoff to send additional items from the corrigendum feedback [11/12]
- ~~<new stuff goes here>~~

gPTP – Won't Work On

- ~~Security (need the requirements and level of needed security)~~
- ~~Mapping between NTP & AS (applicable to 1588) – Will not do [1/11]~~
- ~~No One Step support on transmit~~
- ~~Hardware Two Step (immediate follow up) – No spec change needed~~
- ~~How to assess the synchronization performance of a node~~
  - ~~For certification – Will not do (Jan 2011)~~

Time Aware Shaper (TAS)
IEEE 802.1Qbv

Qbv Definitions [5/12]

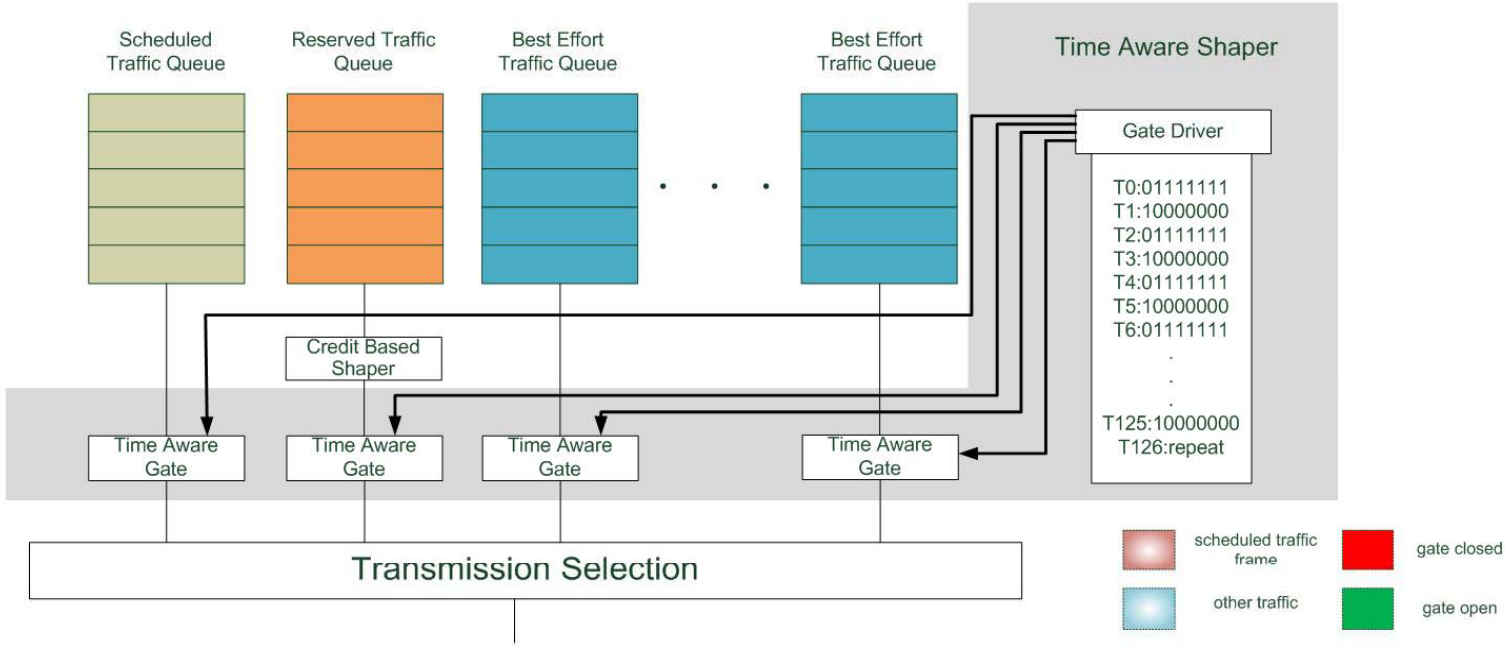
- Definitions are now in the Draft and how to communicate this in a protocol is changing – so the definitions will be changing

Qbv Issues

- Shaper Types:
  - Scheduled – IEEE 802.1Qbv
  - Credit based – IEEE 802.1Qav

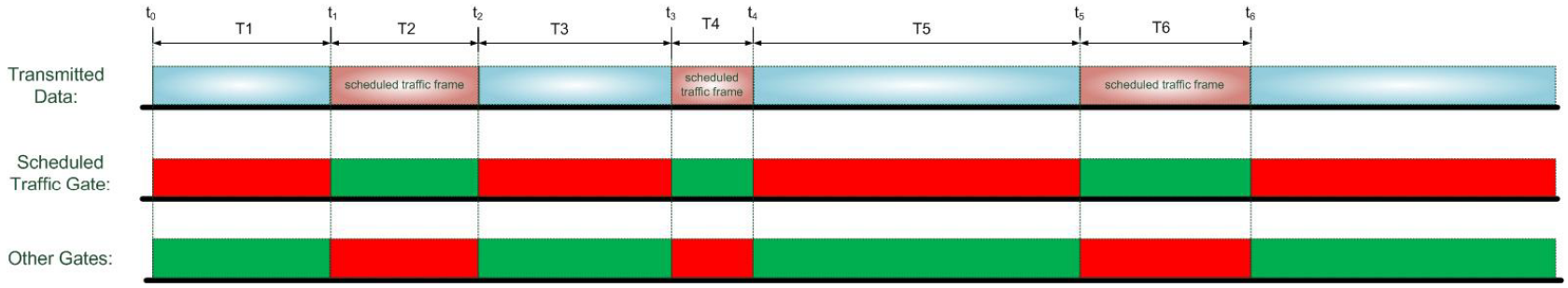
- Qav HiLimit needs to be looked at (at least its definition) at as the Qbv gates must be AFTER the Qav Shaper (i.e., before the Scheduler). [9/12]

Possible Qbv Architecture



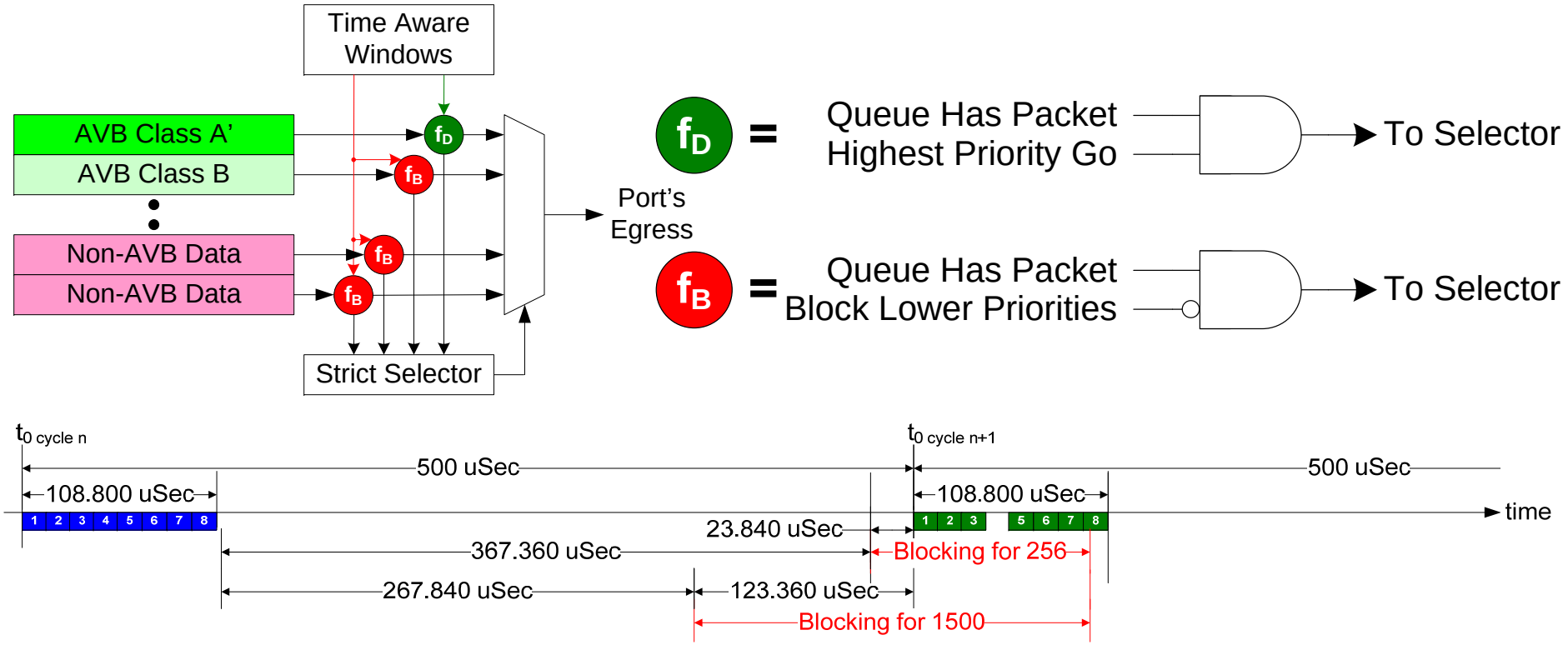
t_R = reference time

$$t_x = t_R + (n \cdot \sum_{i=0}^{126} T_i) + \sum_{i=0}^{x} T_i$$



TAS Ideas [1/12]

- From New-pannell-latency_options-1111-v2:
- Proposed location of the two types of TAS shapers (Blocking and De-Blocking) with example of use of the Blocking Window



TAS Ideas [1 & 5/12]

- Needed Points in time [1/12]:
  - Don't start sending a non-critical (and preempt transmission if needed)
  - Start sending critical (t0)
  - Enable non-critical
- How does a Time Aware Network come up? – in ASbt
  - What if the GM changes & you get a step in time? [11/12] – in ASbt
- How to handled Scheduled frames that arrive outside the transmission window?
  - Options are to drop or transmit or hold until the next window
  - If its outside the window is it too early or too late?
  - Was this frame for the right window? Will testing for this be in the standard? No
- Will support Per queue (per port) with 1 to n windows per cycle [5/12]
- Will not do this per stream. This is currently out of scope for a bridge. [11/12]

TAS Ideas [5/12]

- How are we going to support simple Qbv configurations in the network?
  - Extend SRP? Or IS-IS? Or?
- Need a way to tell SRP how much link bandwidth is left after Scheduled traffic is accounted for
  - Given a particular schedule for the Scheduled traffic, what remaining Guarantees can SRP continue to give? [11/12]
  - SRP to use this new link bandwidth as it does presently, i.e., SR Class streams are to use no more than 75% (default) of the new link's stated remaining bandwidth?
  - Or make sure the SR Class streams always leave at least 25% (default) for Best Effort traffic?
  - The worst case latency needs to be accounted for as well
  - Do all Scheduled flows need to be configured before any plug-n-play SR Classes can be reserved?

Other Shaper Ideas

- Improve Latency
  - Configurable credit-based Shaper that defaults to the Non-Engineered LAN settings? (i.e., use 802.1Qav)
    - To allow less latency by reducing the spreading out of frames with less than the max (75%) reservations [1/12]
    - We need a presentation [11/12]
  - Positive Based shaper (MJT)
    - To reduce the permanent delay and/or other pathological cases? [1/12]
    - We need a presentation [1/12]
  - Burst Limiting Shaper (7/12 presentation from Goetz)

Redundancy Ideas
General

Redundancy Definitions [11/12]

- Static Redundancy:
  - N+M - N+M copies of the data where N copies are required
  - 1+1 - Redundant Links & Redundant Data
  - 2+1 - Voting system with 2 out of 3 required (2oo3)
- Protection Switching:
  - N:M - M Redundant Link(s) for N service link(s)
  - 1:1 - Redundant Links with 1 link as a hot standby
- Active Topology Control:
  - 802.1 standards: SPB, MSTP
  - Central Control or …

  - '+' means redundant data is sent on multiple links
  - ':' means one copy of data is sent on active path(s) only
  - '?' means there may not be an alternate path

Redundancy Definitions [11/12]

- Redundancy Mechanisms:
  - 2oo3 - Voting system with 2 out of 3 required

Redundancy Definitions [11/12]

- Redundancy Matrix:
  - We will fill out this matrix per selected Redundancy Protocol to show what that protocol covers
  - It is just a place holder for now

Redundancy Matrix	System/End Device Redundancy				Media Redundancy			
	Single Network		Multiple Networks		Single Network		Multiple Networks	
Without failover time								
Automated recovery with failover time								
Manual recovery (with failover time)								

Stream Reconfiguration Times [7/11]

- Gen 1 AVB's Reconfigure time = T_rec_routing (RSTP time) + T_rec_SRP (SRP time)
- Pre-Reserved – Goal is a reconfiguration time = T_rec_routing (RSTP time)
  - For example: Discovery of all possible paths to a Listener such that flows will propagate out all Bridge ports until a Blocked port is reached. Link Cost & Stream Reference Count can then used to limit the discovered paths to two (MGMT can limit the available paths further).
- Seamless – Goal is a reconfiguration time of = 0
  - For example: Where a Listener receives more than one copy of a stream on more than one port and it can select which one to use in real time.

SRP Generation 2 Ideas

SRP – Possible New Work

- ~~Dynamic bandwidth reservations (modify 'on the fly') –~~ in Qcc
  - ~~Done by requesting the same Stream ID with a new T-Spec? –~~ in Qcc
  - ~~Will not consider unless a contribution is supplied (Jan 2011) –~~ in Qcc
- ~~Variable bit rate reservations (statistical averaging) –~~ in Qcc
  - ~~Currently a video stream must reserve the max it will use –~~ in Qcc
  - ~~Still want to be able to Guarantee all streams are delivered (by sneaking into the 25%, which is the non-AVB bandwidth?) –~~ in Qcc
  - ~~Will not consider unless a contribution is supplied (Jan 2011) –~~ in Qcc
- ~~Dynamic changes to latency (CG) –~~ in Qcc
  - ~~Due to redundancy –~~ in Qcc
  - ~~Due to MGMT reconfiguration of a bridge –~~ in Qcc
    - ~~Change in Fan-in –~~ in Qcc
    - ~~Class % allocated –~~ in Qcc
  - ~~Due to Multiple Talkers – due to multi-Talker to one Listener –~~ in Qcc
- ~~Add the ability to get current worst case latency assuming no new reservations (CG) –~~ in Qcc
  - ~~Report Max size interfering frame that is smaller than 1522 if that is all a Talker node needs to Tx –~~ in Qcc
  - ~~Lock down the configuration by reporting SRP failed for any new requests? –~~ in Qcc

SRP - Possible New Work

- ~~Configurable Max Latency parameter that can prevent a reservation –~~ in Qcc
  - ~~Add support for a new lowest latency Class (i.e, 2 or 3 Classes in one LAN) –~~ in Qcc
  - ~~On a per port and/or per bridge basis –~~ in Qcc
- ~~Add a Tear Down Rank bit? –~~ in Qcc
  - ~~So a newer stream can stay when bandwidth is needed elsewhere? –~~ in Qcc
  - ~~Need to consider comments received from previous Qat ballots (Mar 2011) –~~ in Qcc
- ~~Be able to create or pre-configure a reservation via MGMT/Flash (CG) –~~ in Qcc
  - ~~For quick boot up or setup via management objects –~~ in Qcc
  - ~~Can this be done and the system remain conformant to the current standard? –~~ in Qcc
  - ~~Is there currently a way to add a reservation through management (MIB)? –~~ in Qcc
- ~~Explicit path reservation – like Talker Advertise pruning to save network & CPU bandwidth by reducing flooding? –~~ in Qcc
  - ~~Needed for Redundancy? –~~ in Qcc
  - ~~Intent is to make things as simple as possible but built on SRP –~~ in Qcc
  - ~~Advertise Pruning on receipt Listener Ready –~~ in Qcc
  - ~~Needed to reduce traffic on Multipath reservations –~~ in Qcc

SRP - Possible New Work

- Link aggregation – in Qcc but not marked as green
  - With and without redundancy – in Qcc but not marked as green
- ~~Redundancy (Philippe)~~ – in Qcc
  - ~~Spanning the range from no single points of failure to up to two completely independent paths with copied data http://www.ieee802.org/1/files/public/docs2010/at-kleineberg-goetz-AVB-redundancy-1110.pdf~~ – in Qcc
  - ~~The redundant path may be statistically over subscribed~~ – in Qcc
  - ~~Protocol neutral interface to layer 2 redundancy mechanisms~~ – in Qcc
  - ~~Need to be able to determine stream recovery times & decision metrics~~ – in Qcc
  - ~~Need to be in sync with RSTP, MSRP or allow streams to egress Blocked ports?~~ – in Qcc
  - ~~Need to look at Shortest Path Bridging & ECMP?~~ – in Qcc
- ~~Energy Efficient Ethernet~~ – in Qcc
  - ~~Remove MMRP/MVRP periodic timers on EEE links (or all the links)~~ – in Qcc
  - ~~Rest may be solved in 802.1BA (What does this mean?)~~ – in Qcc
  - ~~Is this a generic MMRP/MVRP issue that needs to be solve in Q, or an AVB specific issue that can be solved in an amendment to BA?~~ – in Qcc
  - ~~Many other protocols interfere with EEE, is fixing just MMRP and MVRP really something that we should be concerned with?~~ – in Qcc
  - ~~The feeling of the group in Nanjing is that we not address this problem.~~ – in Qcc
- ~~Unicast address Stream destination address~~ – in Qcc
  - ~~What is the real problem here? Makes Policing harder.~~ – in Qcc
  - ~~Streaming HTTP on top of TCP use an address passed to it by DNS~~ – in Qcc
    - ~~Can be detected and fixed? (i.e., make it a multicast on the AVB LAN)~~ – in Qcc

SRP - Possible New Work

- ~~Multiple Talkers per Stream (one streaming at a time)~~ – in Qcc
  - ~~Networked video switcher~~ – in Qcc
    - ~~Switch on a bit in a stream or switch at a specific time?~~ – in Qcc
    - ~~Or do the Talkers to all the turning on or off (i.e., the MUX'ing)?~~ – in Qcc
      - ~~Need the concept of a Group Reservation~~ – in Qcc
- ~~Multiple Talkers per Stream (time sliced approach) (Franz)~~ – in Qcc
  - ~~Industrial control~~ – in Qcc
  - ~~http://www.ieee802.org/1/files/public/docs2010/at-goetz-AVB-lowlatency-part1-0510.pdf~~ – in Qcc
- ~~More SR Classes - Yes, new 'named' performances need to be defined (CG)~~
  - ~~Some applications need better than 2mSec over 7 hops of FE~~ – in Qcc
- ~~Support More PCPs? Hopefully no more than 2 SR Classes at a time are needed.~~ – in Qcc
  - ~~Allow 'moving' specific applications to specific performance levels?~~ – in Qcc
    - ~~i.e., have many SR Classes but by default only two PCP's can be in use at one time?~~ – in Qcc
    - ~~Does any environment need more than 2 PCP's?~~ – in Qcc
- ~~Configurable SR class priorities and VIDs~~ – in Qcc
  - ~~Need service primitives (e.g. REGISTER_DOMAIN.request/indication), management (clause 12), or SNMP (clause 17) to do this currently~~ – in Qcc

Other Q Enhancements

- ~~Gateway between conflicting SR Class domains – already solved as Qat requires that both SR Class and PCP match~~ – in Qcc
- ~~Reduce Latency (Yong)~~ – in Qcc
  - ~~Bursting concerns~~ – in Qcc
  - ~~Configure the characteristics of each Class's Qav Shaper~~ – in Qcc
  - ~~Preemption~~ – in Qcc
  - ~~Other options~~ – in Qcc
- ~~Automatic Talker pruning? – this is not easy~~ – in Qcc
  - ~~Should be addressed by 'Explicit path reservation'~~ – in Qcc
- ~~Need to fix SRP to support Ingress VLAN membership checking so a Talker needs to issue an MVRP join request to the VLAN it is using for flows. (CG)~~ – in Qcc

Other Q Enhancements

- ~~Enhance MRP to use difference-based updates rather than complete database updates (reduces bridge CPU overhead and control bus bandwidth usage) (Tony)~~ – in Qcc
  - ~~Another goals is to support a larger attribute set~~ – in Qcc
  - ~~May have periodic updates of a portion of the database~~ – in Qcc
  - ~~Or don't do updates at all – only do Register / Deregister?~~ – in Qcc
- ~~Make Observation Intervals Changeable [11/12]~~ – in Qcc
  - ~~Latency will be affected accordingly [11/12]~~ – in Qcc
  - ~~This is a new mechanism that will create a boundary port [11/12]~~ – in Qcc
  - ~~This is a possible solution of the so called Time Sliced Multiple~~ – in Qcc
    ~~Talkers as it supports much smaller minimum reservations [1/13]~~ – in Qcc
- ~~Configurable SR class priorities and VIDs~~ – in Qcc
- ~~Add in Andre's comments to SRP.~~ – in Qcc

Other Q Enhancements [3/12]

- ~~Need an SRP mechanism to set the Qbv Schedule window & interval globally for easy configuration (don't want to have to touch every bridge manually) (Rodney – 3/12)~~ – in Qcc
  - ~~May use a new signaling protocol e.g., SRP V2 (1/13)~~ – in Qcc
- ~~The existing SRP also needs to know the Qbv information so that it can take this into account when calculating a port's remaining bandwidth (Christian – 3/12)~~ – in Qcc
  - ~~So it can reserve no more than 75% of the remaining bandwidth (1/13)~~ – in Qcc
- ~~What do we do with Scheduled frames that miss their window? Drop? Transmit it anyway?~~ – in Qcc
  - ~~Qbv doesn't make a distinction between Scheduled frames and non-Scheduled frames; all queues are scheduled – i.e., can't do anything special~~ – in Qcc

SRP - Other Ideas

- ~~Cloud diagnostics (devices along the path) – Craig G. ask~~ – in Qcc
  - ~~Perhaps 802.1ag? IS-IS will at least provide connectivity information and that is what Craig is asking for.~~ – in Qcc
  - ~~If more than this level of diagnostics is needed we need a presentation.~~ – in Qcc
- ~~Ingress policing/monitoring~~ – in Qcc
  - ~~Someone's talking when they shouldn't be~~ – in Qcc
    - ~~Talking without a reservation~~ – in Qcc
      - ~~The stream's DA is not known in the filtering database~~ – in Qcc
        - » ~~If SRP traffic is the only traffic allowed in specific VLANs then flooding of unknowns can be disabled in those VLANs by 802.1Q Clause 8~~ – in Qcc
      - ~~The frame's PCP is AVB (i.e., PCP matches an SR Class) to a unicast DA that not locally administered~~ – in Qcc
  - ~~Talking too much for the amount reserved~~ – in Qcc
    - ~~Exceeding the reservation~~ – in Qcc
  - ~~Is this perfect policing or less than perfect policing?~~ – in Qcc
  - ~~Must it stop a Denial of Service attack? Policing is already in IEEE 802.1ad (see Q-2012 8.6.5) would like the interworking group to educate us on the available tools (to be done at the March 2012 meeting)~~ – in Qcc
  - ~~Need presentations here else this will be defined outside of 802.1~~ – in Qcc
    - ~~This could end up being an Annex in the Specs stating how to use what is already there~~ – in Qcc

SRP - Other Ideas

- ~~802.1AE (MACsec) environments?~~ – in Qcc
  - ~~Any AVB Streams and PTP & SRP frames can be AE Tagged? Yes, but we need to communicate the max final frame size to SRP (1/13).~~ – in Qcc
  - ~~Clean up the interface between the link and SRP? See above (1/13)~~ – in Qcc
  - ~~One known issues with MACsec is frame expansion that will increase the bandwidth usage~~ – in Qcc
  - ~~Does the MACsec block cipher's variable delays affect gPTP timing accuracy? - in Asbt~~ – in Qcc
    - ~~This depends upon where MACSec vs. Time Stamping is performed (1/13) in Asbt~~ – in Qcc
    - ~~Do we need to support all options via reporting accuracy & jitter? (1/13) – in Asbt~~ – in Qcc
- ~~PONs are currently not specifically supported (Yong)~~ – in Qcc
  - ~~i.e., PON support is dependent on contributions from those that need it~~ – in Qcc

SRP - Other Ideas

- ~~How will MSTP select an SRP path over a CM (Congestion Management) path or a non-SRP/non-CM path using 'out of the box' defaults? (MJT)~~ – in Qcc
  - ~~This needs to be taken care of by IS-IS & SRP V2 (1/13)~~ – in Qcc
  - ~~For AVB with non-AVB devices: Use MSTP with at minimum one spanning tree instance and set AVB to AVB path costs low (match terms in capability vectors) and playing with root costs using MSTP's priority vector?~~ – in Qcc
  - ~~MJT will form an interest group to resolve.~~ – in Qcc
- ~~SRP for Layer 3? IETF issue?~~ – in Qcc
  - ~~Need an Internet Draft how RSVP can use SRP (Subnet Bandwidth Manager – SBM)~~ – in Qcc
  - ~~MJT is driving an joint IEEE & IETF task group – see next page (1/13)~~ – in Qcc

SRP – Joint Work w/IETF (1/13)

- ~~This page is for MJT to report back status of the communications between TSN and IETF (1/13)~~ – in Qcc

SRP - Other New Notes

- ~~As per the discussion with 802.11aa (on March 17, 2011 in Singapore) they are targeted to be published in May 2012. We need to replace the duplicate Q Annex C diagrams and discussions relating to 802.11 with appropriate references and text. (CG will supply the required changes to the new editor 1/13)~~ – in Qcc
- ~~Do we want to resurrect per port Talker Pruning so low end products can work in large networks? This is an SRP V2 issue. (CG 1/13)~~ – in Qcc
  - ~~Requires a presentation (CG 1/13)~~ – in Qcc

SRP - Other New Notes

- ~~Introduce an SRP Class Z? that uses a non-AVB PCP but uses a high (6?) PCP for best effort flows. Needed for flows where the max bandwidth of the flow is not known (i.e., it doesn't have T-Spec). This allows these flows to get gPTP, SRP path selection & Gen 2 redundancy without the delivery guarantee. Target MKT is consumer. (Philippe)~~ – in Qcc
  - ~~Need presentation (Philippe to present in 3/13)~~ – in Qcc
- ~~SRP creates its own data path tree?~~ – in Qcc
  - ~~Multipath (Philippe)~~ – in Qcc
  - ~~This will be solved with IS-IS (1/13)~~ – in Qcc

Preemption
IEEE 802.1Qbu

Qbu Definitions

- Preemptable frame – a frame whose transmission can be interrupted, and its transmission is resumed from the point of interruption [1/13]
- Preemptive frame – a frame that can interrupt the transmission of a Preemptable frame [1/13]
- Preemptive queue – a queue containing Preemptive frames [1/13]
- Preemptable queue – a queue containing Preemptable frames [1/13]

MAC Service I/F Ideas [1/12]

- Preemption to be multi level [7/11]? Two at most? (CG)
  - Large (i.e, Jumbo) frames can be supported with AVB flows with Preemption by inference [7/11].
  - Max need of Two “Latency Controlled” Classes for automotive. Industrial? Others?
- Number of Levels of Preemption = 1? (i.e. 2 receive queues)
- Need to tie in TAS to preemption’s resumption of the preempted frame (the interface changes to the MAC need to take this into account)
  - We need presentations on what the corner cases are here (CB – 1/13).
- After the cause of the preemption is done, does the MAC have to continue with the preempted frame? [1/13]
  - Can an AVB frame that is ready be transmitted before the preempted frame? It can if it can guarantee that it will not need to be preempted if there is only 1 level of preemption [1/13]
- The frame including its FCS delivered up the stack for a fragmented frame should not be different from what it would have been had the frame been received unfragmented

Preemption Ideas [1/12]

- Each queue is configured for its frames to be Preemptive, Preemptable or neither.
  - This allows AVB Gen 1 Class A or Class B can preempt, or Class A only or …
- BA ver 2: Does the (default) 75% max AVB bandwidth allocation need to change in any way with preemption? Yes, need presentations here [1/13]
- BA ver 2: Is preemption enabled by default if its link partner is also capable? Need presentations here.

BACKUP SLIDES AND ADDITIONAL INFORMATION

Dynamic bandwidth reservations

- Application
  - Listener surfs from HD channel to SD channel and bandwidth requirements shrink
- Concerns
  - Bandwidth may not be there for SD to HD channel surf. How does Listener request change from Talker? TSpec has been removed from Listener.
- Solutions?
  - On a TV application like this the application needs to reserve the max bandwidth it will ever need. Channel changing from the same source is not done by breaking and re-making an AVB reservation. [1/13]

Variable bit rate reservations

- Application
  - More video channels for a given medium since statistically not every channel will need full bandwidth at the same time – with knowledge that this will not get an absolute guarantee [1/13]
- Concerns
  - What happens when instantaneous requirements exceeds available bandwidth?
  - Also could affect Qav shaping
- Solutions?
  - Temporarily steal bandwidth from Best Effort traffic. Make sure variable bandwidth reservations don't exceed ?95%? of total link bandwidth?
  - Drop precedence?
  - Need a proposal to proceed here before we can proceed [1/13]

Dynamic changes to latency

- Application
  - Management reconfigures the Class A % of bandwidth marker
  - Management reconfigures maximum latency in a bridge and prevents additional reservations if this limit is exceeded
  - Management activates more AVB ports
  - Changes in a links bandwidth (e.g., a wireless link) [1/13]
  - Topology change of a network [1/13]
- Concerns
  - Listeners have already configured buffers
  - Increased latency could eliminate active Listeners
  - How to synchronize the change?
- Solutions
  - Need use case and proposals here [1/13]

Two-way reservations (VOIP phones)

- Application
  - Telephone and/or video conversation where both directions are needed for a useful connection [1/13]
- Concerns
  - Don't want one direction to get a reservation and then not get the needed reservation in the opposite direction. Want to accept or reject both reservations. [1/13]
- Solutions
  - Is IS-IS the solution? Need to connect the two streams together somehow. [1/13]
  - Do we want SRP V2 to handle this too? [1/13]
  - Need a presentation on solutions! [1/13]

Multiple Talkers per Stream (one streaming at a time)

- Application
  - Networked video switcher
- Concerns
  -
- Solutions?
  - Need a presentation on solutions! [1/13]

Multiple Talkers per Stream (time sliced approach)

- Application
  - Several Time Aware Talkers share one reservation where they make sure their transmissions don't overlap
    - Industrial control (http://www.ieee802.org/1/files/public/docs2010/at-goetz-AVB-lowlatency-part1-0510.pdf
- Concerns
  -
- Solutions?
  - This can't be solved by having a longer Class Observation Interval because that would increase the latency [1/13]
  - Need a presentation on solutions! [1/13]

-- Bookmark --

- Got this far in Jan 9, 2013 Call

Gateway between conflicting SR class domains

- Application
  -
- Concerns
  - Increased latency
- Solutions?
  -

Latency calculation algorithm

- Application
  - Identical operation of multi-vendor solutions
- Concerns
  - Someone needs to derive the formula
- Solutions?
  - av-fuller-queue-delay-calculation-0809-v02.pdf

Automatic Talker pruning

- Application
  - Simplified set up
  - Automatic operation
- Concerns
  - All Listeners must be capable and involved
- Solutions?
  -

Maximum time to make or break an SRP Reservation

- Application
  –
- Concerns
  – For consumer remote control applications this must not exceed 100 mSec?
  – For professional video applications this must not exceed 20 mSec?
- Solutions?
  –