

IEEE Standard for Local and metropolitan area networks— Bridges and Bridged Networks— Amendment 28: Per-Stream Filtering and Policing

IEEE Computer Society

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**IEEE Standard for
Local and metropolitan area networks—**

Bridges and Bridged Networks—

Amendment 28: Per-Stream Filtering and Policing

Sponsor

**LAN/MAN Standards Committee
of the
IEEE Computer Society**

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IEEE-SA Standards Board

Abstract: Enhancements to the forwarding process that support per-stream filtering and policing are provided in this amendment to IEEE Std 802.1Q-2014.

Keywords: Bridged Local Area Networks, IEEE 802[®], IEEE 802.1Q[™], IEEE Std 802.1Qbu[™], IEEE 802.1Qbv[™], IEEE Std 802.1Qbz[™], IEEE 802.1Qca[™], IEEE 802.1Qcd[™], IEEE 802.1Qci[™], local area networks (LANs), MAC Bridges, metropolitan area networks, per-stream filtering and policing, PSFP, scheduled traffic, Time-Sensitive Networking, Virtual Bridged Local Area Networks (virtual LANs)

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Introduction

This introduction is not part of IEEE Std 802.1Qci-2017, IEEE Standard for Local and metropolitan area networks—Bridges and Bridged Networks—Amendment 28: Per-Stream Filtering and Policing.

This amendment to IEEE Std 802.1Q-2014 provides enhancements to the forwarding process that support per-stream filtering and policing.

This standard contains state-of-the-art material. The area covered by this standard is undergoing evolution. Revisions are anticipated within the next few years to clarify existing material, to correct possible errors, and to incorporate new related material. Information on the current revision state of this and other IEEE 802[®] standards may be obtained from

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IEEE Standard for Local and metropolitan area networks—

Bridges and Bridged Networks—

Amendment 28: Per-Stream Filtering and Policing

(This amendment is based on IEEE Std 802.1Q™-2014 as amended by IEEE Std 802.1Qca™-2015, IEEE Std 802.1Qcd™-2015, IEEE Std 802.1Q-2014/Cor 1-2015, IEEE Std 802.1Qbv™-2015, IEEE Std 802.1Qbu™-2016, and IEEE Std 802.1Qbz™-2016.)

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strike through~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Deletions and insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.¹

¹Notes in text, tables, and figures are given for information only, and do not contain requirements needed to implement the standard.

1. Overview

1.3 Introduction

Insert the following item at the end of lettered list, renumbering as necessary:

- ch) This standard specifies protocols, procedures, and managed objects that allow for the filtering and policing of individual traffic streams.

2. Normative references

Insert the following references in alphanumeric order:

IEEE Std 802.1CB™, IEEE Standard for Local and Metropolitan Area Networks—Frame Replication and Elimination for Reliability.

MEF Technical Specification 10.3 (MEF 10.3), Ethernet Service Attributes Phase 3.²

Delete the reference to MEF 10.3 from the Bibliography [B45] and amend references to it in the text accordingly.

²MEF technical specifications are available from the MEF website (<http://www.mef.net>).

4. Abbreviations

Insert the following abbreviations in alphanumeric order:

IPV internal priority value specification

PSFP per-stream filtering and policing

5. Conformance

5.4 VLAN Bridge component requirements

5.4.1 VLAN Bridge component options

Insert new subclause 5.4.1.8 as shown, renumbering as necessary:

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.

5.13 MAC Bridge component requirements

5.13.1 MAC Bridge component options

Insert new subclause 5.13.1.1 as shown, renumbering as necessary:

5.13.1.1 Per-stream filtering and policing (PSFP) requirements

A MAC 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.

Insert the following new subclause at the end of Clause 5, renumbering as necessary:

5.27 End-station requirements—PSFP

An end-station 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.

8. Principles of bridge operation

8.6 The Forwarding Process

Replace Figure 8-11 with the following figure. The effect of this replacement is to change “Ingress (8.6.2)” to “Ingress filtering (8.6.2)” and “Egress (8.6.4)” to “Egress filtering (8.6.4)” to match the subclause headings.

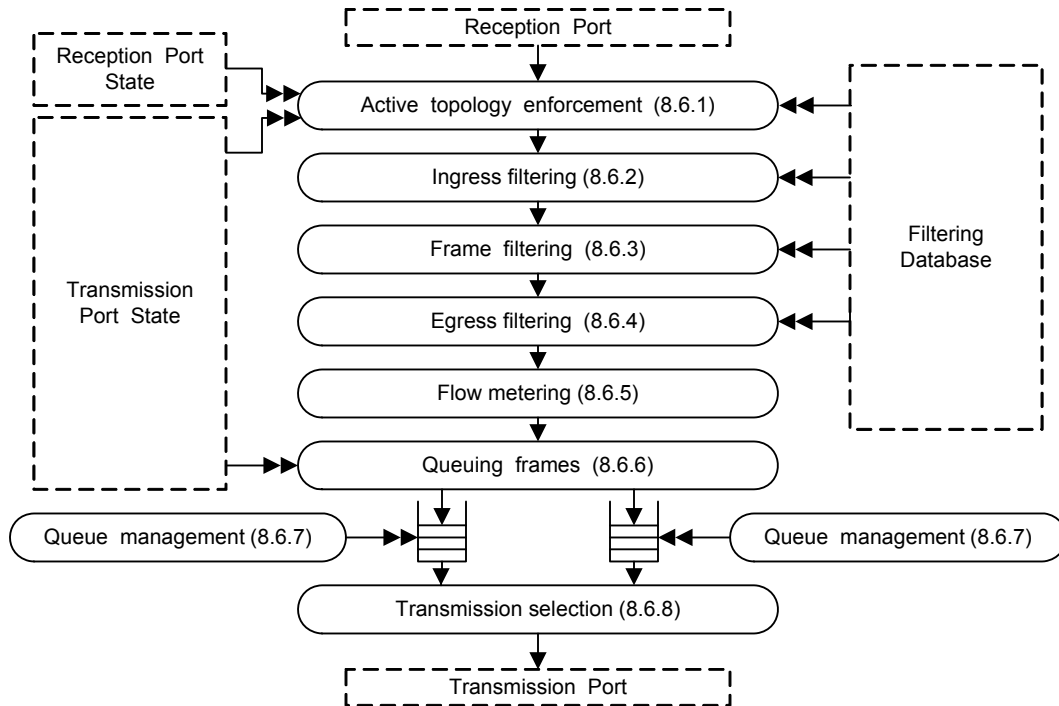


Figure 8-11—Forwarding process functions

8.6.5 Flow classification and metering

Insert new list item e) immediately following list item d), and change the sentence immediately following new item e), renumbering following list items, as shown:

- 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.

Insert new subclause 8.6.5.1, Figure 8-12, and Table 8-5 as shown, renumbering subsequent figures and tables as necessary:

8.6.5.1 Per-stream filtering and policing

A Bridge or an end station may support PSFP capabilities that allow filtering and policing decisions, and subsequent frame queuing decisions (8.6.6.1), to be made on a per-stream basis for received frames.

Support of PSFP requires implementation of the Stream identification function specified in Clause 6 of IEEE Std 802.1CB, as the stream_handle provided by this function is used in the policing and queuing decisions taken by PSFP.

NOTE—The *stream_handle* specified in Clause 6 of IEEE Std 802.1CB is a sub-parameter of the *connection_identifier* parameter of the ISS.

PSFP is supported by the following tables:

- Stream filter instance table (8.6.5.1.1)
- Stream gate instance table (8.6.5.1.2)
- Flow meter instance table (8.6.5.1.3)

The relationship between these tables is illustrated in Figure 8-12. The tables and their parameters can be modified by management as specified in 12.31.

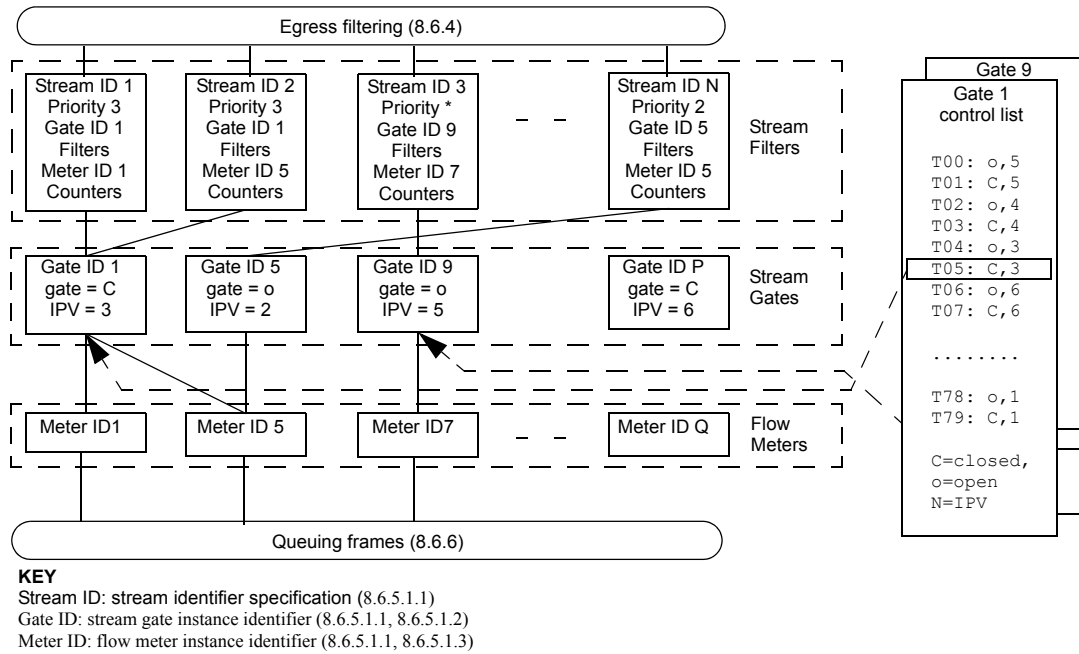


Figure 8-12—Per-stream filtering and policing

8.6.5.1.1 Stream filter instance table

The stream filter instance table consists of an ordered list of *stream filters* that determine the filtering and policing actions that are to be applied to frames received on a specific stream. Each stream filter contains the following elements:

- A *stream filter instance identifier*. This is an integer value that uniquely identifies the filter instance, and acts as an index to the table. The ordering of the identifier values defines the ordering of the list of stream filters; smaller identifier values appear earlier in the ordered list.
- A *stream_handle specification*. This can be either of the following:
 - A single *stream_handle* value, as specified in IEEE Std 802.1CB.
 - A wild-card value that matches any *stream_handle* value.
- A *priority specification*. This can be either of the following:
 - A single priority value.
 - A wild-card value that matches any priority value.

- d) A *stream gate instance identifier*. Identifies the stream gate instance (8.6.5.1.2) that is used by the stream filter. A stream gate can be in one of two states:
 - 1) Open: Frames pass through the gate.
 - 2) Closed: Frames do not pass through the gate.
- e) Zero or more *filter specifications*. The actions specified in a filter specification can result in a frame passing or failing the specified filter. Frames that fail a filter are discarded. The filter specification can include other actions, such as setting the `drop_eligible` parameter to TRUE. The following filter specifications are currently defined:
 - 1) *Maximum SDU size*. Frames that exceed this SDU size do not pass the stream filter; frames that do not exceed this SDU size can pass the stream filter if all other filter conditions are met.

NOTE 1—The Maximum SDU size is defined per stream and can therefore differ from the `queueMaxSDU` specified in 8.6.8.4 of IEEE Std 802.1Qbv. As `queueMaxSDU` is applied after the stream filters, it is possible that a frame that passes the Maximum SDU size stream filter will later be discarded because its SDU size exceeds `queueMaxSDU`.

- 2) *Flow meter instance identifier*. The identifier of an instance of a flow metering function as specified in 8.6.5. The flow meter instance is an index into a *flow meter instance table* (8.6.5.1.3) that specifies the operating parameters for each flow meter instance. Flow metering is always applied after any other filter specifications that could result in frame discard.
- f) Frame counters
 - 1) A count of frames matching both the `stream_handle` and priority specifications.
 - 2) A count of frames that passed the stream gate.
 - 3) A count of frames that did not pass the stream gate.
 - 4) A count of frames that passed the Maximum SDU size filter.
 - 5) A count of frames that did not pass the Maximum SDU size filter.
 - 6) A count of frames that were discarded as a result of the operation of the flow meter.
- g) A *StreamBlockedDueToOversizeFrameEnable* parameter, which takes the value TRUE or FALSE. A value of TRUE indicates that the *StreamBlockedDueToOversizeFrame* function is enabled; a value of FALSE indicates that the *StreamBlockedDueToOversizeFrame* function is disabled. The default value of *StreamBlockedDueToOversizeFrameEnable* is FALSE.
- h) A *StreamBlockedDueToOversizeFrame* parameter, which takes the value TRUE or FALSE. If *StreamBlockedDueToOversizeFrameEnable* is TRUE, a value of TRUE in *StreamBlockedDueToOversizeFrame* indicates that all frames are to be dropped (i.e., the stream filter behaves as it would if the maximum SDU size were to be set to 0 octets). If *StreamBlockedDueToOversizeFrame* is FALSE, it has no effect. The default value of *StreamBlockedDueToOversizeFrame* is FALSE; if any frame is discarded because it exceeds the Maximum SDU size for the stream, then *StreamBlockedDueToOversizeFrame* is set TRUE.

The value of the *stream_handle* and *priority* parameters associated with a received frame determine which stream filter is selected by the frame, and therefore what combination of filtering and policing actions is applied to the frame. If the *stream_handle* and *priority* parameters associated with a received frame match more than one stream filter, the stream filter that is selected is the one that appears earliest in the ordered list. If a received frame's *stream_handle* and *priority* does not match any of the stream filters in the table, the frame is processed as would be the case if PSFP was not supported.

NOTE 2—The use of stream identifier and priority, along with the wild-carding rules previously stated, allow configuration possibilities that go beyond PSFP as implied by the subclause title; for example, per-priority filtering and policing, or per-priority per-ingress port filtering and policing can be configured using these rules.

NOTE 3—If it is desired to discard frames that do not match any other stream filter, rather than such frames being processed without filtering, this can be achieved by placing a stream filter at the end of the table, in which the *stream_handle* and *priority* are both wild-carded (set to the null value), and where the stream gate instance identifier points at a stream gate that is permanently closed.