P802.1Qcr-D0.4 - Restructuring Contents of PSFP and ATS

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Introduction

About

During the comment resolution of P802.1Qcr/D0.3, it was decided that the restructuring of PSFP and ATS related clauses is done before elevating the project to working group ballot stage:

- http://www.ieee802.org/1/files/private/cr-drafts/d0/802-1Qcr-d0-3-dis.pdf, comment 23
- http://www.ieee802.org/1/files/private/cr-drafts/d0/802-1Qcr-D0-1-dis.pdf, comment 2

Purpose of this Presentation

Introduce and discuss:

- Modifications to Q-Rev (PSFP) and Qcr

- Considered alternatives

- Things to re-consider

Important

- This slide set is based on previous slides from previous discussions during creation of Qcr-D0.4 (smaller group) – additional verbal explanation to written statements necessary.

- Subsequent slides refer to P802.1Qcr/D0.3 (*Qcr*) and 802.1Q-Rev/D2.1 (*Q-Rev*). The latter (Q-Rev) includes PSFP, as initially specified in P802.1Qci.

Clauses in Q-Rev, Qcr, and Overview

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PSFP related clauses in Q-Rev

- **5.4.1.8 Per-stream filtering and policing (PSFP) requirements**

VLAN Bridge component requirements for PSFP

- **5.4.1.9 Cyclic queuing and forwarding (CQF) requirements**
- **5.13.1.1 Per-stream filtering and policing (PSFP) requirements**
- **5.13.1.2 Cyclic queuing and forwarding requirements**

MAC Bridge component requirements for PSFP

- **5.27 End-station requirements—PSFP**

End-station component requirements for PSFP

- **5.28 End station requirements—Cyclic queuing and forwarding**
- **8.6.5.1 Per-stream filtering and policing**
- **8.6.5.1.1 Stream filter instance table**

Semantics, operations and parameters of stream filters, as introduced by PSFP.

- **8.6.5.1.2 Stream gate instance table**

Semantics, operations and parameters of stream gates, as introduced by PSFP.

- **8.6.5.1.3 Flow meter instance table**

MEF 10.3 meter parameters.

- **8.6.6.1 PSFP queuing**

Handling of Internal Priority Values (IPV) during queueing, as assigned by stream gates.

- **8.6.10 Stream gate control state machines**

Operation of stream gate FSMs, which open and close the gates in a time-triggered fashion.

- **12.31 Managed objects for per-stream filtering and policing**
- **12.31.1 The Stream Parameter Table**
- **12.31.2 The Stream Filter Instance Table**
- **12.31.3 The Stream Gate Instance Table**
- **12.31.4 The Flow Meter Instance Table**
- **17.2.24 Structure of the IEEE8021-PSFP-MIB**
- **A.5 Major capabilities, Item PSFP**
- **A.14 Bridge Management, item MGT-250**
- **A.24 Management Information Base (MIB), item MIB-44**
- **A.46 Per-stream filtering and policing, all items**
- **B.5 Major capabilities , item PSFP**
- **B.17 Per-stream filtering and policing, all items**
- **Annex T: Cyclic queuing and forwarding**

Uses PSFP, time-triggered stream gate open/close operation and IPV assignments in particular, to realize CQF.

ATS clauses in Qcr

- **5.4.1.10 Asynchronous Traffic Shaping (ATS) requirements**

VLAN Bridge component requirements for ATS

- **5.13.1.2 Asynchronous Traffic Shaping (ATS) requirements**

MAC Bridge component requirements for ATS

- **5.32 End station requirements—asynchronous traffic shaping**

End-station component requirements for ATS

- **8.6.5.1 Per-stream filtering and policing**

- **8.6.5.2.1 Stream filter instance table**

Required subset of those elements specified for PSFP in 8.6.5.1.1 + new elements for ATS

- **8.6.5.2.2 Stream gate instance table**

Required subset of those elements specified for PSFP in 8.6.5.1.1 + new elements for ATS

- **8.6.5.2.3 Shaper instance table and shaper group instance table**

Organization of ATS shaper instances in groups, parameters and variables, association with the ATS shaper state machines.

- **8.6.6.2 ATS Queuing**

Handling of Internal Priority Values (IPV)

- **8.6.8.5 ATS Transmission Selection Algorithm**

Transmission according to eligibility times, as assigned by ATS shaper state machines.

- **8.6.11 ATS Shaper State Machine**

Pseudo-code and explanation of ATS shaper state machines.

- **12.34.1 The Stream Parameter Table, 12.34.2 The Stream Filter Instance Table, 12.34.3 The Stream Gate Instance Table**

Similar to PSFP, but text in each clause for two case: 1) Both, ATS and PSFP, are supported, and 2), only ATS is supported (i.e. no PSFP support)

- **12.34.4 The Shaper Instance Table, 12.34.5 The Shaper Group Instance Table**

ATS-only parameters.

- **17 Management Information Base (MIB)**

Placeholder for external contribution (see http://www.ieee802.org/1/files/private/cr-drafts/d0/802-1Qcr-D0-1-dis.pdf, comment 16).

- **48.3.9 Stream Filter and Stream Gate model**

UML model of a YANG module for the PSFP&ATS superset of stream filter and stream gate managed objects.

- **48.3.11 Asynchronous Traffic Shaping (ATS) model**

UML model of a YANG module with ATS-only managed objects.

- **48.4 Definition of 802.1Q YANG modules**

YANG tree and code for the aforementioned two modules.

- **A.5 Major capabilities, item ATS**

- **A.14 Bridge Management, item MGT-250**

- **A.24 Management Information Base (MIB)**

Placeholder for external contribution (see above)

- **A.48 YANG, items YANG-7 and YANG-9**

- **A.49 Asynchronous traffic shaping, all items**

- **B.5 Major capabilities, item ATS**

- **B.17 Asynchronous traffic shaping, all items**

- **Annex T: Asynchronous Traffic Shaping**

Collects informative clauses.

Restructuring: Overview

- Clause 5.*: No re-structuring (i.e., PSFP and ATS remain separate), adjusted references into 8.6.5 and 12.*

- **8.6.5: Restructured contents in a modular fashion**

- 8.6.6.1 (PSFP queuing) and 8.6.6.2 (ATS queuing): No restructuring, adjusted references into 8.6.5 and 12.*.

- Remainder of 8.6: No restructuring, adjusted references and descriptions

- **12.31 and 12.34: Merged, renamed, and restructured the content, in line with 8.6.5**

- 17.2.24: No restructuring (i.e., MIB module for PSFP, comaptible), adjusted text references and descriptions only

- 48.* (YANG): No restructuring (i.e., one module for stream filters & stream gate, one for PSFP augmentation, one for ATS augmentation); adjusted text references and descriptions.

- A.* and B.*: No restructuring, adjusted references into 8.6.5 and 12.*.

- Annex T (CQF): No restructuring, adjusted references into 8.6.5 and 12.*.

Major clauses:
8.6.5, 12.31 and 12.34

8.6.5: Restructure contents in a modular fashion
12.31 and 12.34: Merge, rename, and restructure the content, in line with 8.6.5

New Structure of Clause 8.6.5

Variant 865V1

8.6.5.1   Stream Filters and Stream Gates
8.6.5.1.1 Stream Filters
8.6.5.1.2 Stream Gates
8.6.5.2   Per-Stream Filtering and Policing (PSFP)
8.6.5.2.1 Flow Meters
8.6.5.2.2 Stream Blocking Options
8.6.5.2.3 Counters
8.6.5.3   Asynchronous Traffic Shaping (ATS)
8.6.5.3.1 Shaper Groups
8.6.5.3.2 Shaper Instances

- Close to agreed Qcr comment responses
- Similar to current YANG module subdivision
- Lots of "extension text" in 8.6.5.2 and 8.6.5.3 to 8.6.5.1
- Less maintainable (future Projects, CQF[1])

Variant 865V2

NEW 8.6.5 introduction text
8.6.5.1   Stream Filters
8.6.5.2   Stream Gates
8.6.5.3   Filter Specifications
8.6.5.3.1 Maximum SDU Size Filters
8.6.5.3.2 Flow Meters
8.6.5.3.3 ATS Shapers
8.6.5.4   Stream Gate and Filter Applications
8.6.5.4.1 Per-Stream Filtering and Policing (PSFP)
8.6.5.4.2 Asynchronous Traffic Shaping (ATS)
8.6.5.5   Flow classification and metering compatibility

OLD 8.6.5 introduction text

- High Modularity
- Extendable (future Projects, CQF[1])
- satisfies the spirit of the comment responses

1: CQF is beyond the scope of project 802.1Qcr – I intend to limit modifications in the current Annex T (CQF) to minor changes (clause reference fixes, item names, etc.). However, it would be possible to call the alternating queue assignment parts of CQF an application of 8.6.5.1 … 8.6.5.3 in a new sub-clause 8.6.5.4.3 instead describing exactly this in Annex T.
2: Right now, there is a combined YANG module for Stream Filters and Stream Gates. However, following exactly the structure of 865V2 with separate YANG modules is technically unreasonable. There would be a separate stream filter YANG module, which would essentially just associate frames to stream filters, but without any associated action (e.g., dropping on misbehavior or similar).

New Structure of Clause 12

12.(n)	Stream Parameter Table
12.(n+1)	Stream Filter Instance Table
12.(n+2)	Stream Gate Instance Table
12.(n+3)	Flow Meter Instance Table
12.(n+4)	Shaper Instance Table
12.(n+5)	Shaper Group Instance Table
12.(n+6)	Port Parameter Table

12.31.(n)	Stream Parameter Table
12.31.(n+1)	Stream Filter Instance Table
12.31.(n+2)	Stream Gate Instance Table
12.31.(n+3)	Flow Meter Instance Table
12.31.(n+4)	Shaper Instance Table
12.31.(n+5)	Shaper Group Instance Table
12.31.(n+6)	Port Parameter Table

Description

- PSFP owned clause 12.31, ATS owned clause 12.34

- Problem: Clause 12.34 (ATS) contained a lot of "if PSFP is supported {…}, else {…}" formulations

- There were two options to re-structure this (just for 865V2), as shown above

In Qcr-D0.4

- The option to the right, i.e.:
  - Put everything into 12.31
  - Eliminate clause 12.34 from Qcr

- The option to the left appears unrealistic, because sub-clause numbers in clause 12 are assigned in the order of 802.1 projects. There would be no continuous sequence (n,n+1,n+2), but contents would be cluttered across clause 12 instead (hard for readers).

Further explanation on selected topics (old slides with minor changes)

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Issue: Initial text in Q-Rev, 8.6.5 (1)

8.6.5 Flow classification and metering

The Forwarding Process may apply flow classification and metering to frames that are received on a Bridge Port and have one or more potential transmission ports.

Flow classification identifies a subset of traffic (frames) that may be subject to the same treatment in terms of metering and forwarding. Flow classification rules may be based on

    a)   Destination MAC address
    b)   Source MAC address
    c)   VID
    d)   Priority
    e)   connection_identifier.

Item c), specifying a VID value, is not applicable to VLAN-unaware MAC Relays. Item e), specifying a connection_identifier, is only applicable to bridges that support PSFP.

Frames classified using the same set of classification rules are subject to the same flow meter. The flow meter can change the drop_eligible parameter associated with each frame and can discard frames on the basis of the following parameters for each received frame and previously received frames, and the time elapsed since those frames were received:

    f)   The received value of the drop_eligible parameter
    g)   The mac_service_data_unit size

Issue: Initial text in Q-Rev, 8.6.5 (2)

1 The flow meter shall not base its decision on the parameters of frames received on other Bridge Ports, or on
2 any other parameters of those Ports. The metering algorithm described in the Metro Ethernet Forum (MEF)
3 Technical Specification 10.3 (MEF 10.3) should be used.
4

5 NOTE 1—Changing the value of the drop_eligible parameter may change the contents of the frame, depending on how
6 the frame is tagged when transmitted, which may then require updating the frame_check_sequence. Mechanisms for
7 conveying information from ingress to egress that the frame_check_sequence may require updating are implementation
8 dependent.

9 NOTE 2—The flow meter described here can encompass a number of meters, each with a simpler specification.
10 However, given the breadth of implementation choice permitted, further structuring to specify, for example, that frames
11 can bypass a meter or are subject only to one of a number of meters provides no additional information.
12

13 NOTE 3—Although flow metering is applied after egress (Figure 8-11), the meter(s) operate per reception Port (see first
14 sentence of 8.6.5), not per potential transmission Port(s).

15 **8.6.5.1 Per-stream filtering and policing**
16

Issue: Initial text in Q-Rev, 8.6.5 (3)

This initial text of 8.6.5 had the following properties:

- Appears imprecise/unspecific. This may be intentional (see P132L9, NOTE 2)

- Contains little normative statements:

  - **S1(Implicit)**: Flow classification and metering happens after Egress filtering in the Forwarding Process
  - **S2**: A single flow meter **shall** not process frames from different input ports
  - **S3**: MEF 10.3 **should** be used for metering
  - **S4**: <u>Flow *classification rules*</u> **may** be based on DA,SA,VID, Priority, or connection_identifier (only for PSFP)
  - **S5**: *"Frames classified using the same set of classification rules are subject to the same flow meter."*

Contrary, sub-clause 8.6.5.1 in Q-Rev (PSFP) was very specific, and thus:

- May be considered a very specific subset of the aforementioned initial text of 8.6.5.

- However, then it may already conflict: PSFP does more than metering according to MEF 10.3. E.g., stream gates, max. MTU size filters.

Issue: Initial text in Q-Rev, 8.6.5 (4)

The essential questions for me were:

- **Q1**: What is this initial text of 8.6.5 good for?

- **Q2**: What is the normative information added by this text?

- **Q3**: I guess, as stated, the initial text in 8.6.5 is intended to be a superset of 8.6.5.1?

More thoughts on this:

- Due to its unspecific nature, it appeared to basically cover out-of-spec mechanisms (i.e., without PSFP).

- There was no management clause, no conformance clause, and no PICS table pointing to the initial text in 8.6.5 (Adobe search: whole word "8.6.5") – maybe because it is unspecific. In particular, 8.6.5 is referred from 1) PSFP-specific contents and 2) Connectivity Fault Management (CFM) clause 22. There are 5.4.1.4 and PICS:CFM-60. The latter points to clause 22, but does not provide any useful details on 8.6.5.

Issue: Initial text in Q-Rev, 8.6.5 (5)

Thought experiment on Q2

What happens if the old initial text in 8.6.5 disappears from a PSFP+ATS perspective:

- **S1(Implicit)**: Flow classification and metering happens after Egress filtering in the Forwarding Process
  → Nothing (figures, clause numbering in 8.6, etc. remains unchanged)
- **S2**: A single flow meter **shall** not process frames from different input ports
  → Would be lost – this should not happen, agreed. But this statement could just be added to the Flow Meters clause of PSFP, if needed at all (see S4 below…).
- **S3**: MEF 10.3 **should** be used for metering
  → It is just a "should", and also covered by the PSFP meters [Q-Rev,8.6.5.1], which are MEF10.3 meters.
  Besides (as indicated before), PSFP also introduces e.g. stream gates that "meter" based on a time-triggered algorithm (8.6.5.1.2) – these work different than MEF10.3 meters. So there is some inconsistency in Q-Rev, if the initial text is intended as a superset of 8.6.5.1.
- **S4**: <u>Flow *classification rules*</u> **may** be based on DA,SA,VID, Priority, or connection_identifier (only for PSFP)
  → connection_identifier identifier itself is associated with a VID and a MAC Address, plus it <u>is associated with a bridge port</u> [Q-Rev, 8.8.12]. I am unsure whether the latter is an input or output port association. If it is an input association, connection_identifier may already cover S2.
- **S5**: *"Frames classified using the same set of classification rules are subject to the same flow meter."*

  → Nothing: Given that there is no specification of what a *(Flow) classification rule* is, nor multiple of these rules, this statement can be interpreted arbitrarily.

Issue: Initial text in Q-Rev, 8.6.5 (6)

History:

- I saw that the initial text in 8.6.5 was introduced during IEEE 802.1Q-Rev-2005:
  - Evolution in 802.1Q-Rev-2005 drafts:
    - Partial initial occurrence in 802.1Q-Rev-2005/D0.0, clause 8.6.4.
    - Significant changes in 802.1Q-Rev-2005/D2.0
    - Slight changes in 802.1Q-Rev-2005/D3.0, including a ref. to comment 28 **[Steve Haddock]** of the comment disposition in an editor's note.
  - According to the cover page of 802.1Q-Rev-2005/D1.0, 802.1Q-Rev-2005 incorporates 802.1Q-1998, 802.1u-2001, 802.1v-2001, and 802.1s-2002. However, in I could not find a trace of flow metering in the aforementioned incorporated documents (Adobe search: "meter", also as part of words).
  - The editor's introduction of 802.1Q-Rev-2005/D4.0 indicate P802.1ad as a further potential source, which is declared as an amendment to 802.1Q-2003 (the "-2003" part disappears in 802.1ad drafts after D4.0).
  - References:
    - 802.1Q-1998:   http://ieeexplore.ieee.org/document/753056/
    - 802.1u-2001:   http://ieeexplore.ieee.org/document/925219/
    - 802.1v-2001:   http://ieeexplore.ieee.org/document/943066/
    - 802.1Q-Rev-2005/D0.0: http://www.ieee802.org/1/files/private/q-2005-drafts/d0/802-1q-rev-d0-0.pdf
    - 802.1Q-Rev-2005/D1.0: http://www.ieee802.org/1/files/private/q-2005-drafts/d1/802-1q-rev-d1-0.pdf
    - 802.1Q-Rev-2005/D2.0 Agreed disposition: http://www.ieee802.org/1/files/private/q-2005-drafts/d2/802-1q-rev-d2-0-dis.pdf
    - 802.1Q-Rev-2005/D4.0: http://www.ieee802.org/1/files/private/q-2005-drafts/d4/802-1q-rev-d4-0.pdf
    - 802.1ad/D4.0: http://www.ieee802.org/1/files/private/ad-drafts/d4/802-1ad-D4-0.pdf

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Open-Minded

- Steve helped me a lot in understanding the purpose and history of the initial text in question:
  - Interworking with L3 DiffServ, and to support the use of Provider Bridging for the Carrier Ethernet Services being defined in MEF
  - The text was introduced to
    - Give an idea where the DEI bit is set
    - Specify the metering location in the forwarding process (i.e., after clause 8.6.4, "Egress filtering")

Now in Qcr-D0.4

- Make PSFP and ATS orthogonal to the initial text rather than try to merge them

- Think about co-existence. It appears to me that we can leave this open, as it is right now.

Variant 865V2

New initial text here:
- **Introduce Framework (8.6.5.1, 8.6.5.2, 8.6.5.3), maybe with a figure.**
- **Introduce application clause (8.6.5.4), which uses the framework.**
- **Introduce compatibility clause (8.6.5.5), if the framework is not used.**

8.6.5.1	Stream Filters
	[Stream Classification]
8.6.5.2	Stream Gates
8.6.5.3	Filter Specifications
	[Stream Filters]
8.6.5.3.1	Maximum SDU Size Filters
8.6.5.3.2	Flow Meters
8.6.5.3.3	ATS Shapers
8.6.5.4	Stream Gate and Filter Applications
8.6.5.4.1	Per-Stream Filtering and Policing (PSFP)
8.6.5.4.2	Asynchronous Traffic Shaping (ATS)
8.6.5.5	**Flow classification and metering compatibility**
	Old initial text here, not including PSFP parts

Issue: Prefix PSFP

Description

- Stream gates were introduced by PSFP, but are also used by ATS.

- Management variables Stream Gates use prefix `PSFP`

- Historically, the prefix helped to distinguish between scheduled traffic output gates and PSFP stream gates (same variables exist for both).

Proposal (now in Qcr-D0.4)

- Rename Table 12-31 Items: Change prefix `PSFP` to `StreamGate`.

- Do not change MIB variable names.

Table 12-31—The Stream Gate Instance Table

Name	Data type	Operations supported[a]	Conformance[b]	References
StreamGateInstance	integer	R	BE	8.6.5.1, 8.6.5.1.2
PSFPGateEnabled	Boolean	RW	BE	8.6.9.4.14
PSFPAdminGateStates	PSFPgateStatesValue	RW	BE	8.6.10.4, 12.29.1.2.2
PSFPOperGateStates	PSFPgateStatesValue	R	BE	8.6.10.5, 12.29.1.2.2
PSFPAdminControlListLength	unsigned integer	RW	BE	8.6.9.4.6, 12.31.3.2
PSFPOperControlListLength	unsigned integer	R	BE	8.6.9.4.23, 12.31.3.2
PSFPAdminControlList	sequence of PSFP-GateControlEntry	RW	BE	8.6.9.4.2, 12.31.3.2

Table 17-30—IEEE8021-PSFP-MIB Structure and relationship to this standard *(continued)*

MIB table	MIB object	Reference
	ieee8021PSFPNotPassingSDUCount	NotPassingSDUCount, 8.6.5, 8.6.5.1, 12.31.2
	ieee8021PSFPREDFramesCount	REDFramesCount, 8.6.5, 8.6.5.1, 12.31.2
	ieee8021PSFPStreamBlockedDueToOversizeFrameEnable	StreamBlockedDueToOversizeFrameEnable, 8.6.5.1, 8.6.5.1.1, 12.31.2
	ieee8021PSFPStreamBlockedDueToOversizeFrame	StreamBlockedDueToOversizeFrame, 8.6.5.1, 8.6.5.1.1, 12.31.2

ieee8021PSFPStreamGateParameters		
ieee8021PSFPStreamGateTable		Stream Gate Instance Table, 8.6.5, 8.6.5.1, 12.31.3
	ieee8021PSFPStreamGateInstance	StreamGateInstance, 8.6.5, 8.6.5.1, 12.31.3
	ieee8021PSFPGateEnabled	PSFPGateEnabled, 8.6.5, 8.6.5.1, 8.6.10, 12.31.3
	ieee8021PSFPAdminGateStates	PSFPAdminGateStates, 8.6.5, 8.6.5.1, 8.6.10, 12.31.3
	ieee8021PSFPOperGateStates	PSFPOperGateStates, 8.6.5, 8.6.5.1, 8.6.10, 12.31.3

Two styles:

1. Q-Rev (PSFP):

- 5.4.1.8, 5.13.1.1, and 5.27 (conformance) refer to 8.6.5.1, which includes 8.6.5.1.2, as well as 8.6.10 as requirements. 8.6.5.1.2, item h) is declared as optional in the text of 8.6.5.1.2. This item refers to the time-triggered gate control list, which has a state machine specified in 8.6.10.

- No indication of optional elements in clause 12 (managed objects).

- No optional items in the PICS (Annex A and B) for optional elements like 8.6.5.1.2., item h), all entries mandatory except MIB.

→ *The superset is referred from clauses 5 and the PICS; optional elements are **only** declared in 8.* via text.*

2. Qcr (ATS):

- The minimum subset of 8.6.5.1.* is specified in 8.6.5.2.*, plus additional specification if more than these subsets are present. Clause 5.4.1.10 refers to 8.6.5.2.*.

- Case distinction (ATS with and without PSFP) in clause 12.34.*.

- PICS refer to 8.6.5.2, which specifies subsets of 8.6.5.1.

→ *The bare minimum subset is referred from clauses 5 and the PICS; **in addition** optional elements are declared in 8.* and 12.34.* via text.*

5.4.1.8 Per-stream filtering and policing (PSFP) requirements

A VLAN Bridge component implementation that conforms to the provisions of this standard for PSFP shall:

a) Support PSFP as specified in 8.6.5.1 and 8.6.6.1.
b) Support the state machines for stream gate control as specified in 8.6.10.
c) Support the management entities for PSFP as specified in 12.31.

A.46 Per-stream filtering and policing

Item	Feature	Status	References	Support
	If neither per-stream filtering and policing (PSFP in Table A.5) nor cyclic queuing and forwarding (CQF in Table A.5) are supported, mark N/A and ignore the remainder of this table.		5.4.1.9, 5.13.1.2, 8.6.5.1, 8.6.6.1, 8.6.10, 12.31, 17.7.24	N/A[ ]
PSFP1	Does the implementation support the state machines and associated definitions as specified in 8.6.10?	PSFP OR CQF:M	5.4.1.9 item b), 5.13.1.2 item b), 8.6.5, 8.6.10	Yes [ ] N/A [ ]
PSFP2	Does the implementation support the management entities defined in 12.31?	PSFP OR CQF:M	5.4.1.9 item e), 5.13.1.2 item e), 8.6.5.1, 8.6.6.1, 8.6.10, 12.31	Yes [ ] N/A [ ]
PSFP3	Is the IEEE8021-PSFP-MIB module fully supported (per its MODULE-COMPLIANCE)?	MIB AND (PSFP OR CQF):O	5.4.1.9 item e), 5.13.1.2 item e), 12.31, 17.7.24	Yes [ ] N/A [ ] No [ ]

5.4.1.10 Asynchronous Traffic Shaping (ATS) requirements

A VLAN Bridge component implementation that conforms to the provisions of this standard for ATS shall:

a) Support the tables as specified 8.6.5.2:
   1) A stream filter instance table which provides at least the elements specified in 8.6.5.2.1.
   2) A stream gate instance table which provides at least the elements specified in 8.6.5.2.2.
   3) A shaper instance table and shaper group table as specified in 8.6.5.2.3.
b) Support the ATS transmission selection algorithm as specified in 8.6.8.5.
c) Support the ATS shaper state machines as specified in 8.6.11.
d) Support the management entities for ATS as specified in 12.34, and the YANG modules for management specified 48.3.9 and 48.3.11.

Item	Feature	Status	References	Support
	Table A.5 is not supported, mark N/A and ignore the remainder of this table.		5.4.1.10, 5.13.1.2, 8.6.5.2, 8.6.8.5, 8.6.11, 12.34	N/A[ ]
ATS1	Does the implementation support the tables as specified in 8.6.5.2?	ATS:M	5.4.1.10, 5.13.1.2, 8.6.5.2	Yes [ ] N/A [ ]
ATS2	Does the implementation support the ATS transmission selection algorithm as specified in 8.6.8.5?	ATS:M	5.4.1.10, 5.13.1.2, 8.6.8.5	Yes [ ] N/A [ ]
ATS3	Does the implementation support the ATS shaper state machines as specified in 8.6.11?	ATS:M	5.4.1.10, 5.13.1.2, 8.6.11	Yes [ ] N/A [ ]
ATS4	Does the implementation support the management entities defined in 12.34?	ATS:M	5.4.1.10, 5.13.1.2, 12.34	Yes [ ] N/A [ ]

Clause 12: As mentioned, PSFP in Q-Rev and ATS in Qcr use different styles in this clause.

- The case distinction in Qcr appeared hard for readers (result of task group ballot comments). Moreover, Qcr omits a conformance column in Tables 12-*.

- PSFP in Q-Rev has a conformance column in tables 12-*. However, the superset specification for PSFP with no optionality in Q-Rev appears inconsistent (see example).

From clause "8.6.5.1.2 Stream gate instance table" of Q-Rev

h) **Optionally,** an operational and an administrative *stream gate control list*. If present, these are ordered lists of stream control operations, as specified in Table 8-7. The state machines that control the execution of the operational stream gate control list, along with their variables and procedures, are specified in 8.6.10.

Table 12-29—The Stream Parameter Table

Name	Data type	Operations supported[a]	Conformance[b]	References
MaxStreamFilterInstances	integer	R	BE	8.6.5.1, 12.31.2
MaxStreamGateInstances	integer	R	BE	8.6.5.1, 12.31.3
MaxFlowMeterInstances	integer	R	BE	8.6.5.1, 12.31.4
SupportedListMax	integer	R	BE	8.6.5.1, 12.31.4

[a]R= Read only access; RW = Read/Write access.
[b]B = Required for Bridge or Bridge component support of PSFP.
E = Required for end-station support of PSFP.

12.31.1.4 SupportedListMax

The maximum value supported by this Bridge component of the AdminControlListLength and OperControlListLength parameters. It is available for use by schedule computation software to determine the Bridge component's control list capacity prior to computation.

PSFPAdminControlListLength	unsigned integer	RW	BE	8.6.9.4.6, 12.31.3.2
PSFPOperControlListLength	unsigned integer	R	BE	8.6.9.4.23, 12.31.3.2
PSFPAdminControlList	sequence of PSFP-GateControlEntry	RW	BE	8.6.9.4.2, 12.31.3.2, 12.31.3.2.2
PSFPOperControlList	sequence of PSFP-GateControlEntry	R	BE	8.6.9.4.19, 12.31.3.2, 12.31.3.2.2

Final Conclusion 8.6.5:
- The intention of "optional" Stream Gate Control Lists was to indicate that (a) implementations must support it, but (b) it may not be used in a particular run-time configuration.

- The term "optional" is removed in Qcr-D0.4 in order to avoid this confusion in future.
  - **Conformance in clause 12 tables:**

SupportedListMax	integer	R	PSFP, ats	8.6.5.2, 12.31.3
MaxShaperInstances	integer	R	psfp, ATS	8.6.5.3.3, 12.31.5
MaxShaperGroupInstances	integer	R	psfp, ATS	8.6.5.3.3, 12.31.6

[a]R = Read only access; RW = Read/Write access.
[b]PSFP = Required for Bridge, Bridge component, or end station support of PSFP.
psfp = Optional for Bridge, Bridge component, or end station support of PSFP.
ATS = Required for Bridge or Bridge component support of ATS.
ats = Optional for Bridge or Bridge component support of ATS.

Items for future Consideration

Qcr-D0.4 is compatible with Q-Rev, but we may enhance the standard

Issue: Unspecified Processing Order

Description

- Q-Rev explicitly specifies by text that Flow Meters are executed after Maximum SDU size filters

- Q-Rev explicitly specifies by Figure that Flow Meters are executed after Stream Gated

- Not explicitly in Q-Rev: <u>Processing ordering of Max. SDU size filters and Stream Gates?</u>

Proposal (now in Qcr-D0.4)

- Set the following processing order, as also required by ATS:

- Stream Filters → Stream Gates → Max. SDU size filters → MEF 10.3 meters

- Stream Filters → Stream Gates → Max. SDU size filters → ATS shapers

- MEF 10.3 meters → ATS shapers – Note that this combination appears to be of little practical use…

Issue: Symmetric Filter Specifications

Description

PSFP MIB: Filter Specifications are associated in different ways with a stream filter: There is a list key-uint32 pairs per stream filter:

- For a max MTU size filter, the key is 0 and the **uint32** is **set to the maximum SDU size**.
- For a flow meter (PSFP), the key is 1 and the **uint32** is **a pointer to this meter**
- For a shaper instance (ATS), the key is 2 and the **uint32** is **a pointer to this shaper instance**
- In the YANG modules, I implemented all three types symmetrically via pointers.

Proposal (I may want to do this)

- Do pointers only in new 8.6.5 contents, as well as new 12.*.

- Note that, for clause 12.*, the current description in Q-Rev and Qcr appears incomplete anyway: Only the uint32 semantic is described – the key element is not mentioned.

- The drawback is that I cannot change the PSFP MIB accordingly (compatibility).

- The implication would be a new sub-clause 12.31, which then contains the max SDU size uint32 plus its instance ID. I believe this would not cause compatibility issues, **but I may be wrong**

Minor issue: Mixed Managed Objects

Description

- Example -- max SDU size filters (new clause 8.6.5.3.1 in new 865V2 clause "8.6.5.3 Filter Specifications"):
  - Max. SDU size filters add counters on a per Stream Filter granularity.
  - In Q-Rev, they are attached to the management tables of Stream Filters (i.e., additional column in the management table of Stream Filters)

Proposal (I may want to do this)

- For the modular structure of 865V2, it *may* be nicer to place max SDU size filter management variables in a separate table:
  - MEF 10.3 meters, ATS shapers, and max SDU size filters are of the same kind: stream filter specifications.
  - MEF 10.3 meters and ATS shapers already have separate tables. A separate table for max SDU size filters would improve symmetry.

Open Editorial Topics

Clause numbers need to be fixed

1. A new numbered major clause for normative ATS description (currently only the end station behavior). It is clause 49 in Qcr-D0.4.

2. The correct letter for current Annex T of Qcr (Q-Rev already contains Annex T for CQF). It is informative Annex X in Qcr-D0.4.