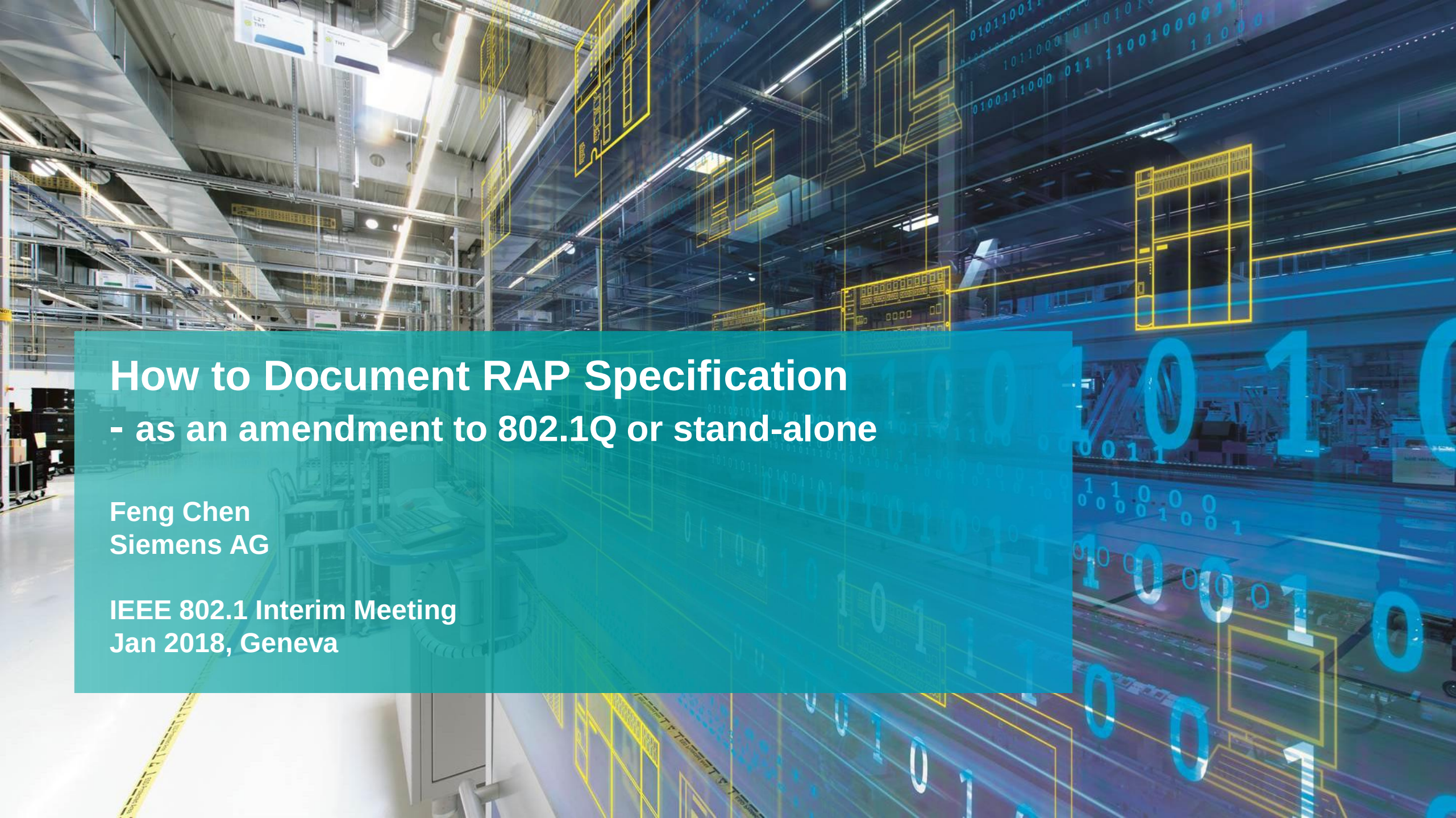

How to Document RAP Specification

- as an amendment to 802.1Q or stand-alone

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Overview

- The first presentation on this topic was discussed at the TSN call on Dec 11 2017 and is available at new-chen-RAP-which-document-1217-v01.pdf. The following issues have been clarified at that call and seem to be clear now.
  - **RAP's relationship to 802.1Qat (MSRPv0)**
  - **RAP's relationship to 802.1Qcc**
  - **RAP's relationship to P802.1CS (LRP)**
- This presentation is intended for resolving the remaining issue
  - **RAP to be in 802.1Q or stand-alone?**

Relevant documents:

Presentations: new-chen-RAP-proposal-and-requirements-0517-v02.pdf, new-kiessling-RAP-poposal-and-features-0517-v01.pdf

White paper for RAP: tsn-chen-RAP-whitepaper-1117-v02.pdf

RAP as an Amendment to 802.1Q

Overview

If specifying RAP in 802.1Q, the following issues need to be analyzed.

- **Where in Q should RAP be documented?**
  - **Can RAP be specified as MSRPv2?**
  - **Can RAP be specified as part of SRP?**
- **How RAP relates to other 802.1Q clauses?**
  - **Clause 34: Forwarding and Queuing Enhancements for Time-Sensitive Streams (FQTSS)**
  - **Clause 46: Time-Sensitive Networking (TSN) Configuration**

Note: *all references to 802.1Q on this slide deck are in accordance with 802.1Q-2014 and P802.1Qcc/D2.0*

Should RAP be specified as MSRPv2?

RAP can NOT be MSRPv2, because RAP is architecturally different to MSRP

- MSRP is a MRP application
  - is specified based on the architecture defined by MRP in Clause 10 of 802.1Q
  - uses the MAD primitives, e.g. MAD_Join.request for declaration of MSRP attributes
  - passes Attributes directly to the lower registration component (MAD), which needs to be semantcialy-aware for encoding of Attributes in MSRPDUs
- RAP is an LRP application
  - is built over LRP using the interfaces currently defined in Clause 8 of P802.1CS/D1.2, i.e. connection primitives, applicant/registrar database primitives
  - only passes Records to LRP, which is independent of the semantics of the application data
  - can specify a facility for “packing“ Attributes into Records to enable more efficient database synchronization as a capability of LRP.

For the reasons given above, specifying RAP shouldn’t be simply thought of as adding updates to the exiting MSRP specifications, even considering that RAP is similar to MSRP in some functional aspects.

Should RAP be specified as Part of SRP?

- SRP is currently specified in Clause 35 as a protocol suite for stream reservation, which currently utilizes three signaling protocols **MMRP** (10.9), **MVRP** (11.2) and **MSRP** (35.1 35.2).

- If specifying RAP as part of SRP, e.g. by adding RAP to SRP as an alternative to MSRP, it would become difficult to specify the conformance for Bridge support of SRP
  - As MSRP is currently specified as mandatory for SRP, should RAP be also mandatory?
  - If one needs only RAP but not MSRP, can we still call it a SRP Bridge.

To avoid such problems, we should **specify RAP as a new protocol in a distinct "RAP" Clause independent of SRP.**

RAP with FQTSS in Clause 34

- FQTSS in Clause 34 specifies the tools primarily for use with SRP and includes the following subclauses
  - 34.2 Detection of SRP domains
  - 34.3 The bandwidth availability parameters
  - 34.4 Deriving actual bandwidth requirements from the size of the MSDU
  - 34.5 Default SR class configuration
  - 34.6 Transmission selection

- The FQTSS functions are mainly related to SRP domains and SR class settings
- RAP will support FQTSS and may further enhance these functions

RAP with Clause 46: TSN Configuration

- Qcc specifies in subclause 46.2 of P802.1Qcc/D2.0 the User/Network Configuration Information for use with different TSN configuration models
  - The current specifications in 46.2 use YANG and TLV modeling
  - The TLV format of this subclause is referenced by Clause 35 to specify protocol TLVs for creation of MSRPv1 Enhanced Attributes.

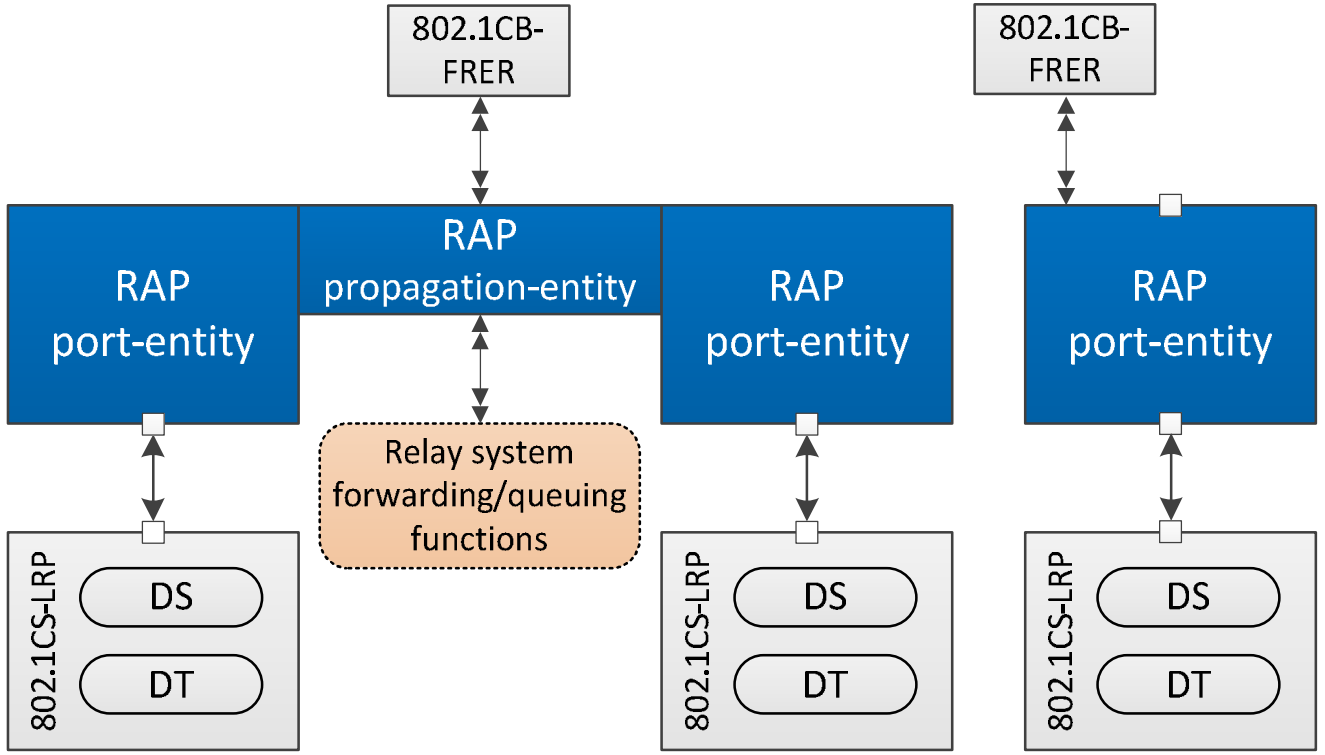
- A decision made during the Qcc comment resolution for sponsor ballot on D2.0 is to
  - rewrite clause 46 as an information model (i.e. text only like clause 12).
  - move TLV specs to clause 35 for MSRPv1

Like MSRPv1, **RAP will refer to the information model in clause 46 and specify the protocol TLVs for creating RAP attributes, which avoids cross-references between MSRP and RAP for specifying protocol specific Attributes.**

RAP as a Stand-alone Specification

A Clause for “Generic RAP”

- This clause can be documented in a style analogous to Clause 7: FRER of 802.1CB
- It specifies the common parts that are independent of Q-Bridges
  - architecture
  - interfaces
  - components and functions
  - reservation flow
  - reservation domain
  - Attributes (as container)
  - **…**



RAP in a relay system

RAP in an end system

A Clause for “RAP in 802.1Q-Bridges”

- Analogous to Clause 8: FRER in Bridges of 802.1CB, this clause specifies the functions\mechanisms needed for using RAP in 802.1Q-Bridges
  - interfacing to 802.1Q Forwarding Process (FDB, queuing, etc.)
  - Attributes using TLVs derived from the information model in Clause 46 of 802.1Q
  - support for FQTSS specified in Clause 34 of 802.1Q
  - support for SR class using other TSN transmission functions not yet included in FQTSS
  - Attribute translation for interoperation with MSRP
  - ...
- References to 802.1Q are needed in this clause, but in general it won‘t require any changes to the 802.1Q Bridging functions.
  - using hyperlink instead of cross-references can help improve readability

A Clause for “RAP for FRER”

- This clause will specify functions and mechanisms needed for RAP to support resource reservation for streams using FRER specified in 802.1CB.

- This clause can be written as independent of 802.1Q Bridges, because 802.1CB as a stand-alone standard is not tied to use with Q-Bridges.

- References to 802.1CB are needed in this Clause

Advantages of RAP as Stand-alone

- **A further step towards refactoring 802.1Q, following 802.1CB and P802.1CS**
  - avoid further overloading the 802.1Q
  - also leave the needed cross-references to CS and CB out of 802.1Q
- **A generalized Reservation Allocation Protocol**
  - specifies a generic architecture independent of 802.1Q Bridges
  - allows use of RAP with and extended by non-Bridges like Routers
- **A specification for use with 802.1Q Bridges will be provided**
  - supports interoperability between RAP and MSRP
  - refers to the TSN configuration information model specified in 802.1Qcc
- **Readability issue caused by cross-referencing can be improved by use of hyperlink**
  - from another point of view, using the whole document to specify a protocol enhances readability

Will RAP as Stand-alone Require Changes in the current 802.1Q?

In general, specifying RAP will NOT necessarily require changes in the current 802.1Q

- RAP specifies its functions, Attributes, managed objects, etc. in its own document.
  - Attributes are specified by using the information model as the basis in Clause 46 of 802.1Q
  - Managed objects for RAP (analogous to those specified in 12.22 Stream Reservation Protocol (SRP) entities for use with MSRP) will be only specified in the RAP document.

- RAP controls parts of the forwarding and queuing functions that are specified in other standards, e.g. 802.1Q for Bridges. For example,
  - RAP needs to have access to filtering database to control Dynamic Reservation Entries and identify the context for propagation of RAP Attributes on 802.1Q Bridges.
  - RAP uses the FQTSS functions/managed objects to control some of the queuing parameters on 802.1Q Bridges.
  - It is not the intention for RAP to change the existing forwarding and queuing functions specified in the current 802.1Q.

Thank You!

Discussion