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STANDARDS ASSOCIATION

IEEE Standard for
 Local and Metropolitan Area Networks—

Bridges and Bridged Networks

Amendment 39:
YANG Data Models for the
Credit-Based Shaper

STANDARDS

IEEE Computer Society

Developed by the
LAN/MAN Standards Committee

IEEE Std 802.1Qdx™-2024
(Amendment to IEEE Std 802.1Q™-2022
as amended by IEEE Std 802.1Qcz™-2023,
IEEE Std 802.1Qcw™-2023,
IEEE Std 802.1Qcj™-2023,
and IEEE Std 802.1Qdj™-2024)

IEEE

IEEE Standard for
Local and Metropolitan Area Networks—

Bridges and Bridged Networks

Amendment 39:
YANG Data Models for the
Credit-Based Shaper

Developed by the

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 6 June 2024

IEEE SA Standards Board

Abstract: A YANG data model that supports configuration and status reporting for credit-based shaper algorithm capabilities in Bridges and end stations is specified in this amendment to IEEE Std 802.1Q-2022 as amended by IEEE Std 802.1Qcz-2023, IEEE Std 802.1Qcw-2023, IEEE Std 802.1Qcj-2023, and IEEE Std 802.1Qdj-2024.

Keywords: amendment, Bridged Network, credit-based shaper algorithm, IEEE 802.1Q™, IEEE 802.1Qdx™, LAN, local area network, MAC Bridge, metropolitan area network, YANG

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[1] Available at: https://standards.ieee.org/about/contact/.

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[3] Available at: https://ieeexplore.ieee.org/browse/standards/collection/ieee.

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[5] Available at: https://standards.ieee.org/about/sasb/patcom/materials.html.

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[6] Not a member of the IEEE 802.1 Working Group at the time this standard was submitted to the IEEE SA Standards Board for approval.

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Introduction

This introduction is not part of IEEE Std 802.1Qdx™-2024, IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks—Amendment 39: YANG Data Models for the Credit-Based Shaper.

IEEE Std 802.1Qdx™-2024: YANG Data Models for the Credit-Based Shaper addresses the need to manage the credit-based shaper algorithm via a YANG model 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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   Local and Metropolitan Area Networks—

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(This amendment is based on IEEE Std 802.1Q™-2022 as amended by IEEE Std 802.1Qcz™-2023, IEEE Std 802.1Qcw™-2023, IEEE Std 802.1Qcj™-2023, and IEEE Std 802.1Qdj™-2024.)

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 <u>underscore</u> (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. [6]

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

IEEE Std 802.1Qdx™-2024
IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks
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48. YANG Data Models

48.2 IEEE 802.1Q YANG models

Insert 48.2.13 at the end of 48.2 as follows:

48.2.13 Credit-based shaper algorithm model

The credit-based shaper algorithm model augments the Bridge Port model (48.2.1) with nodes that represent the managed objects of the credit-based shaper algorithm in Table 12-4.

The credit-based shaper algorithm model is illustrated in Figure 48-23.
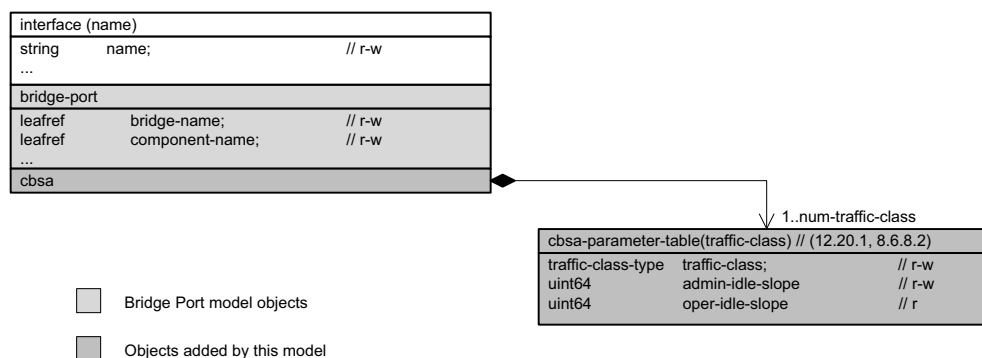
Figure 48-23—Credit-based shaper algorithm model

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48.3 Structure of the YANG models

Insert two new rows at the end of Table 48-1 as follows (unchanged rows not shown):

Table 48-1—Summary of the YANG modules

Module	References	Managed functionality	Initial YANG specification Notes
ieee802-dot1q-cbsa	48.6.24	8.6.8.2	IEEE Std 802.1Qdx Credit-based shaper algorithm module.
ieee802-dot1q-cbsa-bridge	48.6.25	8.6.8.2	IEEE Std 802.1Qdx Augments Bridge Port with credit-based shaper algorithm module.

Insert 48.3.13 at the end of 48.3 as follows:

48.3.13 Credit-based shaper algorithm model

A bridge implementing the credit-based shaper algorithm model (48.2.13) implements the YANG modules in Table 48-14.

Table 48-14—Credit-based shaper algorithm model YANG modules

YANG Module
ieee802-types
ieee802-dot1q-types
ieee-802-dot1q-tsn-types
ieee802-dot1q-bridge
ieee802-dot1q-cbsa
ieee802-dot1q-cbsa-bridge

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48.4 Security considerations

Insert 48.4.13 at the end of 48.4 as follows:

48.4.13 Security considerations of the credit-based shaper algorithm model

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

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

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48.5 YANG schema tree definitions

Insert 48.5.24 and 48.5.25 at the end of 48.5 as follows:

48.5.24 Schema for the ieee802-dot1q-cbsa YANG module

This YANG module does not have a YANG schema tree.

48.5.25 Schema for the ieee802-dot1q-cbsa-bridge YANG module

```
module: ieee802-dot1q-cbsa-bridge

  augment /if:interfaces/if:interface/dot1q:bridge-port:
    +--rw cbsa {credit-based-shaper-algorithm}?
       +--rw cbsa-parameter-table* [traffic-class]
          +--rw traffic-class       dot1q-types:traffic-class-type
          +--rw admin-idle-slope?   uint64
          +--ro oper-idle-slope?    uint64
```

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48.6 YANG modules[7] [8] [9]

Insert 48.6.24 at the end of 48.6 as follows:

48.6.24 The ieee802-dot1q-cbsa YANG module

```
module ieee802-dot1q-cbsa {
  namespace "urn:ieee:std:802.1Q:yang:ieee802-dot1q-cbsa";
  prefix cbsa;

  import ieee802-dot1q-types {
    prefix dot1q-types;
  }

  organization
    "IEEE 802.1 Working Group";
  contact
    "WG-URL: http://www.ieee802.org/1/
    WG-EMail: stds-802-1-L@ieee.org

    Contact: IEEE 802.1 Working Group Chair
    Postal: C/O IEEE 802.1 Working Group
    IEEE Standards Association
    445 Hoes Lane
    Piscataway, NJ 08854
    USA

    E-mail: stds-802-1-chairs@ieee.org";
  description
    "This module provides for management of IEEE Std 802.1Q components
    that support the credit-based shaper algorithm.

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    standard itself for full legal notices.";

  revision 2024-08-07 {
    description
      "Published as part of IEEE Std 802.1Qdx-2024.

      The following reference statement identifies each referenced IEEE
      Standard as updated by applicable amendments.";
    reference
      "IEEE Std 802.1Q Bridges and Bridged Networks:
      IEEE Std 802.1Q-2022, IEEE Std 802.1Qcz-2023, IEEE Std 802.1Qcw-2023,
      IEEE Std 802.1Qcj-2023, IEEE Std 802.1Qdj-2024, IEEE Std 802.1Qdx-2024.";
  }

  grouping cbsa-parameters {
    description
      "cbsa-parameters comprises all the parameters associated
      with the credit-based shaper algorithm.";
    container cbsa {
      description
        "This container comprises all credit-based shaper algorithm related
        nodes.";
      list cbsa-parameter-table {
        key "traffic-class";
        max-elements 8;
        description
          "There is one cbsa-parameter-table list per Port. Each list entry
          corresponds to the set of parameters (12.20.1) for each traffic class
```

---

[7] 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.

[8] 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/.

[9] 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.

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```
          configured for use with the credit-based shaper algorithm (8.6.8.2).
          The cbsa-parameter-table list is valid for a Bridge Port only when
          used in the absence of the stream reservation protocol.";
        reference
          "8.6.8.2, 34.3, 34.6, and 12.20.1 of IEEE Std 802.1Q.";
        leaf traffic-class {
          type dot1q-types:traffic-class-type;
          description
            "An 802.1 traffic class value. This is the numerical value
            associated with a traffic class. Larger values are associated with
            higher priority traffic classes.";
          reference
            "8.6.8 of IEEE Std 802.1Q.";
        }
        leaf admin-idle-slope {
          type uint64;
          units "bits/second";
          default "0";
          description
            "The bandwidth, in bits per second, that has been requested by
            management to be reserved for use by the queue associated with
            this traffic class.

            If the stream reservation protocol is in operation for this traffic
            class, this parameter has no effect.

            If the stream reservation protocol is not in operation for this
            traffic class, then the value of oper-idle-slope is equal to the
            value of admin-idle-slope.";
          reference
            "34.3 of IEEE Std 802.1Q.";
        }
        leaf oper-idle-slope {
          type uint64;
          units "bits/second";
          default "0";
          config false;
          description
            "The actual bandwidth, in bits per second, that is currently
            reserved for use by the queue associated with this traffic class
            (see 34.6.1 and 34.6.2).";
          reference
            "34.3, 34.6.1, and 34.6.2 of IEEE Std 802.1Q.";
        }
      }
    }
  }
}
```

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Insert 48.6.25 after 48.6.24 (inserted above) as follows:

48.6.25 The ieee802-dot1q-cbsa-bridge YANG module

```
module ieee802-dot1q-cbsa-bridge {
  namespace "urn:ieee:std:802.1Q:yang:ieee802-dot1q-cbsa-bridge";
  prefix cbsa-bridge;

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

  organization
    "IEEE 802.1 Working Group";
  contact
    "WG-URL: http://www.ieee802.org/1/
    WG-EMail: stds-802-1-L@ieee.org

    Contact: IEEE 802.1 Working Group Chair
    Postal: C/O IEEE 802.1 Working Group
    IEEE Standards Association
    445 Hoes Lane
    Piscataway, NJ 08854
    USA

    E-mail: stds-802-1-chairs@ieee.org";
  description
    "This module provides for management of IEEE Std 802.1Q Bridges
    that support the credit-based shaper algorithm.

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    This version of this YANG module is part of IEEE Std 802.1Q; see the
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  revision 2024-08-07 {
    description
      "Published as part of IEEE Std 802.1Qdx-2024.

      The following reference statement identifies each referenced IEEE
      Standard as updated by applicable amendments.";
    reference
      "IEEE Std 802.1Q Bridges and Bridged Networks:
      IEEE Std 802.1Q-2022, IEEE Std 802.1Qcz-2023, IEEE Std 802.1Qcw-2023,
      IEEE Std 802.1Qcj-2023, IEEE Std 802.1Qdj-2024, IEEE Std 802.1Qdx-2024.";
  }

  feature credit-based-shaper-algorithm {
    description
      "Credit-based shaper algorithm supported.";
    reference
      "8.6.8.2 of IEEE Std 802.1Q.";
  }

  augment "/if:interfaces/if:interface/dot1q:bridge-port" {
    if-feature "credit-based-shaper-algorithm";
    description
      "Augment dot1q:bridge-port with credit-based shaper algorithm
      configuration.";
    uses cbsa:cbsa-parameters;
  }
}
```

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Annex A

(normative)

PICS proforma—Bridge implementations[10]

A.5 Major capabilities

Insert the following row at the end of the table in A.5 (unchanged rows not shown):

Item	Feature	Status	References	Support	
CBSA	Does the implementation support the credit-based shaper algorithm?	O	8.6.8.2	Yes [ ]	No [ ]

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IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks
Amendment 39: YANG Data Models for the Credit-Based Shaper

A.47 YANG

Insert the following rows at the end of the table in A.47 (unchanged rows not shown):

Item	Feature	Status	References	Support	
YANG-CBSA	Is the *ieee802-dot1q-cbsa* module supported?	CBSA:O	48.6.24	Yes [ ]	No [ ]
YANG-CBSA-BRIDGE	Is the *ieee802-dot1q-cbsa-bridge* module supported?	CBSA:O	48.6.25	Yes [ ]	No [ ]

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

A.55 Credit-based shaper algorithm

Item	Feature	Status	References	Support
	If CBSA is not supported, mark N/A and ignore the remainder of this table.			N/A[ ]
CBSA-1	Does the implementation support the algorithm and associated parameters specified in 8.6.8.2?	CBSA:M	8.6.8.2	Yes [ ] No [ ]
CBSA-2	Does the implementation support the management parameters adminIdleSlope and operIdleSlope as defined in 12.20.1?	CBSA:M	12.20.1	Yes [ ] No [ ]

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Annex B

(normative)

PICS proforma—End station implementations[11]

B.5 Major capabilities

Insert the following row at the end of the table in B.5 (unchanged rows not shown):

Item	Feature	Status	References	Support
CBSA	Does the implementation support the credit-based shaper algorithm?	O	8.6.8.2	Yes [ ] No [ ]

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

B.21 Credit-based shaper algorithm

Item	Feature	Status	References	Support
	If the credit-based shaper algorithm is not supported, mark N/A and ignore the remainder of this table.			N/A[ ]
CBSA-1	Does the implementation support the credit based shaper algorithm and associated parameters specified in 8.6.8.2?	CBSA:M	8.6.8.2	Yes [ ] No [ ]
CBSA-2	Does the implementation support the management parameters adminIdleSlope and operIdleSlope as defined in 12.20.1?	CBSA:M	12.20.1	Yes [ ] No [ ]

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