

AVB Gen 2: Engineered / Non-engineered

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Confirming Assumptions

- How do we achieve consistent configuration of AVB Gen 2 features in applicable end-stations and bridges?
 - Preemption , scheduled shaper, ...
- Engineered
 - Login to each bridge to read/write MIB values (static)
 - E.g. LLDP for discovery, SNMP for MIB
- Non-engineered
 - End-stations use protocol to configure bridges (dynamic)
 - Read/write of MIB is implicit
 - E.g. AVB Gen 1 (SRP & 802.1AS)

Non-engineered same as Plug&Play?

- Plug&Play: Easy to get up and running
 - E.g. user connects talker, listener, and bridge from three different vendors... everything works
 - Ideally no user interaction, but sometimes needed
 - User doesn't need to be a networking expert
- Plug&Play implies higher layer interoperability
 - Layer 3 and higher to negotiate payload content, etc
 - Out of scope for 802.1
- Not same, but Plug&Play requires non-engineered (802.1 protocol)

Industrial/Embedded Device Profiles

- Concept in higher-layer industrial Ethernet protocols
- Higher-layer specifies core features
 - Discovery, configuration, real-time data, best-effort, ...
- Application areas specify use of higher-layer
 - Factory / motion, rail, elevator, medical, ...
- Device profiles per application area
 - E.g. Elevator: drive, position, landing control, car door control
 - Goal: Easy exchange across vendors
 - Standard configuration, similar to MIB
 - Standard real-time data (control)



Typical Use of Device Profiles

- Programmable controller connected to many devices
 1. Add new device to network (physically)
 2. Add device using software tool (logically)
 - Tool discovers device and configures using profile
 - Tool adjusts real-time schedule automatically
 - User changes defaults as needed
 3. Edit control program to read/write real-time data
 - Device's data is determined by profile
- Many industrial protocols refer to this as “Plug&Play”

Typical Use of Device Profiles

(New Step if AVB Gen 2 Engineered)

1. Add new device to network (physically)
2. Add device using software tool (logically)
3. Login to each bridge so that software tool can make AVB Gen 2 changes
 - Cumbersome for large networks
 - Bridges may not have been shown in tool previously
4. Edit control program to read/write real-time data

Does Industrial Require Plug&Play?

- Yes
 - Key aspect of usability and marketing message
- Mitigations if AVB Gen 2 is Engineered-only
 - Require login to each bridge?
 - Worse usability than today's industrial Ethernet protocols
 - Negative effects on AVB Gen 2 adoption
 - Non-engineering of 802.1 features by non-802.1 protocols
 - Continuation of protocol-specific bridges
 - E.g. “Bridge for protocol A” and “Bridge for protocol B” instead of “Bridge for industrial Ethernet”
 - Slower AVB Gen 2 adoption due to protocol effort in consortia

Does Automotive Require Plug&Play?

- Passenger vehicles... Yes and No
 - Control networks: No, engineered at all layers
 - Control algorithm in each Electronic Control Unit is flashed
 - Mapping of control values to/from frame payload is flashed
 - Straightforward for bridges to use the same methodology
 - Infotainment, future applications: May be Yes
- Other types of vehicles (non-automotive)... Yes
 - Heavy vehicles use the profile concept
 - Connect one vendor's "tractor" to another's "trailer" or "implement"



Another Argument For Non-Engineered AVB Gen 2

- Precedent in AVB Gen 1
 - Allow Plug&Play protocol on top of Gen 1 to evolve to Gen 2
 - Non-engineered protocol will help clarify relationship
 - E.g. Will Gen 2 guard band reduce bandwidth for Gen 1 streams?

Possible Arguments Against Non-Engineered AVB Gen 2 (1 of 2)

- Outside 802.1 scope?
 - No: Arguably needs to be in 802.1
- Violates 802 philosophies?
 - No: Precedent in Gen 1 and elsewhere
- Incompatibility w/ existing protocol (e.g. SRP)?
 - No: Agree to extend in compatible manner
- Prevents engineered methodology (e.g. automotive)?
 - No: Agree to support both
 - Clarify for Gen 1 as well as Gen 2

Possible Arguments Against Non-Engineered AVB Gen 2 (2 of 2)

- Effort/cost in silicon?
 - No: Only impacts how MIB values are set
- Effort/cost in software?
 - Somewhat: Extension to protocol is a software upgrade
- Effort in standard?
 - Yes: Valid concern... who will do the work?
 - I volunteer as editor for non-engineered protocol
 - 802.1Qbu and 802.1Qbv
 - Approved through my affiliated sponsor company
- Others?

Proposed Timeline

1. Decide features (procedures and managed objects)
 - Preemption, scheduled shaper, other Gen 2 features
2. Decide future of SRP
 - MRP-based only, or option for SPB-based?
3. Extend SRP for non-engineered Gen 2