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Proposals for TSN Stream Reservation Class

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Introduction

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The previous presentation [1)] in July, 2016 described

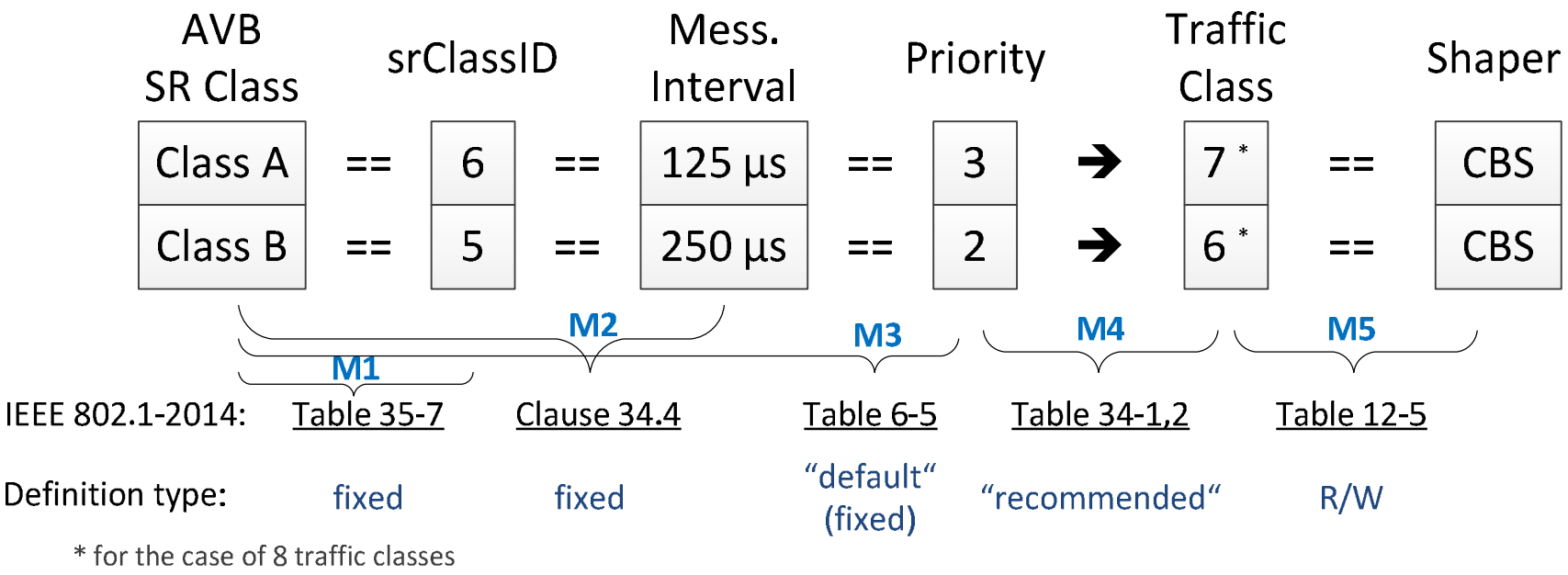
- issues of the current SR Class specification for use in TSN
- requirements for configurable SR Class

This presentation provides a summary of the needed features to support configurable SR Class, including

- the managed objects already specified in the current standard, but not explicitly stated for configuration of SR Class
- a list of To-Do items proposed for Qcc D1.1

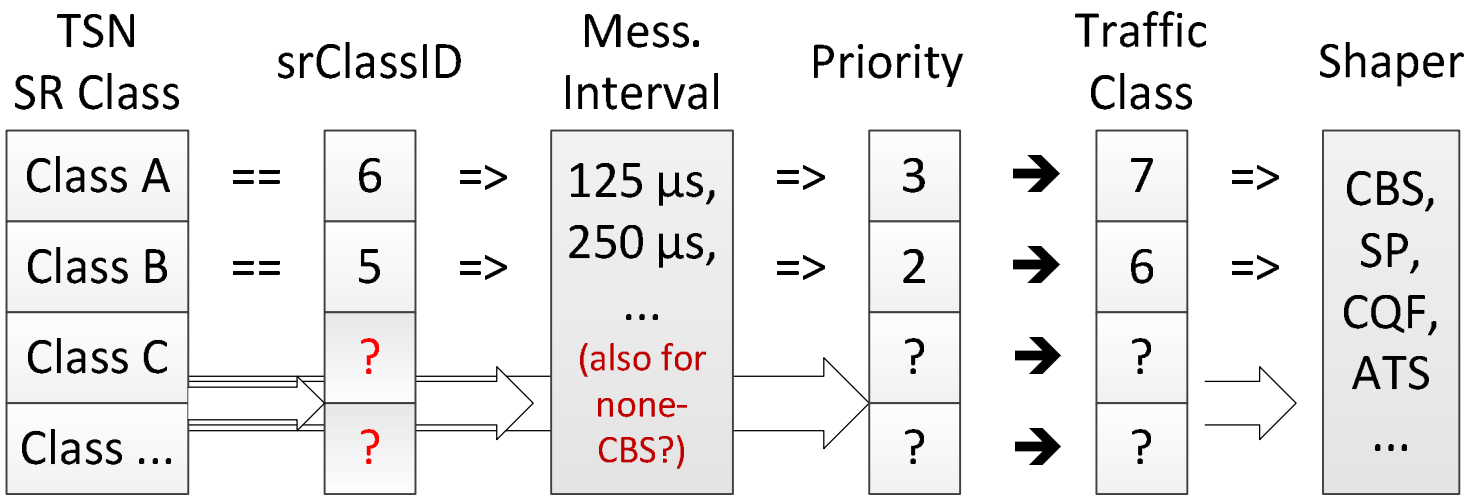
1) http://www.ieee802.org/1/files/public/docs2016/srp-chen-stream-reservation-class-0716-v01.pdf

Recap: SR Class in AVB



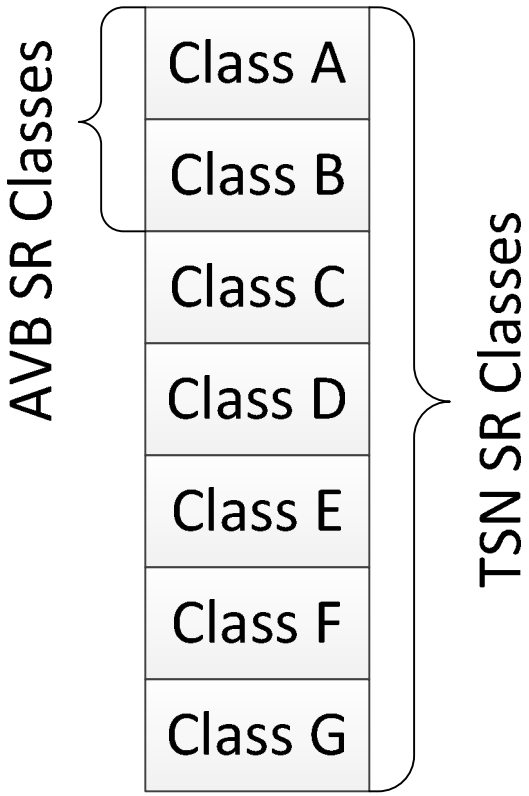
- Issues in the current SR Class specification for use with TSN:
  - only two SR Class A/B with CBS specified for AV traffic
  - lack of managed objects for configuration, e.g. in M2 and M3
  - SR Class A/B tied to CBS in texts, but changeable in M5

Proposals for TSN SR Class



- Configurable SR-Class for TSN
  - allow up to 7 SR Classes (with defined srClassIDs)
  - allow configurable class measurement interval
  - allow configurable mapping of SR Class to Priority
  - allow configurable mapping of Priority to Traffic Class
  - allow use of new TSN shaper for SR class

Support of more SR Classes



Stream reservation (SR) class is defined in 3.231 of the IEEE 802.1-2014

"A traffic class whose bandwidth can be reserved for audio/video (AV) traffic. A priority value is associated with each SR class. SR classes are denoted by consecutive letters of the alphabet, starting with A and continuing for up to seven classes."

In 5.4.1.5 FQTSS requirements

"f) Support two or more SR classes (a maximum of seven), … The number of SR classes supported shall be stated in the PICS."

- ✓ The support of up to seven SR classes is already allowed by 802.1-2014
- ❑ **To-do:** revise the definition to match the scope of TSN

e.g. replace "audio/video (AV) traffic" with "time sensitive streams"

Assignment of srClassID for SR Class

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srClassIDs for Class A and B are defined in Table 35-7

SR Class		srClassID
Class A	==	6
Class B	==	5
Class C	==	4
Class D	==	3
Class E	==	2
Class F	==	1
Class G	==	0

Table 35-7—SR class ID

SR class	SR class ID
A	6
B	5

- **To-do:** assign srClassIDs for SR Classes C to G

Configurable Class Measurement Interval

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The class measurement intervals for SR Class A and B are described as fixed values in 34.4 Note 1

"NOTE 1 - … SR class A corresponds to a class measurement interval of 125 µs; SR class B corresponds to a class measurement interval of 250 µs. …"

- ✓ a managed object for class measurement intervals has been added to Table 12-4 in Qcc D1.0

Table 12-4—Bandwidth Availability Parameter Table row elements

Name	Data type	Operations supported[a]	Conformance[b]	References
Traffic class	unsigned integer [0..7]	R	BE	34.3
deltaBandwidth	percentage	RW	BE	34.3
adminIdleSlope	unsigned integer	RW	BE	34.3
operIdleSlope	unsigned integer	R	BE	34.3
classMeasurementInterval	unsigned integer	RW	be	34.3.2, 34.4

Configurable SR Class to Priority Mapping

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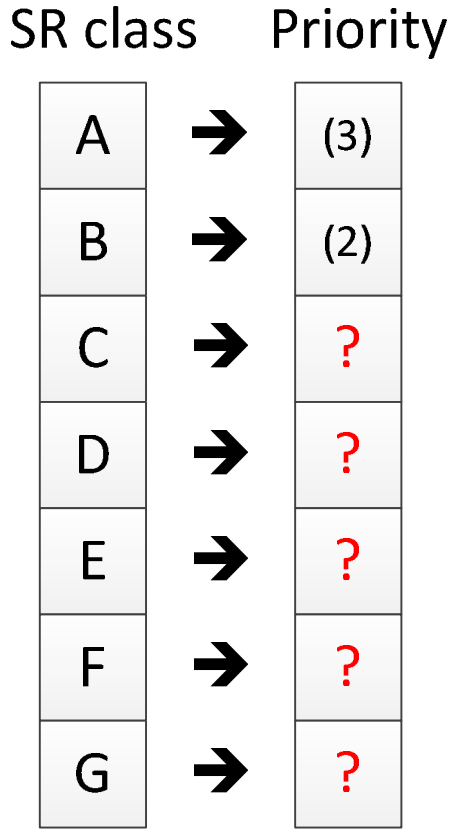

(*) default values for AVB Class A and B

The default priority values for Class A/B are defined in Table 6-5. But the default values cannot be changed by management due to lack of managed objects

Table 6-5—Default SRP domain boundary port priority regeneration override values

SR class	Default priority	Default regenerated priority for SRP domain boundary Ports	Range
A	3	0	0–7
B	2	0	0–7

- **To-do:** define new managed objects for SR Class to priority mapping (per Bridge component)

  e.g. [SR Class (R), Priority (RW)]

Configurable Priority to Traffic Class Mapping

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Priority		Traffic Class
7	→	5
6	→	4
5	→	3
4	→	2
3	→	7
2	→	6
1	→	0
0	→	1

Recommended for AVB

The recommended priority to traffic class mappings for Class A/B are defined in 34.5, Table 34-1 and 34-2.

Table 34-1—Recommended priority to traffic class mappings for SR classes A and B

Priority	Number of available traffic classes						
	2	3	4	5	6	7	8
0 (Default)	0	0	0	0	0	0	1
1	0	0	0	0	0	0	0
2	1	1	2	3	4	5	6
3	1	2	3	4	5	6	7
4	0	0	1	1	1	1	2
5	0	0	1	1	1	2	3
6	0	0	1	2	2	3	4
7	0	0	1	2	3	4	5

Table 34-2—Recommended priority to traffic class mappings for SR class B only

Priority	Number of available traffic classes						
	2	3	4	5	6	7	8
0 (Default)	0	0	0	0	0	1	1
1	0	0	0	0	0	0	0
2	1	2	3	4	5	6	7
3	0	0	0	1	1	2	2
4	0	1	1	2	2	3	3
5	0	1	1	2	2	3	4
6	0	1	2	3	3	4	5
7	0	1	2	3	4	5	6

"Note 2 - …The mappings shown deal only with one or two supported SR classes; a similar mapping strategy can be adopted if more than two SR classes are supported."

✓ The managed objects for configuration of priority to traffic class mapping are already defined in "*12.6.3.2 Set Port Traffic Class Table*" as per-port *

*) per-port is due to the fact the number of supported traffic classes may be different on each port.

Traffic Class to Shaper Mapping

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The Transmission Selection Algorithm Table (per-port) in 12.20.2 defines the managed objects for assigning shaper for each supported traffic class.

Table 12-5—Transmission Selection Algorithm Table row elements

Name	Data type	Operations supported[a]	Conformance[b]	References
Traffic class	unsigned integer [0..7]	R	B	8.6.8
Transmission selection algorithm	enumerated (see Table 8-5)	RW	B	8.6.8, Table 8-5

This implies that a SR Class can be mapped to different shaper

- on different port of the same bridge
- on different bridge

❑ **To-do:**

- change texts in the current std., so that Class A/B are not tied to CBS, but as default for AV traffic.
- extend FTQSS* to include also other TSN shapers (Qch, Qcr …)

*) currently in 802.1-2014, FTQSS contains only CBS.

Proposals for FQTSS

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In Clause 34.1, (Overview for FQTSS):

*"This clause describes a set of tools that can be used to support the forwarding and queuing requirements of **time-sensitive streams**."*

Currently FQTSS describes only CBS. The question is whether to include the new TSN shapers also in FQTSS? If yes, the following are needed:

❑ **To-do:**

- Add subclauses for each of the new TSN shapers into clause 34 (FQTSS)
- Reconstruct subclause12.20 (Management entities for FQTSS) to contain
  - ➢ shaper-specific configuration tables
    - for CBS: Table 12-4 - Bandwidth Availability Parameter Table row elements
    - **add new tables for other shapers**
  - ➢ common FQTSS tables
    - Table 12-5: Transmission Selection Algorithm Table row elements
    - Table 12-6: Priority Regeneration Override Table row elements
    - **add a new table for SR Class to Priority mapping [SR Class (R), Priority (RW)]** (see page 8)

Conclusion

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Only minimum changes are required to support configuration of SR class for TSN

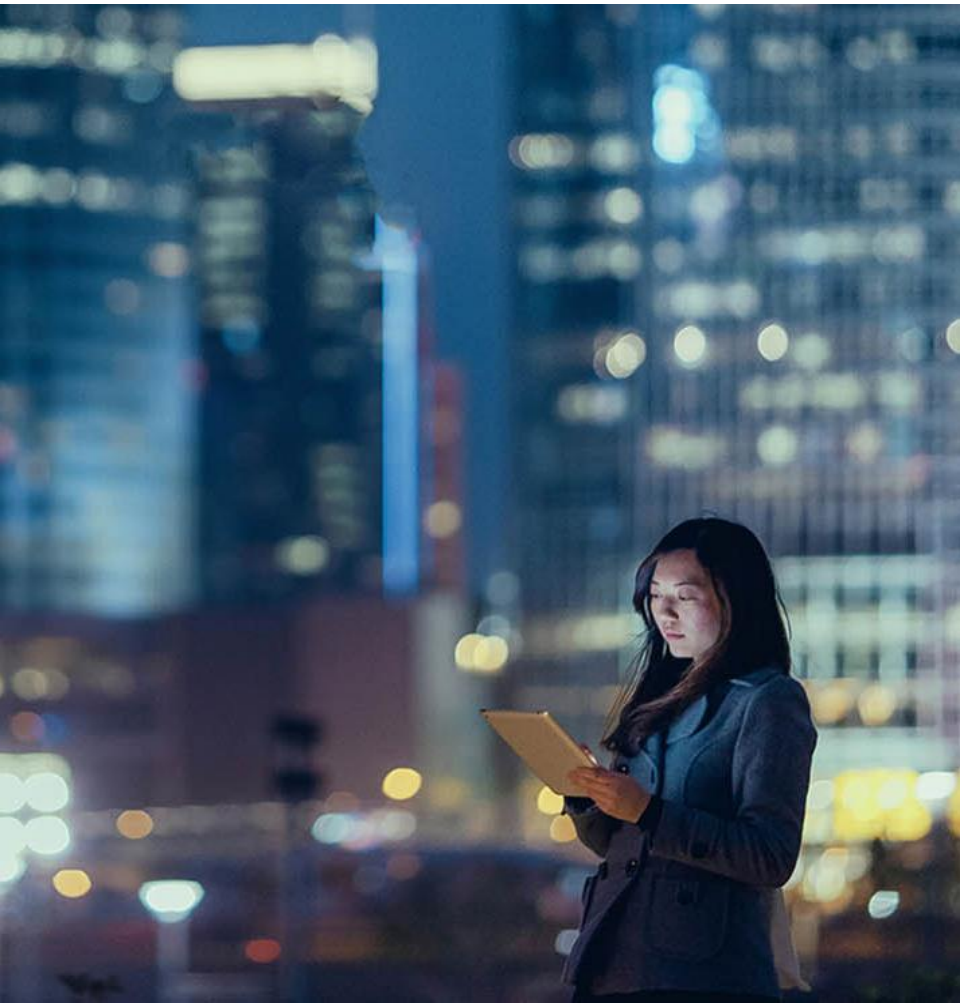
Already supported is:

- ✓ allow up to 7 SR Classes (with defined srClassIDs)
- ✓ allow configurable class measurement interval (defined in Qcc)
- ✓ allow configurable mapping of Priority to Traffic Class

Required changes:

- ❑ rewording of SR class to include scope of TSN
- ❑ assign srClassIDs for SR Classes C to G
- ❑ define new managed objects for SR Class to priority mapping
- ❑ allow use of new TSN shaper for SR class (extend FQTTS)

Thank you for your attention!



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