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Using AVB's SRP in 802.11 (the easy way)

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Why create bandwidth reservations in 802.11?

After talking with several participants at the latest Wi-Fi Alliance (WFA) meeting In Brussels (Oct 2013) about bandwidth reservations I discovered a common theme in many of the responses:

"Wireless is inherently unreliable, what good will a reservation do?"

As currently defined in IEEE 802.1Q-2011 Annex C, SRP mandates EDCA-AC *Admission Control* and optionally supports HCCA (IEEE 802.11e-2005*). To put it kindly there wasn't much, if any, support from WFA members for HCCA. EDCA-AC didn't seem to be widely implemented either.

It's now been 3 years since SRP was published and there is still no support for it in wireless networks. Why is this so important now?

- Pro Audio customers continue to ask about wireless AVB
- Automotive is going AVB, and is becoming very interested in wireless
- Are Consumers next? Apple has enabled AVB support in their latest OS

*Note: 802.11e-2005 was a long time ago, wireless has evolved a lot since then!

How much support does AVB have today?

AVnu Alliance was formed in April 2009 to provide interoperability and certification testing for AVB, much like Wi-Fi Alliance does for 802.11. A list of members can be found here. Professional Audio products are available and some very large installations are now requiring AVB!

In addition there are a several large automotive companies working with AVnu to generate requirements for the next generation of AVB (IEEE 802.1 TSN).

Open Alliance has generated significant participation from automotive and technology industry leaders. They are focused on widespread adoption of Ethernet in Automotive networks. Rumor has it that late 2013 production started on at least one Ethernet AVB vehicle.

Ethernet & IP @ Automotive Technology Day is a great place to see what is going on with AVB in vehicles.

FYI: Just for the sake of scope Ford sell's an F-150 pickup truck every ~45 seconds (763,402/yr). 3

AVB over 802.11; a bit of history (for reference)

AVB is defined by four main IEEE 802.1 standards:

- IEEE 802.1AS-2011 Timing and Synchronization

- IEEE 802.1Qat-2010 Stream Reservation Protocol (802.1Q-2011, cl. 35)

- IEEE 802.1Qav-2009 Queuing and Forwarding (802.1Q-2011, cl. 34)

- IEEE 802.1BA-2011 Audio Video Bridging (AVB) Systems

Additional standards associated with AVB:

- IEEE 802.11v-2011, cl. 10 Timing Measurement (802.11-2012, cl. 6)

- IEEE 802.11aa-2012, cl. 6 Reservations (ADDTSRESERVE, Higher Layer Stream ID)

- IEEE 1722-2011 Stream Transport Protocol

- IEEE 1722.1-2013 Device Discovery, Enumeration, Connection & Control

- IEEE 1733-2011 Layer 3 Transport

Again: Why create bandwidth reservations in 802.11?

AVB provides a single protocol suite that runs over multiple physical layers (802.3, 802.11, MoCA). We want to be able to offer wireless products that can take advantage of that infrastructure.

- There are many situations where wireless works very well and AVB can make it work even better

- Wireless solutions have been developed that utilize AVB Timing

- Supporting SRP will reduce bandwidth requirements on the wired network

- Supporting SRP greatly reduces the annoying start-to-play delay

- SRP defines how to automatically create the 802.11 TSPEC

- Customers want A/V from a wired AVB network on their wireless devices

Is partial SRP support an option? Yes!

The 802.1 AVB (now TSN) Task Group has learned a lot in the last 3 years. Customers understand that in some situation wireless may have performance problems; however they still want content from their media servers delivered wirelessly. In situations where wireless is performing well they want the increased performance of AVB.
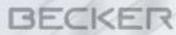
Initially AVB compliance for wireless was as strict as it was for wired. We've come to realize that there is some middle ground that will give customers acceptable performance. If wireless devices on the edge of the wired network can request and/or provide A/V content "in the best way possible" it will be good enough for many situations.

The "proposal"

- **Now**: EDCA-AC and HCCA are difficult; don't require them yet, if ever.

- **Now**: Simply implement the SRP control protocol without performing the related reservation actions (i.e. just fill out the TSPEC and pass SRP packets through the wireless network). 802.11ak along with 802.1Qbz may make this much simpler.

Immediate benefits of "Now" work:
1. *Network agnostic stream setup across wired/wireless*
2. *Wireless end points can stream AVB-based A/V*
3. *Audio will stay in sync after recovery from wireless link "hickup"*
4. *Use wired AVB as backbone for synchronized distributed wireless*
5. *Don't need 2x bandwidth on wired side to support wireless (100 Mbit/s)*
6. *No hardware changes required!*

- **Future**: IEEE 802.11ac-2013 and IEEE 802.11ad-2012 have created some interesting new technologies that may help with reservations; therefore if something better than EDCA-AC or HCCA comes along use that technology to reserve bandwidth. Is there anything that the 802.1TSN TG should be aware of from 802.11/WFA?