2 **P802.1Qdy/D1.0**
3 **November 23, 2023**
4 (Amendment to IEEE Std 802.1Q-2022 as amended by P802.1Qcz/D2.7, P802.1Qcw/D2.2, and
5 P802.1Qcj/D2.5)

6 # Draft Standard for
7 ## Local and metropolitan area networks—

8 # Bridges and Bridged Networks

9 # Amendment nn:
10 # YANG for Multiple Spanning Trees

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

13 Sponsor
14 **LAN/MAN Standards Committee**
15 **of the**
16 **IEEE Computer Society**

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

21 The text proper of this draft begins with the Title page.

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1 Participation in 802.1 standards development

2 All participants in IEEE 802.1 activities should be aware of the Working Group Policies and Procedures, and 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 that the PAR and CSD 10 for this project are still valid.

11 Comments on this draft are encouraged. NOTE: All issues related to IEEE standards presentation style, 12 formatting, spelling, etc. are routinely handled between the 802.1 Editor and the IEEE Staff Editors prior to 13 publication, after balloting and the process of achieving agreement on the technical content of the standard is 14 complete. Readers are urged to devote their valuable time and energy only to comments that materially affect 15 either the technical content of the document or the clarity of that technical content. Comments should not 16 simply state what is wrong, but also what might be done to fix the problem.

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/

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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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41 As part of our IEEE 802 process, the text of the PAR and CSD (Criteria for Standards Development, formerly 42 referred to as the 5 Criteria or 5C's) is reviewed on a regular basis in order to ensure their continued validity. 43 A vote of "Approve" on this draft is also an affirmation by the balloter that the PAR is still valid.

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1 PAR (Project Authorization Request) and CSD

2 This page is a draft, based on the proposed PAR and CSD as of the close of the May 2023 802.1 Interim
3 Meeting.

4 Extracts from the PAR, as approved by IEEE NesCom <date>:

5 https://www.ieee802.org/1/files/public/docs2023/dy-draft-PAR-0523-v01.pdf

6 and the CSD (Criteria for Standards Development):

7 https://www.ieee802.org/1/files/public/docs2023/dy-draft-CSD-0523-v01.pdf

8 follow.

9 **Scope of the project:**

10 This amendment specifies YANG that allows configuration and status reporting for bridges and bridge
11 components for the Multiple Spanning Tree Protocol (MSTP). This amendment addresses MSTP
12 requirements arising from industrial automation networks, updating existing managed objects and updating
13 the existing Management Information Base (MIB) to match the YANG capabilities. Additionally, this
14 amendment addresses errors or omissions in existing functionality.

15 **PAR Need for the Project:**

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

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 MSTP via
24 YANG. Furthermore, industrial automation networks require parameter value ranges that can differ from
25 those currently supported.

26 **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.

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Draft development

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

Any text with a Cyan background (as in this sentence) is temporary, with conditional tag 'Editor comment', inserted by the Editors to solicit comment, suggest a future change, or act simply as an aide memoire.Text can also highlighted to be draw it to the readers' attention, using conditional tag 'Editor highlight'. In both these case conditional tagging helps location, and eventual removal, of text or highlighting and can control whether or not it is displayed.

The ballot comments received on each draft, and the editors' proposed and final disposition of comments on working group drafts, are part of the audit trail of the development of the standard and are available, along with all the revisions of the draft on the 802.1 website (for address see above).

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

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

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

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

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

MIB and YANG modules

The MIB and YANG modules that are modified or added by this amendment are attached to the draft pdf as plain text (UTF-8) .mib and .yang files. When a roll up of the current base standard plus this amendment is made available, all the MIB and YANG modules for the roll up are attached.

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1 Introduction to the current draft [1]

2 This introduction is not part of the draft, and should not be the subject of ballot comments.

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[1] The 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.

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D1.0

This draft version was prepared by Martin Mittelberger for first Working Group ballot.

In this draft the YANG modules for RSTP/MSTP have been added.

D0.1

This is an initial draft and comments are requested on all aspects of the draft. It includes a number of notes that may be of help to the Editors as well as informing the initial review process.

Mick Seaman, 802.1Q Editor

The 802-1Qdy.book, i.e. the FrameMaker set of individual .fm documents that are included in this amendment draft, includes all the .fm documents that appear to be required (an initial assessment). Clauses not required are not in the book. Even if marked as Excluded in the book, they would be updated by applying Show/Hide Conditional Text to the book, which can take time and result in more unresolved cross-reference reports on book update than necessary. These other files are in the same 802-1Qdy directory so can be added to the book if necessary, however before adding check with the 802.1Q Editor to make usre that the latest version is being added, to reduce the work that will be needed when merging the amendment changes into the most recent set of sources for final SA Ballot.

The following files are included:

— Q01 (Clause 1. Overview). This is currently included just to provided the amendment editorial instructions, and the copy of title page information that always precedes these. It would be a waste of time to transfer this material to the first clause file with text to be amended, and that file could change through the course of the project in any case.

— Q13 (Clause 13). Change the upper bound of the Max Hops range, and added draft text to the following Note, following the style of prior amendements in explaining when and why a detailed item has been changed. Note also that the remaining text of this clause has been checked for out of date references to 802.1D and STP. These have been removed where they might appear to be normative language, but retained where they explain backwards compatability aspects of the current standard (which might still be relevant to some users, even this long after RSTP standardization). There changes are changed barred so that they can be reviewed as part of the now approved P802.1Q-2022 Revision Project. Change bars for this Clause's .fm file should not be removed en masse.

— Q17-7-6-MSTP-MIB (17.7.6 Definitions for the IEEE8021-MSTP-MIB module). This has been included with a preliminary update, changing the upper bound of the range for `ieee8021MstpCistMaxHops` from 40 to 100 (which may not be the eventual value determined by this project). References to IEEE Std 802.1D (2004) have been removed, as that standard was obsoleted a long while ago.

Other files in the 802-1Q.book that is used to generate the entire 802.1Q roll up (the last Revision, plus recent amendments, plus this amendment) are not part of the 802-1Qdy book. The present omission of the following may be noteworthy:

— Q02 (Clause 2. Normative references). No additional references are envisaged at present.

— Q03 (Clause 3. Definitions). No additional definitions are expected.

— Q04 (Clause 4. Abbreviations). No additional definitions are expected.

— Q05 (Clause 5. Conformance). There is no absolute need for additions to the Conformance clause, even with the addition of the new YANG module. This would appear to be covered by the existing 5.4.1 VLAN Bridge component options item w) (as of P802.1Qcj/D2.5):

"w) Support YANG modules for the management of VLAN Bridge capabilities (Clause 48)."

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Note that P802.1Qcw, which added several YANG modules, did not make any additions for these to the conformance clause. It did add PICS entries for the new YANG modules (to A.47 and to Tables in Annex B, numbering since corrected).

On the other hand, 802.1Qcz Congestion Isolation did add a specific YANG line item (5.32 item g), as did P802.1Qcj (5.9.2 item h, 5.12.3 item j), and 802.1Q-2022 5.4.1.1 Multiple Spanning Tree (MST) operation (optional) does call out MIB support in item p), though it does not specify which MIB(s).

— Q12 (Clause 12. Bridge management). This clause defers to 13.25 and Table 13-5 for the limit on Max Hops, so does not need to be changed to increase that limit. It is to be hoped that development of the YANG model does not introduce changes that need to be reflected into this clause, or Clause 13.

— Q17 (Clause 17. Management Information Base (MIB) — 17.1 Internet Standard Management Framework & 17.2 Structure of the MIB. No changes should be necessary, unless the work on the YANG adds objects that are to be reflected into the MIB.

— Q17-3 (17.3 MIB module relationships, 17.4 Security considerations, 17.5 Dynamic component and Port creation, 17.6 MIB operations for service interface configuration). No changes to any of these should be necessary.

— Q17-7-3-SPANNING-TREE-MIB. Not currently included, but may be required if the YANG work identifies improvements that need to be made to the MIB(s). I believe such changes are within the scope of the project.

— Q48 (Clause 48. YANG Data Models — Introductory text & 48.1 YANG Framework. This includes Figure 48-2—YANG root hierarchy with IEEE 802.1Q YANG models, but has not been updated by any of the recent amendments.

— Q-X (Annex X Bibliography). No additional references are expected at present. If any are suggested, take care that they are not items already in the 2. Normative References. Both these Clause 2 and the Bibliography will be updated by Annexes in publication, and the Bibliography is more of a nuisance because of the IEEE Style Guide rule placing it as the last Annexes, which means that it can move around. That movement is hard to handle as successive amendments shift its position.

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

Sponsor
LAN/MAN Standards Committee
of the
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1

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 addresses Multiple Spanning Tree Protocol (MSTP) requirements arising from industrial automation networks. It specifies YANG and updates managed objects and the Management Information Base (MIB) module for bridge and bridge component MSTP configuration and status reporting.

Keywords: Bridged Network, IEEE 802.1Q™, LAN, local area network, MAC Bridge, metropolitan area network, MSTP, Multiple Spanning Tree Protocol, MIB, Rapid Spanning Tree Protocol, RSTP, YANG.

10

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[4] Available at: https://standards.ieee.org/standard/index.html.
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Participants

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

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

Glenn Parsons, *Chair*
Jessy V. Rouyer, *Vice Chair*
János Farkas, *Chair, Time-Sensitive Networking Task Group*
Craig Gunther, *Vice Chair, Time-Sensitive Networking Task Group*
Paul Bottorff, *Editor*

<<TBA>>

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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

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1 Introduction

This introduction is not part of IEEE Std 802.1Qdy™-20XX, IEEE Standard for Local and metropolitan area networks— Bridges and Bridged Networks—Amendment 39: YANG for Multiple Spanning Trees.

IEEE Std 802.1Qdy™-2023: YANG for Multiple Spanning Trees addressed requirements arising from industrial automation networks, specifying YANG and updating managed objects and the Management Information Base (MIB) module for bridge and bridge component MSTP configuration and status reporting

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

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IEEE Standard for
Local and metropolitan area networks—

Bridges and Bridged Networks

Amendment nn:
YANG for Multiple Spanning Trees

[This amendment is based on IEEE Std 802.1Q™-2022 as amended by IEEE Std 802.1Qcz™-2023 and IEEE Std 802.1Qcw™-2023.]

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.

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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.

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1 17.7 MIB modules [2] [3]

2 17.7.6 Definitions for the IEEE8021-MSTP-MIB module

3 *Change the text of 17.7.6 as follows:*

```
4 IEEE8021-MSTP-MIB DEFINITIONS ::= BEGIN
5
6 -- ===============================================================
7 -- MIB for IEEE 802.1Q Multiple Spanning Tree Bridge Devices
8 -- ===============================================================
9
10 IMPORTS
11     MODULE-IDENTITY, OBJECT-TYPE, Integer32, Counter64,
12     Unsigned32, TimeTicks
13         FROM SNMPv2-SMI
14     TruthValue, RowStatus
15         FROM SNMPv2-TC
16     ieee802dot1mibs, IEEE8021PbbComponentIdentifier,
17     IEEE8021BridgePortNumber, IEEE8021VlanIndex,
18     IEEE8021MstIdentifier
19         FROM IEEE8021-TC-MIB
20     BridgeId
21         FROM BRIDGE-MIB
22     SnmpAdminString
23         FROM SNMP-FRAMEWORK-MIB
24     MODULE-COMPLIANCE, OBJECT-GROUP
25         FROM SNMPv2-CONF;
26
27 ieee8021MstpMib MODULE-IDENTITY
28     LAST-UPDATED "202306270000Z" -- June 27, 2023"202211080000Z" -- November 8, 2022
29     ORGANIZATION "IEEE 802.1 Working Group"
30     CONTACT-INFO
31         "  WG-URL: http://www.ieee802.org/1/
32          WG-EMail: stds-802-1-l@ieee.org
33           Contact: IEEE 802.1 Working Group Chair
34            Postal: C/O IEEE 802.1 Working Group
35                    IEEE Standards Association
36                    445 Hoes Lane
37                    Piscataway, NJ 08854
38                    USA
39            E-mail: stds-802-1-chairs@ieee.org"
40     DESCRIPTION
41         "The Bridge MIB modules for managing devices that support
42          IEEE Std 802.1Q multiple spanning trees groups.
43
44          Unless otherwise indicated, the references in this MIB
45          module are to IEEE Std 802.1Q-2022 as amended by
46          IEEE Std 802.1Qdy.
47
48          Copyright (C) IEEE (2023).
49          This version of this MIB module is part of IEEE Std 802.1Q;
50          see that standard for full legal notices."
51
52     REVISION "202306270000Z" -- June 27, 2023
53     DESCRIPTION
54             "Published as part of IEEE Std 802.1Qdy.
55             Cross references and contact information updated."
56     REVISION "202211080000Z" -- November 8, 2022
57     DESCRIPTION
58             "Published as part of IEEE Std 802.1Q-2022.
59             Cross references and contact information updated."
60     REVISION "201807010000Z" -- July 1, 2018
61     DESCRIPTION
62             "Published as part of IEEE Std 802.1Q 2018 revision.
```

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[2] *Copyright release for MIBs:* Users of this standard may freely reproduce the MIB modules in this standard so that they can be used for their intended purpose.

[3] An ASCII version of this MIB module is attached to the PDF version of this standard, and can be obtained by Web browser from the IEEE 802.1 Website at https://1.ieee802.org/mib-modules/.

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```
 1            Cross references updated and corrected."
 2
 3      REVISION "201412150000Z" -- December 15, 2014
 4      DESCRIPTION
 5            "Published as part of IEEE Std 802.1Q 2014 revision.
 6            Cross references updated and corrected.
 7            Instances of ...value of mstp(2)... changed to
 8            ...value of mstp(3).
 9            Defval for ieee8021MstpCistPortAdminEdgePort
10            changed to false.
11            ieee8021MstpVlanV2Table DESCRIPTION updated
12            (4094 not 4096).
13            Bug fixes to conformance section."
14
15      REVISION    "201208100000Z" -- August 10, 2012
16      DESCRIPTION
17          "Updated cross references to other clauses, particularly
18          Clause 13, as part of IEEE 802.1Q Cor-2."
19
20      REVISION    "201112120000Z" -- December 12, 2011
21      DESCRIPTION
22          "Deprecated ieee8021MstpFidToMstiTable for an identical
23           ieee8021MstpFidToMstiV2Table to add 4095 to the range
24           of ieee8021MstpFidToMstiV2Fid  and to add 0 and 4095 to
25           the range of ieee8021MstpFidToMstiV2MstId for IEEE Std 802.1aq.
26           Deprecated ieee8021MstpVlanTable for an identical
27           ieee8021MstpVlanV2Table to add 0 & 4095 to the range
28           of ieee8021MstpVlanV2MstId for IEEE Std 802.1aq"
29
30      REVISION    "201103230000Z" -- March 23, 2011
31      DESCRIPTION
32          "Minor edits to contact information, correction to range of
33           ieee8021MstpCistMaxHops and addition of fragile Bridge
34           as part of 2011 revision of IEEE Std 802.1Q."
35
36      REVISION    "200810150000Z" -- October 15, 2008
37      DESCRIPTION
38          "Initial version."
39      ::= { ieee802dot1mibs 6 }
40
41 ieee8021MstpNotifications  OBJECT IDENTIFIER ::= { ieee8021MstpMib 0 }
42 ieee8021MstpObjects        OBJECT IDENTIFIER ::= { ieee8021MstpMib 1 }
43 ieee8021MstpConformance    OBJECT IDENTIFIER ::= { ieee8021MstpMib 2 }
44
45 -- ============================================================
46 -- MSTP CIST Table
47 -- ============================================================
48
49 ieee8021MstpCistTable OBJECT-TYPE
50      SYNTAX      SEQUENCE OF Ieee8021MstpCistEntry
51      MAX-ACCESS  not-accessible
52      STATUS      current
53      DESCRIPTION
54          "The Common and Internal Spanning Tree (CIST) Table. Each row in
55           the table represents information regarding a Bridge's Bridge
56           Protocol Entity for the CIST.
57
58           Note that entries will exist in this table only for Bridge
59           components for which the corresponding instance of
60           ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
61           has a value of mstp(3).
62
63           This table contains objects corresponding to the following items
64           from 12.8.1.1 and 12.8.1.3.  Some of those items are provided
65           in the IEEE8021-SPANNING-TREE-MIB as noted below.
66
67           From 12.8.1.1:
68               Items a), c), o), p), and q) are defined in this table
69               The remaining items are covered in the
70               IEEE8021-SPANNING-TREE-MIB:
71                   b) ieee8021SpanningTreeTimeSinceTopologyChange
72                   c) ieee8021SpanningTreeTopChanges
```

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```
 1                e) ieee8021SpanningTreeDesignatedRoot
 2                f) ieee8021SpanningTreeRootCost
 3                g) ieee8021SpanningTreeRootPort
 4                h) ieee8021SpanningTreeMaxAge
 5                i) ieee8021SpanningTreeForwardDelay
 6                j) ieee8021SpanningTreeBridgeMaxAge
 7                k) ieee8021SpanningTreeBridgeHelloTime
 8                l) ieee8021SpanningTreeBridgeForwardDelay
 9                m) ieee8021SpanningTreeHoldTime
10                n) ieee8021SpanningTreeVersion
11        From 12.8.1.3:
12            Item g) is defined in this table
13            The remaining items are covered in the
14            IEEE8021-SPANNING-TREE-MIB:
15                a) ieee8021SpanningTreeBridgeMaxAge
16                b) ieee8021SpanningTreeBridgeHelloTime
17                c) ieee8021SpanningTreeBridgeForwardDelay
18                d) ieee8021SpanningTreePriority
19                e) ieee8021SpanningTreeVersion
20                f) ieee8021RstpStpExtTxHoldCount"
21     REFERENCE   "12.8.1.1, 12.8.1.3"
22     ::= { ieee8021MstpObjects 1 }
23
24 ieee8021MstpCistEntry OBJECT-TYPE
25     SYNTAX      Ieee8021MstpCistEntry
26     MAX-ACCESS  not-accessible
27     STATUS      current
28     DESCRIPTION
29         "A CIST Table entry."
30     INDEX { ieee8021MstpCistComponentId }
31     ::= { ieee8021MstpCistTable 1 }
32
33 Ieee8021MstpCistEntry ::= SEQUENCE {
34     ieee8021MstpCistComponentId           IEEE8021PbbComponentIdentifier,
35     ieee8021MstpCistBridgeIdentifier      BridgeId,
36     ieee8021MstpCistTopologyChange        TruthValue,
37     ieee8021MstpCistRegionalRootIdentifier  BridgeId,
38     ieee8021MstpCistPathCost              Unsigned32,
39     ieee8021MstpCistMaxHops               Integer32
40 }
41
42 ieee8021MstpCistComponentId OBJECT-TYPE
43     SYNTAX      IEEE8021PbbComponentIdentifier
44     MAX-ACCESS  not-accessible
45     STATUS      current
46     DESCRIPTION
47         "The component identifier is used to distinguish between the
48         multiple virtual Bridge instances within a PBB.  In simple
49         situations where there is only a single component the default
50         value is 1."
51     ::= { ieee8021MstpCistEntry 1 }
52
53 ieee8021MstpCistBridgeIdentifier OBJECT-TYPE
54     SYNTAX      BridgeId
55     MAX-ACCESS  read-only
56     STATUS      current
57     DESCRIPTION
58         "The Bridge Identifier for the CIST."
59     REFERENCE   "12.8.1.1"
60     ::= { ieee8021MstpCistEntry 2 }
61
62 ieee8021MstpCistTopologyChange OBJECT-TYPE
63     SYNTAX      TruthValue
64     MAX-ACCESS  read-only
65     STATUS      current
66     DESCRIPTION
67         "In an STP Bridge, the value of the Topology Change parameter
68         (14.8.1.1.3, item d of IEEE Std 802.1D, 2004 Edition), or in
69         an RSTP or MSTP Bridge, asserted if the tcWhile timer for any
70         Port for the CIST is non-zero."
71     REFERENCE   "13.25.9, 14.8.1.1.3:d of IEEE Std 802.1D-2004"
72     ::= { ieee8021MstpCistEntry 3 }
```

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```
1
2 ieee8021MstpCistRegionalRootIdentifier OBJECT-TYPE
3     SYNTAX       BridgeId
4     MAX-ACCESS   read-only
5     STATUS       current
6     DESCRIPTION
7         "In an MSTP Bridge, the CIST Regional Root Identifier parameter,
8          i.e., the Bridge Identifier of the current CIST Regional Root."
9     REFERENCE    "13.16.4, 13.26.3"
10    ::= { ieee8021MstpCistEntry 4 }
11
12 ieee8021MstpCistPathCost OBJECT-TYPE
13    SYNTAX       Unsigned32 (0..2147483647)
14    MAX-ACCESS   read-only
15    STATUS       current
16    DESCRIPTION
17        "In an MSTP Bridge, the CIST Path Cost parameter, i.e., the CIST
18         path cost from the transmitting Bridge to the CIST Regional Root.
19         The sum (about 20 possible out of the given range) of multiple
20         port path costs. Also, if the 'transmitting Bridge' is
21         the 'CIST Regional Root', then this value could be zero."
22    REFERENCE    "13.9:d, 13.10"
23    ::= { ieee8021MstpCistEntry 5 }
24
25 ieee8021MstpCistMaxHops OBJECT-TYPE
26    SYNTAX       Integer32 (6..40100)
27    MAX-ACCESS   read-write
28    STATUS       current
29    DESCRIPTION
30        "In an MSTP Bridge, the MaxHops parameter.
31
32         The value of this object MUST be retained across
33         reinitializations of the management system."
34    REFERENCE    "13.26.4"
35    ::= { ieee8021MstpCistEntry 6 }
36
37 -- =============================================================
38 -- ieee8021MstpTable:
39 -- =============================================================
40
41 ieee8021MstpTable OBJECT-TYPE
42    SYNTAX       SEQUENCE OF Ieee8021MstpEntry
43    MAX-ACCESS   not-accessible
44    STATUS       current
45    DESCRIPTION
46        "In an MSTP Bridge, the MSTP Table. Each row in the Table
47         represents information regarding a Bridge's Bridge Protocol
48         Entity for the specified Spanning Tree instance.
49
50         Entries in this table MUST be retained across
51         reinitializations of the management system.
52
53         Note that entries can be created in this table only for Bridge
54         components for which the corresponding instance of
55         ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
56         has a value of mstp(3)."
57    REFERENCE    "12.8.1.2, 12.8.1.4, 12.12.3.2, 12.12.1"
58    ::= { ieee8021MstpObjects 2 }
59
60 ieee8021MstpEntry OBJECT-TYPE
61    SYNTAX       Ieee8021MstpEntry
62    MAX-ACCESS   not-accessible
63    STATUS       current
64    DESCRIPTION
65        "A MSTP Table entry."
66    INDEX { ieee8021MstpComponentId, ieee8021MstpId }
67    ::= { ieee8021MstpTable 1 }
68
69 Ieee8021MstpEntry ::= SEQUENCE {
70     ieee8021MstpComponentId              IEEE8021PbbComponentIdentifier,
71     ieee8021MstpId                       IEEE8021MstIdentifier,
72     ieee8021MstpBridgeId                 BridgeId,
```

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```
 1      ieee8021MstpTimeSinceTopologyChange  TimeTicks,
 2      ieee8021MstpTopologyChanges          Counter64,
 3      ieee8021MstpTopologyChange           TruthValue,
 4      ieee8021MstpDesignatedRoot           BridgeId,
 5      ieee8021MstpRootPathCost             Integer32,
 6      ieee8021MstpRootPort                 IEEE8021BridgePortNumber,
 7      ieee8021MstpBridgePriority           Integer32,
 8      ieee8021MstpVids0                    OCTET STRING,
 9      ieee8021MstpVids1                    OCTET STRING,
10      ieee8021MstpVids2                    OCTET STRING,
11      ieee8021MstpVids3                    OCTET STRING,
12      ieee8021MstpRowStatus                RowStatus
13 }
14
15 ieee8021MstpComponentId OBJECT-TYPE
16     SYNTAX      IEEE8021PbbComponentIdentifier
17     MAX-ACCESS  not-accessible
18     STATUS      current
19     DESCRIPTION
20       "The component identifier is used to distinguish between the
21        multiple virtual Bridge instances within a PBB.  In simple
22        situations where there is only a single component the default
23        value is 1."
24     ::= { ieee8021MstpEntry 1 }
25
26 ieee8021MstpId OBJECT-TYPE
27     SYNTAX      IEEE8021MstIdentifier
28     MAX-ACCESS  not-accessible
29     STATUS      current
30     DESCRIPTION
31         "In an MSTP Bridge, this parameter is the MSTID, i.e., the
32          identifier of a Spanning Tree (or MST) Instance."
33     ::= { ieee8021MstpEntry 2 }
34
35 ieee8021MstpBridgeId OBJECT-TYPE
36     SYNTAX      BridgeId
37     MAX-ACCESS  read-only
38     STATUS      current
39     DESCRIPTION
40       "In an MSTP Bridge, the Bridge Identifier for the MSTI."
41     REFERENCE   "13.26.2"
42     ::= { ieee8021MstpEntry 3 }
43
44 ieee8021MstpTimeSinceTopologyChange OBJECT-TYPE
45     SYNTAX      TimeTicks
46     UNITS       "centi-seconds"
47     MAX-ACCESS  read-only
48     STATUS      current
49     DESCRIPTION
50         "In an MSTP Bridge, count in seconds of the time elapsed since
51          tcWhile was last non-zero for any Port for the MSTI."
52     REFERENCE   "13.25.9"
53     ::= { ieee8021MstpEntry 4 }
54
55 ieee8021MstpTopologyChanges OBJECT-TYPE
56     SYNTAX      Counter64
57     UNITS       "topology changes"
58     MAX-ACCESS  read-only
59     STATUS      current
60     DESCRIPTION
61       "In an MSTP Bridge, count of the times tcWhile has been
62        non-zero for any Port for the MSTI since the Bridge was powered
63        on or initialized."
64     REFERENCE   "13.25.9"
65     ::= { ieee8021MstpEntry 5 }
66
67 ieee8021MstpTopologyChange OBJECT-TYPE
68     SYNTAX      TruthValue
69     MAX-ACCESS  read-only
70     STATUS      current
71     DESCRIPTION
72         "In an MSTP Bridge, the Topology Change parameter value: true(1)
```

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```
1           if tcWhile is non-zero for any Port for the MSTI."
2     REFERENCE   "13.25.9"
3     ::= { ieee8021MstpEntry 6 }
4
5 ieee8021MstpDesignatedRoot OBJECT-TYPE
6     SYNTAX      BridgeId
7     MAX-ACCESS  read-only
8     STATUS      current
9     DESCRIPTION
10        "In an MSTP Bridge, the Designated Root parameter value, i.e., the
11        Bridge Identifier of the Root Bridge for the MSTI."
12    REFERENCE   "13.27.20"
13    ::= { ieee8021MstpEntry 7 }
14
15 ieee8021MstpRootPathCost OBJECT-TYPE
16    SYNTAX      Integer32
17    MAX-ACCESS  read-only
18    STATUS      current
19    DESCRIPTION
20        "In an MSTP Bridge, the Root Path Cost parameter value, i.e., the
21        path cost from the transmitting Bridge to the Root Bridge for
22        the MSTI."
23    REFERENCE   "13.27.20"
24    ::= { ieee8021MstpEntry 8 }
25
26 ieee8021MstpRootPort OBJECT-TYPE
27    SYNTAX      IEEE8021BridgePortNumber
28    MAX-ACCESS  read-only
29    STATUS      current
30    DESCRIPTION
31        "In an MSTP Bridge, the Root Port parameter value, i.e., the Root
32        Port for the MSTI."
33    REFERENCE   "13.26.9"
34    ::= { ieee8021MstpEntry 9 }
35
36 ieee8021MstpBridgePriority OBJECT-TYPE
37    SYNTAX      Integer32 (0..61440)
38    MAX-ACCESS  read-create
39    STATUS      current
40    DESCRIPTION
41        "In an MSTP Bridge, the Bridge Priority parameter value for the
42        MSTI, i.e., the most significant 4 bits of the Bridge Identifier
43        for the MSTI."
44    REFERENCE   "13.26.3"
45    ::= { ieee8021MstpEntry 10 }
46
47 ieee8021MstpVids0 OBJECT-TYPE
48    SYNTAX      OCTET STRING (SIZE(128))
49    MAX-ACCESS  read-only
50    STATUS      current
51    DESCRIPTION
52        "This object contains the first 1024 bits of the 4096 bit vector
53        indicating which VIDs are assigned to this MSTID.  The high order
54        bit of the first octet corresponds to the first bit of the vector,
55        while the low order bit of the last octet corresponds to the last
56        bit of this portion of the vector.  A bit that is on (equal to 1)
57        indicates that the corresponding VID is assigned to this MSTID."
58    ::= { ieee8021MstpEntry 11 }
59
60 ieee8021MstpVids1 OBJECT-TYPE
61    SYNTAX      OCTET STRING (SIZE(128))
62    MAX-ACCESS  read-only
63    STATUS      current
64    DESCRIPTION
65        "This object contains the second 1024 bits of the 4096 bit vector
66        indicating which VIDs are assigned to this MSTID.  The high order
67        bit of the first octet corresponds to the first bit of this
68        portion of the vector, while the low order bit of the last octet
69        corresponds to the last bit of this portion of the vector.  A bit
70        that is on (equal to 1) indicates that the corresponding VID is
71        assigned to this MSTID."
72    ::= { ieee8021MstpEntry 12 }
```

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```
1
2  ieee8021MstpVids2 OBJECT-TYPE
3      SYNTAX      OCTET STRING (SIZE(128))
4      MAX-ACCESS  read-only
5      STATUS      current
6      DESCRIPTION
7          "This object contains the third 1024 bits of the 4096 bit vector
8           indicating which VIDs are assigned to this MSTID.  The high order
9           bit of the first octet corresponds to the first bit of this
10          portion of the vector, while the low order bit of the last octet
11          corresponds to the last bit of this portion of the vector.  A bit
12          that is on (equal to 1) indicates that the corresponding VID is
13          assigned to this MSTID."
14     ::= { ieee8021MstpEntry 13 }
15
16 ieee8021MstpVids3 OBJECT-TYPE
17     SYNTAX      OCTET STRING (SIZE(128))
18     MAX-ACCESS  read-only
19     STATUS      current
20     DESCRIPTION
21         "This object contains the fourth 1024 bits of the 4096 bit vector
22          indicating which VIDs are assigned to this MSTID.  The high order
23          bit of the first octet corresponds to the first bit of this
24          portion of the vector, while the low order bit of the last octet
25          corresponds to the last bit of this portion of the vector.  A bit
26          that is on (equal to 1) indicates that the corresponding VID is
27          assigned to this MSTID."
28     ::= { ieee8021MstpEntry 14 }
29
30 ieee8021MstpRowStatus OBJECT-TYPE
31     SYNTAX      RowStatus
32     MAX-ACCESS  read-create
33     STATUS      current
34     DESCRIPTION
35         "The status of the row.
36
37          Read SNMPv2-TC (RFC2579) for an
38          explanation of the possible values this object can take.
39
40          The writable columns in a row cannot be changed if the row
41          is active. All columns must have a valid value before a row
42          can be activated."
43     ::= { ieee8021MstpEntry 15 }
44
45 -- =============================================================
46 -- ieee8021MstpCistPortTable:
47 -- =============================================================
48
49 ieee8021MstpCistPortTable OBJECT-TYPE
50     SYNTAX      SEQUENCE OF Ieee8021MstpCistPortEntry
51     MAX-ACCESS  not-accessible
52     STATUS      current
53     DESCRIPTION
54         "The CIST Port Table. Each row in the Table represents information
55          regarding a specific Port within the Bridge's Bridge Protocol
56          Entity, for the CIST.
57
58          The values of all writable objects in this table MUST be
59          retained across reinitializations of the management system.
60
61          Note that entries will exist in this table only for Bridge
62          components for which the corresponding instance of
63          ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
64          has a value of mstp(3).
65
66          This table contains objects corresponding to the following items
67          from 12.8.2.1, 12.8.2.3, and 12.8.2.5.  Some of those items are
68          provided in the IEEE8021-SPANNING-TREE-MIB as noted below.
69
70          From 12.8.2.1:
71              Items a), d), e), and i) through w) are defined in this table
72              The remaining items are covered in the
```

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```
 1            IEEE8021-SPANNING-TREE-MIB:
 2                b) ieee8021SpanningTreePortState
 3                c) ieee8021SpanningTreePortPriority
 4                d) ieee8021SpanningTreePortPathCost
 5                f) ieee8021SpanningTreePortDesignatedCost
 6                g) ieee8021SpanningTreePortDesignatedBridge
 7                h) ieee8021SpanningTreePortDesignatedPort
 8        From 12.8.2.3:
 9            Items a), b), and d) through h) are defined in this table
10               (item a is the index)
11            The remaining items are covered in the
12            IEEE8021-SPANNING-TREE-MIB:
13                b) ieee8021SpanningTreePortPathCost,
14                c) ieee8021SpanningTreePortPriority
15        From 12.8.2.5:
16            All items are defined in this table
17        Also from 12.8.2.1:
18            Items u), v), w), and x) are defined in this table
19        Also from 12.8.2.3:
20            Items i), j), k), and l) are defined in this table"
21    REFERENCE   "12.8.2.1, 12.8.2.3, 12.8.2.5"
22    ::= { ieee8021MstpObjects 3 }
23
24 ieee8021MstpCistPortEntry OBJECT-TYPE
25    SYNTAX      Ieee8021MstpCistPortEntry
26    MAX-ACCESS  not-accessible
27    STATUS      current
28    DESCRIPTION
29        "A CIST Port Table entry."
30    INDEX { ieee8021MstpCistPortComponentId, ieee8021MstpCistPortNum }
31    ::= { ieee8021MstpCistPortTable 1 }
32
33 Ieee8021MstpCistPortEntry ::= SEQUENCE {
34    ieee8021MstpCistPortComponentId        IEEE8021PbbComponentIdentifier,
35    ieee8021MstpCistPortNum                IEEE8021BridgePortNumber,
36    ieee8021MstpCistPortUptime             TimeTicks,
37    ieee8021MstpCistPortAdminPathCost      Integer32,
38    ieee8021MstpCistPortDesignatedRoot     BridgeId,
39    ieee8021MstpCistPortTopologyChangeAck  TruthValue,
40    ieee8021MstpCistPortHelloTime          Integer32,
41    ieee8021MstpCistPortAdminEdgePort      TruthValue,
42    ieee8021MstpCistPortOperEdgePort       TruthValue,
43    ieee8021MstpCistPortMacEnabled         TruthValue,
44    ieee8021MstpCistPortMacOperational     TruthValue,
45    ieee8021MstpCistPortRestrictedRole     TruthValue,
46    ieee8021MstpCistPortRestrictedTcn      TruthValue,
47    ieee8021MstpCistPortRole               INTEGER,
48    ieee8021MstpCistPortDisputed           TruthValue,
49    ieee8021MstpCistPortCistRegionalRootId BridgeId,
50    ieee8021MstpCistPortCistPathCost       Unsigned32,
51    ieee8021MstpCistPortProtocolMigration  TruthValue,
52    ieee8021MstpCistPortEnableBPDURx       TruthValue,
53    ieee8021MstpCistPortEnableBPDUTx       TruthValue,
54    ieee8021MstpCistPortPseudoRootId       BridgeId,
55    ieee8021MstpCistPortIsL2Gp             TruthValue
56 }
57
58 ieee8021MstpCistPortComponentId OBJECT-TYPE
59    SYNTAX      IEEE8021PbbComponentIdentifier
60    MAX-ACCESS  not-accessible
61    STATUS      current
62    DESCRIPTION
63        "The component identifier is used to distinguish between the
64        multiple virtual Bridge instances within a PBB.  In simple
65        situations where there is only a single component the default
66        value is 1."
67    ::= { ieee8021MstpCistPortEntry 1 }
68
69 ieee8021MstpCistPortNum OBJECT-TYPE
70    SYNTAX      IEEE8021BridgePortNumber
71    MAX-ACCESS  not-accessible
72    STATUS      current
```

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```
 1    DESCRIPTION
 2        "The Port's Port Number parameter value for the CIST, i.e., the
 3         number of the Bridge Port for the CIST."
 4    ::= { ieee8021MstpCistPortEntry 2 }
 5
 6 ieee8021MstpCistPortUptime OBJECT-TYPE
 7    SYNTAX      TimeTicks
 8    UNITS       "centi-seconds"
 9    MAX-ACCESS  read-only
10    STATUS      current
11    DESCRIPTION
12        "The Port's Uptime parameter value for the CIST, i.e., the count
13         in seconds of the time elapsed since the Port was last reset or
14         initialized (BEGIN, Annex E)."
15    ::= { ieee8021MstpCistPortEntry 3 }
16
17 ieee8021MstpCistPortAdminPathCost OBJECT-TYPE
18    SYNTAX      Integer32 (0..200000000)
19    MAX-ACCESS  read-write
20    STATUS      current
21    DESCRIPTION
22        "The administratively assigned value for the contribution
23         of this port to the path cost of paths toward the spanning
24         tree root.
25
26         Writing a value of '0' assigns the automatically calculated
27         default Path Cost value to the port.  If the default Path
28         Cost is being used, this object returns '0' when read.
29
30         This complements the object ieee8021MstpCistPortCistPathCost,
31         which returns the operational value of the port path cost.
32
33         The value of this object MUST be retained across
34         reinitializations of the management system."
35    REFERENCE   "13.27.25, 17.13.11 of IEEE Std 802.1D"
36    ::= { ieee8021MstpCistPortEntry 4 }
37
38 ieee8021MstpCistPortDesignatedRoot OBJECT-TYPE
39    SYNTAX      BridgeId
40    MAX-ACCESS  read-only
41    STATUS      current
42    DESCRIPTION
43        "The CIST Regional Root Identifier component of the Port's port
44         priority vector, as defined in 13.10, for the CIST."
45    REFERENCE   "13.27.47"
46    ::= { ieee8021MstpCistPortEntry 5 }
47
48 ieee8021MstpCistPortTopologyChangeAck OBJECT-TYPE
49    SYNTAX      TruthValue
50    MAX-ACCESS  read-only
51    STATUS      current
52    DESCRIPTION
53        "The Port's Topology Change Acknowledge parameter value.
54         True(1) if a Configuration Message with a topology change
55         acknowledge flag set is to be transmitted. "
56    REFERENCE   "13.27.72, 17.19.41 of IEEE Std 802.1D"
57    ::= { ieee8021MstpCistPortEntry 6 }
58
59 ieee8021MstpCistPortHelloTime OBJECT-TYPE
60    SYNTAX      Integer32 (100..1000)
61    UNITS       "centi-seconds"
62    MAX-ACCESS  read-only
63    STATUS      current
64    DESCRIPTION
65        "The Port's Hello Time timer parameter value, for the CIST.
66         In centi-seconds"
67    REFERENCE   "13.27.48"
68    ::= { ieee8021MstpCistPortEntry 7 }
69
70 ieee8021MstpCistPortAdminEdgePort OBJECT-TYPE
71    SYNTAX      TruthValue
72    MAX-ACCESS  read-write
```

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```
1    STATUS        current
2    DESCRIPTION
3        "In a Bridge that supports the identification of edge ports, the
4         Port's Admin Edge Port parameter value, for the CIST."
5    REFERENCE    "13.27.1"
6    DEFVAL        { false }
7    ::= { ieee8021MstpCistPortEntry 8 }
8
9 ieee8021MstpCistPortOperEdgePort OBJECT-TYPE
10    SYNTAX        TruthValue
11    MAX-ACCESS    read-only
12    STATUS        current
13    DESCRIPTION
14        "In a Bridge that supports the identification of edge ports, the
15         Port's operational Edge Port parameter value, for the CIST.
16         True(1) if it is an operEdge Port."
17    REFERENCE    "13.27.44"
18    ::= { ieee8021MstpCistPortEntry 9 }
19
20 ieee8021MstpCistPortMacEnabled OBJECT-TYPE
21    SYNTAX        TruthValue
22    MAX-ACCESS    read-write
23    STATUS        current
24    DESCRIPTION
25        "In a Bridge that supports the MAC Enabled parameter, the current
26         state of the MAC Enabled parameter.
27         True(1) indicates that administratively the MAC is set as if it
28         was connected to a point-to-point LAN."
29    REFERENCE    "12.8.2.1.3 p)"
30    ::= { ieee8021MstpCistPortEntry 10 }
31
32 ieee8021MstpCistPortMacOperational OBJECT-TYPE
33    SYNTAX        TruthValue
34    MAX-ACCESS    read-only
35    STATUS        current
36    DESCRIPTION
37        "In a Bridge that supports the MAC Operational parameter, the
38         current state of the MAC Operational parameter.
39         True(1) indicates the MAC is operational."
40    REFERENCE    "12.8.2.1.3 q)"
41    ::= { ieee8021MstpCistPortEntry 11 }
42
43 ieee8021MstpCistPortRestrictedRole OBJECT-TYPE
44    SYNTAX        TruthValue
45    MAX-ACCESS    read-write
46    STATUS        current
47    DESCRIPTION
48        "The current state of the restrictedRole parameter for the Port.
49         True(1) causes the Port not to be selected as Root Port for the
50         CIST or any MSTI. "
51    REFERENCE    "13.27.64"
52    ::= { ieee8021MstpCistPortEntry 12 }
53
54 ieee8021MstpCistPortRestrictedTcn OBJECT-TYPE
55    SYNTAX        TruthValue
56    MAX-ACCESS    read-write
57    STATUS        current
58    DESCRIPTION
59        "The current state of the restrictedTcn parameter for the Port.
60         True(1) causes the Port not to propagate topology changes to
61         other Ports."
62    REFERENCE    "13.27.65"
63    ::= { ieee8021MstpCistPortEntry 13 }
64
65 ieee8021MstpCistPortRole OBJECT-TYPE
66    SYNTAX        INTEGER {
67                    root(1),
68                    alternate(2),
69                    designated(3),
70                    backup(4)
71                  }
72    MAX-ACCESS    read-only
```

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```
1    STATUS       current
2    DESCRIPTION
3        "The current Port Role for the Port (i.e., Root, Alternate,
4         Designated, or Backup), for the CIST."
5    REFERENCE    "12.8.2.1.3 v)"
6    ::= { ieee8021MstpCistPortEntry 14 }
7
8 ieee8021MstpCistPortDisputed OBJECT-TYPE
9    SYNTAX       TruthValue
10   MAX-ACCESS   read-only
11   STATUS       current
12   DESCRIPTION
13       "The current value of the disputed variable for the CIST for
14        the Port.  A value of true(1) indicates that the disputed
15        variable is set.  A value of false(2) indicates that the
16        agreed variable is cleared."
17   REFERENCE    "13.27.22"
18   ::= { ieee8021MstpCistPortEntry 15 }
19
20 ieee8021MstpCistPortCistRegionalRootId OBJECT-TYPE
21   SYNTAX       BridgeId
22   MAX-ACCESS   read-only
23   STATUS       current
24   DESCRIPTION
25       "In an MSTP Bridge, the CIST Regional Root Identifier, i.e., the
26        Bridge Identifier of the current CIST Regional Root, for the CIST."
27   REFERENCE    "13.9:c, 13.10, 13.27.47"
28   ::= { ieee8021MstpCistPortEntry 16 }
29
30 ieee8021MstpCistPortCistPathCost OBJECT-TYPE
31   SYNTAX       Unsigned32 (0..2147483647)
32   MAX-ACCESS   read-only
33   STATUS       current
34   DESCRIPTION
35       "In an MSTP Bridge, the Port's Port Path Cost
36        parameter value for the CIST."
37   REFERENCE    "13.27.25, 17.13.11 of IEEE Std 802.1D"
38   ::= { ieee8021MstpCistPortEntry 17 }
39
40 ieee8021MstpCistPortProtocolMigration OBJECT-TYPE
41   SYNTAX       TruthValue
42   MAX-ACCESS   read-write
43   STATUS       current
44   DESCRIPTION
45       "In an MSTP Bridge, the current value of the mcheck variable for
46        the Port.  A value of true(1) forces the state machine to
47        perform functions as per 13.27.38."
48   REFERENCE    "13.27.38"
49   ::= { ieee8021MstpCistPortEntry 18 }
50
51 ieee8021MstpCistPortEnableBPDURx OBJECT-TYPE
52   SYNTAX       TruthValue
53   MAX-ACCESS   read-write
54   STATUS       current
55   DESCRIPTION
56       "In an MSTP Bridge, the enableBPDUrx parameter value.  A value
57        of false(2) indicates that BPDUs are ignored."
58   REFERENCE    "13.27.38"
59   DEFVAL { true }
60   ::= { ieee8021MstpCistPortEntry 19 }
61
62 ieee8021MstpCistPortEnableBPDUTx OBJECT-TYPE
63   SYNTAX       TruthValue
64   MAX-ACCESS   read-write
65   STATUS       current
66   DESCRIPTION
67       "In an MSTP Bridge, the enableBPDUtx parameter value.  A value
68        of false(2) indicates that BPDUs are not transmitted."
69   REFERENCE    "13.27.24"
70   DEFVAL { true }
71   ::= { ieee8021MstpCistPortEntry 20 }
72
```

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```
 1 ieee8021MstpCistPortPseudoRootId OBJECT-TYPE
 2     SYNTAX      BridgeId
 3     MAX-ACCESS  read-write
 4     STATUS      current
 5     DESCRIPTION
 6         "In an MSTP Bridge, the pseudoRootId parameter value."
 7     REFERENCE   "13.27.51"
 8     ::= { ieee8021MstpCistPortEntry 21 }
 9
10 ieee8021MstpCistPortIsL2Gp OBJECT-TYPE
11     SYNTAX      TruthValue
12     MAX-ACCESS  read-write
13     STATUS      current
14     DESCRIPTION
15         "In an MSTP Bridge, the isL2gp parameter value.  A value of
16         true(1) indicates this is an L2GP port."
17     REFERENCE   "13.27.26"
18     DEFVAL { false }
19     ::= { ieee8021MstpCistPortEntry 22 }
20
21 -- ==============================================================
22 -- ieee8021MstpPortTable:
23 -- ==============================================================
24
25 ieee8021MstpPortTable OBJECT-TYPE
26     SYNTAX      SEQUENCE OF Ieee8021MstpPortEntry
27     MAX-ACCESS  not-accessible
28     STATUS      current
29     DESCRIPTION
30         "The MSTP Port Table. Each row in the Table represents information
31          regarding a specific Port within the Bridge's Bridge Protocol
32          Entity, for a given MSTI.
33
34          The values of all writable objects in this table MUST be
35          retained across reinitializations of the management system.
36
37          Note that entries will exist in this table only for Bridge
38          components for which the corresponding instance of
39          ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
40          has a value of mstp(3)."
41     REFERENCE   "12.8.2.2, 12.8.2.4"
42     ::= { ieee8021MstpObjects 4 }
43
44 ieee8021MstpPortEntry OBJECT-TYPE
45     SYNTAX      Ieee8021MstpPortEntry
46     MAX-ACCESS  not-accessible
47     STATUS      current
48     DESCRIPTION
49         "A MSTP Port Table entry."
50     INDEX { ieee8021MstpPortComponentId,
51            ieee8021MstpPortMstId,
52            ieee8021MstpPortNum }
53     ::= { ieee8021MstpPortTable 1 }
54
55 Ieee8021MstpPortEntry ::= SEQUENCE {
56     ieee8021MstpPortComponentId       IEEE8021PbbComponentIdentifier,
57     ieee8021MstpPortMstId             IEEE8021MstIdentifier,
58     ieee8021MstpPortNum               IEEE8021BridgePortNumber,
59     ieee8021MstpPortUptime            TimeTicks,
60     ieee8021MstpPortState             INTEGER,
61     ieee8021MstpPortPriority          Integer32,
62     ieee8021MstpPortPathCost          Integer32,
63     ieee8021MstpPortDesignatedRoot    BridgeId,
64     ieee8021MstpPortDesignatedCost    Integer32,
65     ieee8021MstpPortDesignatedBridge  BridgeId,
66     ieee8021MstpPortDesignatedPort    IEEE8021BridgePortNumber,
67     ieee8021MstpPortRole              INTEGER,
68     ieee8021MstpPortDisputed          TruthValue,
69     ieee8021MstpPortAdminPathCost     Integer32
70 }
71
72 ieee8021MstpPortComponentId OBJECT-TYPE
```

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```
1    SYNTAX      IEEE8021PbbComponentIdentifier
2    MAX-ACCESS  not-accessible
3    STATUS      current
4    DESCRIPTION
5        "The component identifier is used to distinguish between the
6        multiple virtual Bridge instances within a PBB.  In simple
7        situations where there is only a single component the default
8        value is 1."
9    ::= { ieee8021MstpPortEntry 1 }
10
11 ieee8021MstpPortMstId OBJECT-TYPE
12    SYNTAX      IEEE8021MstIdentifier
13    MAX-ACCESS  not-accessible
14    STATUS      current
15    DESCRIPTION
16        "In an MSTP Bridge, this parameter is the MSTID, i.e., the
17        identifier of a Spanning Tree (or MST) Instance."
18    ::= { ieee8021MstpPortEntry 2 }
19
20 ieee8021MstpPortNum OBJECT-TYPE
21    SYNTAX      IEEE8021BridgePortNumber
22    MAX-ACCESS  not-accessible
23    STATUS      current
24    DESCRIPTION
25        "In an MSTP Bridge, the Port's Port Number parameter value for
26        the MSTI, i.e., the number of the Bridge Port for the MSTI."
27    ::= { ieee8021MstpPortEntry 3 }
28
29 ieee8021MstpPortUptime OBJECT-TYPE
30    SYNTAX      TimeTicks
31    UNITS       "centi-seconds"
32    MAX-ACCESS  read-only
33    STATUS      current
34    DESCRIPTION
35        "In an MSTP Bridge, the Port's Uptime parameter value for the
36        MSTI, i.e., the count in seconds of the time elapsed since the
37        Port was last reset or initialized (BEGIN, Annex E)."
38    ::= { ieee8021MstpPortEntry 4 }
39
40 ieee8021MstpPortState OBJECT-TYPE
41    SYNTAX      INTEGER {
42                disabled(1),
43                listening(2),
44                learning(3),
45                forwarding(4),
46                blocking(5)
47                }
48    MAX-ACCESS  read-only
49    STATUS      current
50    DESCRIPTION
51        "In an MSTP Bridge, the current state of the Port (i.e., Disabled,
52        Listening, Learning, Forwarding, or Blocking), for the MSTI."
53    REFERENCE   "13.38"
54    ::= { ieee8021MstpPortEntry 5 }
55
56 ieee8021MstpPortPriority OBJECT-TYPE
57    SYNTAX      Integer32 (0..240)
58    MAX-ACCESS  read-write
59    STATUS      current
60    DESCRIPTION
61        "In an MSTP Bridge, the Port's Port Priority parameter value for
62        the MSTI, i.e., the priority field for the Port Identifier for the
63        Port for the MSTI."
64    REFERENCE   "13.27.47"
65    ::= { ieee8021MstpPortEntry 6 }
66
67 ieee8021MstpPortPathCost OBJECT-TYPE
68    SYNTAX      Integer32 (1..200000000)
69    MAX-ACCESS  read-write
70    STATUS      current
71    DESCRIPTION
72        "In an MSTP Bridge, the Port's Port Path Cost parameter value for
```

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```
1           the MSTI."
2      REFERENCE   "13.27.33"
3      ::= { ieee8021MstpPortEntry 7 }
4
5 ieee8021MstpPortDesignatedRoot OBJECT-TYPE
6      SYNTAX      BridgeId
7      MAX-ACCESS  read-only
8      STATUS      current
9      DESCRIPTION
10         "In an MSTP Bridge, the Regional Root Identifier component of the
11          Port's MSTI port priority vector, as defined in 13.11, for the MSTI."
12     REFERENCE   "13.27.47"
13     ::= { ieee8021MstpPortEntry 8 }
14
15 ieee8021MstpPortDesignatedCost OBJECT-TYPE
16     SYNTAX      Integer32
17     MAX-ACCESS  read-only
18     STATUS      current
19     DESCRIPTION
20         "In an MSTP Bridge, the Internal Root Path Cost component of the
21          Port's MSTI port priority vector, as defined in 13.11, for the MSTI."
22     REFERENCE   "13.27.47"
23     ::= { ieee8021MstpPortEntry 9 }
24
25 ieee8021MstpPortDesignatedBridge OBJECT-TYPE
26     SYNTAX      BridgeId
27     MAX-ACCESS  read-only
28     STATUS      current
29     DESCRIPTION
30         "In an MSTP Bridge, the Designated Bridge Identifier component of
31          the Port's MSTI port priority vector, as defined in 13.11, for
32          the MSTI."
33     REFERENCE   "13.27.47"
34     ::= { ieee8021MstpPortEntry 10 }
35
36 ieee8021MstpPortDesignatedPort OBJECT-TYPE
37     SYNTAX      IEEE8021BridgePortNumber
38     MAX-ACCESS  read-only
39     STATUS      current
40     DESCRIPTION
41         "In an MSTP Bridge, the Designated Port Identifier component of the
42          Port's MSTI port priority vector, as defined in 13.11, for the MSTI."
43     REFERENCE   "13.27.47"
44     ::= { ieee8021MstpPortEntry 11 }
45
46 ieee8021MstpPortRole OBJECT-TYPE
47     SYNTAX      INTEGER {
48                     root(1),
49                     alternate(2),
50                     designated(3),
51                     backup(4)
52                 }
53     MAX-ACCESS  read-only
54     STATUS      current
55     DESCRIPTION
56         "In an MSTP Bridge, the current Port Role for the Port (i.e., Root,
57          Alternate, Designated, or Backup), for the MSTI."
58     ::= { ieee8021MstpPortEntry 12 }
59
60 ieee8021MstpPortDisputed OBJECT-TYPE
61     SYNTAX      TruthValue
62     MAX-ACCESS  read-only
63     STATUS      current
64     DESCRIPTION
65         "In an MSTP Bridge, the current value of the disputed variable for
66          the MSTI for the Port."
67     REFERENCE   "13.27.22"
68     ::= { ieee8021MstpPortEntry 13 }
69
70
71 ieee8021MstpPortAdminPathCost OBJECT-TYPE
72     SYNTAX      Integer32 (1..200000000)
```

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```
 1    MAX-ACCESS   read-write
 2    STATUS       current
 3    DESCRIPTION
 4        "In an MSTP Bridge, the administrative value of the Port's
 5         Port Path Cost parameter value for the MSTI.
 6
 7         Writing a value of '0' assigns the automatically calculated
 8         default Path Cost value to the Port.  If the default Path
 9         Cost is being used, this object returns '0' when read.
10
11         This complements the object ieee8021MstpPortPathCost,
12         which returns the operational value of the path cost.
13
14         The value of this object MUST be retained across
15         reinitializations of the management system."
16    REFERENCE   "13.27.33"
17    ::= { ieee8021MstpPortEntry 14 }
18
19 -- ============================================================
20 -- ieee8021MstpFidToMstiTable  deprecated
21 -- see ieee8021MstpFidToMstiV2Table below
22 -- ============================================================
23
24 ieee8021MstpFidToMstiTable OBJECT-TYPE
25    SYNTAX       SEQUENCE OF Ieee8021MstpFidToMstiEntry
26    MAX-ACCESS   not-accessible
27    STATUS       deprecated
28    DESCRIPTION
29        "In an MSTP Bridge, the fixed-length FID to MSTID Allocation Table
30         entry. Each entry in the Table corresponds to a FID, and the value
31         of the entry specifies the MSTID of the spanning tree to which the
32         set of VLANs supported by that FID are assigned. A value of zero
33         in an entry specifies that the set of VLANs supported by that FID
34         are assigned to the CST.
35
36         The values of all writable objects in this table MUST be
37         retained across reinitializations of the management system.
38
39         Note that entries will exist in this table only for Bridge
40         components for which the corresponding instance of
41         ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
42         has a value of mstp(3)."
43    REFERENCE   "12.12.2"
44    ::= { ieee8021MstpObjects 5 }
45
46 ieee8021MstpFidToMstiEntry OBJECT-TYPE
47    SYNTAX       Ieee8021MstpFidToMstiEntry
48    MAX-ACCESS   not-accessible
49    STATUS       deprecated
50    DESCRIPTION
51        "In an MSTP Bridge, a FID to MSTID Allocation Table entry."
52    INDEX { ieee8021MstpFidToMstiComponentId, ieee8021MstpFidToMstiFid }
53    ::= { ieee8021MstpFidToMstiTable 1 }
54
55 Ieee8021MstpFidToMstiEntry ::= SEQUENCE {
56     ieee8021MstpFidToMstiComponentId  IEEE8021PbbComponentIdentifier,
57     ieee8021MstpFidToMstiFid          Unsigned32,
58     ieee8021MstpFidToMstiMstId        IEEE8021MstIdentifier
59 }
60
61 ieee8021MstpFidToMstiComponentId OBJECT-TYPE
62    SYNTAX       IEEE8021PbbComponentIdentifier
63    MAX-ACCESS   not-accessible
64    STATUS       deprecated
65    DESCRIPTION
66        "The component identifier is used to distinguish between the
67         multiple virtual Bridge instances within a PBB.  In simple
68         situations where there is only a single component the default
69         value is 1."
70    ::= { ieee8021MstpFidToMstiEntry 1 }
71
72 ieee8021MstpFidToMstiFid OBJECT-TYPE
```

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```
1     SYNTAX      Unsigned32 (1..4094)
2     MAX-ACCESS  not-accessible
3     STATUS      deprecated
4     DESCRIPTION
5         "In an MSTP Bridge, the FID of the entry in the FID to MSTID
6          Allocation Table."
7     ::= { ieee8021MstpFidToMstiEntry 2 }
8
9  ieee8021MstpFidToMstiMstId OBJECT-TYPE
10     SYNTAX      IEEE8021MstIdentifier
11     MAX-ACCESS  read-write
12     STATUS      deprecated
13     DESCRIPTION
14         "In an MSTP Bridge, the MSTID to which the FID (of the entry in
15          the FID to MSTID Allocation Table) is to be allocated."
16     ::= { ieee8021MstpFidToMstiEntry 3 }
17
18 -- ==============================================================
19 -- ieee8021MstpFidToMstiV2Table
20 -- ==============================================================
21
22 ieee8021MstpFidToMstiV2Table OBJECT-TYPE
23     SYNTAX      SEQUENCE OF Ieee8021MstpFidToMstiV2Entry
24     MAX-ACCESS  not-accessible
25     STATUS      current
26     DESCRIPTION
27         "In an MSTP Bridge, the fixed-length FID to MSTID Allocation Table
28          entry. Each entry in the Table corresponds to a FID, and the value
29          of the entry specifies the MSTID of the spanning tree to which the
30          set of VLANs supported by that FID are assigned. A value of zero
31          in an entry specifies that the set of VLANs supported by that FID
32          are assigned to the CST.
33
34          The values of all writable objects in this table MUST be
35          retained across reinitializations of the management system.
36
37          Note that entries will exist in this table only for Bridge
38          components for which the corresponding instance of
39          ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
40          has a value of mstp(3)."
41     REFERENCE   "12.12.2"
42     ::= { ieee8021MstpObjects 9 }
43
44 ieee8021MstpFidToMstiV2Entry OBJECT-TYPE
45     SYNTAX      Ieee8021MstpFidToMstiV2Entry
46     MAX-ACCESS  not-accessible
47     STATUS      current
48     DESCRIPTION
49         "In an MSTP Bridge, a FID to MSTID Allocation Table entry."
50     INDEX { ieee8021MstpFidToMstiV2ComponentId, ieee8021MstpFidToMstiV2Fid }
51     ::= { ieee8021MstpFidToMstiV2Table 1 }
52
53 Ieee8021MstpFidToMstiV2Entry ::= SEQUENCE {
54     ieee8021MstpFidToMstiV2ComponentId  IEEE8021PbbComponentIdentifier,
55     ieee8021MstpFidToMstiV2Fid          Unsigned32,
56     ieee8021MstpFidToMstiV2MstId        Unsigned32
57 }
58
59 ieee8021MstpFidToMstiV2ComponentId OBJECT-TYPE
60     SYNTAX      IEEE8021PbbComponentIdentifier
61     MAX-ACCESS  not-accessible
62     STATUS      current
63     DESCRIPTION
64         "The component identifier is used to distinguish between the
65          multiple virtual Bridge instances within a PBB.  In simple
66          situations where there is only a single component the default
67          value is 1."
68     ::= { ieee8021MstpFidToMstiV2Entry 1 }
69
70 ieee8021MstpFidToMstiV2Fid OBJECT-TYPE
71     SYNTAX      Unsigned32 (1..4095)
72     MAX-ACCESS  not-accessible
```

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```
 1    STATUS        current
 2    DESCRIPTION
 3        "In an MSTP Bridge, the FID of the entry in the FID to MSTID
 4         Allocation Table."
 5    ::= { ieee8021MstpFidToMstiV2Entry 2 }
 6
 7 ieee8021MstpFidToMstiV2MstId OBJECT-TYPE
 8    SYNTAX        Unsigned32 (0..4095)
 9    MAX-ACCESS    read-write
10    STATUS        current
11    DESCRIPTION
12        "In an MSTP Bridge, the MSTID to which the FID (of the entry in
13         the FID to MSTID Allocation Table) is to be allocated.
14         In an SPT Bridge, the value 4095 is used to indicate unused
15         (non-filtering) FIDs."
16    ::= { ieee8021MstpFidToMstiV2Entry 3 }
17
18 -- ============================================================
19 -- ieee8021MstpVlanTable   deprecated
20 -- see ieee8021MstpVlanV2Table below
21 -- ============================================================
22
23 ieee8021MstpVlanTable OBJECT-TYPE
24    SYNTAX        SEQUENCE OF Ieee8021MstpVlanEntry
25    MAX-ACCESS    not-accessible
26    STATUS        deprecated
27    DESCRIPTION
28        "In an MSTP Bridge, the fixed-length (4094 elements), read-only,
29         MST Configuration Table. Its elements are derived from other
30         configuration information held by the Bridge; specifically, the
31         current state of the VID to FID Allocation Table (8.8.8,
32         12.10.1),and the FID to MSTID Allocation Table (8.9.3, 12.12.2).
33         Hence, changes made to either of these Tables can in turn affect
34         the contents of the MST Configuration Table, and also affect the
35         value of the digest element of the MST Configuration Identifier.
36
37         The values of all writable objects in this table MUST be
38         retained across reinitializations of the management system.
39
40         Note that entries will exist in this table only for Bridge
41         components for which the corresponding instance of
42         ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
43         has a value of mstp(3)."
44    REFERENCE   "12.12.3.1"
45    ::= { ieee8021MstpObjects 6 }
46
47 ieee8021MstpVlanEntry OBJECT-TYPE
48    SYNTAX        Ieee8021MstpVlanEntry
49    MAX-ACCESS    not-accessible
50    STATUS        deprecated
51    DESCRIPTION
52        "In an MSTP Bridge, a MST Configuration Table entry."
53    INDEX { ieee8021MstpVlanComponentId, ieee8021MstpVlanId }
54    ::= { ieee8021MstpVlanTable 1 }
55
56 Ieee8021MstpVlanEntry ::= SEQUENCE {
57    ieee8021MstpVlanComponentId   IEEE8021PbbComponentIdentifier,
58    ieee8021MstpVlanId            IEEE8021VlanIndex,
59    ieee8021MstpVlanMstId         IEEE8021MstIdentifier
60 }
61
62 ieee8021MstpVlanComponentId OBJECT-TYPE
63    SYNTAX        IEEE8021PbbComponentIdentifier
64    MAX-ACCESS    not-accessible
65    STATUS        deprecated
66    DESCRIPTION
67        "The component identifier is used to distinguish between the
68         multiple virtual Bridge instances within a PBB.  In simple
69         situations where there is only a single component the default
70         value is 1."
71    ::= { ieee8021MstpVlanEntry 1 }
72
```

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```
1 ieee8021MstpVlanId OBJECT-TYPE
2     SYNTAX       IEEE8021VlanIndex
3     MAX-ACCESS   not-accessible
4     STATUS       deprecated
5     DESCRIPTION
6         "In an MSTP Bridge, the VID of the entry in the MST
7          Configuration Table."
8     ::= { ieee8021MstpVlanEntry 2 }
9
10 ieee8021MstpVlanMstId OBJECT-TYPE
11     SYNTAX       IEEE8021MstIdentifier
12     MAX-ACCESS   read-only
13     STATUS       deprecated
14     DESCRIPTION
15         "In an MSTP Bridge, the MSTID value corresponding to the VID
16          of the entry in the MST Configuration Table."
17     ::= { ieee8021MstpVlanEntry 3 }
18
19 -- ============================================================
20 -- ieee8021MstpVlanV2Table
21 -- ============================================================
22
23 ieee8021MstpVlanV2Table OBJECT-TYPE
24     SYNTAX       SEQUENCE OF Ieee8021MstpVlanV2Entry
25     MAX-ACCESS   not-accessible
26     STATUS       current
27     DESCRIPTION
28         "In an MSTP Bridge, the fixed-length (4094 elements), read-only,
29          MST Configuration Table. Its elements are derived from other
30          configuration information held by the Bridge; specifically, the
31          current state of the VID to FID Allocation Table (8.8.8,
32          12.10.1),and the FID to MSTID Allocation Table (8.9.3, 12.12.2).
33          Hence, changes made to either of these Tables can in turn affect
34          the contents of the MST Configuration Table, and also affect the
35          value of the digest element of the MST Configuration Identifier.
36
37          The values of all writable objects in this table MUST be
38          retained across reinitializations of the management system.
39
40          Note that entries will exist in this table only for Bridge
41          components for which the corresponding instance of
42          ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
43          has a value of mstp(3)."
44     REFERENCE    "12.12.3.1"
45     ::= { ieee8021MstpObjects 10 }
46
47 ieee8021MstpVlanV2Entry OBJECT-TYPE
48     SYNTAX       Ieee8021MstpVlanV2Entry
49     MAX-ACCESS   not-accessible
50     STATUS       current
51     DESCRIPTION
52         "In an MSTP Bridge, a MST Configuration Table entry."
53     INDEX { ieee8021MstpVlanV2ComponentId, ieee8021MstpVlanV2Id }
54     ::= { ieee8021MstpVlanV2Table 1 }
55
56 Ieee8021MstpVlanV2Entry ::= SEQUENCE {
57     ieee8021MstpVlanV2ComponentId  IEEE8021PbbComponentIdentifier,
58     ieee8021MstpVlanV2Id           IEEE8021VlanIndex,
59     ieee8021MstpVlanV2MstId        Unsigned32
60 }
61
62 ieee8021MstpVlanV2ComponentId OBJECT-TYPE
63     SYNTAX       IEEE8021PbbComponentIdentifier
64     MAX-ACCESS   not-accessible
65     STATUS       current
66     DESCRIPTION
67         "The component identifier is used to distinguish between the
68          multiple virtual Bridge instances within a PBB.  In simple
69          situations where there is only a single component the default
70          value is 1."
71     ::= { ieee8021MstpVlanV2Entry 1 }
72
```

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```
1 ieee8021MstpVlanV2Id OBJECT-TYPE
2     SYNTAX      IEEE8021VlanIndex
3     MAX-ACCESS  not-accessible
4     STATUS      current
5     DESCRIPTION
6         "In an MSTP Bridge, the VID of the entry in the MST
7          Configuration Table."
8     ::= { ieee8021MstpVlanV2Entry 2 }
9
10 ieee8021MstpVlanV2MstId OBJECT-TYPE
11     SYNTAX      Unsigned32 (0..4095)
12     MAX-ACCESS  read-only
13     STATUS      current
14     DESCRIPTION
15         "In an MSTP Bridge, the MSTID value corresponding to the VID
16          of the entry in the MST Configuration Table.
17          In an SPT Bridge, a value of 4095 is used to indicate
18          SPVIDs."
19     ::= { ieee8021MstpVlanV2Entry 3 }
20
21 -- ============================================================
22 -- MST Configuration Identifier Table
23 -- ============================================================
24
25 ieee8021MstpConfigIdTable OBJECT-TYPE
26     SYNTAX      SEQUENCE OF Ieee8021MstpConfigIdEntry
27     MAX-ACCESS  not-accessible
28     STATUS      current
29     DESCRIPTION
30         "A table containing the MST Configuration Identifier for each
31          virtual Bridge.  In simple situations where there is only
32          a single component, there will only be a single entry in
33          this table (i.e., only a single MST Configuration Identifier).
34
35          The values of all writable objects in this table MUST be
36          retained across reinitializations of the management system.
37
38          Note that entries will exist in this table only for Bridge
39          components for which the corresponding instance of
40          ieee8021SpanningTreeVersion (from the IEEE8021-SPANNING-TREE-MIB)
41          has a value of mstp(3)."
42     REFERENCE   "12.12.3.3, 12.12.3.4"
43     ::= { ieee8021MstpObjects 7 }
44
45 ieee8021MstpConfigIdEntry OBJECT-TYPE
46     SYNTAX      Ieee8021MstpConfigIdEntry
47     MAX-ACCESS  not-accessible
48     STATUS      current
49     DESCRIPTION
50         "An entry containing the MST Configuration Identifier of a Bridge."
51     INDEX { ieee8021MstpConfigIdComponentId }
52     ::= { ieee8021MstpConfigIdTable 1 }
53
54 Ieee8021MstpConfigIdEntry ::= SEQUENCE {
55     ieee8021MstpConfigIdComponentId     IEEE8021PbbComponentIdentifier,
56     ieee8021MstpConfigIdFormatSelector  Integer32,
57     ieee8021MstpConfigurationName       SnmpAdminString,
58     ieee8021MstpRevisionLevel           Unsigned32,
59     ieee8021MstpConfigurationDigest     OCTET STRING
60 }
61
62 ieee8021MstpConfigIdComponentId OBJECT-TYPE
63     SYNTAX      IEEE8021PbbComponentIdentifier
64     MAX-ACCESS  not-accessible
65     STATUS      current
66     DESCRIPTION
67         "The component identifier is used to distinguish between the
68          multiple virtual Bridge instances within a PBB.  In simple
69          situations where there is only a single component the default
70          value is 1."
71     ::= { ieee8021MstpConfigIdEntry 1 }
72
```

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```
1  ieee8021MstpConfigIdFormatSelector OBJECT-TYPE
2      SYNTAX       Integer32 (0..0)
3      MAX-ACCESS   read-write
4      STATUS       current
5      DESCRIPTION
6          "In an MSTP Bridge, the Configuration Identifier Format Selector
7           in use by the Bridge, in the MST Configuration Identifier. This
8           has a value of 0 to indicate the format specified in IEEE Std 802.1Q."
9      REFERENCE   "13.8:1"
10     ::= { ieee8021MstpConfigIdEntry 2 }
11
12 ieee8021MstpConfigurationName OBJECT-TYPE
13     SYNTAX       SnmpAdminString (SIZE(32))
14     MAX-ACCESS   read-write
15     STATUS       current
16     DESCRIPTION
17         "In an MSTP Bridge, the Configuration Name in the MST
18          Configuration Identifier."
19     REFERENCE   "13.8:2"
20     ::= { ieee8021MstpConfigIdEntry 3 }
21
22 ieee8021MstpRevisionLevel OBJECT-TYPE
23     SYNTAX       Unsigned32 (0..65535)
24     MAX-ACCESS   read-write
25     STATUS       current
26     DESCRIPTION
27         "In an MSTP Bridge, the Revision Level in the MST
28          Configuration Identifier."
29     REFERENCE   "13.8:3"
30     ::= { ieee8021MstpConfigIdEntry 4 }
31
32 ieee8021MstpConfigurationDigest OBJECT-TYPE
33     SYNTAX       OCTET STRING (SIZE(16))
34     MAX-ACCESS   read-only
35     STATUS       current
36     DESCRIPTION
37         "In an MSTP Bridge, the Configuration Digest in the MST
38          Configuration Identifier."
39     REFERENCE   "13.8:4"
40     ::= { ieee8021MstpConfigIdEntry 5 }
41
42
43 -- ==============================================================
44 -- Ieee8021MstpCistPortExtensionTable:
45 -- ==============================================================
46
47 ieee8021MstpCistPortExtensionTable OBJECT-TYPE
48     SYNTAX       SEQUENCE OF Ieee8021MstpCistPortExtensionEntry
49     MAX-ACCESS   not-accessible
50     STATUS       current
51     DESCRIPTION
52         "The CIST Port Extensions Table. Each row in the Table represents information
53          regarding a specific Port within the Bridge's Bridge Protocol
54          Entity, for the CIST."
55     REFERENCE   "12.8.2"
56     ::= { ieee8021MstpObjects 8 }
57
58 ieee8021MstpCistPortExtensionEntry OBJECT-TYPE
59     SYNTAX       Ieee8021MstpCistPortExtensionEntry
60     MAX-ACCESS   not-accessible
61     STATUS       current
62     DESCRIPTION
63         "A list of additional objects containing information
64          maintained by every port about the CIST
65          state for that port."
66   AUGMENTS { ieee8021MstpCistPortEntry}
67     ::= { ieee8021MstpCistPortExtensionTable 1 }
68
69 Ieee8021MstpCistPortExtensionEntry ::=
70     SEQUENCE {
71         ieee8021MstpCistPortAutoEdgePort
72             TruthValue,
```

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```
 1        ieee8021MstpCistPortAutoIsolatePort
 2            TruthValue
 3    }
 4
 5 ieee8021MstpCistPortAutoEdgePort OBJECT-TYPE
 6    SYNTAX      TruthValue
 7    MAX-ACCESS  read-write
 8    STATUS      current
 9    DESCRIPTION
10        "The administrative value of the Auto Edge Port parameter.
11         A value of true(1) indicates if the Bridge detection state
12         machine (BDM, 13.33) is to detect other Bridges
13         attached to the LAN, and set
14         ieee8021SpanningTreeRstpPortOperEdgePort automatically.
15         The default value is true(1)
16
17         This is optional and provided only by implementations
18         that support the automatic identification of edge ports.
19
20         The value of this object MUST be retained across
21         reinitializations of the management system."
22    REFERENCE   "12.8.2.1.3 )"
23    ::= { ieee8021MstpCistPortExtensionEntry 1 }
24
25 ieee8021MstpCistPortAutoIsolatePort OBJECT-TYPE
26    SYNTAX      TruthValue
27    MAX-ACCESS  read-only
28    STATUS      current
29    DESCRIPTION
30        "The operational value of the Isolate Port parameter.
31
32        A value of true(1) indicates a Designated Port will
33        transition to discarding if both
34        ieee8021SpanningTreeRstpPortAdminEdgePort and
35        ieee8021SpanningTreeRstpPortAutoEdgePort are FALSE and
36        the other Bridge presumed to be attached to the same
37        point-to-point LAN does not transmit periodic BPDUs.
38
39        This is optional and provided only by implementations
40        that support the automatic identification of fragile
41         Bridges."
42    REFERENCE   "12.8.2.1.3"
43    ::= { ieee8021MstpCistPortExtensionEntry 2 }
44
45
46 -- ================================================================
47 -- Conformance Information
48 -- ================================================================
49
50 ieee8021MstpGroups
51    OBJECT IDENTIFIER ::= { ieee8021MstpConformance 1 }
52 ieee8021MstpCompliances
53    OBJECT IDENTIFIER ::= { ieee8021MstpConformance 2 }
54
55 -- ================================================================
56 -- Units of conformance
57 -- ================================================================
58
59 ieee8021MstpCistGroup OBJECT-GROUP
60    OBJECTS {
61        ieee8021MstpCistBridgeIdentifier,
62        ieee8021MstpCistTopologyChange,
63        ieee8021MstpCistRegionalRootIdentifier,
64        ieee8021MstpCistPathCost,
65        ieee8021MstpCistMaxHops
66    }
67    STATUS      current
68    DESCRIPTION
69        "Objects for the CIST group"
70    ::= { ieee8021MstpGroups 1 }
71
72 ieee8021MstpGroup OBJECT-GROUP
```

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```
 1    OBJECTS {
 2        ieee8021MstpBridgeId,
 3        ieee8021MstpTimeSinceTopologyChange,
 4        ieee8021MstpTopologyChanges,
 5        ieee8021MstpTopologyChange,
 6        ieee8021MstpDesignatedRoot,
 7        ieee8021MstpRootPathCost,
 8        ieee8021MstpRootPort,
 9        ieee8021MstpBridgePriority,
10        ieee8021MstpVids0,
11        ieee8021MstpVids1,
12        ieee8021MstpVids2,
13        ieee8021MstpVids3,
14        ieee8021MstpRowStatus
15    }
16    STATUS      current
17    DESCRIPTION
18        "Objects for the MST group"
19    ::= { ieee8021MstpGroups 2 }
20
21 ieee8021MstpCistPortGroup OBJECT-GROUP
22    OBJECTS {
23        ieee8021MstpCistPortUptime,
24        ieee8021MstpCistPortAdminPathCost,
25        ieee8021MstpCistPortDesignatedRoot,
26        ieee8021MstpCistPortTopologyChangeAck,
27        ieee8021MstpCistPortHelloTime,
28        ieee8021MstpCistPortAdminEdgePort,
29        ieee8021MstpCistPortOperEdgePort,
30        ieee8021MstpCistPortMacEnabled,
31        ieee8021MstpCistPortMacOperational,
32        ieee8021MstpCistPortRestrictedRole,
33        ieee8021MstpCistPortRestrictedTcn,
34        ieee8021MstpCistPortRole,
35        ieee8021MstpCistPortDisputed,
36        ieee8021MstpCistPortCistRegionalRootId,
37        ieee8021MstpCistPortCistPathCost,
38        ieee8021MstpCistPortProtocolMigration,
39        ieee8021MstpCistPortEnableBPDURx,
40        ieee8021MstpCistPortEnableBPDUTx,
41        ieee8021MstpCistPortPseudoRootId,
42        ieee8021MstpCistPortIsL2Gp
43    }
44    STATUS      current
45    DESCRIPTION
46        "Objects for the CIST Port group"
47    ::= { ieee8021MstpGroups 3 }
48
49 ieee8021MstpPortGroup OBJECT-GROUP
50    OBJECTS {
51        ieee8021MstpPortUptime,
52        ieee8021MstpPortState,
53        ieee8021MstpPortPriority,
54        ieee8021MstpPortPathCost,
55        ieee8021MstpPortDesignatedRoot,
56        ieee8021MstpPortDesignatedCost,
57        ieee8021MstpPortDesignatedBridge,
58        ieee8021MstpPortDesignatedPort,
59        ieee8021MstpPortRole,
60        ieee8021MstpPortDisputed,
61        ieee8021MstpPortAdminPathCost
62    }
63    STATUS      current
64    DESCRIPTION
65        "Objects for the MST Port group"
66    ::= { ieee8021MstpGroups 4 }
67
68 ieee8021MstpFidToMstiGroup OBJECT-GROUP
69    OBJECTS {
70        ieee8021MstpFidToMstiMstId
71    }
72    STATUS      deprecated
```

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```
1    DESCRIPTION
2        "Objects for the MST FID to MSTID Allocation Table group"
3    ::= { ieee8021MstpGroups 5 }
4
5  ieee8021MstpVlanGroup OBJECT-GROUP
6    OBJECTS {
7        ieee8021MstpVlanMstId
8    }
9    STATUS      deprecated
10   DESCRIPTION
11       "Objects for the MST Configuration Table group"
12   ::= { ieee8021MstpGroups 6 }
13
14
15 ieee8021MstpConfigIdGroup OBJECT-GROUP
16   OBJECTS {
17       ieee8021MstpConfigIdFormatSelector,
18       ieee8021MstpConfigurationName,
19       ieee8021MstpRevisionLevel,
20       ieee8021MstpConfigurationDigest
21   }
22   STATUS      current
23   DESCRIPTION
24       "Objects for the MST Configuration Identifier group"
25   ::= { ieee8021MstpGroups 7 }
26
27
28 ieee8021MstpCistPortExtensionGroup OBJECT-GROUP
29   OBJECTS {
30       ieee8021MstpCistPortAutoEdgePort,
31       ieee8021MstpCistPortAutoIsolatePort
32   }
33   STATUS      current
34   DESCRIPTION
35       "Objects for the CIST Port Extension group
36        for fragile Bridges"
37   ::= { ieee8021MstpGroups 8 }
38
39 ieee8021MstpFidToMstiV2Group OBJECT-GROUP
40   OBJECTS {
41       ieee8021MstpFidToMstiV2MstId
42   }
43   STATUS      current
44   DESCRIPTION
45       "Objects for the MST FID to MSTID Allocation Table group
46       for SPB"
47   ::= { ieee8021MstpGroups 9 }
48
49 ieee8021MstpVlanV2Group OBJECT-GROUP
50   OBJECTS {
51       ieee8021MstpVlanV2MstId
52   }
53   STATUS      current
54   DESCRIPTION
55       "Objects for the MST Configuration Table group for SPB"
56   ::= { ieee8021MstpGroups 10 }
57
58 -- ============================================================
59 -- Compliance statements
60 -- ============================================================
61
62 ieee8021MstpCompliance MODULE-COMPLIANCE
63   STATUS      deprecated
64   DESCRIPTION
65       "The compliance statement for devices supporting Multiple
66       Spanning Tree as defined in 13 of IEEE Std 802.1Q."
67
68   MODULE
69       MANDATORY-GROUPS {
70           ieee8021MstpCistGroup,
71           ieee8021MstpGroup,
72           ieee8021MstpCistPortGroup,
```

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```
 1            ieee8021MstpPortGroup,
 2            ieee8021MstpFidToMstiGroup,
 3            ieee8021MstpVlanGroup,
 4            ieee8021MstpConfigIdGroup
 5        }
 6
 7    GROUP ieee8021MstpCistPortExtensionGroup
 8    DESCRIPTION
 9        "Implementation of this group is optional."
10
11    ::= { ieee8021MstpCompliances 1 }
12
13 ieee8021MstpComplianceV2 MODULE-COMPLIANCE
14    STATUS        current
15    DESCRIPTION
16        "The compliance statement for devices supporting Multiple
17        Spanning Tree as defined in 13 of IEEE Std 802.1Q."
18
19    MODULE
20        MANDATORY-GROUPS {
21            ieee8021MstpCistGroup,
22            ieee8021MstpGroup,
23            ieee8021MstpCistPortGroup,
24            ieee8021MstpPortGroup,
25            ieee8021MstpFidToMstiV2Group,
26            ieee8021MstpVlanV2Group,
27            ieee8021MstpConfigIdGroup
28        }
29
30    GROUP ieee8021MstpCistPortExtensionGroup
31    DESCRIPTION
32        "Implementation of this group is optional."
33
34    ::= { ieee8021MstpCompliances 2 }
35
36 END
```

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48. YANG Data Models

48.2 IEEE 802.1Q YANG models

Insert 48.2.12 and 48.2.13 as follows:

48.2.12 Rapid Spanning Tree (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, 48.2.13) and report on protocol operation. The RSTP model is illustrated in Figure 48-21.

```
component  (name)
string        name;                              // r-w
...
rstp
enum          protocol-specification;     // r
int32         priority;                          // r-w
timeticks     time-since-topology-change;  // r
counter64     topology-changes;            // r
uint64        designated-root;             // r
int32         root-cost;                   // r
uint16        root-port;                   // r
uint32        max-age;                     // r
uint32        hello-time;                  // r
int32         hold-time;                   // r
uint32        forward-delay;               // r
uint32        bridge-max-age;              // r-w
uint32        bridge-hello-time;           // r-w
uint32        bridge-forward-delay;        // r-w
enum          version;                     // r-w
int32         rstp-tx-hold-count;          // r-w
```

```
bridge-port
leafref       bridge-name;                 // r-w
leafref       component-name;              // r-w
...
rstp
int32         priority;                    // r-w
enum          state;                       // r
bool          enabled;                     // r-w
int32         path-cost;                   // r-w
uint32        designated-root;             // r
int32         designated-cost;             // r
uint32        designated-bridge;           // r
binary        designated-port;             // r
counter64     forward-transitions;         // r
bool          protocol-migration;          // r-w
bool          admin-edge-port;             // r-w
bool          oper-edge-port;              // r
int32         admin-path-cost;             // r-w
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 48-21—RSTP model

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1 **48.2.13 Multiple Spanning Trees model**

2 The Multiple Spanning Trees model augments the RSTP (48.2.12) model with nodes for MSTP. These nodes
3 control the configuration of the CIST and MSTIs and the assignment of VLANs and VIDs to MSTIs (8.9)
4 within MST Regions. They also report on MSTP protocol operation. The Multiple Spanning Trees model is
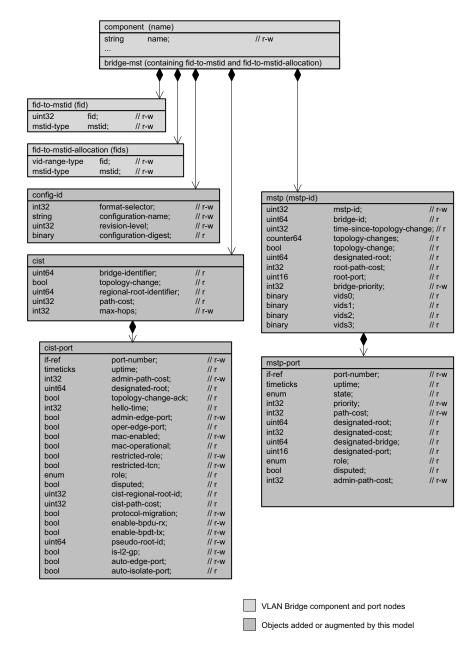5 illustrated in Figure 48-21.

Figure 48-22—Multiple Spanning Trees model

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48.3 Structure of the YANG models

Table 48-1—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-rstp	48.5.23, 48.6.23	8.4, 8.7, 8.8, 8.10 Clause 13	IEEE Std 802.1Qcy Augments Bridge components and Bridge Ports with RSTP parameters.
ieee802-dot1q-mstp	48.5.24, 48.6.24	8.4, 8.7, 8.8, 8.8, 8.9, 8.10 Clause 13	IEEE Std 802.1Qcy Augments Bridge components, Bridge Ports, and the ieee802-dot1q-rstp module with Multiple Spanning Tree parameters.

Insert 48.3.12 and 48.3.13 at the end of clause 48.3 as follows:

48.3.12 RSTP model

A bridge implementing the RSTP model (48.2.11) 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

48.3.13 MSTP model

A bridge implementing the MSTP model (48.2.11) implements the YANG modules in Table 48-13.

Table 48-14—MSTP model YANG modules

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

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48.4 Security considerations

Insert 48.4.12 and 48.4.13 at the end of clause 48.4, as follows:

48.4.12 Security considerations of the RSTP model

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

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

48.4.13 Security considerations of the Multiple Spanning Trees model

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

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

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48.5 YANG schema tree definitions

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

— Brackets "[" and "]" enclose list keys.

— Abbreviations before data node names: "rw" means configuration (read-write), and "ro" means state data (read-only).

— Symbols after data node names: "?" means an optional node, "!" means a presence container, and "*" denotes a list and leaf-list.

— Parentheses enclose choice and case nodes, and case nodes are also marked with a colon (":").

— Ellipsis ("...") stands for contents of subtrees that are not shown.

Insert new 48.5.23 and 48.5.24 at the end of 48.5, as follows:

48.5.23 Schema for the ieee802-dot1q-rstp YANG module

```
module: ieee802-dot1q-rstp

  augment /dot1q:bridges/dot1q:bridge/dot1q:component:
    +--rw rstp {rstp}?
       +--ro protocol-specification?      enumeration
       +--rw priority?                    int32
       +--ro time-since-topology-change?  yang:timeticks
       +--ro topology-changes?            yang:counter64
       +--ro designated-root?             uint64
       +--ro root-cost?                   int32
       +--ro root-port?                   uint16
       +--ro max-age?                     uint32
       +--ro hello-time?                  uint32
       +--ro hold-time?                   int32
       +--ro forward-delay?               uint32
       +--rw bridge-max-age?              uint32
       +--rw bridge-hello-time?           uint32
       +--rw bridge-forward-delay?        uint32
       +--rw version?                     enumeration
       +--rw rstp-tx-hold-count?          int32
  augment /if:interfaces/if:interface/dot1q:bridge-port:
    +--rw rstp {rstp}?
       +--rw priority?            int32
       +--ro state?               enumeration
       +--rw enabled?             boolean
       +--rw path-cost?           int32
       +--ro designated-root?     uint32
       +--ro designated-cost?     int32
       +--ro designated-bridge?   uint32
       +--ro designated-port?     binary
       +--ro forward-transitions? yang:counter64
       +--rw protocol-migration?  boolean
       +--rw admin-edge-port?     boolean
       +--ro oper-edge-port?      boolean
       +--rw admin-path-cost?     int32
       +--rw auto-edge-port?      boolean
       +--ro auto-isolate-port?   boolean
       +--ro isolate-port?        boolean

  notifications:
    +---n new-root
    +---n topology-change

```

48.5.24 Schema for the ieee802-dot1q-mstp YANG module

```
module: ieee802-dot1q-mstp

  augment /dot1q:bridges/dot1q:bridge/dot1q:component/dot1q:bridge-mst:
    +--rw cist
       +--ro bridge-identifier?          uint64
```

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```
1        +--ro topology-change?          boolean
2        +--ro regional-root-identifier? uint64
3        +--ro path-cost?                uint32
4        +--rw max-hops?                 int32
5        +--rw cist-port
6        |  +--rw port-number?           if:interface-ref
7        |  +--ro uptime?                yang:timeticks
8        |  +--rw admin-path-cost?       int32
9        |  +--ro designated-root?       uint64
10       |  +--ro topology-change-ack?   boolean
11       |  +--ro hello-time?            int32
12       |  +--rw admin-edge-port?       boolean
13       |  +--ro oper-edge-port?        boolean
14       |  +--rw mac.enabled?           boolean
15       |  +--ro mac-operational?       boolean
16       |  +--rw restricted-role?       boolean
17       |  +--rw restricted-tcn?        boolean
18       |  +--ro role?                  enumeration
19       |  +--ro disputed?              boolean
20       |  +--ro cist-regional-root-id? uint32
21       |  +--ro cist-path-cost?        uint32
22       |  +--rw protocol-migration?    boolean
23       |  +--rw enable-bpdu-rx?        boolean
24       |  +--rw enable-bpdu-tx?        boolean
25       |  +--rw pseudo-root-id?        uint64
26       |  +--rw is-l2gp?               boolean
27       |  +--rw auto-edge-port?        boolean
28       |  +--ro auto-isolate-port?     boolean
29       +--rw mstp* [mstp-id]
30       |  +--rw mstp-id                    uint32
31       |  +--ro bridge-id?                 uint64
32       |  +--ro time-since-topology-change? uint32
33       |  +--ro topology-changes?          yang:counter64
34       |  +--ro topology-change?           boolean
35       |  +--ro designated-root?           uint64
36       |  +--ro root-path-cost?            int32
37       |  +--ro root-port?                 uint16
38       |  +--rw bridge-priority?           int32
39       |  +--ro vids0?                     binary
40       |  +--ro vids1?                     binary
41       |  +--ro vids2?                     binary
42       |  +--ro vids3?                     binary
43       |  +--rw mstp-port
44       |     +--rw port-number?       if:interface-ref
45       |     +--rw mst-id?            uint32
46       |     +--ro uptime?            yang:timeticks
47       |     +--ro state?             enumeration
48       |     +--rw priority?          int32
49       |     +--rw path-cost?         int32
50       |     +--ro designated-root?   uint64
51       |     +--ro designated-cost?   int32
52       |     +--ro designated-bridge? uint64
53       |     +--ro designated-port?   uint16
54       |     +--ro role?              enumeration
55       |     +--ro disputed?          boolean
56       |     +--rw admin-path-cost?   int32
57       +--rw config-id
58          +--rw format-selector?      int32
59          +--rw configuration-name?   string
60          +--rw revision-level?       uint32
61          +--ro configuration-digest? binary
62
```

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48.6 YANG modules

Insert 48.6.23 as follows:

48.6.23 The ieee802-dot1q-rstp YANG module

```
module ieee802-dot1q-rstp {
  yang-version 1.1;
  namespace "urn:ieee:std:802.1Q:yang:ieee802-dot1q-rstp";
  prefix rstp;

  import ietf-yang-types {
    prefix yang;
  }
  import ietf-interfaces {
    prefix if;
  }
  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 management of 802.1Q bridge components that
     support the Rapid Spanning Tree Algorithm and Protocol (RSTP).

     Copyright (C) IEEE (2024).

     This version of this YANG module is part of IEEE Std 802.1Q; see the
     standard itself for full legal notices.";

  revision 2023-11-23 {
    description
      "Published as part of IEEE Std 802.1Qcy-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 Stds 802.1Q-2022, 802.1Qcy-2024.";
  }

  feature rstp {
    description
      "Rapid Spanning Tree Algorithm and Protocol supported.";
    reference
      "13.4 of IEEE Std 802.1Q";
  }

  augment "/dot1q:bridges/dot1q:bridge/dot1q:component" {
    description
      "Augment bridge with RSTP configuration";
    container rstp {
      if-feature "rstp";
      leaf protocol-specification {
        type enumeration {
          enum unknown {
            value 1;
```

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```
1              }
2            enum decLb100 {
3              value 2;
4            }
5            enum ieee8021d {
6              value 3;
7            }
8            enum ieee8021q {
9              value 4;
10           }
11         }
12       config false;
13       description
14         "An indication of what version of the Spanning Tree Protocol is
15          being run.  The value 'decLb100(2)' indicates the DEC LANbridge
16          100 Spanning Tree protocol.  IEEE 802.1D implementations will
17          return 'ieee8021d(3)'.  New enumerated values may be added in
18          the future to the definition of this object to reflect future
19          versions of the IEEE Spanning Tree protocol.";
20     }
21     leaf priority {
22       type int32 {
23         range "0..65535";
24       }
25       config true;
26       description
27         "The value of the write-able portion of the Bridge ID
28          (i.e., the first two octets of the (8 octet long) Bridge
29          ID).  The other (last) 6 octets of the Bridge ID are
30          given by the value of ieee8021BridgeBaseBridgeAddress.
31          On Bridges supporting IEEE 802.1t or IEEE 802.1w,
32          permissible values are 0-61440, in steps of 4096.
33
34          The value of this object MUST be retained across
35          reinitializations of the management system.";
36       reference
37         "Item a) in 12.8.1.1.3 of IEEE Std 802.1Q";
38     }
39     leaf time-since-topology-change {
40       type yang:timeticks;
41       units "centi-seconds";
42       config false;
43       description
44         "The time (in hundredths of a second) since the
45          last time a topology change was detected by the
46          Bridge entity.
47          For RSTP, this reports the time since the tcWhile
48          timer for any port on this Bridge was nonzero.";
49       reference
50         "Item b) in 12.8.1.1.3  of IEEE Std 802.1Q";
51     }
52     leaf topology-changes {
53       type yang:counter64;
54       units "topology changes";
55       config false;
56       description
57         "The total number of topology changes detected by
58          this Bridge since the management entity was last
59          reset or initialized.
60
61          Discontinuities in the value of the counter can occur
62          at re-initialization of the management system.";
63       reference
64         "Item c) in 12.8.1.1.3 of IEEE Std 802.1Q";
65     }
66     leaf designated-root {
67       type uint64;
68       config false;
69       description
70         "The Bridge identifier of the root of the spanning
71          tree, as determined by the Spanning Tree Protocol,
72          as executed by this node.  This value is used as
```

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```
 1            the Root Identifier parameter in all Configuration
 2            Bridge PDUs originated by this node.";
 3          reference
 4            "Item e) in 12.8.1.1.3 of IEEE Std 802.1Q";
 5        }
 6        leaf root-cost {
 7          type int32;
 8          config false;
 9          description
10            "The cost of the path to the root as seen from
11            this Bridge.";
12          reference
13            "Item f) of 12.8.1.1.3 of IEEE Std 802.1Q";
14        }
15        leaf root-port {
16          type uint16;
17          config false;
18          description
19            "The port number of the port that offers the lowest
20            cost path from this Bridge to the root Bridge.";
21          reference
22            "Item g) in 12.8.1.1.3 of IEEE Std 802.1Q";
23        }
24        leaf max-age {
25          type uint32;
26          units "centi-seconds";
27          config false;
28          description
29            "The maximum age of Spanning Tree Protocol information
30            learned from the network on any port before it is
31            discarded, in units of hundredths of a second.  This is
32            the actual value that this Bridge is currently using.";
33          reference
34            "Item h) in 12.8.1.1.3 of IEEE Std 802.1Q";
35        }
36        leaf hello-time {
37          type uint32;
38          units "centi-seconds";
39          config false;
40          description
41            "The amount of time between the transmission of
42            Configuration Bridge PDUs by this node on any port when
43            it is the root of the spanning tree, or trying to become
44            so, in units of hundredths of a second.  This is the
45            actual value that this Bridge is currently using.";
46          reference
47            "Item k) in 12.8.1.1.3 of IEEE Std 802.1Q";
48        }
49        leaf hold-time {
50          type int32;
51          units "centi-seconds";
52          config false;
53          description
54            "This time value determines the interval length
55            during which no more than two Configuration Bridge
56            PDUs shall be transmitted by this node, in units
57            of hundredths of a second.";
58          reference
59            "Item m) in 12.8.1.1.3 of IEEE Std 802.1Q";
60        }
61        leaf forward-delay {
62          type uint32;
63          units "centi-seconds";
64          config false;
65          description
66            "This time value, measured in units of hundredths of a
67            second, controls how fast a port changes its spanning
68            state when moving towards the Forwarding state.  The
69            value determines how long the port stays in each of the
70            Listening and Learning states, which precede the
71            Forwarding state.  This value is also used when a
72            topology change has been detected and is underway, to
```

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```
 1              age all dynamic entries in the Filtering Database.
 2              [Note that this value is the one that this Bridge is
 3              currently using, in contrast to
 4              ieee8021SpanningTreeBridgeForwardDelay, which is the
 5              value that this Bridge and all others would start using
 6              if/when this Bridge were to become the root.]";
 7            reference
 8              "Item i) in 12.8.1.1.3 of IEEE Std 802.1Q";
 9          }
10        leaf bridge-max-age {
11          type uint32 {
12            range "600..4000";
13          }
14          units "centi-seconds";
15          config true;
16          description
17            "The value that all Bridges use for MaxAge when this
18             Bridge is acting as the root.  Note that IEEE Std 802.1D-1998
19             specifies that the range for this parameter is related
20             to the value of ieee8021SpanningTreeBridgeHelloTime.  The
21             granularity of this timer is specified by IEEE Std 802.1D-1998
22             to be 1 second.  An agent may return an SNMP badValue error
23             (or its equivalent if another protocol is used) if a set
24             is attempted to a value that is not a whole number of
25             seconds.
26
27             The value of this object MUST be retained across
28             reinitializations of the management system.";
29          reference
30            "Item j) in 12.8.1.1.3";
31        }
32        leaf bridge-hello-time {
33          type uint32 {
34            range "100..1000";
35          }
36          units "centi-seconds";
37          config true;
38          description
39            "The value that all Bridges use for HelloTime when this
40             Bridge is acting as the root.  The granularity of this
41             timer is specified by IEEE Std 802.1D-1998 to be 1 second.
42             An agent may return an SNMP badValue error (or its equivalent
43             if another protocol is used) if a set is attempted to a
44             value that is not a whole number of seconds.
45
46             The value of this object MUST be retained across
47             reinitializations of the management system.";
48          reference
49            "Item k) in 12.8.1.1.3 of IEEE Std 802.1Q";
50        }
51        leaf bridge-forward-delay {
52          type uint32 {
53            range "400..3000";
54          }
55          units "centi-seconds";
56          config true;
57          description
58            "The value that all Bridges use for ForwardDelay when
59             this Bridge is acting as the root.  Note that IEEE Std
60             802.1D-1998 specifies that the range for this parameter
61             is related to the value of ieee8021SpanningTreeBridgeMaxAge.
62             The granularity of this timer is specified by IEEE Std 802.1D-1998
63             to be 1 second.  An agent may return an SNMP badValue error
64             (or its equivalent if another protocol is used) if a set is
65             attempted to a value that is not a whole number of seconds.
66
67             The value of this object MUST be retained across
68             reinitializations of the management system.";
69          reference
70            "Item l) in 12.8.1.1.3 of IEEE Std 802.1Q";
71        }
72      leaf version {
```

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```
1          type enumeration {
2            enum stp {
3              value 0;
4            }
5            enum rstp {
6              value 2;
7            }
8            enum mstp {
9              value 3;
10           }
11         }
12         config true;
13         description
14           "The version of Spanning Tree Protocol the Bridge is
15            currently running.  The values are directly from
16            the IEEE standard.  New values may be defined as future
17            versions of the protocol become available.
18
19            The value 'stp(0)' indicates the Bridge is running the
20            Spanning Tree Protocol specified in IEEE Std 802.1D-1998.
21
22            The value 'rstp(2)' indicates the Bridge is running RSTP
23            specified in IEEE 802.1Q.
24
25            The value 'mstp(3)' indicates the Bridge is running
26            MSTP specified in Clause 13 of IEEE Std 802.1Q.
27
28            The value of this object MUST be retained across
29            reinitializations of the management system.";
30         reference
31           "Item n) in 12.8.1.1.3 of IEEE Std 802.1Q";
32       }
33     leaf rstp-tx-hold-count {
34       type int32 {
35         range "1..10";
36       }
37       config true;
38       description
39         "The value used by the Port Transmit state machine to limit
40          the maximum transmission rate.  This is used by Bridges
41          that are running RSTP.
42
43          The value of this object MUST be retained across
44          reinitializations of the management system.";
45       reference
46         "Item m) in 12.8.1.1.3, 13.26.12 of IEEE Std 802.1Q";
47     }
48   }
49 }
50
51 augment "/if:interfaces/if:interface/dot1q:bridge-port" {
52   description
53     "Augment bridge port with RSTP configuration";
54   container rstp {
55     if-feature "rstp";
56     leaf priority {
57       type int32 {
58         range "0..255";
59       }
60       config true;
61       description
62         "The value of the priority field that is contained in
63          the first (in network byte order) octet of the (2 octet
64          long) Port ID.  The other octet of the Port ID is given
65          by the value of ieee8021SpanningTreePort.
66          On Bridges supporting IEEE 802.1t or IEEE 802.1w,
67          permissible values are 0-240, in steps of 16.
68
69          The value of this object MUST be retained across
70          reinitializations of the management system.";
71       reference
72         "Item c) in 12.8.2.1.3 of IEEE Std 802.1Q";
```

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```
1          }
2        leaf state {
3          type enumeration {
4            enum disabled {
5              value 1;
6            }
7            enum blocking {
8              value 2;
9            }
10           enum listening {
11             value 3;
12           }
13           enum learning {
14             value 4;
15           }
16           enum forwarding {
17             value 5;
18           }
19           enum broken {
20             value 6;
21           }
22         }
23         config false;
24         description
25           "The port's current state, as defined by application of
26            the Spanning Tree Protocol.  This state controls what
27            action a port takes on reception of a frame.  If the
28            Bridge has detected a port that is malfunctioning, it
29            will place that port into the broken(6) state.  For
30            ports that are disabled (see
31            ieee8021SpanningTreePortEnabled), this object will have a
32            value of disabled(1).  The values disabled, blocking,
33            listening, and broken correspond to the Clause 12 port
34            state of 'Discarding'. The value learning corresponds to
35            the Clause 12 port state of 'Learning'. The value forwarding
36            corresponds to the Clause 12 port state of 'Forwarding'.";
37         reference
38           "Item b) in 12.8.2.1.3 of IEEE Std 802.1Q";
39       }
40       leaf enabled {
41         type boolean;
42         config true;
43         description
44           "The enabled/disabled status of the port.  A value of true(1)
45            means the spanning-tree protocol is enabled for this port.
46
47            The value of this object MUST be retained across
48            reinitializations of the management system.";
49         reference
50           "Item m) in 12.8.2.1.3 of IEEE Std 802.1Q";
51       }
52       leaf path-cost {
53         type int32 {
54           range "1..200000000";
55         }
56         config true;
57         description
58           "The contribution of this port to the path cost of
59            paths towards the spanning tree root that include
60            this port.  Table 13-4 recommends defaults and ranges
61            for Port Path Cost values, in inverse proportion
62            to the speed of the attached LAN. If this object is used
63            to set the Path Cost it is possible to restore the
64            default setting using the
65            ieee8021SpanningTreeRstpPortAdminPathCost object.
66
67            Table 13-4 recommends defaults and ranges for Port
68            Path Cost values, in inverse proportion to the speed of the
69            attached LAN. If this object is used to set the Path
70            Cost it is possible to restore the default
71            setting using the ieee8021MstpPortAdminPathCost object.
72
```

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```
1            The value of this object MUST be retained across
2            reinitializations of the management system.";
3          reference
4            "Item d) in 12.8.2.1.3 of IEEE Std 802.1Q";
5        }
6      leaf designated-root {
7        type uint32;
8        config false;
9        description
10           "The unique Bridge Identifier of the Bridge
11           recorded as the Root in the Configuration BPDUs
12           transmitted by the Designated Bridge for the
13           segment to which the port is attached.";
14         reference
15           "Item e) in 12.8.2.1.3 of IEEE Std 802.1Q";
16       }
17     leaf designated-cost {
18       type int32;
19       config false;
20       description
21           "The path cost of the Designated Port of the segment
22           connected to this port.  This value is compared to the
23           Root Path Cost field in received Bridge PDUs.";
24         reference
25           "Item f) in 12.8.2.1.3 of IEEE Std 802.1Q";
26       }
27     leaf designated-bridge {
28       type uint32;
29       config false;
30       description
31           "The Bridge Identifier of the Bridge that this
32           port considers to be the Designated Bridge for
33           this port's segment.";
34         reference
35           "Item g) in 12.8.2.1.3 of IEEE Std 802.1Q";
36       }
37     leaf designated-port {
38       type binary {
39         length "2";
40       }
41       config false;
42       description
43           "The Port Identifier of the port on the Designated
44           Bridge for this port's segment.";
45         reference
46           "Item h) in 12.8.2.1.3 of IEEE Std 802.1Q";
47       }
48     leaf forward-transitions {
49       type yang:counter64;
50       units "forwarding transitions";
51       config false;
52       description
53           "The number of times this port has transitioned
54           from the Learning state to the Forwarding state.
55
56           Discontinuities in the value of the counter can occur
57           at re-initialization of the management system, and at
58           other times as indicated by the value of
59           ifCounterDiscontinuityTime object of the associated
60           interface (if any).";
61       }
62     leaf protocol-migration {
63       type boolean;
64       config true;
65       description
66           "When operating in RSTP (version 2) mode, writing true(1)
67           to this object forces this port to transmit RSTP BPDUs.
68           Any other operation on this object has no effect and
69           it always returns false(2) when read.";
70         reference
71           "12.8.2.5 of IEEE Std 802.1Q";
72       }
```

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```
1      leaf admin-edge-port {
2        type boolean;
3        config true;
4        description
5          "The administrative value of the Edge Port parameter.
6           A value of true(1) indicates that this port should be
7           assumed as an edge-port, and a value of false(2) indicates
8           that this port should be assumed as a non-edge-port.
9
10          Setting this object will also cause the corresponding
11          instance of ieee8021SpanningTreeRstpPortOperEdgePort to
12          change to the same value.  Note that even when this
13          object's value is true(1), the value of the corresponding
14          instance of ieee8021SpanningTreeRstpPortOperEdgePort can
15          be false(2) if a BPDU has been received.
16
17          The value of this object MUST be retained across
18          reinitializations of the management system.";
19       reference
20         "Item k) in 12.8.2.1.3 of IEEE Std 802.1Q";
21     }
22     leaf oper-edge-port {
23       type boolean;
24       config false;
25       description
26         "The operational value of the Edge Port parameter.  The
27          object is initialized to the value of the corresponding
28          instance of ieee8021SpanningTreeRstpPortAdminEdgePort.
29          When the corresponding instance of
30          ieee8021SpanningTreeRstpPortAdminEdgePort is set, this
31          object will be changed as well.  This object will also be
32          changed to false(2) on reception of a BPDU.";
33       reference
34         "Item l) in 12.8.2.1.3 of IEEE Std 802.1Q";
35     }
36     leaf admin-path-cost {
37       type int32 {
38         range "0..200000000";
39       }
40       config true;
41       description
42         "The administratively assigned value for the contribution
43          of this port to the path cost of paths toward the spanning
44          tree root.
45
46          Writing a value of '0' assigns the automatically calculated
47          default Path Cost value to the port.  If the default Path
48          Cost is being used, this object returns '0' when read.
49
50          This complements the object ieee8021SpanningTreePortPathCost,
51          which returns the operational value of the path cost.
52
53          The value of this object MUST be retained across
54          reinitializations of the management system.";
55       reference
56         "Item d) in 12.8.2.1.3 of IEEE Std 802.1Q";
57     }
58     leaf auto-edge-port {
59       type boolean;
60       config true;
61       description
62         "The administrative value of the Auto Edge Port parameter.
63          A value of true(1) indicates if the Bridge detection state
64          machine (BDM, 13.33) is to detect other Bridges
65          attached to the LAN, and set
66          ieee8021SpanningTreeRstpPortOperEdgePort automatically.
67          The default value is true(1)
68
69          This is optional and provided only by implementations
70          that support the automatic identification of edge ports.
71
72          The value of this object MUST be retained across
```

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```
 1                reinitializations of the management system.";
 2            reference
 3              "Item m) in 12.8.2.1.3 of IEEE Std 802.1Q";
 4          }
 5        leaf auto-isolate-port {
 6          type boolean;
 7          config false;
 8          description
 9            "The operational value of the Isolate Port parameter.
10
11              A value of true(1) indicates a Designated Port will
12              transition to discarding if both
13              ieee8021SpanningTreeRstpPortAdminEdgePort and
14              ieee8021SpanningTreeRstpPortAutoEdgePort are FALSE and
15              the other Bridge presumed to be attached to the same
16              point-to-point LAN does not transmit periodic BPDUs.
17
18              This is optional and provided only by implementations
19              that support the automatic identification of edge ports.";
20          reference
21              "Item n) in 12.8.2.1.3 of IEEE Std 802.1Q";
22        }
23        leaf isolate-port {
24          type boolean;
25          config false;
26          description
27            "The operational value of the Isolate Port parameter.
28
29              A value of true(1), Set by the Bridge detection state
30                  machine (BDM, 13.33), indicates when the Spanning Tree
31                  Protocol Entity of a neighboring Bridge has apparently
32            failed .";
33          reference
34              "Item o) in 12.8.2.1.3 of IEEE Std 802.1Q";
35        }
36      }
37  }
38
39  notification new-root {
40    description
41      "The new-root notification indicates that
42      the sending agent has become the new root of the Spanning Tree;
43      the notification is sent by a Bridge soon after its election
44      as the new root, e.g., upon expiration of the Topology Change
45      Timer, immediately subsequent to its election.";
46  }
47
48  notification topology-change {
49    description
50      "A topology-change notification is sent
51      by a Bridge when any of its configured ports transitions from
52      the Learning state to the Forwarding state, or from the
53      Forwarding state to the Blocking state.  The notification
54      is not sent if a ieee8021SpanningTreeNewRoot notification
55      is sent for the same transition.";
56  }
57 }
58
59
```

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1 *Insert 48.6.24 as follows:*

2 **48.6.24 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-yang-types {
9     prefix yang;
10  }
11  import ietf-interfaces {
12    prefix if;
13  }
14  import ieee802-dot1q-bridge {
15    prefix dot1q;
16  }
17
18  organization
19    "IEEE 802.1 Working Group";
20  contact
21    "WG-URL: http://www.ieee802.org/1/
22     WG-EMail: stds-802-1-l@ieee.org
23
24     Contact: IEEE 802.1 Working Group Chair
25     Postal: C/O IEEE 802.1 Working Group
26             IEEE Standards Association
27             445 Hoes Lane
28             Piscataway, NJ 08854
29             USA
30
31     E-mail: stds-802-1-chairs@ieee.org";
32  description
33    "This module provides management of 802.1Q bridge components that
34     support the Multiple Spanning Tree Algorithm and Protocol (MSTP).
35
36     Copyright (C) IEEE (2024).
37
38     This version of this YANG module is part of IEEE Std 802.1Q; see the
39     standard itself for full legal notices.";
40
41  revision 2023-11-23 {
42    description
43      "Published as part of IEEE Std 802.1Qcy-2024.
44
45       The following reference statement identifies each referenced IEEE
46       Standard as updated by applicable amendments.";
47    reference
48      "IEEE Std 802.1Q Bridges and Bridged Networks:
49       IEEE Stds 802.1Q-2022, 802.1Qcy-2024.";
50  }
51
52  feature mstp {
53    description
54      "Multiple Spanning Tree Algorithm and Protocol supported.";
55    reference
56      "13.5 of IEEE Std 802.1Q";
57  }
58
59  augment "/dot1q:bridges/dot1q:bridge/dot1q:component/dot1q:bridge-mst" {
60    description
61      "Augment bridge component with MSTP configuration";
62    container cist {
63      leaf bridge-identifier {
64        type uint64;
65        config false;
66        description
67          "The Bridge Identifier for the CIST.";
68        reference
69          "12.8.1.1 of IEEE Std 802.1Q";
```

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```
1          }
2      leaf topology-change {
3        type boolean;
4        config false;
5        description
6          "In an STP Bridge, the value of the Topology Change parameter,
7           or in an RSTP or MSTP Bridge, asserted if the tcWhile timer
8           for any Port for the CIST is non-zero.";
9        reference
10         "13.25.9 of IEEE Std 802.1Q";
11     }
12     leaf regional-root-identifier {
13       type uint64;
14       config false;
15       description
16         "In an MSTP Bridge, the CIST Regional Root Identifier parameter,
17          i.e., the Bridge Identifier of the current CIST Regional Root.";
18       reference
19         "13.16.4 of IEEE Std 802.1Q, 13.26.3 of IEEE Std 802.1Q";
20     }
21     leaf path-cost {
22       type uint32 {
23         range "0..2147483647";
24       }
25       config false;
26       description
27         "In an MSTP Bridge, the CIST Path Cost parameter, i.e., the CIST
28          path cost from the transmitting Bridge to the CIST Regional Root.
29          The sum (about 20 possible out of the given range) of multiple
30          port path costs. Also, if the 'transmitting Bridge' is
31          the 'CIST Regional Root', then this value could be zero.";
32       reference
33         "Item d) in 13.9, 13.10 of IEEE Std 802.1Q";
34     }
35     leaf max-hops {
36       type int32 {
37         range "6..40";
38       }
39       config true;
40       description
41         "In an MSTP Bridge, the MaxHops parameter.
42
43          The value of this object MUST be retained across
44          reinitializations of the management system.";
45       reference
46         "13.26.4 of IEEE Std 802.1Q";
47     }
48     container cist-port {
49       description
50         "A CIST Port.";
51       leaf port-number {
52         type if:interface-ref;
53         description
54           "Reference to the associated IETF YANG
55            interface of this cist port.";
56         reference
57           "RFC 8343";
58       }
59       leaf uptime {
60         type yang:timeticks;
61         units "centi-seconds";
62         config false;
63         description
64           "The Port's Uptime parameter value for the CIST, i.e., the count
65            in seconds of the time elapsed since the Port was last reset or
66            initialized (BEGIN, Annex E).";
67       }
68       leaf admin-path-cost {
69         type int32 {
70           range "0..200000000";
71         }
72         config true;
```

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```
 1          description
 2            "The administratively assigned value for the contribution
 3             of this port to the path cost of paths toward the spanning
 4             tree root.
 5
 6             Writing a value of '0' assigns the automatically calculated
 7             default Path Cost value to the port.  If the default Path
 8             Cost is being used, this object returns '0' when read.
 9
10             This complements the object ieee8021MstpCistPortCistPathCost,
11             which returns the operational value of the port path cost.
12
13             The value of this object MUST be retained across
14             reinitializations of the management system.";
15          reference
16            "13.27.25 of IEEE Std 802.1Q";
17        }
18        leaf designated-root {
19          type uint64;
20          config false;
21          description
22            "The CIST Regional Root Identifier component of the Port's port
23             priority vector, as defined in 13.10, for the CIST.";
24          reference
25            "13.27.47 of IEEE Std 802.1Q";
26        }
27        leaf topology-change-ack {
28          type boolean;
29          config false;
30          description
31            "The Port's Topology Change Acknowledge parameter value.
32             True(1) if a Configuration Message with a topology change
33             acknowledge flag set is to be transmitted. ";
34          reference
35            "13.27.72 of IEEE Std 802.1Q";
36        }
37        leaf hello-time {
38          type int32 {
39            range "100..1000";
40          }
41          units "centi-seconds";
42          config false;
43          description
44            "The Port's Hello Time timer parameter value, for the CIST.
45             In centi-seconds";
46          reference
47            "13.27.48 of IEEE Std 802.1Q";
48        }
49        leaf admin-edge-port {
50          type boolean;
51          config true;
52          description
53            "In a Bridge that supports the identification of edge ports, the
54             Port's Admin Edge Port parameter value, for the CIST.";
55          reference
56            "13.27.1 of IEEE Std 802.1Q";
57        }
58        leaf oper-edge-port {
59          type boolean;
60          config false;
61          description
62            "In a Bridge that supports the identification of edge ports, the
63             Port's operational Edge Port parameter value, for the CIST.
64             True(1) if it is an operEdge Port.";
65          reference
66            "13.27.44 of IEEE Std 802.1Q";
67        }
68        leaf mac.enabled {
69          type boolean;
70          config true;
71          description
72            "In a Bridge that supports the MAC Enabled parameter, the current
```

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```
 1            state of the MAC Enabled parameter.
 2            True(1) indicates that administratively the MAC is set as if it
 3            was connected to a point-to-point LAN.";
 4          reference
 5            "Item p) in 12.8.2.1.3 of IEEE Std 802.1Q";
 6        }
 7        leaf mac-operational {
 8          type boolean;
 9          config false;
10          description
11            "In a Bridge that supports the MAC Operational parameter, the
12             current state of the MAC Operational parameter.
13             True(1) indicates the MAC is operational.";
14          reference
15            "Item q) in 12.8.2.1.3 of IEEE Std 802.1Q";
16        }
17        leaf restricted-role {
18          type boolean;
19          config true;
20          description
21            "The current state of the restrictedRole parameter for the Port.
22             True(1) causes the Port not to be selected as Root Port for the
23             CIST or any MSTI. ";
24          reference
25            "13.27.64 of IEEE Std 802.1Q";
26        }
27        leaf restricted-tcn {
28          type boolean;
29          config true;
30          description
31            "The current state of the restrictedTcn parameter for the Port.
32             True(1) causes the Port not to propagate topology changes to
33             other Ports.";
34          reference
35            "13.27.65 of IEEE Std 802.1Q";
36        }
37        leaf role {
38          type enumeration {
39            enum root {
40              value 1;
41            }
42            enum alternate {
43              value 2;
44            }
45            enum designated {
46              value 3;
47            }
48            enum backup {
49              value 4;
50            }
51          }
52          config false;
53          description
54            "The current Port Role for the Port (i.e., Root, Alternate,
55             Designated, or Backup), for the CIST.";
56          reference
57            "Item v) in 12.8.2.1.3 of IEEE Std 802.1Q";
58        }
59        leaf disputed {
60          type boolean;
61          config false;
62          description
63            "The current value of the disputed variable for the CIST for
64             the Port.  A value of true(1) indicates that the disputed
65             variable is set.  A value of false(2) indicates that the
66             agreed variable is cleared.";
67          reference
68            "13.27.22 of IEEE Std 802.1Q";
69        }
70        leaf cist-regional-root-id {
71          type uint32;
72          config false;
```

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```
 1          description
 2            "In an MSTP Bridge, the CIST Regional Root Identifier, i.e., the
 3             Bridge Identifier of the current CIST Regional Root, for the CIST.";
 4          reference
 5            "Item c) in 13.9, 13.10, 13.27.47 of IEEE Std 802.1Q";
 6        }
 7        leaf cist-path-cost {
 8          type uint32 {
 9            range "0..2147483647";
10          }
11          config false;
12          description
13            "In an MSTP Bridge, the Port's Port Path Cost
14             parameter value for the CIST.";
15          reference
16            "13.27.25 of IEEE Std 802.1Q";
17        }
18        leaf protocol-migration {
19          type boolean;
20          config true;
21          description
22            "In an MSTP Bridge, the current value of the mcheck variable for
23             the Port.  A value of true(1) forces the state machine to
24             perform functions as per 13.27.38.";
25          reference
26            "13.27.38 of IEEE Std 802.1Q";
27        }
28        leaf enable-bpdu-rx {
29          type boolean;
30          config true;
31          description
32            "In an MSTP Bridge, the enableBPDUrx parameter value.  A value
33             of false(2) indicates that BPDUs are ignored.";
34          reference
35            "13.27.38 of IEEE Std 802.1Q";
36        }
37        leaf enable-bpdu-tx {
38          type boolean;
39          config true;
40          description
41            "In an MSTP Bridge, the enableBPDUtx parameter value.  A value
42             of false(2) indicates that BPDUs are not transmitted.";
43          reference
44            "13.27.24 of IEEE Std 802.1Q";
45        }
46        leaf pseudo-root-id {
47          type uint64;
48          config true;
49          description
50            "In an MSTP Bridge, the pseudoRootId parameter value.";
51          reference
52            "13.27.51 of IEEE Std 802.1Q";
53        }
54        leaf is-l2gp {
55          type boolean;
56          config true;
57          description
58            "In an MSTP Bridge, the isL2gp parameter value.  A value of
59             true(1) indicates this is an L2GP port.";
60          reference
61            "13.27.26 of IEEE Std 802.1Q";
62        }
63        leaf auto-edge-port {
64          type boolean;
65          config true;
66          description
67            "The administrative value of the Auto Edge Port parameter.
68             A value of true(1) indicates if the Bridge detection state
69             machine (BDM, 13.33) is to detect other Bridges
70             attached to the LAN, and set
71             ieee8021SpanningTreeRstpPortOperEdgePort automatically.
72             The default value is true(1)
```

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```
 1
 2                  This is optional and provided only by implementations
 3                  that support the automatic identification of edge ports.
 4
 5                  The value of this object MUST be retained across
 6                  reinitializations of the management system.";
 7                reference
 8                  "12.8.2.1.3 of IEEE Std 802.1Q";
 9            }
10          leaf auto-isolate-port {
11              type boolean;
12              config false;
13              description
14                  "The operational value of the Isolate Port parameter.
15
16                  A value of true(1) indicates a Designated Port will
17                  transition to discarding if both
18                  ieee8021SpanningTreeRstpPortAdminEdgePort and
19                  ieee8021SpanningTreeRstpPortAutoEdgePort are FALSE and
20                  the other Bridge presumed to be attached to the same
21                  point-to-point LAN does not transmit periodic BPDUs.
22
23                  This is optional and provided only by implementations
24                  that support the automatic identification of fragile
25                   Bridges.";
26                reference
27                  "12.8.2.1.3 of IEEE Std 802.1Q";
28            }
29        }
30        list mstp {
31          key "mstp-id";
32          description
33              "A MSTP Table entry.";
34          leaf mstp-id {
35              type uint32;
36              description
37                  "In an MSTP Bridge, this parameter is the MSTID, i.e., the
38                  identifier of a Spanning Tree (or MST) Instance.";
39            }
40          leaf bridge-id {
41              type uint64;
42              config false;
43              description
44                  "In an MSTP Bridge, the Bridge Identifier for the MSTI.";
45                reference
46                  "13.26.2 of IEEE Std 802.1Q";
47            }
48          leaf time-since-topology-change {
49              type uint32;
50              units "centi-seconds";
51              config false;
52              description
53                  "In an MSTP Bridge, count in seconds of the time elapsed since
54                  tcWhile was last non-zero for any Port for the MSTI.";
55                reference
56                  "13.25.9 of IEEE Std 802.1Q";
57            }
58          leaf topology-changes {
59              type yang:counter64;
60              units "topology changes";
61              config false;
62              description
63                  "In an MSTP Bridge, count of the times tcWhile has been
64                  non-zero for any Port for the MSTI since the Bridge was powered
65                  on or initialized.";
66                reference
67                  "13.25.9 of IEEE Std 802.1Q";
68            }
69          leaf topology-change {
70              type boolean;
71              config false;
72              description
```

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```
 1            "In an MSTP Bridge, the Topology Change parameter value: true(1)
 2             if tcWhile is non-zero for any Port for the MSTI.";
 3          reference
 4            "13.25.9 of IEEE Std 802.1Q";
 5        }
 6        leaf designated-root {
 7          type uint64;
 8          config false;
 9          description
10            "In an MSTP Bridge, the Designated Root parameter value, i.e., the
11             Bridge Identifier of the Root Bridge for the MSTI.";
12          reference
13            "13.27.20 of IEEE Std 802.1Q";
14        }
15        leaf root-path-cost {
16          type int32;
17          config false;
18          description
19            "In an MSTP Bridge, the Root Path Cost parameter value, i.e., the
20             path cost from the transmitting Bridge to the Root Bridge for
21             the MSTI.";
22          reference
23            "13.27.20 of IEEE Std 802.1Q";
24        }
25        leaf root-port {
26          type uint16;
27          config false;
28          description
29            "In an MSTP Bridge, the Root Port parameter value, i.e., the Root
30             Port for the MSTI.";
31          reference
32            "13.26.9 of IEEE Std 802.1Q";
33        }
34        leaf bridge-priority {
35          type int32 {
36            range "0..61440";
37          }
38          config true;
39          description
40            "In an MSTP Bridge, the Bridge Priority parameter value for the
41             MSTI, i.e., the most significant 4 bits of the Bridge Identifier
42             for the MSTI.";
43          reference
44            "13.26.3 of IEEE Std 802.1Q";
45        }
46        leaf vids0 {
47          type binary {
48            length "128";
49          }
50          config false;
51          description
52            "This object contains the first 1024 bits of the 4096 bit vector
53             indicating which VIDs are assigned to this MSTID.  The high order
54             bit of the first octet corresponds to the first bit of the vector,
55             while the low order bit of the last octet corresponds to the last
56             bit of this portion of the vector.  A bit that is on (equal to 1)
57             indicates that the corresponding VID is assigned to this MSTID.";
58        }
59        leaf vids1 {
60          type binary {
61            length "128";
62          }
63          config false;
64          description
65            "This object contains the second 1024 bits of the 4096 bit vector
66             indicating which VIDs are assigned to this MSTID.  The high order
67             bit of the first octet corresponds to the first bit of this
68             portion of the vector, while the low order bit of the last octet
69             corresponds to the last bit of this portion of the vector.  A bit
70             that is on (equal to 1) indicates that the corresponding VID is
71             assigned to this MSTID.";
72        }
```

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```
1        leaf vids2 {
2          type binary {
3            length "128";
4          }
5          config false;
6          description
7            "This object contains the third 1024 bits of the 4096 bit vector
8             indicating which VIDs are assigned to this MSTID.  The high order
9             bit of the first octet corresponds to the first bit of this
10            portion of the vector, while the low order bit of the last octet
11            corresponds to the last bit of this portion of the vector.  A bit
12            that is on (equal to 1) indicates that the corresponding VID is
13            assigned to this MSTID.";
14       }
15       leaf vids3 {
16         type binary {
17           length "128";
18         }
19         config false;
20         description
21           "This object contains the fourth 1024 bits of the 4096 bit vector
22            indicating which VIDs are assigned to this MSTID.  The high order
23            bit of the first octet corresponds to the first bit of this
24            portion of the vector, while the low order bit of the last octet
25            corresponds to the last bit of this portion of the vector.  A bit
26            that is on (equal to 1) indicates that the corresponding VID is
27            assigned to this MSTID.";
28       }
29       container mstp-port {
30         description
31           "A MSTP Port Table entry.";
32         leaf port-number {
33           type if:interface-ref;
34           description
35             "Reference to the associated IETF YANG
36              interface of this mstp port.";
37           reference
38             "RFC 8343";
39         }
40         leaf mst-id {
41           type uint32;
42           description
43             "In an MSTP Bridge, this parameter is the MSTID, i.e., the
44              identifier of a Spanning Tree (or MST) Instance.";
45         }
46         leaf uptime {
47           type yang:timeticks;
48           units "centi-seconds";
49           config false;
50           description
51             "In an MSTP Bridge, the Port's Uptime parameter value for the
52              MSTI, i.e., the count in seconds of the time elapsed since the
53              Port was last reset or initialized (BEGIN, Annex E).";
54         }
55         leaf state {
56           type enumeration {
57             enum disabled {
58               value 1;
59             }
60             enum listening {
61               value 2;
62             }
63             enum learning {
64               value 3;
65             }
66             enum forwarding {
67               value 4;
68             }
69             enum blocking {
70               value 5;
71             }
72           }
```

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```
1          config false;
2          description
3            "In an MSTP Bridge, the current state of the Port (i.e., Disabled,
4             Listening, Learning, Forwarding, or Blocking), for the MSTI.";
5          reference
6            "13.38 of IEEE Std 802.1Q";
7        }
8        leaf priority {
9          type int32 {
10           range "0..240";
11         }
12         config true;
13         description
14           "In an MSTP Bridge, the Port's Port Priority parameter value for
15            the MSTI, i.e., the priority field for the Port Identifier for the
16            Port for the MSTI.";
17         reference
18           "13.27.47 of IEEE Std 802.1Q";
19       }
20       leaf path-cost {
21         type int32 {
22           range "1..200000000";
23         }
24         config true;
25         description
26           "In an MSTP Bridge, the Port's Port Path Cost parameter value for
27            the MSTI.";
28         reference
29           "13.27.33 of IEEE Std 802.1Q";
30       }
31       leaf designated-root {
32         type uint64;
33         config false;
34         description
35           "In an MSTP Bridge, the Regional Root Identifier component of the
36            Port's MSTI port priority vector, as defined in 13.11, for the MSTI.";
37         reference
38           "13.27.47 of IEEE Std 802.1Q";
39       }
40       leaf designated-cost {
41         type int32;
42         config false;
43         description
44           "In an MSTP Bridge, the Internal Root Path Cost component of the
45            Port's MSTI port priority vector, as defined in 13.11, for the MSTI.";
46         reference
47           "13.27.47 of IEEE Std 802.1Q";
48       }
49       leaf designated-bridge {
50         type uint64;
51         config false;
52         description
53           "In an MSTP Bridge, the Designated Bridge Identifier component of
54            the Port's MSTI port priority vector, as defined in 13.11, for
55            the MSTI.";
56         reference
57           "13.27.47 of IEEE Std 802.1Q";
58       }
59       leaf designated-port {
60         type uint16;
61         config false;
62         description
63           "In an MSTP Bridge, the Designated Port Identifier component of the
64            Port's MSTI port priority vector, as defined in 13.11, for the MSTI.";
65         reference
66           "13.27.47 of IEEE Std 802.1Q";
67       }
68       leaf role {
69         type enumeration {
70           enum root {
71             value 1;
72           }
```

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```
1                enum alternate {
2                  value 2;
3                }
4                enum designated {
5                  value 3;
6                }
7                enum backup {
8                  value 4;
9                }
10             }
11             config false;
12             description
13               "In an MSTP Bridge, the current Port Role for the Port (i.e., Root,
14                Alternate, Designated, or Backup), for the MSTI.";
15           }
16           leaf disputed {
17             type boolean;
18             config false;
19             description
20               "In an MSTP Bridge, the current value of the disputed variable for
21                the MSTI for the Port.";
22             reference
23               "13.27.22 of IEEE Std 802.1Q";
24           }
25           leaf admin-path-cost {
26             type int32 {
27               range "1..200000000";
28             }
29             config true;
30             description
31               "In an MSTP Bridge, the administrative value of the Port's
32                Port Path Cost parameter value for the MSTI.
33
34                Writing a value of '0' assigns the automatically calculated
35                default Path Cost value to the Port.  If the default Path
36                Cost is being used, this object returns '0' when read.
37
38                This complements the object ieee8021MstpPortPathCost,
39                which returns the operational value of the path cost.
40
41                The value of this object MUST be retained across
42                reinitializations of the management system.";
43             reference
44               "13.27.33 of IEEE Std 802.1Q";
45           }
46         }
47       }
48     container config-id {
49       description
50         "Containing the MST Configuration Identifier of a Bridge.";
51       leaf format-selector {
52         type int32 {
53           range "0";
54         }
55         config true;
56         description
57           "In an MSTP Bridge, the Configuration Identifier Format Selector
58            in use by the Bridge, in the MST Configuration Identifier. This
59            has a value of 0 to indicate the format specified in IEEE Std 802.1Q.";
60         reference
61           "Item a) in 13.8 of IEEE Std 802.1Q";
62       }
63       leaf configuration-name {
64         type string {
65           length "32";
66         }
67         config true;
68         description
69           "In an MSTP Bridge, the Configuration Name in the MST
70            Configuration Identifier.";
71         reference
72           "Item b) in 13.8:2 of IEEE Std 802.1Q";
```

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```
 1          }
 2        leaf revision-level {
 3          type uint32 {
 4            range "0..65535";
 5          }
 6          config true;
 7          description
 8            "In an MSTP Bridge, the Revision Level in the MST
 9             Configuration Identifier.";
10          reference
11            "Item c) in 13.8 of IEEE Std 802.1Q";
12        }
13        leaf configuration-digest {
14          type binary {
15            length "16";
16          }
17          config false;
18          description
19            "In an MSTP Bridge, the Configuration Digest in the MST
20             Configuration Identifier.";
21          reference
22            "Item d) in 13.8 of IEEE Std 802.1Q";
23        }
24      }
25    }
26  }
27 }
28
29
```

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Annex A

(normative)

PICS proforma—Bridge implementations[4]

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[4] *Copyright release for PICS proformas:* Users of this standard may freely reproduce the PICS proforma in this annex so that it can be used for its intended purpose and may further publish the completed PICS.

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A.47 YANG

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

Item	Feature	Status	References	Support	
YANG-LLDP-RSTP	Is the *ieee802-dot1q-rstp* module supported?	RSTP:O	48.6.23	Yes [ ] No [ ] N/A [ ]	
YANG-LLDP-MSTP	Is the *ieee802-dot1q-mstp* module supported?	MSTP:O	48.6.24	Yes [ ] No [ ] N/A [ ]	