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October 13, 2023

(Amendment to IEEE Std 802.1Q-2022 as amended by 802.1Qcz-2023, 802.1Qcw-2023, and 802.1Qcj-2023)

Draft Standard for Local and metropolitan area networks—

Bridges and Bridged Networks

Amendment: YANG Data Models for the Credit-Based Shaper

Prepared by the
Time-Sensitive Networking (TSN) Task Group of IEEE 802.1

Sponsor
LAN/MAN Standards Committee
of the
IEEE Computer Society

Draft for first working group ballot

IEEE Standards Association
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Abstract: This amendment to IEEE Std 802.1Q-2022 as amended by IEEE Std 802.1Qcz-2023, IEEE Std 802.1Qcw-2023, and IEEE Std 802.1Qcj-2023 specifies YANG data models that allow configuration and status reporting for bridges and end stations with capabilities for the credit-based shaper algorithm.

Keywords: Bridged Network, IEEE 802.1Q™, LAN, local area network, MAC Bridge, metropolitan area network, CBS, Credit-Based Shaper, YANG.

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Introduction

This introduction is not part of IEEE Std 802.1Qdx™-2023, IEEE Standard for Local and metropolitan area networks— Bridges and Bridged Networks—Amendment 3x: YANG Data Models for the Credit-Based Shaper.

IEEE Std 802.1Qdx™-2023: YANG models for the credit-based shaper addresses the need to manage the credit-based shaper algorithm via YANG models compatible with modern management systems

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
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Credit-Based Shaper

[This amendment is based on IEEE Std 802.1Q™-2022 as amended by IEEE Std 802.1Qcz™-2023, IEEE Std 802.1Qcw™-2023, and IEEE Std 802.1Qcj-2023. is this the correct reference? - these amendments are P802.1Q and not published]

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 italics***. 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 ~~strikethrough~~ (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

1

12. Bridge management

Insert 12.34 as follows:

12.34 Managed objects for Credit-Based Shaping

The Bridge enhancements for support of credit-based shaper are defined in 8.6.8.2

This managed resource comprises the following object:

a) The CBS parameter Table (12.34.1)

12.34.1 The CBS Parameter Table

There is one CBS Parameter Table per Port of a Bridge component. Each table row contains a set of parameters that supports the enhancements for credit-based shaper (8.6.8.2), as detailed in Table 12-46. The CBS parameter table is valid for a Bridge port only when used in the absence of FQTSS or SRP. If the FQTSS Bandwidth Availability Parameter Table (12.20.1) is defined for a Port of the Bridge component, the CBS parameter table is ignored for that Port.

Table 12-46—CBS Parameter Table

Name	Data type	Operations supported[a]	References
trafficClass[b]	unsigned integer [0..7]	R	3.273, 8.6.8
idleSlope	unsigned integer	RW	8.6.8.2

[a] R = Read-only access, RW = Read/Write access.

[b] The term “trafficClass” in this table is the same as the “traffic class” definition of this standard.

48. YANG Data Models

48.2 IEEE 802.1Q YANG models

insert 48.2.14 as follows:

48.2.14 Credit-Based Shaper (CBS) model

The Credit-Based Shaper model augments the Bridge Port model (48.2.1) with nodes that represent the managed objects contained in the following table:

a) CBS Parameter Table (12.34.1)

The CBS model is illustrated in Figure 48-23.

There is one CBS Parameter Table per Port of a Bridge component or end station. Each object of the table represents parameters that support the credit-based shaper (8.6.8.2) as detailed in Table 12-46.

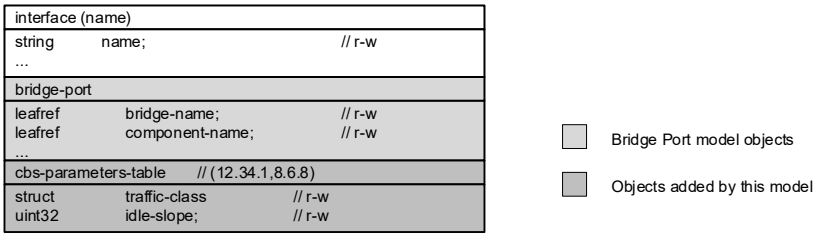

Figure 48-23—Credit-Based Shaper model

48.3 Structure of the YANG models

Table 48-2—Summary of the YANG modules

Insert the following rows at the end of Table 48-1 as shown:

Module	References	Managed functionality	Initial YANG specification Notes
ieee802-dot1q-cbs	48.6.25	8.6.8.2	IEEE Std 802.1Qdx Credit-based shaper module
ieee802-dot1q-cbs-bridge	48.6.26	8.6.8.2	IEEE Std 802.1Qdx Augments Bridge Port with Credit-based shaper module.
ieee802-dot1q-cbs-if	48.6.27	8.6.8.2	IEEE Std 802.1Qdx Augments interface with Credit-based shaper configuration.

Insert 48.3.12 at the end of clause 48.3 as follows:

48.3.12 Credit-Based Shaper (CBS) model

A bridge implementing the CBS model (48.2.14) implements the YANG modules in Table 48-9.

Table 48-9—CBS model YANG modules

YANG Module
ieee802-types
ieee802-dot1q-types
ieee802-dot1q-bridge
ieee802-dot1q-cbs
ieee802-dot1q-cbs-bridge

48.4 Security considerations

Insert 48.4.26 at the end of clause 48.4, as follows

48.4.26 Security considerations of the Credit-Based Shaper model

The following objects in the ieee802-dot1q-cbs YANG module could be manipulated to interfere with the operation of the credit-based shapers. This could, for example, be used to force a reinitialization of CBS state, thus causing network instability.

interfaces/interface/cbs-parameter-table

interfaces/interface/bridge-port/cbs-parameter-table

48.5 YANG schema tree definitions

Insert new 48.5.25, 48.5.26 and 48.5.27 as follows:

48.5.25 Schema for the ieee802-dot1q-cbs YANG module

This YANG module does not have a YANG schema tree.

48.5.26 Schema for the ieee802-dot1q-cbs-bridge YANG module

```
module: ieee802-dot1q-cbs-bridge

  augment /if:interfaces/if:interface/dot1q:bridge-port:
    +--rw cbs-parameters
       +--rw class* [traffic-class]
          +--rw traffic-class    dot1q-types:traffic-class-type
          +--rw idle-slope?      uint64
```

48.5.27 Schema for the ieee802-dot1q-if YANG module

```
module: ieee802-dot1q-cbs-if

  augment /if:interfaces/if:interface:
    +--rw cbs-parameters
       +--rw class* [traffic-class]
          +--rw traffic-class    dot1q-types:traffic-class-type
          +--rw idle-slope?      uint64
```

48.6 YANG modules[1] [2] [3]

[1] Copyright release for YANG: Users of this standard may freely reproduce the YANG modules contained in this standard so that they can be used for their intended purpose.

[2] An ASCII version of each YANG module is attached to the PDF of this standard and can also be obtained from the IEEE 802.1 Website at https://1.ieee802.org/yang-modules/.

[3] References in this standard's YANG module definitions are not clickable, as each module has been incorporated unchanged after development and verification using YANG tools.

Insert 48.6.25 as follows:

48.6.25 The ieee802-dot1q-cbs YANG module

```
module ieee802-dot1q-cbs {

  namespace urn:ieee:std:802.1Q:yang:ieee802-dot1q-cbs;
  prefix cbs;

  import ietf-interfaces { prefix if; }
  import ieee802-dot1q-types { prefix dot1q-types; }

  organization
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  description
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     that support the Credit Based Shaper

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  revision 2023-10-12
  {
    description
      "Published as part of IEEE Std 802.1Qdx.
       Initial version.";
    reference
      "IEEE Std 802.1Qdx, YANG Data Models for the Credit-Based Shaper.";
  }

  grouping cbs-config
  {
    description
      "cbs-config comprises all the parameters associated
       with Credit Based Shaper.";
    container cbs-parameters
    {
      reference "34.3 of IEEE Std 802.1Q";

      list class
      {
        key "traffic-class";
        leaf traffic-class
        {
          type dot1q-types:traffic-class-type;
                config true;
          description "An 802.1 CBS traffic class value. This is the numerical
                       value associated with a traffic class in a Bridge. Larger
                       values are associated with higher priority traffic classes.";
          reference "12.20.1 of IEEE Std 802.1Q";
        }
        leaf idle-slope
        {
          type uint64;
          units "bits/second";
          default 0;
          config true;
```

```
          description "The bandwidth, in bits per second, that the manager desires
                       to allocate to this traffic class as idleSlope.

                       If SRP is supported and in operation, then the reserved
                       bandwidth is determined by the operation of SRP, and any
                       changes to the value of this object have no effect on the
                       operational value of idleSlope(N).

                       The value of this object MUST be retained across
                       reinitializations of the management system.";
          reference "34.3 of IEEE Std 802.1Q";
        }
      }
    }
  }
}

```

Insert 48.6.26 as follows:

48.6.26 The ieee802-dot1q-cbs-bridge YANG module

```
module ieee802-dot1q-cbs-bridge {

  namespace urn:ieee:std:802.1Q:yang:ieee802-dot1q-cbs-bridge;
  prefix cbs-bridge;

  import ietf-interfaces {
    prefix if;
  }
  import ieee802-dot1q-cbs {
    prefix cbs;
  }
  import ieee802-dot1q-bridge {
    prefix dot1q;
  }

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  revision 2023-10-12
  {
    description
      "Published as part of IEEE Std 802.1Qdx.
       Initial version.";
    reference
      "IEEE Std 802.1Qdx, YANG Data Models for the Credit-Based Shaper.";
  }
  feature credit-based-shaper {
    description
      "Credit Based Shaper supported.";
    reference
      "8.6.8.2 of IEEE Std 802.1Q-2022";
  }
  augment "/if:interfaces/if:interface/dot1q:bridge-port" {
    if-feature "credit-based-shaper";
    description
      "Augment bridge-port with Credit Based Shaper configuration.";
    uses cbs:cbs-config;
  }
}

```

Insert 48.6.27 as follows:

48.6.27 The ieee802-dot1q-cbs-if YANG module

```
module ieee802-dot1q-cbs-if {

  namespace urn:ieee:std:802.1Q:yang:ieee802-dot1q-cbs-if;
  prefix cbs-if;

  import ietf-interfaces {
    prefix if;
  }
  import ieee802-dot1q-cbs {
    prefix cbs;
  }

  organization
    "IEEE 802.1 Working Group";
  contact
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       WG-EMail: stds-802-1-L@ieee.org

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  {
       description
      "Published as part of IEEE Std 802.1Qdx
       Initial version.";
    reference
      "IEEE Std 802.1Qdx-2023, YANG Data Models for the Credit-Based Shaper.";
  }
  feature credit-based-shaper {
    description
      "Credit Based Shaper supported.";
    reference
      "8.6.8.2 of IEEE Std 802.1Q";
  }
  augment "/if:interfaces/if:interface" {
    if-feature "credit-based-shaper";
    description
      "Augment interface with Credit Based Shaper configuration.";
    uses cbs:cbs-config;
  }
}
```

Annex A

(normative)

PICS proforma—Bridge implementations[4]

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A.5 Major capabilities

Insert the following rows at the end of Table A.5:

Item	Feature	Status	References	Support	
CBS	Does the implementation support credit-based shaping	O	8.6.8.2	Yes [ ]	No [ ]

Insert new A.55 at the end of Annex A, as follows:

A.55 Credit-Based Shaping

Item	Feature	Status	References	Support
	If CBS is not supported, mark N/A and ignore the remainder of this table.			N/A[ ]
CBS-1	Does the implementation support the algorithm and associated definitions specified in 8.6.8.2	CBS:M	8.6.8.2	Yes [ ] No [ ]
CBS-2	Does the implementation support the management entities defined in 12.34	CBS:M	12.34	Yes [ ] No [ ]

1

A.47 YANG

Insert the following rows at the end of Table A.47:

Item	Feature	Status	References	Support
YANG-CBS	Is the *ieee802-dot1q-cbs* module supported?	CBS:O	48.6.25	Yes [ ] No [ ]
YANG-CBS-BRIDGE	Is the *ieee802-dot1q-cbs-bridge* module supported?	CBS:O	48.6.26	Yes [ ] No [ ]

Annex B

(normative)

PICS proforma—End station implementations[5]

B.5 Major capabilities

Insert the following row at the end of Table B.5:

Item	Feature	Status	References	Support	
CBS	Does the implementation support credit-based shaping	O	8.6.8.2	Yes [ ]	No [ ]

Insert new B.21 at the end of Annex B, as follows:

B.21 Credit-Based Shaping

Item	Feature	Status	References	Support
	If CBS is not supported, mark N/A and ignore the remainder of this table.			N/A[ ]
CBS-1	Does the implementation support the algorithm and associated definitions specified in 8.6.8.2	CBS:M	8.6.8.2	Yes [ ] No [ ]
CBS-2	Does the implementation support the management entities defined in 12.34	CBS:M	12.34	Yes [ ] No [ ]
CBS-3	Is the ieee802-dot1q-cbs YANG module supported?	CBS:O	48.6.25	Yes [ ] No [ ]
CBS-4	Is the ieee802-dot1q-cbs-if YANG module supported?	CBS:O	48.6.27	Yes [ ] No [ ]

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