

6 **Draft Standard for**
7 **Local and Metropolitan Area Networks—**
8 **Bridges and Bridged Networks**

9 **Amendment 40:**
10 **YANG for the Multiple Spanning Tree**
11 **Protocol**

12 Prepared by the

13 **Time-Sensitive Networking (TSN) Task Group of IEEE 802.1**

14 Sponsor

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

16 **This and the following cover pages are not part of the draft.** They provide revision and other information
17 for IEEE 802.1 Working Group members and will be updated as convenient. **New participants: Please read**
18 **these cover pages**, they contain information that should help you contribute effectively to this standards
19 development project. The [Introduction to the current draft](#) should be useful to all readers.

20 The text proper of this draft begins with the [Title page](#).

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1 This document is a draft amendment to IEEE Std 802.1Q-2022 as updated by published and draft
2 amendments (if, and as, noted on the [Title page](#)), and may include (in addition to the main subject of the
3 amendment, as per the PAR) the agreed or proposed resolution of [Maintenance items and technical and](#)
4 [editorial corrections](#), to the description of existing functionality(see below).

5 These cover pages provide an [Introduction to the current draft](#), an introduction to [Participation in 802.1](#)
6 [standards development](#), a summary of the [PAR \(Project Authorization Request\) and CSD](#), for this project, and
7 a general discussion of [Draft development](#).

8 These cover pages will be replaced for SA Ballot by a briefer version providing information for that ballot, with
9 space for commentary on, and hyperlinks to, changes that occur in SA Ballot.

10 Introduction to the current draft¹

11 This draft, P802.1Qdy/D1.2, has been prepared for Working Group recirculation ballot. It incorporates the
12 resolution of comments received on the Working Group Ballot of P802.1Qdy/D1.0:

13 <https://www.ieee802.org/1/files/private/dy-drafts/d1/802-1Qdy-d1-0-dis-v01.pdf>

14 Major changes made in this draft include:

- 15 — The Title of the amendment, as shown in the frontmatter and on the first cover page was (in D1.0) not
16 the title of the approved project, but had been abbreviated to ‘YANG for Multiple Spanning Trees’.
17 This was not noted in the WG ballot, but since there has been no decision to revise the PAR and
18 using a different title would fail MEC (editorial coordination) and delay moving to SA Ballot this has
19 been simply corrected.
- 20 — the YANG modules were restructured based on:
21 <https://www.ieee802.org/1/files/public/docs2024/dy-mittelberger-rstp-mstp-YANG-0124-v01.pdf>
- 22 — Clause 17 (MIB) changes are no longer included, following the WG decision in comment resolution to
23 not revise the MIB. The Abstract and the brief Introduction that form part of the front matter of the
24 standard (on the reverse of the title page, and immediately prior to the Table of Contents respectively)
25 were not noted specifically in ballot comment resolution, but have been also updated to remove
26 references to MIB changes. Note that although the PAR Scope of the Project includes updating the
27 MIB to match the YANG capabilities, the IEEE process only requires that the content of the project
28 remain within its scope, rather than filling out the entire possible scope. The MIB changes were not a
29 specific requirement of the CSD.
- 30 — Clause 5 (Conformance) has been added, to reflect the availability of YANG for MSTP.

31 Minor editorial changes, not noted specifically in WG Ballot comment resolution, made in this draft include:

- 32 — Additions to the Keywords following the Abstract, including “VLANs” among other terms essential to
33 the use of Multiple Spanning Trees, and also including “IEEE 802.1QdyTM” consistent with
34 pre-publication editorial practice for recent amendments.
- 35 —

36 Maintenance items and technical and editorial corrections

37 This draft does not include proposed or agreed resolutions of maintenance items for the base standard.

38 This draft does not include any technical corrections to the base standard beyond the project subject matter.

39 This draft does not include any editorial corrections to the base standard beyond the project subject matter.

40 YANG modules

41 The YANG modules specified by this standard are attached to the draft pdf as plain text (UTF-8) .yang files.

¹The whole or parts of the introduction, possibly updated, to past drafts may be retained at the Editor’s discretion, with the most recent introduction first. The introduction to each draft may solicit input on specific subjects.

1 Sources

2 This draft, P802.1Qdy/D1.2, has been prepared from a set of Framemaker files with conditional text that
3 supports the production of an amendment draft and a preliminary rollup of that amendment draft into the text
4 of the base standard, IEEE Std 802.1Q-2022 as amended by prior amendments.

5 These sources were based on those for P802.1Q-2022-Rev/D1.0, with further amendment by the text of the
6 published and in-process amendments (at the time of preparation of this draft). Further changes (not included
7 in the printed text of this amendment) may have been made to those sources as part of an ongoing program
8 of making the 802.1Q Framemaker sources consistent. Further drafts of P802.1Q-2022-Rev should be based
9 on this (or a successor) source set, and not those for D1.0.

10 This particular amendment does not depend on the in-process amendments (P802.1Qdj and P802.1Qdx) and
11 should be unaffected by any changes made to those amendments as part of SA Ballot, with the minor
12 exception of possible (though unlikely) changes to clause numbering.

13 For a description of the use of conditional text and other FrameMaker and IEEE Std 802.1Q Style
14 considerations applicable to this draft see the EDITOR-PLEASE-READ-ME file in the FrameMaker books
15 used to generate this draft.

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3 their obligations under the IEEE Patent Policy, the IEEE Standards Association (SA) Copyright Policy, and the
4 IEEE SA Participation Policy. For information on these policies see 1.ieee802.org/rules/ and the slides
5 presented at the beginning of each of our Working Group and Task Group meeting.

6 The IEEE SA [PAR \(Project Authorization Request\)](#) and [CSD](#) (Criteria for Standards Development established
7 by IEEE 802) are summarized in these cover pages and links are provided to the full text of both PAR and
8 CSD. As part of the IEEE 802® process, the text of the PAR and CSD of each project is reviewed regularly to
9 ensure their continued validity. A vote of "Approve" on this draft is also an affirmation by the voter that the PAR
10 and CSD for this project are still valid.

11 Comments on this draft are encouraged. NOTE: All issues related to IEEE standards presentation style,
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13 publication, after balloting and the process of achieving agreement on the technical content of the standard is
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15 either the technical content of the document or the clarity of that technical content. Comments should not
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17 Full participation in the work of IEEE 802.1 requires attendance at IEEE 802 meetings. Information on 802.1
18 activities, working papers, and email distribution lists etc. can be found on the 802.1 Website:

19 <http://ieee802.org/1/>

20 Use of the email distribution list is not presently restricted to 802.1 members, and the working group has a
21 policy of considering comments from all who are interested and willing to contribute to the development of the
22 draft. Individuals not attending meetings have helped to identify sources of misunderstanding and ambiguity
23 in past projects. The email lists exist primarily to allow the members of the working group to develop
24 standards, and are not a general forum. All contributors to the work of 802.1 should familiarize themselves
25 with the IEEE patent policy and anyone using the email distribution list will be assumed to have done so.
26 Information can be found at <http://standards.ieee.org/db/patents/>

27 Comments on this draft may be sent to the 802.1 email exploder, to the Editors, or to the Chairs of the 802.1
28 Working Group and Time-Sensitive Networking (TSN) Task Group.

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38 **All participants in IEEE standards development have responsibilities under the IEEE patent policy and**
39 **should familiarize themselves with that policy, see**
40 <http://standards.ieee.org/about/sasb/patcom/materials.html>

1 **PAR (Project Authorization Request) and CSD**

2 Extracts from the PAR, as approved by IEEE NesCom 21st September, 2023:

3 <https://development.standards.ieee.org/myproject-web/public/view.html#pardetail/10988>

4 and the CSD (Criteria for Standards Development):

5 <https://mentor.ieee.org/802-ec/dcn/23/ec-23-0149-00-ACSD-p802-1qdy.pdf>

6 follow. The Scope and Purpose of the base standard remains unchanged from IEEE Std 802.1Q-2022.

7 **PAR Scope of the Project:**

8 This amendment specifies YANG modules that enable configuration and status reporting for bridges and
9 bridge components for the Multiple Spanning Tree Protocol (MSTP). This amendment addresses MSTP
10 requirements arising from industrial automation networks, updating existing managed objects and updating
11 the existing Management Information Base (MIB) to match the capabilities of the YANG modules.

12 **PAR Need for the Project:**

13 YANG (RFC 7950) is a formalized data modeling language that is widely accepted and can be used to
14 simplify network configuration. The ability to manage the Multiple Spanning Tree Protocol via YANG
15 modules is needed for compatibility with modern network management systems. Industrial automation
16 networks require parameter value ranges that can differ from those currently supported.

17 **PAR Possible registration activity related to this project:**

18 The YANG Data Model will be assigned a Uniform Resource Name (URN) based on the IEEE Registration
19 Authority (RA) URN tutorial and IEEE Std 802d.

20 **CSD Broad market potential [extract]:**

21 The proposed amendment will support the use of YANG, which has broad industry support in networks that
22 use IEEE Std 802.1Q. Both IEEE Std 802.1Q and YANG are already supported and used by multiple
23 vendors, network providers, and network users. There is a wide interest in the industry to manage the
24 Multiple Spanning Tree Protocol (MSTP) via YANG. Furthermore, industrial automation networks require
25 parameter value ranges that can differ from those currently supported.

26 **CSD Economic feasibility [extract]:**

- 27 a) Management using YANG utilizes a balance between end station and infrastructure capabilities; the
28 balance will be similar to that for existing management methods.
- 29 b) The cost factors will be similar to those of existing management methods.
- 30 c) This project extends the YANG capabilities of IEEE Std 802.1Q to MSTP as a step towards a
31 complete YANG management solution. This helps to eliminate multiple management platforms,
32 thus reduces installation cost.
- 33 d) This project extends the YANG capabilities of IEEE Std 802.1Q to manage MSTP as a step towards
34 a complete YANG management solution. This helps to eliminate multiple management platforms,
35 thus reduces operational cost.

1 Draft development

2 During the early stages of draft development, 802.1 editors have a responsibility to attempt to craft technically
3 coherent drafts from the resolutions of ballot comments and from the other discussions that take place in the
4 working group meetings. Preparation of drafts often exposes inconsistencies in editor's instructions or
5 exposes the need to make choices between approaches that were not fully apparent in the meeting. Choices
6 and requests by the editors' for contributions on specific issues will be found in the editors' [Introduction to the](#)
7 [current draft](#) and at appropriate points in the draft.

8 Any text with a Cyan background (as in this sentence) is temporary, with conditional tag 'Editor comment',
9 inserted by the Editors to solicit comment, suggest a future change, or act simply as an aide memoire. Text
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11 these case conditional tagging helps location, and eventual removal, of text or highlighting and can control
12 whether or not it is displayed.

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14 working group drafts, are part of the audit trail of the development of the standard and are available, along
15 with all the revisions of the draft on the 802.1 website (for address see above).

16 During the early stages of draft development the proposed text can be moved around a great deal, and even
17 minor rearrangement can lead to a lot of 'change', not all of which is noteworthy from the point of the reviewer,
18 so the use of automatic change bars is not very effective. In early drafts change bars may be omitted or
19 applied manually, with a view to drawing the readers attention to the most significant areas of change.
20 Readers interested in viewing every change are encouraged to use Adobe Acrobat to compare the document
21 with their selected prior draft. Note that the FrameMaker change bar feature is useless when it comes to
22 indicating changes to Figures.

23 This draft has been prepared from a set of Framemaker files with conditional text that supports the production
24 of an amendment draft and a preliminary roll up of that amendment draft into the text of the base standard, i.e.
25 IEEE Std 802.1Q as of the last Revision as amended by prior amendments (usually as of the close of their
26 successful SA ballots) as noted on the Title Page and the first Cover Page. The editor may make preliminary
27 roll ups available to check consistency with the base standard and cross-references to text that does not
28 appear in this amendment. Roll ups may also be recorded as part of the approved P802.1Q Revision project.

29 For a description of the use of conditional text and other FrameMaker and IEEE Std 802.1Q Style
30 considerations applicable to this draft see the EDITOR-PLEASE-READ-ME file in the FrameMaker books
31 used to generate these drafts.

32 There are generally multiple amendments under development at any time, and while they will add or amend
33 different clauses in the base standard, there are some clauses (notably Clauses 12, 48, and the PICS
34 Annexes that all are likely to change). They need to be fully integrated before or during SA Ballot, and
35 complete that ballot in serial order to avoid future problems.

36 Records of participants in the development of the standard are added after SA Ballot, as part of
37 pre-publication editing by IEEE Staff.

Draft Standard for Local and Metropolitan Area Networks—

Bridges and Bridged Networks

Amendment 40: YANG for the Multiple Spanning Tree Protocol

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

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

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1

2 **Abstract:** This amendment to IEEE Std 802.1Q-2022 as amended by IEEE Std 802.1Qcz-2023,
3 IEEE Std 802.1Qcw-2023, IEEE Std 802.1Qcj-2023, IEEE Std 802.1Qdj-2024, and
4 IEEE Std 802.1Qdx-2024 addresses Multiple Spanning Tree Protocol (MSTP) requirements arising
5 from industrial automation networks. It specifies YANG for bridge and bridge component RSTP and
6 MSTP configuration and status reporting.

7 **Keywords:** Bridged Network, IEEE 802.1Q™, IEEE 802.1Qdy™, LAN, local area network, MAC
8 Bridge, metropolitan area network, MSTP, Multiple Spanning Tree Protocol, MIB, Rapid Spanning
9 Tree Protocol, RSTP, Virtual Bridged Network, virtual LAN, VLAN Bridge, YANG.

10

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1 Participants

2 <<The following lists will be updated in the usual way prior to publication>>

3 At the time this standard was submitted to the IEEE-SA Standards Board for approval, the IEEE 802.1
4 Working Group had the following membership:

5 **Glenn Parsons, *Chair***
6 **Jessy V. Rouyer, *Vice Chair***
7 **János Farkas, *Chair, Time-Sensitive Networking Task Group***
8 **Craig Gunther, *Vice Chair, Time-Sensitive Networking Task Group***
9 **Martin Mittelberger, *Editor***

10 <<TBA>>

¹ The following members of the individual balloting committee voted on this standard. Balloters may have
² voted for approval, disapproval, or abstention.

<<TBA>>

³ When the IEEE-SA Standards Board approved this standard on XX Month 20xx, it had the following
⁴ membership:

⁵ <<TBA>>

<<TBA>>

⁶
⁷ *Member Emeritus
⁸
⁹
¹⁰

1 Introduction

This introduction is not part of IEEE Std 802.1Qdy™-2024, IEEE Standard for Local and metropolitan area networks— Bridges and Bridged Networks—Amendment 40: YANG for Multiple Spanning Trees.

2 IEEE Std 802.1Qdy™-2024: YANG for Multiple Spanning Trees addresses requirements arising from
3 industrial automation networks, specifying YANG for bridge and bridge component MSTP configuration
4 and status reporting.

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

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1

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

4 **Bridges and Bridged Networks**

5 **Amendment 40:**
6 **YANG for the Multiple Spanning Tree**
7 **Protocol**

8 [This amendment is based on IEEE Std 802.1Q™-2022 as amended by IEEE Std 802.1Qcz™-2023,
9 IEEE Std 802.1Qcw™-2023, IEEE Std 802.1Qcj™-2023, IEEE Std 802.1Qdj™-2024, and IEEE Std
10 802.1Qdx™-2024.]

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

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

1 5. Conformance

2 5.4.1.1 Multiple Spanning Tree (MST) operation (optional)

3 *Insert new list item q) after item p) in 5.4.1.1 as follows:*

- 4 q) Support YANG modules for the management of MSTP (48.6.24).

5

13. Spanning tree protocols

13.25 State machine timers

Change Table 13-5 and the following NOTE as follows:

Table 13-5—Timer and related parameter values

Parameter	Default	Permitted range	Interoperability recommendations
Migrate Time	3.0	— ^a	— ^a
(Bridge) Hello Time	2.0	— ^a	— ^a
Bridge Max Age	20.0	6.0–40.0	20.0
Bridge Forward Delay	15.0	4.0–30.0	15.0
Transmit Hold Count	6	1–10	6
Max Hops	20	6– 40 100	—

All times are in seconds. —^a Not applicable, value is fixed.

NOTE—Changes to Bridge Forward Delay do not affect reconfiguration times, unless the network includes Bridges that do not conform to this revision of this standard. Changes to Bridge Max Age can have an effect, as it is possible for old information to persist in loops in the physical topology for a number of “hops” equal to the value of Max Age in seconds, and thus exhaust the Transmit Hold Count in small loops. [The IEEE Std 802.1Qdy amendment to this standard increased the permitted range of Max Hops to allow a spanning tree to provide initial and remedial connectivity in extended ring topologies whenever physical connectivity is possible. Once configured such networks are not expected to depend on spanning tree for failure protection.](#)

48. YANG Data Models

48.2 IEEE 802.1Q YANG models

Insert 48.2.14 and 48.2.15 as follows:

48.2.14 Rapid Spanning Tree Protocol (RSTP) model

The RSTP model augments the VLAN Bridge component model (48.2.1, Figure 48-4) and the Interface management model for Bridge Ports (48.2.1, Figure 48-5) with nodes common to both RSTP and MSTP. These nodes control the configuration of the CST (and the CIST, when augmented by the Multiple Spanning Trees model, 48.2.15) and report on protocol operation. The RSTP model is illustrated in Figure 48-24.

component (name)		
string	name;	// r-w
...		
rstp		
enum	force-protocol-version;	// r-w
uint64	cist-bridge-id;	// r
priority-type	cist-bridge-id-priority;	// r-w
uint64	cist-root-id;	// r
uint32	external-root-path-cost;	// r
port-number-type	cist-root-port-number;	// r
uint8	max-age;	// r
tv-secs-type	hello-time;	// r
uint8	forward-delay;	// r
uint8	bridge-max-age;	// r-w
uint8	bridge-hello-time;	// r
uint8	bridge-forward-delay;	// r-w
int32	tx-hold-count;	// r-w
int32	migrate-time;	// r
uint32	time-since-topology-change;	// r
counter64	topology-change-count;	// r

bridge-port		
leafref	bridge-name;	// r-w
leafref	component-name;	// r-w
...		
rstp		
enum	cist-port-state;	// r
enum	cist-port-role;	// r
bool	restricted-role;	// r
bool	restricted-tcn;	// r
uint16	cist-port-id;	// r
priority-type	cist-port-priority;	// r
int32	external-port-path-cost;	// r-w
uint32	cist-root-id;	// r
int32	cist-external-path-cost;	// r
uint32	designated-bridge-id;	// r
binary	designated-port-id;	// r
bool	port-protocol-migration-check;	//rw
bool	admin-edge-port;	// r-w
bool	oper-edge-port;	// r
bool	auto-edge-port;	// r-w
bool	auto-isolate-port;	// r
bool	isolate-port;	// r



-  VLAN Bridge component and port nodes
-  Objects added or augmented by this model

Figure 48-24—RSTP model

48.2.15 Multiple Spanning Tree Protocol (MSTP) model

The Multiple Spanning Tree Protocol model augments the bridge-mst container of the VLAN Bridge components model (48.2.1) and the RSTP model (48.2.14) with nodes for MSTP. These nodes control the configuration of the CIST and MSTIs and the assignment of VLANs and VIDs to MSTIs (8.9) within MST Regions. They also report on MSTP protocol operation. The Multiple Spanning Tree Protocol model is illustrated in Figure 48-25.

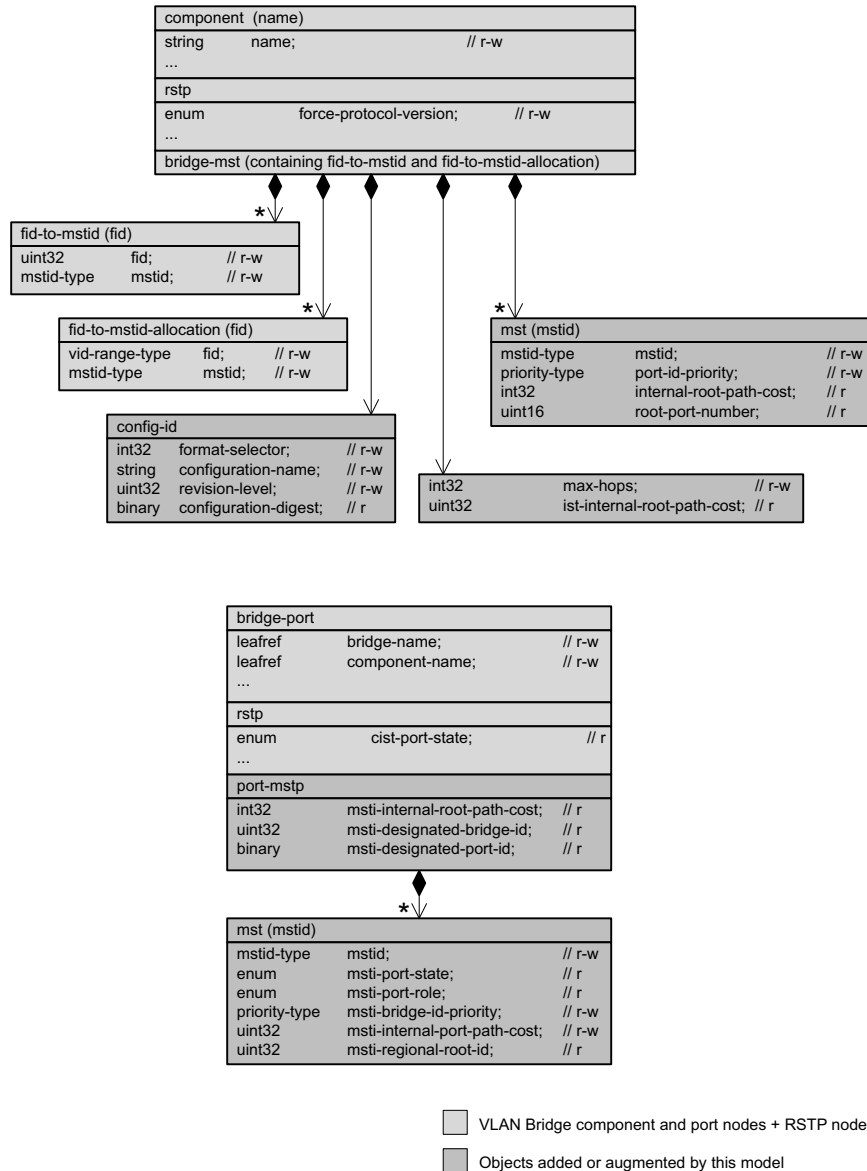


Figure 48-25—MSTP model

48.3 Structure of the YANG models

2

Insert the following row(s) 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-rstp	48.5.26, 48.6.26	8.4, 8.7, 8.8, 8.10 Clause 13	IEEE Std 802.1Qdy Augments Bridge components and Bridge Ports with RSTP parameters.
ieee802-dot1q-mstp	48.5.27, 48.6.27	8.4, 8.7, 8.8, 8.8, 8.9, 8.10 Clause 13	IEEE Std 802.1Qdy Augments Bridge components, Bridge Ports, and the ieee802-dot1q-rstp module with MSTP parameters.

3 *Insert 48.3.14 and 48.3.15 after 48.3.13 (inserted by IEEE Std 802.1Qdx-2024) as follows:*

48.3.14 RSTP model

5 A bridge implementing the RSTP model (48.2.14) implements the YANG modules in Table 48-13.

Table 48-13—RSTP model YANG modules

YANG module
ieee802-types
ieee802-dot1q-types
ieee802-dot1q-bridge
ieee802-dot1q-rstp

48.3.15 MSTP model

7 A bridge implementing the MSTP model (48.2.15) implements the YANG modules in Table 48-14.

Table 48-14—MSTP model YANG modules

YANG module
ieee802-types
ieee802-dot1q-types
ieee802-dot1q-bridge
ieee802-dot1q-rstp
ieee802-dot1q-mstp

8

1 48.4 Security considerations

2 Insert 48.4.14 and 48.4.15 after 48.4.13 (inserted by IEEE Std 802.1Qdx-2024) as follows:

3 48.4.14 Security considerations of the RSTP model

4 All writeable nodes in the ieee802-dot1q-rstp YANG module could be manipulated to interfere with basic
5 networking connectivity.

6 See 48.4.1 for related ieee802-dot1q-bridge YANG model security considerations.

7 48.4.15 Security considerations of the Multiple Spanning Trees model

8 All writeable nodes in the ieee802-dot1q-mstp YANG module could be manipulated to interfere with basic
9 networking connectivity.

10 See 48.4.1 for related ieee802-dot1q-bridge YANG model security considerations.

11

1 48.5 YANG schema tree definitions

2 A simplified graphical representation of the data model is used in this document. The meaning of the
3 symbols in these diagrams is as follows:

- 4 — Brackets “[“ and “]” enclose list keys.
- 5 — Abbreviations before data node names: “rw” means configuration (read-write), and “ro” means state
6 data (read-only).
- 7 — Symbols after data node names: “?” means an optional node, “!” means a presence container, and
8 “*” denotes a list and leaf-list.
- 9 — Parentheses enclose choice and case nodes, and case nodes are also marked with a colon (“:”).
- 10 — Ellipsis (“...”) stands for contents of subtrees that are not shown.

11 *Insert 48.5.26 and 48.5.27 after 48.5.25 (inserted by IEEE Std 802.1Qdx-2024) as follows:*

12 48.5.26 Schema for the ieee802-dot1q-rstp YANG module

```
13 module: ieee802-dot1q-rstp
14
15   augment /dot1q:bridges/dot1q:bridge/dot1q:component:
16     +--rw rstp!
17       +--rw force-protocol-version?      enumeration
18       +--ro cist-bridge-id?              uint64
19       +--rw cist-bridge-id-priority?     dot1qtypes:priority-type
20       +--ro cist-root-id?                uint64
21       +--ro external-root-path-cost?    uint32
22       +--ro cist-root-port-number?      dot1qtypes:port-number-type
23       +--ro max-age?                    uint8
24       +--ro hello-time?                 rt-types:timer-value-seconds16
25       +--ro forward-delay?              uint8
26       +--rw bridge-max-age?             uint8
27       +--ro bridge-hello-time?          uint8
28       +--rw bridge-forward-delay?       uint8
29       +--rw tx-hold-count?               int32
30       +--ro migrate-time?                int32
31       +--ro time-since-topology-change?  uint32
32       +--ro topology-change-count?      yang:counter64
33   augment /if:interfaces/if:interface/dot1q:bridge-port:
34     +--rw rstp!
35       +--ro cist-port-state?             enumeration
36       +--ro cist-port-role?              enumeration
37       +--ro restricted-role?              boolean
38       +--ro restricted-tcn?              boolean
39       +--ro cist-port-id?                uint16
40       +--rw cist-port-priority?          dot1qtypes:priority-type
41       +--rw external-port-path-cost?    int32
42       +--ro cist-root-id?                uint32
43       +--ro cist-external-path-cost?    int32
44       +--ro designated-bridge-id?       uint32
45       +--ro designated-port-id?         binary
46       +--rw port-protocol-migration-check? boolean
47       +--rw admin-edge-port?            boolean
48       +--ro oper-edge-port?             boolean
49       +--rw auto-edge-port?             boolean
50       +--ro auto-isolate-port?          boolean
51       +--ro isolate-port?               boolean
52
```

53 48.5.27 Schema for the ieee802-dot1q-mstp YANG module

```
54 module: ieee802-dot1q-mstp
55
56   augment /dot1q:bridges/dot1q:bridge/dot1q:component/dot1q:bridge-mst:
57     +--rw mst-config-id!
58       | +--rw format-selector?          int32
59       | +--rw configuration-name?       string
60       | +--rw revision-level?           uint32
61       | +--ro configuration-digest?      binary
```

```
1  +--rw bridge-mstp!
2      +--rw max-hops?                int32
3      +--ro ist-internal-root-path-cost?  uint32
4      +--rw mst* [mstid]
5          +--rw mstid                uint16
6          +--rw port-id-priority?    dot1qtypes:priority-type
7          +--ro internal-root-path-cost?  uint32
8          +--ro root-port-number?    dot1qtypes:port-number-type
9  augment /if:interfaces/if:interface/dot1q:bridge-port:
10     +--rw port-mstp!
11         +--rw mst* [mstid]
12             | +--rw mstid                uint16
13             | +--ro msti-port-state?    enumeration
14             | +--ro msti-port-role?    enumeration
15             | +--rw msti-bridge-id-priority?  dot1qtypes:priority-type
16             | +--rw msti-internal-port-path-cost?  uint32
17             | +--ro msti-regional-root-id?  uint32
18             +--ro msti-internal-root-path-cost?  int32
19             +--ro msti-designated-bridge-id?  uint32
20             +--ro msti-designated-port-id?  binary
21
```

1 48.6 YANG modules^{6 7 8}

2 *Insert 48.6.26 after 48.6.25 (inserted by IEEE Std 802.1Qdx-2024) as follows::*

3 48.6.26 The ieee802-dot1q-rstp YANG module

```
4 module ieee802-dot1q-rstp {
5   yang-version 1.1;
6   namespace "urn:ieee:std:802.1Q:yang:ieee802-dot1q-rstp";
7   prefix rstp;
8
9   import ietf-yang-types {
10     prefix yang;
11   }
12   import ietf-interfaces {
13     prefix if;
14   }
15   import ietf-routing-types {
16     prefix rt-types;
17   }
18   import ieee802-dot1q-types {
19     prefix dot1qtypes;
20   }
21   import ieee802-dot1q-bridge {
22     prefix dot1q;
23   }
24
25   organization
26     "IEEE 802.1 Working Group";
27   contact
28     "WG-URL: http://www.ieee802.org/1/
29      WG-EMail: stds-802-1-1@ieee.org
30
31     Contact: IEEE 802.1 Working Group Chair
32     Postal: C/O IEEE 802.1 Working Group
33             IEEE Standards Association
34             445 Hoes Lane
35             Piscataway, NJ 08854
36             USA
37
38     E-mail: stds-802-1-chairs@ieee.org";
39   description
40     "This module provides management of 802.1Q Bridge components that
41      support the Rapid Spanning Tree Algorithm and Protocol (RSTP).
42
43      Copyright (C) IEEE (2024).
44
45      This version of this YANG module is part of IEEE Std 802.1Q; see the
46      standard itself for full legal notices.";
47
48   revision 2024-02-26 {
49     description
50       "Published as part of IEEE Std 802.1Qdy-2024.
51
52       The following reference statement identifies each referenced IEEE
53       Standard as updated by applicable amendments.";
54     reference
55       "IEEE Std 802.1Q Bridges and Bridged Networks:
56       IEEE Std 802.1Q-2022, IEEE Std 802.1Qcz-2023, IEEE Std 802.1Qcw-2023,
57       IEEE Std 802.1Qcj-2023, IEEE Std 802.1Qdj-2024, IEEE Std 802.1Qdx-2024,
58       IEEE Std 802.1Qdy-2024.";
59   }
```

⁶ 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.

⁷ 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/>.

⁸ 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.

```
1
2 augment "/dot1q:bridges/dot1q:bridge/dot1q:component" {
3   description
4     "Augment Bridge with RSTP configuration.";
5   reference
6     "13.24, 13.25, and 13.26 of IEEE Std 802.1Q.";
7   container rstp {
8     presence "The presence of this container indicates that RSTP is supported";
9     leaf force-protocol-version {
10      type enumeration {
11        enum emulate-stp {
12          value 0;
13        }
14        enum withdrawn {
15          value 1; // previously assigned to IEEE Std 802.1G-1996 (withdrawn)
16        }
17        enum rstp-rapid-spanning-tree-protocol {
18          value 2;
19        }
20        enum rstp-mstp {
21          value 3;
22        }
23        enum rstp-spb {
24          value 4;
25        }
26      }
27      default "rstp-rapid-spanning-tree-protocol";
28      config true;
29      description
30        "By default RSTP will provide rapid reconfiguration,
31         but will interoperate with Bridges using STP as specified in
32         IEEE Std 802.1D (now withdrawn). Force Protocol Version can
33         force emulation of aspects of STP behavior, slowing reconfiguration
34         and ageing of FDB entries. Force Protocol Version can be configured
35         to enable MSTP and SPB behavior (if implemented) - interoperability
36         with Bridges that support only RSTP or STP will be maintained.";
37      reference
38        "13.7.2 and item a) of 13.26 of IEEE Std 802.1Q.";
39    }
40    leaf cist-bridge-id {
41      type uint64;
42      config false;
43      description
44        "The Bridge Identifier used by this Bridge for the CIST. Eight
45         octets with the four most significant bits of the first encoding the
46         manageable cist-bridge-id-priority, the next twelve bits being zero,
47         and last six octets encoding the Bridge Address.";
48      reference
49        "13.26.2, 14.1.2, and item e) in 13.26 of IEEE Std 802.1Q.";
50    }
51    leaf cist-bridge-id-priority {
52      type dot1qtys:priority-type;
53      config true;
54      description
55        "The priority component of this Bridge's Bridge Identifier for the
56         CIST, encoded in the four most-significant bits of the first octet
57         of the eight octet Bridge Identifier.
58
59         The value of this object MUST be retained across reinitializations
60         of the management system.";
61      reference
62        "13.26.2, 14.2.5, and item e) in 13.26 of IEEE Std 802.1Q.";
63    }
64    leaf cist-root-id {
65      type uint64;
66      config false;
67      description
68        "The CIST Root Identifier, i.e. the Bridge Identifier of the
69         Common and Internal Spanning Tree calculated by RSTP and of the
70         logical continuation of that connectivity calculate by MSTP, as
71         determined by this node.";
72      reference
```

```
1      "13.9, 14.1.2, and item f) in 13.26 of IEEE Std 802.1Q.";
2  }
3  leaf external-root-path-cost {
4      type uint32;
5      config false;
6      description
7          "The External Root Path Cost (MSTP) or Root Path Cost (RSTP)
8          calculated by this Bridge after the addition of the receiving
9          Port Path Cost.";
10     reference
11         "13.9, 13.10, 13.5.3, and item i) in 13.26 of IEEE Std 802.1Q.";
12 }
13 leaf cist-root-port-number {
14     type dot1qt-types:port-number-type;
15     config false;
16     description
17         "The port number of the Root Port for the RSTP and for the CIST
18         Root Port (MSTP), i.e. the Port Identifier for the port that offers
19         the lowest cost path from this Bridge to the (CIST) Root.";
20     reference
21         "13.4, 13.5, 13.26.9, and item h) in 13.26 of IEEE Std 802.1Q.";
22 }
23 leaf max-age {
24     type uint8;
25     units "seconds";
26     config false;
27     description
28         "For the CIST, the whole seconds (most-significant octet) part of
29         the maximum age of the spanning tree information (Max Age) currently
30         used by this Bridge. Set to the bridge-max-age if the Bridge is the
31         CIST Root, and to the whole seconds part of the value received on
32         the CIST Root Port otherwise.";
33     reference
34         "13.15, 13.20, 13.25, item l) in 13.28, and item g) in 13.26 of
35         IEEE Std 802.1Q.";
36 }
37 leaf hello-time {
38     type rt-types:timer-value-seconds16;
39     units "seconds";
40     config false;
41     description
42         "The interval (Hello Time) between the periodic transmission of
43         Configuration Bridge PDUs on Designated Ports. Set to
44         bridge-hello-time if the Bridge is currently acting as the CIST Root,
45         and to the value received on the CIST Root Port otherwise.";
46     reference
47         "Table 13-5, 13.25.3, and 13.28.11 of IEEE Std 802.1Q.";
48 }
49 leaf forward-delay {
50     type uint8;
51     units "seconds";
52     config false;
53     description
54         "If a Port is using STP rather than RSTP, either as a result of
55         setting force-protocol-version to be less than 2 or because STP BPDUs
56         have been received, this Forward Delay parameter determines the time
57         spent in the Listening and Learning Port States when transitioning
58         from Discarding to Forwarding, and also controls rapid ageing of FDB
59         entries after a topology change. Set to bridge-forward-delay if the
60         Bridge is currently acting as the CIST Root, and to the whole seconds
61         part of the value received on the CIST Root Port otherwise. If RSTP,
62         MSTP, or SPB is used, Port State transitions and FDB flushing are
63         rapid and not controlled by this parameter.";
64     reference
65         "Table 13-5, 13.25.2, 13.28.10, and item g) in 13.26.4 of
66         IEEE Std 802.1Q.";
67 }
68 leaf bridge-max-age {
69     type uint8 {
70         range "6..40";
71     }
72     default "20";
```

```
1      units "seconds";
2      config true;
3      description
4          "The value of the whole seconds part of Max Age when this Bridge is
5          acting as the CIST Root. The fractional part, conveyed in the
6          less-significant octet of each BPDU's Max Age field, will be zero.
7
8          The value of this object MUST be retained across reinitializations
9          of the management system.";
10     reference
11         "Table 13-5, 13.26.4, and item g) in 13.26 of IEEE Std 802.1Q.";
12 }
13 leaf bridge-hello-time {
14     type uint8;
15     default "2";
16     units "seconds";
17     config false;
18     description
19         "The value that this Bridge uses for HelloTime when acting as the
20         CIST Root.";
21     reference
22         "Table 13-5, 13.25.3, and 13.28.11 of IEEE Std 802.1Q.";
23 }
24 leaf bridge-forward-delay {
25     type uint8 {
26         range "4..30";
27     }
28     default "15";
29     units "seconds";
30     config true;
31     description
32         "The value of the whole seconds part of Message Age when this
33         Bridge is acting as the CIST Root. The fractional part, conveyed in
34         the less-significant octet of each BPDU's Max Age field, will be
35         zero.
36
37         The value of this object MUST be retained across reinitializations
38         of the management system.";
39     reference
40         "Table 13-5, 13.26.4, and item g) in 13.26 of IEEE Std 802.1Q.";
41 }
42 leaf tx-hold-count {
43     type int32 {
44         range "1..10";
45     }
46     default "6";
47     config true;
48     description
49         "Limits the rate of BPDU transmission. If the variable txCount
50         (which is incremented on each transmission and decremented once a
51         second) reaches TxHoldCount, transmission is delayed.
52
53         The value of this object MUST be retained across
54         reinitializations of the management system.";
55     reference
56         "Table 13-5, 13.27.75, 13.26.12, and item b) in 13.26 of
57         IEEE Std 802.1Q.";
58 }
59 leaf migrate-time {
60     type int32;
61     default "3";
62     units "seconds";
63     config false;
64     description
65         "Management can force the transmission of RST (or MST or SPT) BPDUs
66         for MigrateTime to check that all STP Bridges have been removed
67         from a specified port's attached LAN, so RST/MST/SPT BPDU
68         transmission can persist. Fixed value of 3 seconds.";
69     reference
70         "Table 13-5, 13.27.38, and item c) in 13.26 of IEEE Std 802.1Q.";
71 }
72 leaf time-since-topology-change {
```

```

1      type uint32;
2      units "seconds";
3      config false;
4      description
5          "The time (in seconds) since the Topology Change timer, tcWhile, for
6          any port on this Bridge was last running - i.e. since
7          Topology Change Notification (TCN) Messages were last transmitted.";
8      reference
9          "13.25.9 of IEEE Std 802.1Q.";
10     }
11     leaf topology-change-count {
12         type yang:counter64;
13         units "topology change count";
14         config false;
15         description
16             "The number of times (since the management entity was last
17             reset or initialized) that at least one port's Topology Change timer
18             (tcWhile) has been non-zero.
19
20             Discontinuities in the value of the counter can occur at
21             re-initialization of the management system, and at other times as
22             indicated by the value of 'discontinuity-time'.";
23         reference
24             "13.25.9 of IEEE Std 802.1Q.";
25     }
26 }
27 }
28
29 augment "/if:interfaces/if:interface/dot1q:bridge-port" {
30     description
31         "Augment Bridge Port with RSTP configuration";
32     reference
33         "13.24, 13.25, and 13.27 of IEEE Std 802.1Q.";
34     container rstp {
35         presence "The presence of this container indicates that RSTP is supported";
36         leaf cist-port-state {
37             type enumeration {
38                 enum discarding {
39                     value 1;
40                 }
41                 enum learning {
42                     value 2;
43                 }
44                 enum forwarding {
45                     value 3;
46                 }
47             }
48             config false;
49             description
50                 "The port's Port State, summarizing the application of learning to
51                 received frames, and the forwarding of relayed frames, for all frames
52                 (for RSTP) or for frames assigned to the CIST (for MSTP). The
53                 Port State is Discarding if both learning and forwarding are both
54                 false, Learning if only learning, and Forwarding if both learning and
55                 forwarding are true. The Discarding state encompasses all reasons for
56                 not forwarding, including MAC_Operational false (if:oper-status not
57                 up) and MAC_Enabled false (if:admin-status not up).";
58             reference
59                 "8.4, 13.4, item aw) and item ba) in 13.27 of IEEE Std 802.1Q.";
60         }
61         leaf cist-port-role {
62             type enumeration {
63                 enum disabled-port {
64                     value 1;
65                 }
66                 enum root-port {
67                     value 2;
68                 }
69                 enum designated-port {
70                     value 3;
71                 }
72                 enum alternate-port {

```



```
1         value 4;
2     }
3     enum backup-port {
4         value 5;
5     }
6 }
7 config false;
8 description
9     "The port's Port Role for the CIST. Disabled Port, Root Port,
10    Designated Port, Alternate Port, or Backup Port.";
11 reference
12     "13.4, 13.5, 13.12, 13.24, 13.27.66, and item bn) in 13.27 of
13    IEEE Std 802.1Q.";
14 }
15 leaf restricted-role {
16     type boolean;
17     default "false";
18     config false;
19     reference
20         "13.20, 13.27.65, 13.29.34, 16.2, 16.3, 26.5, 27.6, 27.20,
21         item t) in 13.27 of IEEE Std 802.1Q.";
22 }
23 leaf restricted-tcn {
24     type boolean;
25     default "false";
26     config false;
27     reference
28         "13.20, 13.27.64, 13.29.25, 16.2, 16.3, item s) in 13.27 of
29         IEEE Std 802.1Q.";
30 }
31 leaf cist-port-id {
32     type uint16;
33     config false;
34     description
35         "The Port Identifier used by this Bridge Port for the CIST. Two
36         octets with the four most-significant bits of the first encoding the
37         manageable cist-port-id-priority, and the next twelve bits encoding
38         the port's port-number.";
39     reference
40         "13.27.46, 14.1.2, item bd) in 13.27 of IEEE Std 802.1Q.";
41 }
42 leaf cist-port-priority {
43     type dot1qttype:priority-type;
44     config true;
45     description
46         "The priority component of this Port's Port Identifier for the
47         CIST, encoded in the four most-significant bits of the first octet
48         of the two octet Port Identifier.
49
50         The value of this object MUST be retained across reinitializations
51         of the management system.";
52     reference
53         "13.27.47, 14.2.7, and item be) in 13.27 of IEEE Std 802.1Q.";
54 }
55 leaf external-port-path-cost {
56     type int32 {
57         range "0..2000000000";
58     }
59     config true;
60     description
61         "The administratively assigned value for the port's contribution to
62         the External Root Path Cost for the Bridge, when the port is the
63         CST Root Port (for RSTP and MSTP) or the CIST Master Port (for MSTP
64         and ISIS-SPB).
65
66         The value of this object MUST be retained across reinitializations
67         of the management system.";
68     reference
69         "13.27.25, Table 13-4, and item g) of 13.27 of IEEE Std 802.1Q.";
70 }
71 leaf cist-root-id {
72     type uint32;
```

```

1      config false;
2      description
3          "The CIST Root Identifier in Configuration BPDUs transmitted by the
4          Designated Bridge for the attached LAN.";
5      reference
6          "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
7  }
8  leaf cist-external-path-cost {
9      type int32;
10     config false;
11     description
12         "The External Path Cost advertised in BPDUs by the Designated Bridge
13         for the attached LAN.";
14     reference
15         "27.6, 14.1.2, 13.27.20, and item ar) in 13.27 of IEEE Std 802.1Q.";
16 }
17 leaf designated-bridge-id {
18     type uint32;
19     config false;
20     description
21         "The Bridge Identifier of the Bridge that this port considers to be
22         the Designated Bridge for the attached LAN.";
23     reference
24         "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
25 }
26 leaf designated-port-id {
27     type binary {
28         length "2";
29     }
30     config false;
31     description
32         "The Port Identifier of the Bridge Port that this port considers to
33         be the Designated Port for the attached LAN.";
34     reference
35         "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
36 }
37 leaf port-protocol-migration-check {
38     type boolean;
39     config true;
40     description
41         "Writing true(1) to port-protocol-migration-check (mcheck)
42         forces transmission of RST (or MST or SPT) BPDUs for migrate-time to
43         check that all STP Bridges have been removed from the port's attached
44         LAN, so RST/MST/SPT BPDUs transmission can persist. Has no effect if
45         force-protocol-version is emulate-stp(0) or withdrawn(1). Always
46         returns false(2) when read.";
47     reference
48         "13.27.38, 13.32, and item j) in 13.27 of IEEE Std 802.1Q.";
49 }
50 leaf admin-edge-port {
51     type boolean;
52     default "false";
53     config true;
54     description
55         "Set if the port is to be identified as an Edge Port immediately
56         on initialization without a delay to detect other Bridges attached
57         to the LAN. Recommended default false(2). The operational value,
58         oper-edge-port, will become false(2) if a BPDU has been received.
59
60         The value of this object MUST be retained across reinitializations
61         of the management system.";
62     reference
63         "13.33, and item a) in 13.27 of IEEE Std 802.1Q.";
64 }
65 leaf oper-edge-port {
66     type boolean;
67     config false;
68     description
69         "Set if the port is currently identified as an Edge Port.
70         Initialized to the value of admin-edge-port, and controlled by the
71         Bridge Detection state machine.";
72     reference

```

```
1      "13.33, and item l) in 13.27 of IEEE Std 802.1Q.";
2    }
3    leaf auto-edge-port {
4      type boolean;
5      default "true";
6      config true;
7      description
8        "Administratively set true(1) to allow the value of oper-edge-port
9        is to be maintained automatically, with continuous monitoring of
10       the presence or absence of other Bridges attached to the LAN.
11
12       The value of this object MUST be retained across reinitializations
13       of the management system.";
14      reference
15        "13.33, 13.27.18, and item c) in 13.27 of IEEE Std 802.1Q.";
16    }
17    leaf auto-isolate-port {
18      type boolean;
19      default "false";
20      config true;
21      description
22        "Administratively set true(1) to allow automatic setting of
23        isolate-port, causing a Designated Port to transition to Discarding
24        if both admin-edge-port and auto-edge-port are false, but the other
25        Bridge presumed attached to the same point-to-point LAN appears
26        unable to transmit BPDUs, indicating failure of a Spanning Tree
27        Protocol Entity or of transmission and/or reception.
28
29        The value of this object MUST be retained across reinitializations
30        of the management system.";
31      reference
32        "13.23, 13.27.19, 13.33, and item d) in 13.27 of IEEE Std 802.1Q.";
33    }
34    leaf isolate-port {
35      type boolean;
36      config false;
37      description
38        "Set by the Bridge Detection state machine when the Spanning Tree
39        Protocol Entity of a neighboring Bridge has apparently failed.";
40      reference
41        "13.23, 13.27.27, 13.33, and item i) in 13.27 of IEEE Std 802.1Q.";
42    }
43  }
44 }
45 }
46
47
```

1 *Insert 48.6.27 as follows:*

2 **48.6.27 The ieee802-dot1q-mstp YANG module**

```
3 module ieee802-dot1q-mstp {
4   yang-version 1.1;
5   namespace "urn:ieee:std:802.1Q:yang:ieee802-dot1q-mstp";
6   prefix mstp;
7
8   import ietf-interfaces {
9     prefix if;
10  }
11  import ieee802-dot1q-types {
12    prefix dot1qtypes;
13  }
14  import ieee802-dot1q-bridge {
15    prefix dot1q;
16  }
17  import ieee802-dot1q-rstp {
18    prefix rstp;
19  }
20
21  organization
22    "IEEE 802.1 Working Group";
23  contact
24    "WG-URL: http://www.ieee802.org/1/
25     WG-EMail: stds-802-1-l@ieee.org
26
27     Contact: IEEE 802.1 Working Group Chair
28     Postal: C/O IEEE 802.1 Working Group
29             IEEE Standards Association
30             445 Hoes Lane
31             Piscataway, NJ 08854
32             USA
33
34     E-mail: stds-802-1-chairs@ieee.org";
35  description
36    "This module provides management of 802.1Q Bridge components that
37     support the Multiple Spanning Tree Algorithm and Protocol (MSTP).
38
39     Copyright (C) IEEE (2024).
40
41     This version of this YANG module is part of IEEE Std 802.1Q; see the
42     standard itself for full legal notices.";
43
44  revision 2024-02-26 {
45    description
46      "Published as part of IEEE Std 802.1Qdy-2024.
47
48      The following reference statement identifies each referenced IEEE
49      Standard as updated by applicable amendments.";
50    reference
51      "IEEE Std 802.1Q Bridges and Bridged Networks:
52       IEEE Std 802.1Q-2022, IEEE Std 802.1Qcz-2023, IEEE Std 802.1Qcw-2023,
53       IEEE Std 802.1Qcj-2023, IEEE Std 802.1Qdj-2024, IEEE Std 802.1Qdx-2024,
54       IEEE Std 802.1Qdy-2024.";
55  }
56
57  augment "/dot1q:bridges/dot1q:bridge/dot1q:component/dot1q:bridge-mst" {
58    when "../rstp:rstp";
59
60    description
61      "Augment RSTP-capable Bridge component with MSTP configuration and
62      management.";
63    reference
64      "13.24, 13.25, and 13.26 of IEEE Std 802.1Q.";
65
66    container mst-config-id {
67      presence "The presence of this container indicates that MSTP is supported";
68      description
69        "Containing the MST Configuration Identifier of a Bridge.";
```

```
1  reference
2  "Item d) in 13.26.";
3  leaf format-selector {
4      type int32 {
5          range "0";
6      }
7      config true;
8      description
9          "In an MSTP Bridge, the MST Configuration Identifier's
10         Configuration Identifier Format Selector. This has a value of 0
11         indicating the format specified in IEEE Std 802.1Q.";
12     reference
13         "Item a) in 13.8 of IEEE Std 802.1Q.";
14 }
15 leaf configuration-name {
16     type string {
17         length "32";
18     }
19     config true;
20     description
21         "The Configuration Name in the MST Configuration Identifier.";
22     reference
23         "Item b) in 13.8:2 of IEEE Std 802.1Q.";
24 }
25 leaf revision-level {
26     type uint32 {
27         range "0..65535";
28     }
29     config true;
30     description
31         "The Revision Level in the MST Configuration Identifier.";
32     reference
33         "Item c) in 13.8 of IEEE Std 802.1Q.";
34 }
35 leaf configuration-digest {
36     type binary {
37         length "16";
38     }
39     config false;
40     description
41         "The Configuration Digest in the MST Configuration Identifier.";
42     reference
43         "Item d) in 13.8 of IEEE Std 802.1Q.";
44 }
45 }
46
47 container bridge-mstp {
48     presence "The presence of this container indicates that MSTP is supported";
49     description
50         "Per-Bridge configuration and management parameters for the IST
51         and each MSTI in an MST Region.";
52     reference
53         "Clause 13, 13.26 of IEEE Std 802.1Q.";
54     leaf max-hops {
55         type int32 {
56             range "6..100";
57         }
58         default "20";
59         config true;
60         description
61             "In an MSTP Bridge, the MaxHops parameter for the IST, also used
62             for each of the MSTIs.
63
64             The value of this object MUST be retained across reinitializations
65             of the management system.";
66         reference
67             "Clause 13, Table 13-5, 13.26.4, item g) in 13.26 of
68             IEEE Std 802.1Q.";
69     }
70     leaf ist-internal-root-path-cost {
71         type uint32;
72         config false;
```

```

1      description
2          "The Internal Root Path Cost for the IST calculated by this
3          Bridge after the addition of the Internal Port Path Cost for the
4          Root Port (or Master Port) for this IST (MSTID 0) or MST.";
5      reference
6          "13.9, 13.10, 13.5.3, 13.26.10 and item i) in 13.26 of
7          IEEE Std 802.1Q.";
8  }
9  list mst {
10     key "mstid";
11     description
12         "Per-Bridge configuration and management parameters for each MST,
13         with an MSTID in the range allocated for MSTP configuration.";
14     reference
15         " ";
16     leaf mstid {
17         type uint16 {
18             range "1..4091";
19         }
20         description
21             "MSTIDs allocated for use by MSTP (1..4091) to identify MSTIs.
22             Other MSTIDs in the 12-bit range are reserved [for use in
23             the MST Configuration Table, whose configuration is identified
24             by the Configuration Digest in the MST Configuration Identifier
25             (mst-config-id/configuration-digest)] for the CIST-MSTID,
26             SPBM-MSTID, SPBV-MSTID, TE-MSTID, and SPVID-Poll-MSTID.";
27         reference
28             "8.4, 8.6.1, 8.9.3, 13.2.1 of IEEE Std 802.1Q.";
29     }
30     leaf port-id-priority {
31         type dot1qttype:priority-type;
32         config true;
33         description
34             "The priority component of this Bridge Port's Port Identifier for
35             the MSTI, encoded in the four most-significant bits of octet 15 of
36             the MSTI Configuration Message.
37
38             The value of this object MUST be retained across reinitializations
39             of the management system.";
40         reference
41             "13.26.3, 13.11, 14.4.1, and
42             item f) in 13.26 of IEEE Std 802.1Q."; ///!
43     }
44     leaf internal-root-path-cost {
45         type uint32;
46         config false;
47         description
48             "The Internal Root Path Cost for this MSTI calculated by this
49             Bridge after the addition of the Internal Port Path Cost for the
50             Root Port (or Master Port) for this MSTI.";
51         reference
52             "13.9, 13.10, 13.5.3, 13.26.10 and item i) in 13.26 of
53             IEEE Std 802.1Q.";
54     }
55     leaf root-port-number {
56         type dot1qttype:port-number-type;
57         config false;
58         description
59             "The port number of the Root Port for this MSTI.";
60         reference
61             "13.4, 13.5, 13.26.9, and item h) in 13.26 of IEEE Std 802.1Q."; ///!
62     }
63 }
64 }
65 }
66 augment "/if:interfaces/if:interface/dot1q:bridge-port" {
67     when "rstp:rstp";
68     description
69         "Augment RSTP Bridge Port with MSTP configuration";
70     reference
71         "13.24, 13.25, and 13.27 of IEEE Std 802.1Q.";
72     container port-mstp {

```

```

1  presence "The presence of this container indicates that MSTP is supported";
2  description
3    "Per-Bridge Port configuration and management parameters for the IST
4    and each MSTI in an MST Region.";
5  list mst {
6    key "mstid";
7    description
8      "Per-Bridge Port configuration and management parameters for each MST,
9      with an MSTID in the range allocated for MSTP configuration.";
10   reference
11     " ";
12   leaf mstid {
13     type uint16 {
14       range "1..4091";
15     }
16     description
17       "MSTIDs allocated for use by MSTP (1..4091) to identify MSTIs.";
18     reference
19       "8.4, 8.6.1, 8.9.3, 13.2.1 of IEEE Std 802.1Q.";
20   }
21   leaf msti-port-state {
22     type enumeration {
23       enum discarding {
24         value 1;
25       }
26       enum learning {
27         value 2;
28       }
29       enum forwarding {
30         value 3;
31       }
32     }
33     config false;
34     description
35       "The port's Port State, summarizing the application of learning to
36       received frames, and the forwarding of relayed frames, for frames
37       assigned to this MSTI.";
38     reference
39       "8.4, 13.4, item aw) and item ba) in 13.27 of IEEE Std 802.1Q.";
40   }
41   leaf msti-port-role {
42     type enumeration {
43       enum disabled-port {
44         value 1;
45       }
46       enum root-port {
47         value 2;
48       }
49       enum designated-port {
50         value 3;
51       }
52       enum alternate-port {
53         value 4;
54       }
55       enum backup-port {
56         value 5;
57       }
58       enum master-port {
59         value 6;
60       }
61     }
62     config false;
63     description
64       "The port's Port Role for the MSTI. Disabled Port, Root Port,
65       Designated Port, Alternate Port, Backup Port, or Master Port.";
66     reference
67       "13.4, 13.5, 13.12, 13.24, 13.27.66, and item bn) in 13.27 of
68       IEEE Std 802.1Q."//!!
69   }
70   leaf msti-bridge-id-priority {
71     type dot1qtptypes:priority-type;
72     config true;

```

```
1      description
2          "The priority component of this Bridge's Bridge Identifier for the
3          MSTI, encoded in the four most-significant bits of octet 14 of the
4          MSTU Configuration Message.
5
6          The value of this object MUST be retained across reinitializations
7          of the management system.";
8      reference
9          "13.26.3, 13.11, 14.4.1, and item f) in 13.26 of IEEE Std 802.1Q.";
10     }
11     leaf msti-internal-port-path-cost {
12         type uint32;
13         config true;
14         description
15             "The Internal Port Path Cost for this Bridge Port and MSTI.";
16         reference
17             "Item b) of 13.2.1, and item ay) in 13.26 of IEEE Std 802.1Q.";
18     }
19     leaf msti-regional-root-id {
20         type uint32;
21         config false;
22         description
23             "The MSTI Regional Root Identifier in Configuration BPDUs transmitted
24             by the Designated Bridge for the attached LAN and this MSTI.";
25         reference
26             "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
27     }
28 }
29 leaf msti-internal-root-path-cost {
30     type int32;
31     config false;
32     description
33         "The MSTI Internal Path Cost advertised in BPDUS by the Designated
34         Bridge for the attached LAN and this MSTI.";
35     reference
36         "27.6, 14.4.1, 13.27.20, 14.4.1, and item ar) in 13.27 of
37         IEEE Std 802.1Q."; ///!
38 }
39 leaf msti-designated-bridge-id {
40     type uint32;
41     config false;
42     description
43         "The Bridge Identifier of the Bridge that this port considers to be
44         the Designated Bridge for the attached LAN and this MSTI.";
45     reference
46         "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
47 }
48 leaf msti-designated-port-id {
49     type binary {
50         length "2";
51     }
52     config false;
53     description
54         "The Port Identifier of the Bridge Port that this port considers to
55         be the Designated Port for the attached LAN and this MSTI.";
56     reference
57         "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
58 }
59 }
60 }
61 }
62
63
```


¹ Annex A

² (normative)

³ PICS proforma—Bridge implementations⁹

⁴ 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-RSTP	Is the <i>ieee802-dot1q-rstp</i> module supported?	RSTP:O	48.6.26	Yes [] N/A []	No []
YANG-MSTP	Is the <i>ieee802-dot1q-mstp</i> module supported?	MSTP:O	48.6.27	Yes [] N/A []	No []

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