

P802.1Qdy – Proposed new YANG model

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V01

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During comment resolution there was a proposed new YANG model that concentrates the RSTP-relevant nodes.

Comment Text (Comment #59):

“The Multiple Spanning Trees model shown here is separate from the prior Rapid Spanning Tree. This misses a key point of the Clause 13 specification - an MSTP capable implementation will behave exactly as a RSTP implementation on a given port when it finds that its neighbour is not MSTP capable. MSTP is not implemented separately from RSTP, but is an augmentation of an RSTP implementation. It would highly undesirable for a network manager to have to flip between models /configuration/terminology for two bridges which are using a single protocol just because one has additional capabilities.”

Proposed Change:

“Change the MSTP model to comprise be an augmentation of an RSTP augmented bridge and bridge port. To supply a detailed suggested remedy for other comments I have supplied a suitable basic RSTP model at <https://www.ieee802.org/1/files/public/docs2024/dy-seaman-rstp-yang-0124-v00.txt> and an augment to that at <https://www.ieee802.org/1/files/public/docs2024/dy-seaman-mstp-yang-0124-v00.txt>. The latter omits the vid-msti mapping which can be taken from the exiting model. I have used .txt rather than .yang extensions to make them easily viewable with web browsers.”

This contribution is intended to agree on the changes to the next Qdy draft.

Changes in RSTP YANG

Original Version of Qdy d1-0

Mick's Proposal

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

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

Removed nodes:
- protocol-specification
- version

Added nodes:
- cist-bridge-id
- migrate-time

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-w
int32	admin-path-cost;	// r-w
bool	auto-edge-port;	// r-w
bool	auto-isolate-port;	// r
bool	isolate-port;	// r

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

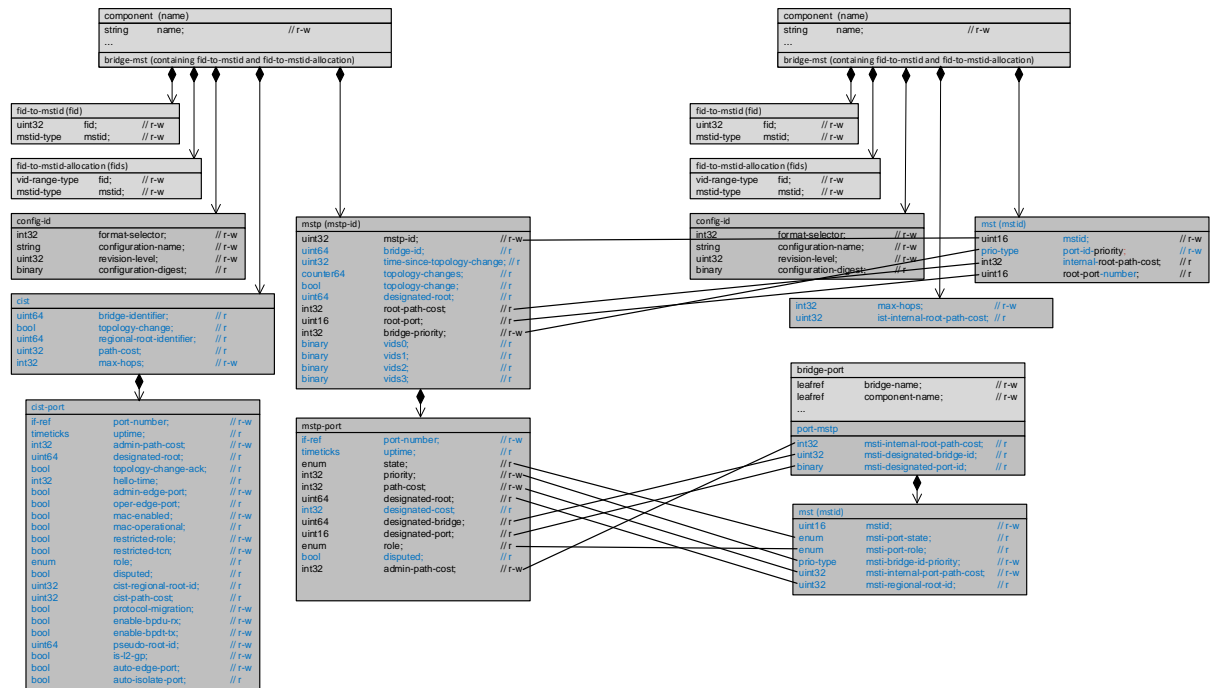
Removed nodes:
- priority
- enabled
- designated-root
- designated-cost
- forward-transitions
- admin-path-cost

Added nodes:
- cist-port-role
- restricted-role
- restricted-tcn
- cist-port-id
- cist-port-priority
- cist-root-id
- cist-external-path-cost

Changes in MSTP YANG

Original Version of Qdy d1-0

Mick's Proposal



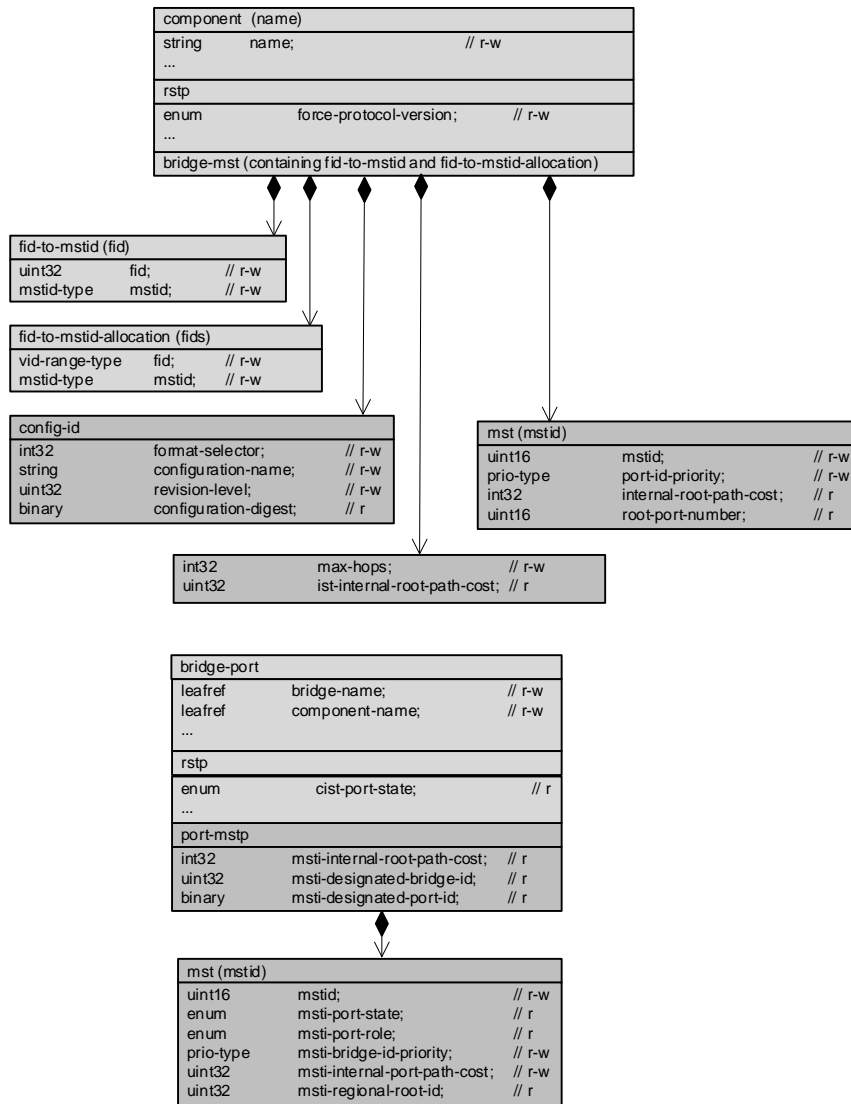
Proposed RSTP YANG model (Fig. 21)

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

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

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

Proposed MSTP YANG model (Fig. 22)



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

Proposed RSTP YANG model (Tree)

module: ieee802-dot1q-rstp

augment /dot1q:bridges/dot1q:bridge/dot1q:component:

```
+--rw rstp {rstp}?
  +--rw force-protocol-version?  enumeration
  +--ro cist-bridge-id?          uint64
  +--rw cist-bridge-id-priority? dot1qtypes:priority-type
  +--ro cist-root-id?           uint64
  +--ro external-root-path-cost? uint32
  +--ro cist-root-port-number?  dot1qtypes:port-number-type
  +--ro max-age?                uint8
  +--ro hello-time?             rt-types:timer-value-seconds16
  +--ro forward-delay?         uint8
  +--rw bridge-max-age?        uint8
  +--ro bridge-hello-time?     uint8
  +--rw bridge-forward-delay?  uint8
  +--rw tx-hold-count?         int32
  +--ro migrate-time?          int32
  +--ro time-since-topology-change? uint32
  +--ro topology-change-count?  yang:counter64
```

augment /if:interfaces/if:interface/dot1q:bridge-port:

```
+--rw rstp {rstp}?
  +--ro cist-port-state?        enumeration
  +--ro cist-port-role?        enumeration
  +--ro restricted-role?       boolean
  +--ro restricted-tcn?       boolean
  +--ro cist-port-id?          uint16
  +--rw cist-port-priority?    dot1qtypes:priority-type
  +--rw external-port-path-cost? int32
  +--ro cist-root-id?          uint32
  +--ro cist-external-path-cost? int32
  +--ro designated-bridge-id?  uint32
  +--ro designated-port-id?    binary
  +--rw port-protocol-migration-check? boolean
  +--rw admin-edge-port?      boolean
  +--ro oper-edge-port?       boolean
  +--rw auto-edge-port?       boolean
  +--rw auto-isolate-port?    boolean
  +--ro isolate-port?         boolean
```

notifications:

```
+---n new-root
+---n topology-change
```

Proposed MSTP YANG model (Tree)

module: ieee802-dot1q-mstp

augment /dot1q:bridges/dot1q:bridge/dot1q:component/dot1q:bridge-mst:

```
+--rw mst-config-id
| +--rw format-selector?   int32
| +--rw configuration-name? string
| +--rw revision-level?   uint32
| +--ro configuration-digest? binary
+--rw bridge-mstp
  +--rw max-hops?          int32
  +--ro ist-internal-root-path-cost? uint32
  +--rw mst* [mstid]
    +--rw mstid            uint16
    +--rw port-id-priority? dot1qtypes:priority-type
    +--ro internal-root-path-cost? uint32
    +--ro root-port-number?   dot1qtypes:port-number-type
```

augment /if:interfaces/if:interface/dot1q:bridge-port:

```
+--rw port-mstp
  +--rw mst* [mstid]
    | +--rw mstid            uint16
    | +--ro msti-port-state?  enumeration
    | +--ro msti-port-role?   enumeration
    | +--rw msti-bridge-id-priority? dot1qtypes:priority-type
    | +--rw msti-internal-port-path-cost? uint32
    | +--ro msti-regional-root-id?   uint32
    +--ro msti-internal-root-path-cost? int32
    +--ro msti-designated-bridge-id?  uint32
    +--ro msti-designated-port-id?    binary
```

Proposed RSTP YANG model (YANG)

```
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 ietf-routing-types {
    prefix rt-types;
  }
  import ieee802-dot1q-types {
    prefix dot1qtypes;
  }
  import ieee802-dot1q-bridge {
    prefix dot1q;
  }

  organization
    "IEEE 802.1 Working Group";
  contact
    "WG-URL: http://www.ieee802.org/1/
    WG-EMail: stds-802-1-1@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 2024-01-06 {
    description
      "Comment on P802.1Qdy/D1.0, supporting material, Mick Seaman.
```



```

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

feature rstp {
  description
    "Rapid Spanning Tree Algorithm and Protocol supported.";
  reference
    "Clause 13, 13.4, and 13.24 of IEEE Std 802.1Q.";
}

augment "/dot1q:bridges/dot1q:bridge/dot1q:component" {
  description
    "Augment Bridge with RSTP configuration.";
  reference
    "13.24, 13.25, and 13.26 of IEEE Std 802.1Q.";
  container rstp {
    if-feature "rstp";
    leaf force-protocol-version {
      type enumeration {
        enum emulate-stp {
          value 0;
        }
        enum withdrawn {
          value 1; // previously assigned to IEEE Std 802.1G-1996 (withdrawn)
        }
        enum rstp-rapid-spanning-tree-protocol {
          value 2;
        }
        enum rstp-mstp {
          value 3;
        }
        enum rstp-spb {
          value 4;
        }
      }
      default "rstp-rapid-spanning-tree-protocol";
      config true;
      description
        "By default RSTP will provide rapid reconfiguration,
        but will interoperate with Bridges using STP as specified in
        IEEE Std 802.1D (now withdrawn). Force Protocol Version can
        force emulation of aspects of STP behavior, slowing reconfiguration
        and ageing of FDB entries. Force Protocol Version can be configured
        to enable MSTP and SPB behavior (if implemented) - interoperability
        with Bridges that support only RSTP or STP will be maintained.";
    }
  }
}

```

```

reference
  "13.7.2 and item a) of 13.26 of IEEE Std 802.1Q.";
}
leaf cist-bridge-id {
  type uint64;
  config false;
  description
    "The Bridge Identifier used by this Bridge for the CIST. Eight
    octets with the four most significant bits of the first encoding the
    manageable cist-bridge-id-priority, the next twelve bits being zero,
    and last six octets encoding the Bridge Address.";
  reference
    "13.26.2, 14.1.2, and item e) in 13.26 of IEEE Std 802.1Q.";
}
leaf cist-bridge-id-priority {
  type dot1qtypes:priority-type;
  config true;
  description
    "The priority component of this Bridge's Bridge Identifier for the
    CIST, encoded in the four most-significant bits of the first octet
    of the eight octet Bridge Identifier.

    The value of this object MUST be retained across reinitializations
    of the management system.";
  reference
    "13.26.2, 14.2.5, and item e) in 13.26 of IEEE Std 802.1Q.";
}
leaf cist-root-id {
  type uint64;
  config false;
  description
    "The CIST Root Identifier, i.e. the Bridge Identifier of the
    Common and Internal Spanning Tree calculated by RSTP and of the
    logical continuation of that connectivity calculate by MSTP, as
    determined by this node.";
  reference
    "13.9, 14.1.2, and item f) in 13.26 of IEEE Std 802.1Q.";
}
leaf external-root-path-cost {
  type uint32;
  config false;
  description
    "The External Root Path Cost (MSTP) or Root Path Cost (RSTP)
    calculated by this Bridge after the addition of the receiving
    Port Path Cost.";
  reference
    "13.9, 13.10, 13.5.3, and item i) in 13.26 of IEEE Std 802.1Q.";
}
leaf cist-root-port-number {
  type dot1qtypes:port-number-type;
  config false;

```

```

description
  "The port number of the Root Port for the RSTP and for the CIST
  Root Port (MSTP), i.e. the Port Identifier for the port that offers
  the lowest cost path from this Bridge to the (CIST) Root.";
reference
  "13.4, 13.5, 13.26.9, and item h) in 13.26 of IEEE Std 802.1Q.";
}
leaf max-age {
  type uint8;
  units "seconds";
  config false;
  description
    "For the CIST, the whole seconds (most-significant octet) part of
    the maximum age of the spanning tree information (Max Age) currently
    used by this Bridge. Set to the bridge-max-age if the Bridge is the
    CIST Root, and to the whole seconds part of the value received on
    the CIST Root Port otherwise.";
  reference
    "13.15, 13.20, 13.25, item l) in 13.28, and item g) in 13.26 of
    IEEE Std 802.1Q.";
}
leaf hello-time {
  type rt-types:timer-value-seconds16;
  units "seconds";
  config false;
  description
    "The interval (Hello Time) between the periodic transmission of
    Configuration Bridge PDUs on Designated Ports. Set to
    bridge-hello-time if the Bridge is currently acting as the CIST Root,
    and to the value received on the CIST Root Port otherwise.";
  reference
    "Table 13-5, 13.25.3, and 13.28.11 of IEEE Std 802.1Q.";
}
leaf forward-delay {
  type uint8;
  units "seconds";
  config false;
  description
    "If a Port is using STP rather than RSTP, either as a result of
    setting force-protocol-version to be less than 2 or because STP BPDUs
    have been received, this Forward Delay parameter determines the time
    spent in the Listening and Learning Port States when transitioning
    from Discarding to Forwarding, and also controls rapid ageing of FDB
    entries after a topology change. Set to bridge-forward-delay if the
    Bridge is currently acting as the CIST Root, and to the whole seconds
    part of the value received on the CIST Root Port otherwise. If RSTP,
    MSTP, or SPB is used, Port State transitions and FDB flushing are
    rapid and not controlled by this parameter.";
  reference
    "Table 13-5, 13.25.2, 13.28.10, and item g) in 13.26.4 of
    IEEE Std 802.1Q.";
}

```

```

}
leaf bridge-max-age {
  type uint8 {
    range "6..40";
  }
  default "20";
  units "seconds";
  config true;
  description
    "The value of the whole seconds part of Max Age when this Bridge is
    acting as the CIST Root. The fractional part, conveyed in the
    less-significant octet of each BPDU's Max Age field, will be zero.

    The value of this object MUST be retained across reinitializations
    of the management system.";
  reference
    "Table 13-5, 13.26.4, and item g) in 13.26 of IEEE Std 802.1Q.";
}
leaf bridge-hello-time {
  type uint8;
  default "2";
  units "seconds";
  config false;
  description
    "The value that this Bridge uses for HelloTime when acting as the
    CIST Root.";
  reference
    "Table 13-5, 13.25.3, and 13.28.11 of IEEE Std 802.1Q.";
}
leaf bridge-forward-delay {
  type uint8 {
    range "4..30";
  }
  default "15";
  units "seconds";
  config true;
  description
    "The value of the whole seconds part of Message Age when this
    Bridge is acting as the CIST Root. The fractional part, conveyed in
    the less-significant octet of each BPDU's Max Age field, will be
    zero.

    The value of this object MUST be retained across reinitializations
    of the management system.";
  reference
    "Table 13-5, 13.26.4, and item g) in 13.26 of IEEE Std 802.1Q.";
}
leaf tx-hold-count {
  type int32 {
    range "1..10";
  }
}

```

```

default "6";
config true;
description
  "Limits the rate of BPDU transmission. If the variable txCount
  (which is incremented on each transmission and decremented once a
  second) reaches TxHoldCount, transmission is delayed.

  The value of this object MUST be retained across
  reinitializations of the management system.";
reference
  "Table 13-5, 13.27.75, 13.26.12, and item b) in 13.26 of
  IEEE Std 802.1Q.";
}
leaf migrate-time {
  type int32;
  default "3";
  units "seconds";
  config false;
  description
    "Management can force the transmission of RST (or MST or SPT) BPDUs
    for MigrateTime to check that all STP Bridges have been removed
    from a specified port's attached LAN, so RST/MST/SPT BPDU
    transmission can persist. Fixed value of 3 seconds.";
  reference
    "Table 13-5, 13.27.38, and item c) in 13.26 of IEEE Std 802.1Q.";
}
leaf time-since-topology-change {
  type uint32;
  units "seconds";
  config false;
  description
    "The time (in seconds) since the Topology Change timer, tcWhile, for
    any port on this Bridge was last running - i.e. since
    Topology Change Notification (TCN) Messages were last transmitted.";
  reference
    "13.25.9 of IEEE Std 802.1Q.";
}
leaf topology-change-count {
  type yang:counter64;
  units "topology change count";
  config false;
  description
    "The number of times (since the management entity was last
    reset or initialized) that at least one port's Topology Change timer
    (tcWhile) has been non-zero.

    Discontinuities in the value of the counter can occur at
    re-initialization of the management system, and at other times as
    indicated by the value of 'discontinuity-time'.";
  reference
    "13.25.9 of IEEE Std 802.1Q.";
}

```

```
}  
}  
}
```

```
augment "/if:interfaces/if:interface/dot1q:bridge-port" {  
  description  
    "Augment Bridge Port with RSTP configuration";  
  reference  
    "13.24, 13.25, and 13.27 of IEEE Std 802.1Q.";  
  container rstp {  
    if-feature "rstp";  
    leaf cist-port-state {  
      type enumeration {  
        enum discarding {  
          value 1;  
        }  
        enum learning {  
          value 2;  
        }  
        enum forwarding {  
          value 3;  
        }  
      }  
    }  
    config false;  
    description  
      "The port's Port State, summarizing the application of learning to  
      received frames, and the forwarding of relayed frames, for all frames  
      (for RSTP) or for frames assigned to the CIST (for MSTP). The  
      Port State is Discarding if both learning and forwarding are both  
      false, Learning if only learning, and Forwarding if both learning and  
      forwarding are true. The Discarding state encompasses all reasons for  
      not forwarding, including MAC_Operational false (if:oper-status not  
      up) and MAC_Enabled false (if:admin-status not up).";  
    reference  
      "8.4, 13.4, item aw) and item ba) in 13.27 of IEEE Std 802.1Q.";  
  }  
  leaf cist-port-role {  
    type enumeration {  
      enum disabled-port {  
        value 1;  
      }  
      enum root-port {  
        value 2;  
      }  
      enum designated-port {  
        value 3;  
      }  
      enum alternate-port {  
        value 4;  
      }  
      enum backup-port {
```

```

        value 5;
    }
}
config false;
description
    "The port's Port Role for the CIST. Disabled Port, Root Port,
    Designated Port, Alternate Port, or Backup Port.";
reference
    "13.4, 13.5, 13.12, 13.24, 13.27.66, and item bn) in 13.27 of
    IEEE Std 802.1Q.";
}
leaf restricted-role {
    type boolean;
    default "false";
    config false;
    reference
        "13.20, 13.27.65, 13.29.34, 16.2, 16.3, 26.5, 27.6, 27.20,
        item t) in 13.27 of IEEE Std 802.1Q.";
}
leaf restricted-tcn {
    type boolean;
    default "false";
    config false;
    reference
        "13.20, 13.27.64, 13.29.25, 16.2, 16.3, item s) in 13.27 of
        IEEE Std 802.1Q.";
}
leaf cist-port-id {
    type uint16;
    config false;
    description
        "The Port Identifier used by this Bridge Port for the CIST. Two
        octets with the four most-significant bits of the first encoding the
        manageable cist-port-id-priority, and the next twelve bits encoding
        the port's port-number.";
    reference
        "13.27.46, 14.1.2, item bd) in 13.27 of IEEE Std 802.1Q.";
}
leaf cist-port-priority {
    type dot1qtypes:priority-type;
    config true;
    description
        "The priority component of this Port's Port Identifier for the
        CIST, encoded in the four most-significant bits of the first octet
        of the two octet Port Identifier.

        The value of this object MUST be retained across reinitializations
        of the management system.";
    reference
        "13.27.47, 14.2.7, and item be) in 13.27 of IEEE Std 802.1Q.";
}

```

```

leaf external-port-path-cost {
  type int32 {
    range "0..200000000";
  }
  config true;
  description
    "The administratively assigned value for the port's contribution to
    the External Root Path Cost for the Bridge, when the port is the
    CST Root Port (for RSTP and MSTP) or the CIST Master Port (for MSTP
    and ISIS-SPB).

    The value of this object MUST be retained across reinitializations
    of the management system.";
  reference
    "13.27.25, Table 13-4, and item g) of 13.27 of IEEE Std 802.1Q.";
}
leaf cist-root-id {
  type uint32;
  config false;
  description
    "The CIST Root Identifier in Configuration BPDUs transmitted by the
    Designated Bridge for the attached LAN.";
  reference
    "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
}
leaf cist-external-path-cost {
  type int32;
  config false;
  description
    "The External Path Cost advertised in BPDUS by the Designated Bridge
    for the attached LAN.";
  reference
    "27.6, 14.1.2, 13.27.20, and item ar) in 13.27 of IEEE Std 802.1Q.";
}
leaf designated-bridge-id {
  type uint32;
  config false;
  description
    "The Bridge Identifier of the Bridge that this port considers to be
    the Designated Bridge for the attached LAN.";
  reference
    "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
}
leaf designated-port-id {
  type binary {
    length "2";
  }
  config false;
  description
    "The Port Identifier of the Bridge Port that this port considers to
    be the Designated Port for the attached LAN.";
}

```



```

reference
  "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
}
leaf port-protocol-migration-check {
  type boolean;
  config true;
  description
    "Writing true(1) to port-protocol-migration-check (mcheck)
    forces transmission of RST (or MST or SPT) BPDUs for migrate-time to
    check that all STP Bridges have been removed from the port's attached
    LAN, so RST/MST/SPT BPDUs transmission can persist. Has no effect if
    force-protocol-version is emulate-stp(0) or withdrawn(1). Always
    returns false(2) when read.";
  reference
    "13.27.38, 13.32, and item j) in 13.27 of IEEE Std 802.1Q.";
}
leaf admin-edge-port {
  type boolean;
  default "false";
  config true;
  description
    "Set if the port is to be identified as an Edge Port immediately
    on initialization without a delay to detect other Bridges attached
    to the LAN. Recommended default false(2). The operational value,
    oper-edge-port, will become false(2) if a BPDUs has been received.

    The value of this object MUST be retained across reinitializations
    of the management system.";
  reference
    "13.33, and item a) in 13.27 of IEEE Std 802.1Q.";
}
leaf oper-edge-port {
  type boolean;
  config false;
  description
    "Set if the port is currently identified as an Edge Port.
    Initialized to the value of admin-edge-port, and controlled by the
    Bridge Detection state machine.";
  reference
    "13.33, and item l) in 13.27 of IEEE Std 802.1Q.";
}
leaf auto-edge-port {
  type boolean;
  default "true";
  config true;
  description
    "Administratively set true(1) to allow the value of oper-edge-port
    is to be maintained automatically, with continuous monitoring of
    the presence or absence of other Bridges attached to the LAN.

    The value of this object MUST be retained across reinitializations

```

```

    of the management system.";
reference
    "13.33, 13.27.18, and item c) in 13.27 of IEEE Std 802.1Q.";
}
leaf auto-isolate-port {
    type boolean;
    default "false";
    config true;
    description
        "Administratively set true(1) to allow automatic setting of
        isolate-port, causing a Designated Port to transition to Discarding
        if both admin-edge-port and auto-edge-port are false, but the other
        Bridge presumed attached to the same point-to-point LAN appears
        unable to transmit BPDUs, indicating failure of a Spanning Tree
        Protocol Entity or of transmission and/or reception.

        The value of this object MUST be retained across reinitializations
        of the management system.";
reference
    "13.23, 13.27.19, 13.33, and item d) in 13.27 of IEEE Std 802.1Q.";
}
leaf isolate-port {
    type boolean;
    config false;
    description
        "Set by the Bridge Detection state machine when the Spanning Tree
        Protocol Entity of a neighboring Bridge has apparently failed.";
reference
    "13.23, 13.27.27, 13.33, and item i) in 13.27 of IEEE Std 802.1Q.";
}
}
}

notification new-root {
    description
        "The new-root notification indicates that
        the sending agent has become the new root of the Spanning Tree;
        the notification is sent by a Bridge soon after its election
        as the new root, e.g., upon expiration of the Topology Change
        Timer, immediately subsequent to its election.";
}

notification topology-change {
    description
        "A topology-change notification is sent
        by a Bridge when any of its configured ports transitions from
        the Learning state to the Forwarding state, or from the
        Forwarding state to the Blocking state. The notification
        is not sent if a ieee8021SpanningTreeNewRoot notification
        is sent for the same transition.";
}
}

```

}

Proposed MSTP YANG model (YANG)

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

  import ietf-interfaces {
    prefix if;
  }
  import ieee802-dot1q-types {
    prefix dot1qtypes;
  }
  import ieee802-dot1q-bridge {
    prefix dot1q;
  }
  import ieee802-dot1q-rstp {
    prefix rstp;
  }

  organization
    "IEEE 802.1 Working Group";
  contact
    "WG-URL: http://www.ieee802.org/1/
    WG-EMail: stds-802-1-1@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 Multiple Spanning Tree Algorithm and Protocol (MSTP).

    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 2024-01-08 {
    description
      "Comment on P802.1Qdy/D1.0, supporting material, Mick Seaman. At present
      fragments of the required specification, but all the important leaves
      and structure should be here. Occurences of ///! mark
      reference statements that need to be updated, or at least checked. Use
      of the feature and if-feature statements needs to be addressed to ensure
```

this module augments a Bridge and Bridge Ports that have been augmented by the RSTP module.

The following reference statement identifies each referenced IEEE Standard as updated by applicable amendments.";

reference

"IEEE Std 802.1Q Bridges and Bridged Networks:
IEEE Std 802.1Q-2022, IEEE Std 802.1Qcz-2023, IEEE Std 802.1Qcw-2023,
IEEE Std 802.1Qcj-2023, IEEE Std 802.1Qdj-2024, IEEE Std 802.1Qdx-2024,
IEEE Std 802.1Qdy-2024.";

}

feature mstp {

if-feature rstp:rstp;

description

"Multiple Spanning Tree Algorithm and Protocol supported.";

reference

"Clause 13, 13.5, and 13.24 of IEEE Std 802.1Q.";

}

augment "/dot1q:bridges/dot1q:bridge/dot1q:component/dot1q:bridge-mst" {

description

"Augment RSTP-capable Bridge component with MSTP configuration and management.";

reference

"13.24, 13.25, and 13.26 of IEEE Std 802.1Q.";

container mst-config-id {

description

"Containing the MST Configuration Identifier of a Bridge.";

reference

"Item d) in 13.26.";

leaf format-selector {

type int32 {

range "0";

}

config true;

description

"In an MSTP Bridge, the MST Configuration Identifier's Configuration Identifier Format Selector. This has a value of 0 indicating the format specified in IEEE Std 802.1Q.";

reference

"Item a) in 13.8 of IEEE Std 802.1Q.";

}

leaf configuration-name {

type string {

length "32";

}

config true;

description

"The Configuration Name in the MST Configuration Identifier.";

```

reference
  "Item b) in 13.8:2 of IEEE Std 802.1Q.";
}
leaf revision-level {
  type uint32 {
    range "0..65535";
  }
  config true;
  description
    "The Revision Level in the MST Configuration Identifier.";
  reference
    "Item c) in 13.8 of IEEE Std 802.1Q.";
}
leaf configuration-digest {
  type binary {
    length "16";
  }
  config false;
  description
    "The Configuration Digest in the MST Configuration Identifier.";
  reference
    "Item d) in 13.8 of IEEE Std 802.1Q.";
}
}

container bridge-mstp {
  description
    "Per-Bridge configuration and management parameters for the IST
    and each MSTI in an MST Region.";
  reference
    "Clause 13, 13.26 of IEEE Std 802.1Q.";
  leaf max-hops {
    type int32 {
      range "6..100";
    }
    default "20";
    config true;
    description
      "In an MSTP Bridge, the MaxHops parameter for the IST, also used
      for each of the MSTIs.

      The value of this object MUST be retained across reinitializations
      of the management system.";
    reference
      "Clause 13, Table 13-5, 13.26.4, item g) in 13.26 of
      IEEE Std 802.1Q.";
  }
  leaf ist-internal-root-path-cost {
    type uint32;
    config false;
    description

```

```

    "The Internal Root Path Cost for the IST calculated by this
    Bridge after the addition of the Internal Port Path Cost for the
    Root Port (or Master Port) for this IST (MSTID 0) or MST.";
reference
    "13.9, 13.10, 13.5.3, 13.26.10 and item i) in 13.26 of
    IEEE Std 802.1Q.";
}
list mst {
    key "mstid";
    description
        "Per-Bridge configuration and management parameters for each MST,
        with an MSTID in the range allocated for MSTP configuration.";
    reference
        " ";
    leaf mstid {
        type uint16 {
            range "1..4091";
        }
        description
            "MSTIDs allocated for use by MSTP (1..4091) to identify MSTIs.
            Other MSTIDs in the 12-bit range are reserved [for use in
            the MST Configuration Table, whose configuration is identified
            by the Configuration Digest in the MST Configuration Identifier
            (mst-config-id/configuration-digest)] for the CIST-MSTID,
            SPBM-MSTID, SPBV-MSTID, TE-MSTID, and SPVID-Poll-MSTID.";
        reference
            "8.4, 8.6.1, 8.9.3, 13.2.1 of IEEE Std 802.1Q.";
    }
    leaf port-id-priority {
        type dot1qtypes:priority-type;
        config true;
        description
            "The priority component of this Bridge Port's Port Identifier for
            the MSTI, encoded in the four most-significant bits of octet 15 of
            the MSTI Configuration Message.

            The value of this object MUST be retained across reinitializations
            of the management system.";
        reference
            "13.26.3, 13.11, 14.4.1, and
            item f) in 13.26 of IEEE Std 802.1Q."; ///
    }
    leaf internal-root-path-cost {
        type uint32;
        config false;
        description
            "The Internal Root Path Cost for this MSTI calculated by this
            Bridge after the addition of the Internal Port Path Cost for the
            Root Port (or Master Port) for this MSTI.";
        reference
            "13.9, 13.10, 13.5.3, 13.26.10 and item i) in 13.26 of

```

```

    IEEE Std 802.1Q.";
}
leaf root-port-number {
  type dot1qtypes:port-number-type;
  config false;
  description
    "The port number of the Root Port for this MSTI.";
  reference
    "13.4, 13.5, 13.26.9, and item h) in 13.26 of IEEE Std 802.1Q.");//!!
}
}
}
}
augment "/if:interfaces/if:interface/dot1q:bridge-port" {
  description
    "Augment RSTP Bridge Port with MSTP configuration";
  reference
    "13.24, 13.25, and 13.27 of IEEE Std 802.1Q.";
  container port-mstp {
    description
      "Per-Bridge Port configuration and management parameters for the IST
      and each MSTI in an MST Region.";
    list mst {
      key "mstid";
      description
        "Per-Bridge Port configuration and management parameters for each MST,
        with an MSTID in the range allocated for MSTP configuration.";
      reference
        " ";
      leaf mstid {
        type uint16 {
          range "1..4091";
        }
        description
          "MSTIDs allocated for use by MSTP (1..4091) to identify MSTIs.";
        reference
          "8.4, 8.6.1, 8.9.3, 13.2.1 of IEEE Std 802.1Q.";
      }
    }
    leaf msti-port-state {
      type enumeration {
        enum discarding {
          value 1;
        }
        enum learning {
          value 2;
        }
        enum forwarding {
          value 3;
        }
      }
    }
    config false;
  }
}

```



```

description
  "The port's Port State, summarizing the application of learning to
  received frames, and the forwarding of relayed frames, for frames
  assigned to this MSTI.";
reference
  "8.4, 13.4, item aw) and item ba) in 13.27 of IEEE Std 802.1Q.";
}
leaf msti-port-role {
  type enumeration {
    enum disabled-port {
      value 1;
    }
    enum root-port {
      value 2;
    }
    enum designated-port {
      value 3;
    }
    enum alternate-port {
      value 4;
    }
    enum backup-port {
      value 5;
    }
    enum master-port {
      value 6;
    }
  }
  config false;
  description
    "The port's Port Role for the MSTI. Disabled Port, Root Port,
    Designated Port, Alternate Port, Backup Port, or Master Port.";
  reference
    "13.4, 13.5, 13.12, 13.24, 13.27.66, and item bn) in 13.27 of
    IEEE Std 802.1Q.";
}
leaf msti-bridge-id-priority {
  type dot1qtypes:priority-type;
  config true;
  description
    "The priority component of this Bridge's Bridge Identifier for the
    MSTI, encoded in the four most-significant bits of octet 14 of the
    MSTU Configuration Message.

    The value of this object MUST be retained across reinitializations
    of the management system.";
  reference
    "13.26.3, 13.11, 14.4.1, and item f) in 13.26 of IEEE Std 802.1Q.";
}
leaf msti-internal-port-path-cost {
  type uint32;

```

```

    config true;
    description
      "The Internal Port Path Cost for this Bridge Port and MSTI.";
    reference
      "Item b) of 13.2.1, and item ay) in 13.26 of IEEE Std 802.1Q.";
  }
  leaf msti-regional-root-id {
    type uint32;
    config false;
    description
      "The MSTI Regional Root Identifier in Configuration BPDUs transmitted
      by the Designated Bridge for the attached LAN and this MSTI.";
    reference
      "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
  }
}
leaf msti-internal-root-path-cost {
  type int32;
  config false;
  description
    "The MSTI Internal Path Cost advertised in BPDUS by the Designated
    Bridge for the attached LAN and this MSTI.";
  reference
    "27.6, 14.4.1, 13.27.20, 14.4.1, and item ar) in 13.27 of
    IEEE Std 802.1Q."; ///
}
leaf msti-designated-bridge-id {
  type uint32;
  config false;
  description
    "The Bridge Identifier of the Bridge that this port considers to be
    the Designated Bridge for the attached LAN and this MSTI.";
  reference
    "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
}
leaf msti-designated-port-id {
  type binary {
    length "2";
  }
  config false;
  description
    "The Port Identifier of the Bridge Port that this port considers to
    be the Designated Port for the attached LAN and this MSTI.";
  reference
    "13.27.20, 13.10, and item ar) in 13.27 of IEEE Std 802.1Q.";
}
}
}
}
}
}

```