

**IEEE Standard for
Local and metropolitan area networks—
Media Access Control (MAC) Bridges and
Virtual Bridged Local Area Networks—
Amendment 21: Edge Virtual Bridging**

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

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(Amendment to IEEE Std 802.1Q™-2011
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Approved 14 May 2012

IEEE-SA Standards Board

Abstract: This amendment to IEEE Std 802.1Q-2011 specifies protocols, procedures, and managed objects that

- Provide for the discovery, configuration, and control of a pair of direct-attached limited-function Service VLAN (S-VLAN) components to extend the services of a customer bridge to remote ports and enable coexistence of multiple services on station-resident ports (e.g., embedded bridging).
- Provide for discovery, configuration, and control of a Reflective Relay Service for a bridge port.
- Provide for discovery of, and coordinated configuration of, edge relays (ERs) and other devices that utilize the reflective relay service.
- Provide for dynamic profile-driven port configuration.

Keywords: Bridged Local Area Networks, edge virtual bridging, IEEE 802.1Qbg, LANs, local area networks, MAC Bridges, metropolitan area networks, Reflective Relay Service, SPB, Virtual Bridged Local Area Networks, virtual LANs

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Introduction

This introduction is not part of IEEE Std 802.1Qbg-2012, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—Amendment 21: Edge Virtual Bridging.

This amendment to IEEE Std 802.1Q-2011 specifies protocols, procedures, and managed objects that

- Provide for the discovery, configuration, and control of a pair of direct-attached limited-function Service VLAN (S-VLAN) components to extend the services of a customer bridge to remote ports and enable coexistence of multiple services on station-resident ports (e.g., embedded bridging).
- Provide for discovery, configuration, and control of a Reflective Relay Service for a bridge port.
- Provide for discovery of, and coordinated configuration of, edge relays (ERs) and other devices that utilize the reflective relay service.
- Provide for dynamic profile-driven port configuration.

The purpose of this standard is to allow multiple virtual stations to share a common bridge port to obtain the services of bridge relay. The standard enables coordinated configuration and management of bridge services for virtual stations.

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—

Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—

Amendment 21: Edge Virtual Bridging

[This amendment is based on IEEE Std 802.1Q™-2011, as modified by those amendments that had been approved, but not incorporated into the base text of the standard, at the time that this amendment was approved, namely (in chronological order) IEEE Std 802.1Qbe, IEEE Std 802.1Qbc, IEEE Std 802.1Qbb, IEEE Std 802.1Qaz, IEEE Std 802.1Qbf, and IEEE Std 802.1aq.]

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1. Overview

1.3 Introduction

Insert the following text at the end of 1.3, renumbering the list items as necessary:

This standard specifies protocols, procedures, and managed objects that

- a) Provide for the discovery, configuration, and control of a pair of direct-attached Port-mapping Service VLAN (S-VLAN) components to extend the operation of a customer bridge to remote ports and enable coexistence of multiple services on station-resident ports (e.g., embedded bridging).
- b) Provide for discovery, configuration, and operation of reflective relay (8.6.1) for a bridge port.
- c) Provide for discovery of, and coordinated configuration of, edge relays (ERs) and other devices that utilize the reflective relay service.
- d) Provide for dynamic profile-driven port configuration.

2. Normative references

Insert the following references into Clause 2, in appropriate collating sequence:

IEEE Std 802.1BR™, IEEE Standard for Local and Metropolitan Area Networks—Virtual Bridged Local Area Networks—Bridge Port Extension.²

IETF RFC 4122, A Universally Unique Identifier (UUID) URN Namespace.

IETF RFC 4291, IP Version 6 Addressing Architecture.

²IEEE publications are available from the Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08854, USA (<http://standards.ieee.org/>).

3. Definitions

Insert the following definitions into Clause 3, in appropriate collating sequence, renumbering existing definitions as needed:

3.1 Downlink relay port (DRP): A port of an edge relay that is capable of supporting at least one VSI.

3.2 Edge Control Protocol (ECP): A protocol that provides reliable delivery of control SDUs.

3.3 edge relay (ER): A bridge supporting the transfer of frames between one or more downlink relay ports (DRPs) and one uplink relay port (URP).

3.4 Edge Virtual Bridging (EVB): The set of functions supporting VSIs in Bridges and attached end stations.

3.5 Edge Virtual Bridging Bridge (EVB Bridge): A C-VLAN Bridge that supports the Virtual Station Interface (VSI) discovery and configuration protocol (VDP).

3.6 Edge Virtual Bridging station (EVB station): An end station containing one or more edge relays.

3.7 GroupID: A service instance identifier used in VDP.

3.8 Reflective relay: A mode of operation of the active topology enforcement function in which a received frame on a port that supports reflective operation can be forwarded on the same port on which it was received.

3.9 S-channel: A point-to-point S-VLAN established between a Port-mapping S-VLAN component in an EVB Bridge and a Port-mapping S-VLAN component in an EVB station.

3.10 S-channel Access Port (CAP): The Port that terminates an S-channel.

3.11 S-channel Discovery and Configuration Protocol (CDCP): A protocol that is used to configure S-VLAN components to create S-channels.

3.12 Station-facing Bridge Port (SBP): A Port of a Bridge that supports the EVB status parameters (6.6.6) with an EVBMode parameter value of “EVB Bridge”.

3.13 Uplink Access Port (UAP): A Port on a Port-mapping S-VLAN component that connects an EVB Bridge with an EVB station.

3.14 Uplink relay port (URP): A port of an edge relay that supports the EVB status parameters (6.6.6) with an EVBMode parameter value of “EVB station”.

3.15 Virtual edge bridge (VEB): An edge relay that requires reflective relay service to be disabled on the station-facing Bridge Port (SBP) of the attached Bridge.

3.16 Virtual edge port aggregator (VEPA): An edge relay that always forwards frames through its uplink relay port (URP) and that can make use of reflective relay service provided by the station-facing Bridge Port (SBP) of the attached Bridge.

3.17 Virtual station: An end station instantiated within an EVB station.

3.18 Virtual Station Interface (VSI): An interface to a virtual station that is attached to a DRP of an edge relay.

3.19 Virtual Station Interface (VSI) Discovery and Configuration Protocol (VDP): A protocol that supports the association of a VSI with a bridge port.

4. Abbreviations

Insert the following abbreviations into Clause 4, in appropriate collating sequence:

ACK	acknowledgement
CAP	S-channel Access Port
CDCP	S-channel discovery and configuration protocol
DCN	data center network
DRP	downlink relay port
ECP	edge control protocol
ECPDU	edge control protocol data unit
ER	edge relay
EVB	Edge Virtual Bridging
IP	Internet protocol
IPv6	Internet protocol version 6
LLDP	link layer discovery protocol
OUI	organizationally unique identifier
SBP	Station-facing Bridge Port
SCID	S-channel identifier
SDU	service data unit
TLV	type, length, value
UAP	Uplink Access Port
ULP	upper layer protocol
ULPDU	upper layer PDU
URP	uplink relay port
UUID	Universally Unique Identifier
VDP	VSI discovery and configuration protocol
VEB	virtual edge bridge
VEPA	virtual edge port aggregator
VSID	VSI Instance Identifier
VSI	Virtual Station Interface
VTID	VSI Type identifier

5. Conformance

Change subclause 5.2 as follows:

5.2 Conformant components and equipment

This subclause specifies requirements and options for the following core components:

- a) VLAN-aware Bridge component (5.4);
- b) VLAN-unaware Bridge component (5.12);

for the following components that use that core functionality:

- c) C-VLAN component (5.5);
- d) S-VLAN component (5.6);
- e) I-component (5.7);
- f) B-component (5.8);
- g) TPMR component (5.13);
- h) T-component (5.15);
- i) [Edge relay \(5.23.1\)](#);

and for the following systems that include instances of the above components:

- j) VLAN Bridge (5.9);
- k) S-VLAN Bridge (5.10.1);
- l) Provider Edge Bridge (5.10.2);
- m) Backbone Edge Bridge (5.11);
- n) TPMR (5.14);
- o) [Edge Virtual Bridging Bridge \(5.22\)](#);
- p) [Edge Virtual Bridging station \(5.23\)](#).

NOTE—A VLAN Bridge can also be referred to as a Customer Bridge or a C-VLAN Bridge. Both S-VLAN Bridges and Provider Edge Bridges are examples of Provider Bridges.

Insert new subclauses 5.22 and 5.23, renumbering existing subclauses as necessary, as follows:

5.22 Edge Virtual Bridging (EVB) Bridge requirements

An EVB Bridge shall comprise a single conformant C-VLAN component (5.5) and zero or one Port-mapping S-VLAN component (5.6) per externally accessible port.

Each externally accessible port shall be capable of being configured as one of, and may be capable of being configured as any of the following:

- a) A C-VLAN Bridge Port
- b) A Station-facing Bridge Port (SBP)
- c) An Uplink Access Port (UAP)

as specified in Clause 40.

A conformant EVB Bridge implementation shall

- d) Support the functionality of a C-VLAN component (5.5).

- e) Support at least one SBP on the C-VLAN component (Clause 40).
- f) Support the EVB status parameters for EVBMode = EVB Bridge (6.6.6).
- g) Support an LLDP nearest Customer Bridge database (Clause 40).
- h) Support the EVB TLV on each SBP (D.2.13).
- i) Support ECP on each SBP (Clause 43).
- j) Support the Bridge role of VDP on each SBP (Clause 41).

A conformant EVB Bridge may support S-channels. A conformant EVB Bridge with S-channel support shall

- k) Support at least one Port-mapping S-VLAN component (22.6.4) and associated UAP, configured as specified in 40.2 a)–d).
- l) Support CDCP, as specified in Clause 42, operating in Bridge mode.
- m) Support the enhanced filtering utility criteria (8.7.2) and not support the default filtering utility criteria (8.7.1).

A conformant EVB Bridge implementation may

- n) Support configuration of reflective relay on each SBP of the C-VLAN component (8.6.1).
- o) Support management for the EVB components (12.4–12.12, 12.26).
- p) Support the MIB module defined in 17.7.20.
- q) Support assignment of VIDs to GroupIDs (41.2.9).
- r) Support the use of the M and S bits in VDP (41.2.3).

5.23 Edge Virtual Bridging (EVB) station requirements

An EVB station shall comprise one or more conformant ERs (5.23.1) and zero or one Port-mapping S-VLAN component (5.6) per externally accessible port.

Each externally accessible port shall be capable of being configured as one of, and may be capable of being configured as any of the following:

- a) An Uplink Access Port (UAP)
- b) An Uplink Relay Port (URP)

as specified in Clause 40.

Each DRP shall be capable of attaching to one or more VSIs.

Each URP shall be capable of attaching its ER to the LAN connecting to an EVB Bridge, or in the case where a Port-mapping S-VLAN component is present, to an internal LAN (6.14) connecting the URP to a CAP.

A conformant EVB station implementation shall

- c) Support at least one ER (5.23.1, Clause 40).
- d) Support the EVB status parameters for EVBMode = EVB station on each URP (6.6.6).
- e) Support an LLDP nearest Customer Bridge database (Clause 40).
- f) Support the EVB TLV on each URP of each ER (D.2.13).
- g) Support ECP on each URP of each ER (Clause 43).
- h) Support the station role of VDP for each URP of each ER (Clause 41).

In addition, a conformant EVB station implementation that supports a Port-mapping S-VLAN components shall

- i) Support a Port-mapping S-VLAN component (22.6.4) on each port configured as a UAP (42.1.2) configured as specified in 40.2 (a)–(d).
- j) Support CDCP, as specified in Clause 42, operating in Station mode.
- k) Support the enhanced filtering utility criteria (8.7.2) and not support the default filtering utility criteria (8.7.1).

A conformant EVB station implementation may

- l) Support multiple ERs (Clause 40).
- m) Support management for the EVB components (12.4–12.12, 12.26).
- n) Support the MIB module defined in 17.7.20.
- o) Support assignment of VIDs to GroupIDs (41.2.9).
- p) Support the use of the M and S bits in VDP (41.2.3).

5.23.1 Edge relay requirements

A conformant implementation of an ER shall

- a) Conform to the relevant standard for the Media Access Control technology implemented at each Port in support of the MAC ISS, as specified in 6.6, 6.7, and 6.14.
- b) Support the MAC Enhanced Internal Sublayer Service at each Port, as specified in 6.8 and 6.9.
- c) Recognize and use C-TAGs (6.9).
- d) Relay and filter frames as described in 8.1 and specified in 8.5, 8.6, and 8.8.
- e) Support the following on each DRP Port that supports untagged and priority-tagged frames:
 - 1) A Port VLAN Identifier (PVID) value (6.9)
 - 2) Configuration of at least one VID whose untagged set includes that Port (8.8.2)
- f) Support setting the Acceptable Frame Types parameter (6.9) to *Admit Only VLAN Tagged Frames* on the URP.
- g) Allow tag headers to be inserted, modified, and removed from relayed frames, as specified in 8.1 and Clause 9, as required by the value(s) of the Acceptable Frame Types parameter supported on each Port, and by the ability of each Port to transmit VLAN-tagged and/or untagged frames.
- h) Support at least one Filtering Identifier (FID) (6.6, 8.8.3, 8.8.8, and 8.8.9).
- i) Allow allocation of at least one VID to each FID that is supported (6.6, 8.8.3, 8.8.8, and 8.8.9).
- j) Support exactly one URP (Clause 40) supporting the parameters of 6.6.6 for EVBMode = EVB station.
- k) Support one or more DRPs each supporting access to VSIs (Clause 40).
- l) Filter the Reserved MAC Addresses specified in Table 8-1.
- m) If more than one DRP is supported, support setting the Enable Ingress Filtering parameter (8.6.2) on each DRP and the URP.
- n) Support the requirements of either a VEB ER (5.23.1.1), or a VEPA ER (5.23.1.2).

A conformant implementation of an ER may

- o) Support the following if the URP supports untagged and priority-tagged frames:
 - 1) A Port VLAN Identifier (PVID) value (6.9);
 - 2) Configuration of at least one VID whose untagged set includes that Port (8.8.2).
- p) Comprise a single conformant C-VLAN component (5.4).
- q) Support disabling of learning on each DRP (8.6.1).
- r) Support the ability to discard frames received at each DRP if there is no entry in the filtering database that specifies forwarding on that Port for the frame's source MAC address and VLAN.
- s) Support the operation of the learning process as described in 8.7.

5.23.1.1 VEB ER requirements

In addition to the requirements stated in 5.23.1, a conformant VEB ER implementation shall

- a) Request that reflective relay service not be provided by setting adminReflectiveRelayRequest to FALSE (6.6.6).

5.23.1.2 VEPA ER requirements

In addition to the requirements stated in 5.23.1, a conformant VEPA ER implementation shall

- a) Disable learning on the URP (8.6.1).
- b) Filter frames as specified in 8.6.3.1.

A conformant VEPA ER implementation may

- c) Filter frames received at each DRP that are destined for the URP until reflective relay is enabled (6.6.6).

A conformant VEPA ER implementation should

- d) Request the provision of reflective relay service by setting adminReflectiveRelayRequest to TRUE (6.6.6).

NOTE—This item is optional because there can be cases where an EVB station is configured to prohibit VSIs from communicating with each other in VEPA mode.

6. Support of the MAC Service

6.6 Internal Sublayer Service

Insert the following new subclause 6.6.6, renumbering existing subclauses as necessary:

6.6.6 EVB status parameters

The Internal Sublayer Service optionally makes available parameters that control and represent the EVB status of each instance of the service provided.

The **EVBMode** parameter determines whether EVB functionality is supported, and in what mode. The parameter can take one of the following three values:

- a) **EVB Bridge.** The service supports the functionality of an EVB Bridge.
- b) **EVB station.** The service supports the functionality of an EVB station.
- c) **Not Supported.** The service does not support EVB functionality. This value is assumed if the EVB status parameters are not implemented.

6.6.6.1 EVBMode = Not supported

If the value of the **EVBMode** parameter is **Not Supported**, then no further status parameters are available, EVB functionality is not supported, and the operation of the service follows the normal forwarding rules for a Bridge.

6.6.6.2 EVBMode = EVB Bridge

If the value of the **EVBMode** parameter is **EVB Bridge**, then further parameters are available, as follows:

- a) **reflectiveRelayCapable.** If this parameter is TRUE, then the active topology enforcement function is capable of performing reflective relay, as specified in 8.6.1; if FALSE, the active topology enforcement function is not capable of performing reflective relay.

NOTE 1—The value of the reflectiveRelayCapable parameter is an inherent property of the implementation and is not subject to administrative control.

- b) **operReflectiveRelayControl.** If this parameter is TRUE, then reflective relay is enabled; if FALSE, reflective relay is disabled.

NOTE 2—Reflective relay is enabled if a remote EVB station has requested that it be provided (as determined by protocol exchanges between the EVB station and EVB Bridge) and the EVB Bridge is capable of providing it, or disabled if the EVB station has not requested that it be provided or the EVB Bridge is not capable of providing it.

6.6.6.3 EVBMode = EVB station

If the value of the **EVBMode** parameter is **EVB station**, then further parameters are available, as follows:

- a) **adminReflectiveRelayRequest.** This parameter can take one of two values:
 - 1) **TRUE.** The attached EVB Bridge is requested to enable Reflective relay.
 - 2) **FALSE.** The attached EVB Bridge is requested to disable Reflective relay.

NOTE 1—The value of adminReflectiveRelayRequest is used in the EVB TLV exchanges described in D.2.13 to indicate to an attached EVB Bridge that the EVB station needs reflective relay to be provided. A given EVB station is not required to support both possible values of adminReflectiveRelayRequest.

- b) **operReflectiveRelayStatus**. This parameter can take one of three values:
- 1) **TRUE**. The EVB Bridge has enabled reflective relay.
 - 2) **FALSE**. The EVB Bridge has disabled reflective relay.
 - 3) **Unknown**. It is not known whether the EVB Bridge has enabled reflective relay or not.

NOTE 2—The value of operReflectiveRelayStatus indicates whether or not the EVB Bridge has enabled reflective relay, or whether the EVB Bridge status is not currently known, as determined by protocol exchanges between the EVB station and EVB Bridge. The EVB Bridge status can be unknown during initialization or until the protocol exchanges have completed.

6.11.4 Regenerating priority

Change the NOTE as follows:

NOTE—IEEE 802 LAN technologies signal a maximum of eight priority values. ~~Annex G~~Annex I further explains the use of priority values and how they map to traffic classes.

8. Principles of bridge operation

8.6 The Forwarding Process

8.6.1 Active topology enforcement

Change the initial paragraph as follows:

To prevent data loops and unwanted learning of source MAC addresses, the Forwarding Process determines the values (TRUE, or FALSE) of the learning and forwarding controls (8.4) appropriate to each received frame and Bridge Port. If learning is ~~true~~ TRUE for the receiving Port and ingress filtering (8.6.2) would not cause the received frame to be discarded, the source address and VID are submitted to the Learning Process. If forwarding is ~~true~~ TRUE for the receiving Port, and either the EVBMode parameter value (6.6.6) for the Port is not “EVB Bridge” or the value of the operReflectiveRelayControl parameter for the Port is FALSE, each Bridge Port, other than the reception Port, with forwarding ~~true~~ TRUE is identified as a potential transmission Port. If forwarding is TRUE for the receiving Port and the EVBMode parameter value (6.6.6) for the Port is “EVB Bridge” and the operReflectiveRelayControl parameter value for the Port is TRUE, each Bridge Port, including the reception Port, with forwarding TRUE is identified as a potential transmission Port.

Insert a new paragraph between the first and second paragraphs, as follows:

In an edge relay (ER), the forwarding process may set learning FALSE for all frames.

Insert new subclause 8.6.1.1 at the end of 8.6.1, as follows:

8.6.1.1 Requirements for the use of reflective relay

VEPA ERs (8.6.3.1) used in Edge Virtual Bridging (Clause 40) require reflective relay (6.6.6, 8.6.1) to be enabled on an attached EVB Bridge SBP in order to ensure that all VSIs connected to the VEPA ER are able to receive frames transmitted on one of the other VSIs. The following requirements ensure that a device operates correctly when using reflective relay:

- a) The operation of the device shall be such that it prevents the establishment of loops, i.e., the device shall not both request and provide reflective relay on the same port.
- b) The device shall ensure that any frame that it transmits on a given port, and that is reflected back to the device through the attached Bridge Port, is filtered by the device in order to prevent it being delivered to the originating port.
- c) Any device requesting reflective relay is responsible for performing frame replication as necessary for delivery to multiple ports.

NOTE—Information that can be used to assist in meeting these requirements is the source MAC address and the FID derived from the VLAN ID.

8.6.3 Frame filtering

Change the first sentence of the second paragraph of 8.6.3 as follows:

Each of the Reserved MAC Addresses specified in Table 8-1 shall be permanently configured in the Filtering Database in C-VLAN components and Edge Relays.

Insert new subclause 8.6.3.1 at the end of 8.6.3, as follows:

8.6.3.1 Virtual edge port aggregator (VEPA) filtering

A virtual edge port aggregator (VEPA) ER filters frames as follows.

If the receiving port is a DRP, then the URP shall be selected as the only transmission Port.

If the receiving port is a URP, then in addition to the filtering specified in 8.6.3, if there is a filtering entry that specifies forwarding for the source MAC address and VLAN of the frame for any DRP, then that DRP shall be removed from the list of potential transmission Ports.

8.7 The Learning Process

Change the last paragraph, and insert a new paragraph after it, as follows:

The purpose of filtering utility criteria is to reduce the capacity requirements of the Filtering Database and to reduce the time for which service can be denied (6.5.1) by retaining filtering information learned prior to a change in the physical topology of the network. Filtering utility criteria shall be applied to the learning and retention of information for each Filtering Identifier (FID) (8.8.8). [In Bridges other than EVB Bridges \(5.22\), Enhanced filtering utility criteria may be implemented for any Bridge Port as specified below \(8.7.2\); if implemented, both the default \(8.7.1\) and the enhanced criteria shall be selectable by management. In EVB Bridges, the enhanced filtering utility criteria shall be implemented for all Bridge Ports, and the default filtering utility criteria shall not be implemented.](#)

[Figure 8-4 illustrates the operation of the Learning Process in the inclusion of station location information carried by a single frame, received on one of the Ports of a Bridge, in the Filtering Database.](#)

8.7.2 Enhanced filtering utility criteria

Change 8.7.2 as follows:

The enhanced criteria are satisfied if at least one VID that uses the FID includes the reception Port and at least one other Port with a Port State of Learning or Forwarding in its member set, and:

- a) The operPointToPointMAC parameter is false for the reception Port; or
- b) Ingress for the VID is permitted through a third Port; [or](#)
- c) [The reception Port has reflective relay enabled \(6.6.6.2\).](#)

NOTE—The third port can, but is not required to, be in the member set.

~~Figure 8-4 illustrates the operation of the Learning Process in the inclusion of station location information carried by a single frame, received on one of the Ports of a Bridge, in the Filtering Database.~~

10. Multiple Registration Protocol (MRP) and Multiple MAC Registration Protocol (MMRP)

10.6 Protocol operation

Change the second paragraph after NOTE 4 as follows:

When two MRP Participants are connected by a point-to-point medium or service instance delaying MRPDU transmission provides no benefit. In bridged networks it is desirable to transmit without delay, minimizing the denial of service that might occur while registration changes propagate after reconfiguration, and maximizing the benefit from using protocols such as RSTP and MSTP. When operPointToPointMAC (~~6.4.36.6.3~~) is TRUE, transmit opportunities are scheduled immediately on request, subject to rate limiting (10.7.4).

12. Bridge management

12.1 Management functions

12.1.1 Configuration management

Insert the following list item, re-lettering if necessary, to follow the existing list:

- l) The ability to configure the functional elements of Edge Virtual Bridging and to control their operation.

12.2 VLAN-aware bridge objects

Insert the following list item, re-lettering if necessary, to follow the existing list:

- r) The Edge Virtual Bridging entities (12.26).

12.3 Data types

Insert the following list items, re-lettering if necessary, and NOTE, to follow the existing list:

- s) Timer exp, an unsigned value from 0–31 representing a positive integer for the exponent of 2, which forms the multiplier of 10 μ s, used for EVB protocol timeout parameters.

NOTE—For example, a value of 4 represents $2^4 \times 10 \mu$ s, or 160 μ s.

- t) Boolean array, an array of Boolean values.

12.4 Bridge Management Entity

Change subclause 12.4.1 as follows:

12.4.1 Bridge Configuration

The Bridge Configuration object models the operations that modify, or inquire about, the configuration of the Bridge's resources. There is a single Bridge Configuration object per Bridge.

The management operations that can be performed on the Bridge Configuration are

- a) Discover Bridge (12.4.1.1);
- b) Read Bridge (12.4.1.2);
- c) Set Bridge Name (12.4.1.3);
- d) Reset Bridge (12.4.1.4);
- e) [Read component table entry \(12.4.1.5\);](#)
- f) [Update component table entry \(12.4.1.5\).](#)

Insert the following new subclauses 12.4.1.5, 12.4.1.5.1, and 12.4.1.5.2, and Table 12-1 after subclause 12.4.1.4, renumbering subsequent tables as necessary.

12.4.1.5 Bridge component configuration

There is a single Bridge component table per system. Each entry in the component table represents a component of the system (Table 12-1). The entries hold the parameters for each component including the component type and capabilities.

The operations that can be implemented on component table entries are as follows:

- a) Read component table entry;
- b) Update component table entry.

Table 12-1—Component table entry managed object

Name	Data type	Operations supported*	References
compComponentId	ComponentID	R	12.3 l)
compMACAddress	MAC Address	R	8.13.8, 13.24
compNumberPorts	unsigned (1..4095)	R	12.4.1.1.3 c)
compComponentType	ComponentType	R	12.3 m)
compDeviceCapabilities	Boolean array (0..7)	R	12.10.1.1.3 b)
compTrafficClassesEnabled	Boolean	RW	—
compMmrpEnabledStatus	Boolean	RW	—

*R= Read-only access; RW = Read/Write access

NOTE—The Bridge component table is implemented in Clause 17 as the BridgeBaseTable (see Table 17-3).

12.4.1.5.1 Component type enumeration

The compComponentType parameter can be assigned the following values:

- a) iComponent—An I-component (5.7);
- b) bComponent—A B-component (5.8);
- c) cVlanComponent—A C-VLAN component (5.5);
- d) sVlanComponent—An S-VLAN component (5.6);
- e) dBridgeComponent—A VLAN unaware component (5.12);
- f) edgeRelay—An EVB station edge relay (5.23.1).

12.4.1.5.2 Component device capabilities

The compDeviceCapabilities parameter contains an array of Boolean values for the following:

- g) ExtendedFilteringServices;
- h) TrafficClasses;

- i) StaticEntryIndividualPort;
- j) IVLCapable;
- k) SVLCapable;
- l) HybridCapable;
- m) ConfigurablePvidTagging;
- n) LocalVlanCapable.

Change subclause 12.4.2 and insert new Table 12-2, as follows:

12.4.2 Port configuration

The Port Configuration object models the operations that modify, or inquire about, the configuration of the Ports of a Bridge. Unless the system explicitly supports the ability to dynamically create and/or delete ports, there ~~There~~ are a fixed set of Bridge Ports per Bridge (one for each MAC interface), and each is identified by a permanently allocated Port Number.

The allocated Port Numbers are not required to be consecutive. Also, some Port Numbers can be dummy entries, with no actual LAN Port (for example, to allow for expansion of the Bridge by addition of further MAC interfaces in the future). Such dummy Ports can support the Port Configuration management operations and other Port-related management operations in a manner consistent with the Port being permanently disabled.

The information provided by the Port Configuration consists of summary data indicating its name and type. Specific counter information pertaining to the number of packets forwarded, filtered, and in error is maintained by the Forwarding Process resource. The management operations supported by the Bridge Protocol Entity allow for controlling the states of each Port.

A port table entry can be implemented by a Bridge for each Port of each component (Table 12-2). It comprises the parameters for each Port including the port type, capabilities, and statistics.

The management operations that can be implemented on the port ~~Configuration are~~ table are

- a) ~~Read Port~~ Read port table entry (12.4.2.1);
- b) ~~Set Port Name (12.4.2.2)~~ Update port table entry (12.4.2.1).

Delete subclause 12.4.2.1 through 12.4.2.3 and insert the following new subclause 12.4.2.1.

12.4.2.1 Port type capabilities and enumeration

The portTypeCapabilities array has a bit for each port type the Port can take, while the portType is an enumeration. The portTypeCapabilities can take any combination of port types while the portType can take exactly one of the following values:

- a) C-VLAN Bridge Port;
- b) Provider Network Port (PNP);
- c) Customer Network Port (CNP);
- d) Customer Edge Port (CEP);
- e) Customer Backbone Port (CBP);
- f) Virtual Instance Port (VIP);
- g) D-Bridge Port;
- h) Remote Customer Access Port (RCAP)—(12.13.4);
- i) Station-facing Bridge Port (SBP)—(6.6.5, 12.26.2);
- j) Uplink Access Port (UAP)—(12.26.4);
- k) Uplink Relay Port (URP)—(6.6.6, 12.26.5).

Table 12-2—Port table entry

Name	Data type	Operations supported*	References
portComponentId	ComponentID	R	12.4.1.5
portPortNumber	Port Number	R	13.25
portMACAddress	MAC Address	R	12.4.1.1.3 a)
portDelayExceededDiscards	counter	R	—
portMtuExceededDiscards	counter	R	—
portCapabilities	unsigned	R	—
portTypeCapabilities	unsigned	R	—
portType	enumerated	R	12.4.2.1
portExternal	Boolean	R	—
portAdminPointToPoint	unsigned	RW	6.6.3
portOperPointToPoint	Boolean	R	6.6.3
portName	Latin1 String (SIZE(0..32))	RW	—

*R= Read-only access; RW = Read/Write access

NOTE—A portType is not required for a Downlink Relay Port (DRP) or an S-channel Access Port (CAP) as no special EVB objects are necessary. A DRP is type C-VLAN Bridge Port while a CAP is type Customer Network Port.

12.5 MAC entities

Insert the following new subclause 12.5.1 and Table 12-3 after 12.5:

12.5.1 ISS Port Number table managed object (optional)

An instance of the ISS Port Number table can be implemented by a Bridge system to identify the ISS interfaces that can be assigned to Bridge Ports. The ISS table is required when the Bridge Port assigned to an ISS and the ISS itself are referenced using different Port Numbers. The ISS table is keyed on the ISS Port Number. Each ISS table entry identifies a mapping from the ISS Port Number to a Bridge Port's ComponentID and Port Number. An issToComponentID value of 0 indicates the ISS is not bound to a Bridge Port. The issToComponentID and issToPortNumber parameters are updated indirectly as a result of creating or updating other system specific Port objects.

The operation that can be implemented on an ISS Port Number table is

- a) Read ISS Port Number table entry.

Table 12-3—ISS Port Number table entry

Name	Data type	Operations supported*	References
issPortNumber	Port Number	R	12.3 i)
issMACAddress	MAC Address	R	8.13.2
issToComponentID	ComponentID, 0	R	12.4.2
issToPortNumber	Port Number, 0	R	12.4.2

*R= Read-only access; RW = Read/Write access

Insert the following new subclauses, tables, and figures, following all existing subclauses, tables, and figures, renumbering as necessary:

12.26 Edge Virtual Bridging management

The conformance requirements for EVB Bridges and EVB stations are defined in 5.22 and 5.23, respectively. Each C-VLAN component, edge relay (5.23.1), and Port-mapping S-VLAN component can be managed using the managed objects of 12.4 through 12.12 along with the EVB managed objects specified in this subclause.

An EVB Bridge system (Figure 12-4) supports the EVB managed objects defined in 12.26.1 through 12.26.3 and 12.27. Optionally, an EVB Bridge supports the managed objects for S-channels defined in 12.26.4.

An EVB station system (Figure 12-5) supports the EVB managed objects defined in 12.26.1, 12.26.3, 12.26.5, and 12.27. Optionally, an EVB station supports the managed objects for S-channels defined in 12.26.4.

The EVB specific managed objects defined here

- Provide managed objects for identifying and configuring an EVB system and its system-wide default parameters for LLDP, Virtual Station Interface Discovery and Configuration Protocol (VDP), and S-channel (12.26.1);
- Provide managed objects for configuring the Station-facing Bridge Ports of EVB Bridges (12.26.2);
- Provide a Virtual Station Interface (VSI) table that contains the current VSI and VDP state for each VSI that is active in the EVB system (12.26.3);
- Provide managed objects for configuring the Port-mapping S-VLAN components and S-channels (12.26.4).
- Provide managed objects for configuring the Uplink Relay Ports of the edge relays (12.26.5).

For each EVB system, an EVB system configuration managed object exists containing the system-wide defaults used to initialize the other EVB objects.

Every Port of the EVB system (40.1, 40.2, 40.3) is uniquely identified by a ComponentID (12.3) and Port Number (12.3) [which together identify a Port Index (12.3)]. In EVB systems where the ISS and bound Bridge Port have different Port Numbers, an ISS table (12.5.1) allows determining the associated Bridge Port's ComponentID and Port Number from the scalar ISS Port Number. An example where the ISS table

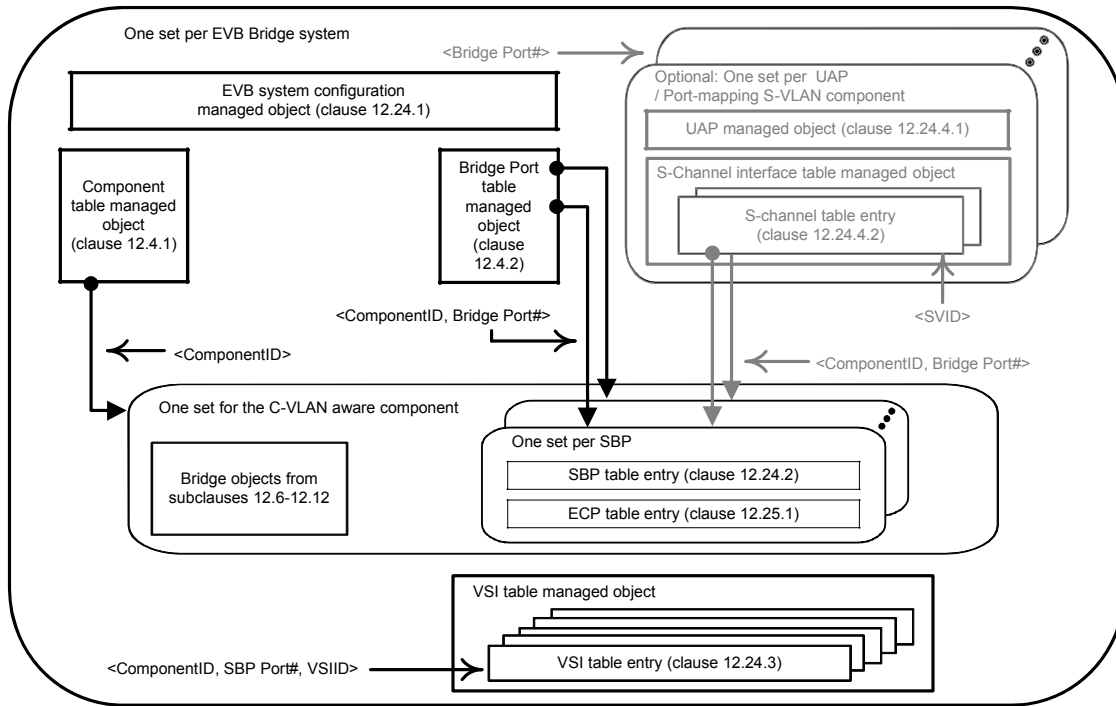
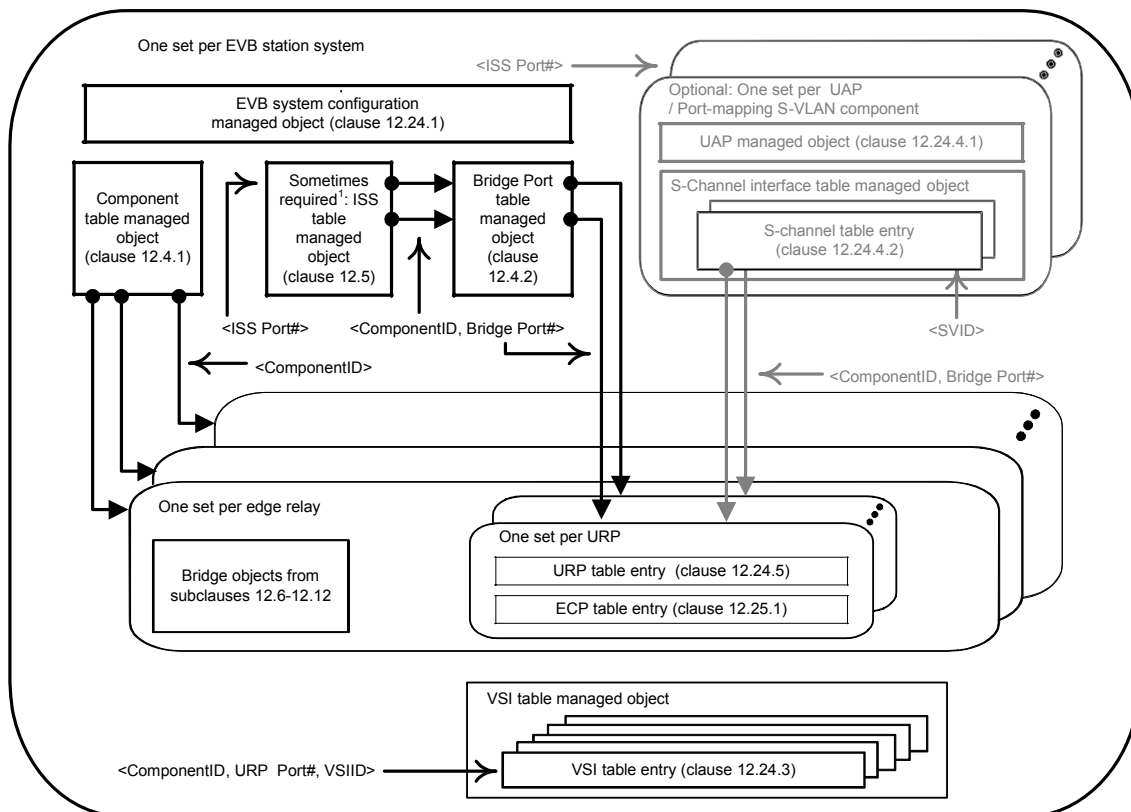


Figure 12-4—Relationships among EVB Bridge managed objects



Note 1: ISS table managed object is required when URP Port# != ISS Port#

Figure 12-5—Relationship among EVB station managed objects

would be needed is an EVB station where the station has multiple LANs each attaching to different edge relays and where the edge relays each use the same Port Number (however different ComponentIDs) to identify their Uplink Relay Ports (Figure 40-3). The ISS table is normally not necessary in an EVB Bridge since the single C-VLAN aware component provides a Bridge Port Number that is unique within the EVB Bridge for every ISS, allowing the ISS and the Bridge Port to use the same Port Number independent from the ComponentID.

The edge relays of an EVB station have two types of ports. Each edge relay DRP provides attachment to one or more Virtual Station Interfaces. No special EVB objects are used to manage the DRPs. URPs can attach to a LAN that can be externally accessible or attach through an internal LAN to a CAP of an S-channel. URPs are managed using the URP table. Each URP table entry identifies a URP within the system and allows configuration and monitoring of LLDP and VDP for the URP (12.26.5). For each URP there is also a ECP table entry that allows configuration and monitoring of ECP (12.27).

NOTE 1—The most common case is that a single VSI is associated with each DRP.

The C-VLAN component of an EVB Bridge has two types of Ports. Each C-VLAN Bridge Port is externally accessible and does not provide any EVB capabilities. No special EVB objects are used to manage the C-VLAN Bridge Ports. Each SBP attaches to a LAN that can be externally accessible or attach through an internal LAN to a CAP of an S-channel. SBPs are managed using the SBP table. Each SBP table entry identifies a single SBP within the system and allows configuration and monitoring of LLDP and VDP for the SBP (12.26.2). For each SBP there is also a ECP table entry that allows configuration and monitoring of ECP (12.27).

Within each EVB station and EVB Bridge, a table holding the VSIs allows monitoring of the active VSIs (12.26.3). VSI table entries are keyed on the VSI Instance Identifier (VSIID) and the URP's or SBP's ComponentID and Port Number. During the movement of VSIs within the DCN it is possible to have a transient condition where the same VSIID exists at two locations. When these two instances are at the same URP or SBP, they are indistinguishable and therefore the table holds only the state for the most recent VSI command; however, when the movement is between different URPs or SBPs, the table will hold two copies of the same VSIID differentiated by the ComponentID and Port Number of the URPs or SBPs.

NOTE 2—In the case where a VSI is migrated between DRPs of the same ER, there is no reason to de-associate, as the table does not maintain any state that identifies the DRP of the ER to which the VSI is attached.

An association is identified by its URP and VSIID. If an association is established for a VSI, and a new association is established on the same URP for the same VSIID, then the new association replaces the old one. A subsequent de-association for that VSIID will remove the current association, regardless of the parameters.

In EVB systems supporting S-channels, the optional UAP table and S-channel interface table are used to configure and control the Port-mapping S-VLAN components and CDCP protocol (12.26.4).

Each ISS that is bound to an Uplink Access Port (UAP) automatically has a Port-mapping S-VLAN component with a default S-channel (using S-VID 1). Each S-channel is identified by the ISS Port Number of the UAP and the S-VID, for SBPs, or SCID, for URPs, identifying the S-channel. The default S-channel carries all the un-S-tagged traffic that traverses the Port-mapping S-VLAN component.

In an EVB Bridge system, S-channels are automatically connected to SBPs when the S-Channel is created. If the S-channel is the default S-channel, it is connected to the SBP with the same Port Number as the ISS bound to the UAP. If the S-channel is not the default S-channel, a new SBP is allocated to the S-channel (which has a Port Number different from any ISS Port Number where a UAP or C-VLAN Bridge Port could be bound) and connected to the CAP through an internal LAN (6.14). With CDCP enabled and operating in

the ‘B’ role, the S-channel interface table entries are automatically created (deleted) by CDCP to fill requests from the peer CDCP operating the ‘S’ role.

In an EVB station, S-channels are connected to URPs by the operating system. The URP Port Numbers are not reserved, so the UAP’s ISS Port Number may not be the same as the URP Port Number. The operating system is not required to automatically attach each S-channel to a URP; however, it can if it chooses. The URP Port Numbers have no restrictions beyond the normal requirement that every relay port be uniquely identified in the EVB system by a ComponentID and Port Number pair. With CDCP enabled and operating in the ‘S’ role, CDCP uses the S-channel interface table to build requests for creating (deleting) S-channels from the peer CDCP operating in the ‘B’ role and enables these S-channels after the peer grants an S-VID for use by the S-channel.

Management of the UAP, Port-mapping S-VLAN component and CDCP is achieved through the UAP table (12.26.4.1). The management of CAPs and their LAN attachments is accomplished by the S-channel interface table entries (12.26.4.2). A UAP table entry along with the Port-mapping S-VLAN creation rules specified in 12.26.4 are sufficient to manage the Port-mapping S-VLAN component. The Bridge managed objects in 12.4 through 12.12 can optionally be used, in addition to the objects of 12.26.4, to manage the Port-mapping S-VLAN components.

The following managed objects, illustrated in Figure 12-4 and Figure 12-5, define the semantics of the management operations specific to EVB Bridges and stations:

- a) The EVB system base managed object (12.26.1);
- b) The SBP table entry managed object (12.26.2);
- c) The VSI table entry managed object (12.26.3);
- d) The MAC/VID pair table entry managed object (12.26.3);
- e) The UAP table entry managed object (12.26.4);
- f) The S-channels interface table entry managed object (12.26.4);
- g) The URP table entry managed object (12.26.5).

12.26.1 EVB system base table

An instance of the EVB system base table (Table 12-17) can be implemented by an EVB Bridge or EVB station. It comprises the identifiers for an EVB system (40) and system-wide default parameters used to support EVB services (D.2.13, 6.6.5), VSI discovery (42.2), and ECP (43.3).

Table 12-17—EVB system base table

Name	Data type	Operations supported*	Conformance [†]	References
evbSysType	enumerated {sysB, sysS}	R	BE	5.22, 5.23
evbSysNumExternalPorts	unsigned [1...4095]	R	BE	12.4.2, 12.5.1
evbSysEvbLldpTxEnable	Boolean	RW	BE	D.2.13
evbSysEvbLldpManual	Boolean	RW	BE	D.2.13
evbSysEvbLldpGidCapable	Boolean	RW	BE	D.2.13

Table 12-17—EVB system base table (continued)

Name	Data type	Operations supported [*]	Conformance [†]	References
evbSysEcpDfltAckTimerInit	timer exp	RW	BE	D.2, 43.3.6.1
evbSysEcpDfltMaxTries	unsigned [0...7]	RW	BE	D.2, 43.3.7.4
evbSysVdpDfltRsrcWaitDelay	timer exp	RW	BE	D.2.13, 41.5.5.7
evbSysVdpDfltReinitKeepAlive	timer exp	RW	BE	D.2.13, 41.5.5.5

^{*}R = Read-only access; RW = Read/Write access[†]B = Required for an EVB Bridge system; E = Required for an EVB station system

The management operations that can be performed on an EVB system table entry are as follows:

- Read EVB system table entry;
- Update EVB system table entry.

12.26.1.1 System identifiers

The evbSysType identifies the system type. The enumerated types for evbSysType are

- sysB—EVB Bridge;
- sysS—EVB station.

12.26.1.2 System defaults for EVB

The parameters evbSysEvpLldpTxEnable and evbSysEvpLldpManual are used to initialize the LLDP EVB objects for new SBPs and URPs. When evbSysLldpTxEnable is TRUE, a new SBP or URP will place the local EVB objects in the LLDP nearest Customer database; when FALSE, a new SBP or URP will not place the local EVB objects in the LLDP database. When evbSysLldpManual is FALSE, the operating configuration will be determined by the comparison between the local and remote LLDP EVB objects (automatic), regardless of the setting of evbSysLldpTxEnable. When evbSysLldpManual is TRUE, the configuration will be determined by the setting of the local EVB objects only (manual).

The evbSysLldpGidCapable parameter indicates if the port is capable of processing GroupIDs. GroupIDs can be used if both the EVB Bridge and EVB station indicate they are capable by setting the EVB LLDP object for GroupID capable to TRUE. On an EVB Station this means the station can provide GroupIDs rather than VIDs in VDP requests and accept VIDs in response from the EVB Bridge. On an EVB Bridge this means the Bridge can provide a VID corresponding to the GroupID provided by the EVB station.

The default value for evbSysEcpDfltAckTimerInit is 14, which provides a time of 164 msec. Systems are not required to implement smaller times and can reject requests to set the timers to small times, however are required to implement 14 and above to allow fall back to the longest time proposed by the EVB Bridge or EVB station.

The default value for `evbSysVdpDfltRsrcWaitDelay` and `evbSysVdpDfltReinitKeepAlive` is system dependant. All systems support the values of 20 and above, which provide times of 10.5 seconds and greater. Systems are not required to implement smaller times and can reject requests to set the timers to small times; however, systems are required to implement 20 and above to allow fall back to the longest time proposed by the EVB Bridge or EVB station.

Table 12-18 shows how the system defaults are used to initialize the parameters in the SBP, URP, and ECP table entries.

Table 12-18—EVB system parameter defaults

System parameter	Default value	LLDP, SBP, URP, ECP entry parameter
<code>evbSysEvpLldpTxEnable</code>	TRUE	LLDP Transmit Enable
<code>evbSysEvpLldpManual</code>	FALSE	<code>sbpLldpManual</code> , <code>urpLldpManual</code>
<code>evbSysEvpLldpGidCapable</code>	system dependant	LLDP GID Capable
<code>evbSysEcpDfltAckTimerInit</code>	14, for 164 milliseconds	<code>ecpAdminAckTimerInit</code>
<code>evbSysEcpDfltMaxTries</code>	3	<code>ecpAdminMaxTries</code>
<code>evbSysVdpDfltRsrcWaitDelay</code>	system dependant	<code>sbpVdpAdminRsrcWaitDelay</code> , <code>urpVdpAdminRsrcWaitDelay</code>
<code>evbSysVdpDfltReinitKeepAlive</code>	system dependant	<code>sbpVdpAdminReinitKeepAlive</code> , <code>urpVdpAdminReinitKeepAlive</code>

12.26.2 SBP table entry

SBP table entries may be created explicitly or implicitly as a result of creating an entry in the S-channel interface table. When an SBP table entry is created, the port type in the Port table entry (Table 12-2) changes to type ‘Station-facing Bridge Port’. When an SBP table entry is deleted, the Port table entry returns to type C-VLAN Bridge Port.

Whenever a new SBP table entry is created, a new entry is also created in the ECP table (12.27) keyed under the ComponentID and Port Number of the SBP. Whenever an SBP table entry is deleted, the corresponding entry in the ECP table is deleted.

The management operations that can be performed on an SBP table entry are as follows:

- Read SBP table entry;
- Update SBP table entry;
- Create SBP table entry;
- Delete SBP table entry.

Table 12-19—SBP table entry

Name	Data type	Operations supported [*]	Conformance [†]	References
sbpComponentID	ComponentID	R	B	12.4.1.5
sbpPortNumber	Port Number	R	B	12.4.2
sbpLldpManual	Boolean	RW	B	—
sbpVdpOperRsrcWaitDelay	timer exp	R	B	D.2.13, 41.5.5.7
sbpVdpOperReinitKeepAlive	timer exp	R	B	D.2.13, 41.5.5.5
sbpVdpOperToutKeepAlive	unsigned	R	B	D.2.13, 41.5.5.13

^{*}R = Read-only access; RW = Read/Write access[†]B = Required for an EVB Bridge system

12.26.3 VSI table entry

Each EVB system maintains a table of the active Virtual Station Interfaces. The structure of a VSI table entry is shown in Table 12-20. This read-only table provides the current operation parameters of each VSI along with the VDP state associated with the VSI. The table is keyed on the SBP's or URP's ComponentID and Port Number and on the VSIID. The operations that can be performed on the VSI table are

- a) Read entry for a ComponentID, Port Number and VSIID.

Each EVB Bridge or EVB station maintains a table of the VID/MACs on each Virtual Station Interface. This read-only table provides the current GroupID/VID/MAC assignments for each VSI. The operations that can be performed on the VSI table are

- b) Read entries for a ComponentID, Port Number and VSIID
- c) Read entries for a ComponentID and Port Number

Table 12-20—VSI table entry

Name	Data type	Operations supported [*]	Conformance [†]	References
evbVsiComponentID	ComponentID	R	BE	12.4.1.5
evbVsiPortNumber	Port Number	R	BE	12.4.2
evbVsiIDType	enumerated	R	BE	41.2.6, Table 41-5
evbVsiID	Latin1 String (SIZE(16))	R	BE	41.2.7
evbVsiTimeSinceCreate	time interval	R	BE	41
evbVsiVdpOperCmd	enumerated	R	BE	41.2.1, Table 41-1
evbVsiOperRevert	Boolean	R	BE	41.2.3
evbVsiOperHard	Boolean	R	BE	41.2.3
evbVsiOperReason	unsigned (0..15)	R	BE	41.2.3
evbVsiMgrID	Latin1 String (SIZE(1))	R	BE	41.1.3
evbVsiType	Latin1 String (SIZE(3))	R	BE	41.2.4
evbVsiTypeVersion	Latin1 String (SIZE(1))	R	BE	41.2.5
evbVsiMvFormat	Latin1 String (SIZE(1))	R	BE	41.2.8
evbVsiNumMACs	unsigned	R	BE	41.2.9
evbVdpMachineState	enumerated	R	BE	41.5.5.14
evbVdpCmdsSucceeded	counter	R	BE	41.5
evbVdpCmdsFailed	counter	R	BE	41.5
evbVdpCmdsReverts	counter	R	BE	41.5

^{*}R = Read-only access; RW = Read/Write access

[†]B = Required for an EVB Bridge system; E = Required for an EVB station system

Table 12-21—VSI MAC/VLAN table entry

Name	Data type	Operations supported [*]	Conformance [†]	References
evbMvComponentID	ComponentID	R	BE	12.4.1.5
evbMvPortNumber	Port Number	R	BE	12.4.2
evbMvVsiIDType	enumerated	R	BE	41.2.6, Table 41-5
evbMvVsiID	Latin1 String (SIZE(16))	R	BE	41.2.7
evbMvVsiGroupID	unsigned	R	BE	41.2.9
evbMvVsiVID	unsigned (1..4094)	R	BE	41.2.9
evbMvVsiMAC	MAC Address	R	BE	41.2.9

^{*}R = Read-only access; RW = Read/Write access

[†]B = Required for an EVB Bridge system; E = Required for an EVB station system

12.26.4 S-channel configuration and management

The S-channel managed objects are not required unless the system implements S-channels.

Creating an UAP table entry (40.2) causes a Port-mapping S-VLAN component (15.6) to be instantiated and sets the portType parameter of the Port table entry (12.4.2) to type 'Uplink Access Port'. The Port-mapping S-VLAN component automatically includes a default S-channel with one CAP that can attach to an SBP or a URP through an internal LAN (6.14). Each UAP is identified by the ISS Port Number where the UAP is attached. The default S-channel and CAP shall be identified by the S-VID 1 and SCID 1.

12.26.4.1 UAP table entry

The management operations that can be performed on the UAP table entry (Table 12-22) managed object are as follows:

- Read UAP table entry;
- Update UAP table entry;
- Create UAP table entry;
- Delete UAP table entry.

Table 12-22—UAP table entry

Name	Data type	Operations supported [*]	Conformance [†]	References
uapISSPortNumber	Port Number	R	BE	12.4.2, 12.5.1
uapComponentID	ComponentID	R	be	12.4.1.5
uapPortNumber	Port Number	R	be	12.4.2
uapSchCdcAdminEnable	Boolean	RW	BE	42.4.2
uapSchCdcAdminRole	enumerated	RW	BE	42.4.2
uapSchCdcAdminChnCap	unsigned [1...167]	RW	BE	42.4.1
uapSchCdcOperChnCap	unsigned [1...167]	R	BE	42.4.8
uapSchAdminCdcSvidPoolLow	unsigned [0,2...4094]	RW	BE	42.4.7
uapSchAdminCdcSvidPoolHigh	unsigned [0,2...4094]	RW	BE	42.4.7
uapSchOperState	enumerated	R	BE	42.4.15
uapSchCdcRemoteEnabled	Boolean	R	BE	42.4.14
uapSchCdcRemoteRole	enumerated	R	BE	42.4.12

^{*}R = Read-only access; RW = Read/Write access

[†]B = Required for an EVB Bridge system; E = Required for an EVB station system; b = Optional for an EVB Bridge system; e = Optional for an EVB station system

Table 12-23—UAP table entry parameters

UAP table name	Default values
uapSchCdcPAdminEnable	TRUE
uapSchCdcPAdminRole	schS if EVB station and schB if EVB Bridge
uapSchCdcPAdminChnCap	1
uapSchAdminCdcPSvidPoolLow	0
uapSchAdminCdcPSvidPoolHigh	0

The available SVIDs determined by the range of uapSchAdminCdcPSvidPoolLow and uapSchAdminCdcPSvidPoolHigh limit the S-channel capacity indicated by uapSchCdcPAdminChnCap to the available SVIDs plus one for the default S-channel. If the capacity is greater than the VID range plus one, then the VID range overrides the capacity (i.e., the actual capacity is never bigger than the available VID range plus one).

12.26.4.2 S-channel interface table entry

The S-channel interface table entry applies to each internal S-channel configured on an EVB Bridge or EVB station, as shown in Table 12-24. The management operations that can be performed on an S-channel interface table entry are as follows:

- Read S-channel interface table entry;
- Update S-channel interface table entry;
- Create S-channel interface table entry;
- Delete S-channel interface table entry.

If the S-channel interface table is being used with a UAP operating in the cdcP role, then the table is keyed on schUapISSPortNumber and schScid. If the S-channel interface table is being used with a UAP operating in the cdcB role, then the table is keyed on the schUapISSPortNumber and schSvid.

The schComponentID and schCapPortNumber refer to the Port-mapping S-VLAN component and the Port which may also be identified by the schISSPortNumber and S-VID (or SCID).

The schSbpOrUrpComponentID and schSbpOrUrpPortNumber are the ComponentID and Port Number of the attached SBP or URP.

Table 12-24—S-channel interface table entry

Name	Data type	Operations supported [*]	Conformance [†]	References
schUapISSPortNumber	Port Number	R	BE	12.4.2, 12.5.1
schScid	unsigned [1...4094]	R	bE	42.4.3
schSvid	unsigned [0...4094]	R	BE	42.4.3
schComponentID	ComponentID	R	be	42.1, 12.4.1.5
schCapPortNumber	Port Number	R	be	42.1, 12.4.2
schSbpOrUrpComponentID	ComponentID	RW	BE	12.4.1.5
schSbpOrUrpPortNumber	Port Number	RW	BE	12.4.2

^{*}R = Read-only access; RW = Read/Write access

[†]B = Required for an EVB Bridge system; E = Required for an EVB station system;

b = Optional for an EVB Bridge system; e = Optional for an EVB station system

12.26.5 Edge relay management

Edge relays can be built dynamically or statically within an EVB station. Each edge relay is assigned a ComponentID that is unique for the EVB station system. An edge relay always has a single Uplink Relay Port (URP) that exists as long as the edge relay exists. The Downlink Relay Ports (DRPs) of an edge relay may be built either along with the edge relay or on demand.

12.26.5.1 URP table entry

When a URP table entry is created, a corresponding Component table entry is created for the edge relay along with a Port table entry for the URP. When a URP table entry is deleted, the corresponding Component table entry is deleted along with the corresponding Port table entry.

When each URP table entry is created, a corresponding entry is created in the ECP table (12.27) and keyed under the ComponentID and Port Number of the URP. Whenever a URP table entry is deleted, the corresponding entry in the ECP table is deleted.

The management operations that can be performed on the URP table entry (Table 12-25) managed object are as follows:

- a) Read URP table entry;
- b) Update URP table entry;
- c) Create URP table entry;
- d) Delete URP table entry.

Table 12-25—URP table entry

Name	Data type	Operations supported*	Conformance†	References
urpComponentID	ComponentID	R	E	12.4.1.5
urpPortNumber	Port Number	R	E	12.4.2
urpBindToISSPortNumber	unsigned [0...4095]	RW	e	12.5.1
urpLldpManual	Boolean	RW	E	
urpVdpOperRsrcWaitDelay	timer exp	R	E	D.2.13, 41.5.5.7
urpVdpOperRespWaitDelay	unsigned	R	E	D.2.13, 41.5.5.9
urpVdpOperReinitKeepAlive	timer exp	R	E	D.2.13, 41.5.5.5

*R = Read-only access; RW = Read/Write access

†E = Required for an EVB station system; e = Optional for an EVB station system

12.27 Edge Control Protocol management

12.27.1 ECP table entry

The management operations that can be performed on the ECP table entry managed object are as follows:

- a) Read ECP table entry.

ECP table entries are created or deleted implicitly as a result of the creation or deletion of other port objects.

Table 12-26—ECP table entry

Name	Data type	Operations supported [*]	Conformance [†]	References
ecpComponentID	ComponentID	R	BE	12.4.1.5
ecpPortNumber	Port Number	R	BE	12.4.2
ecpOperAckTimerInit	timer exp	R	BE	D.2.13, 43.3.7.1
ecpOperMaxTries	unsigned [0...7]	R	BE	D.2.13, 43.3.7.4
ecpTxFrameCount	counter	R	BE	43
ecpTxRetryCount	counter	R	BE	43
ecpTxFailures	counter	R	BE	43
ecpRxFrameCount	counter	R	BE	43

^{*}R = Read-only access; RW = Read/Write access

[†]B = Required for an EVB Bridge system; E = Required for an EVB station system

17. Management protocol

17.2 Structure of the MIB

Insert the following new row at the end of Table 17-1:

Table 17-1—Structure of the MIB modules

IEEE8021-EVB-MIB	17.7.20	802.1Qbg	5.22, 5.23	Initial version in IEEE Std 802.1Qbg
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17.2.2 Structure of the IEEE8021-Bridge MIB

Insert the following new rows at the end of Table 17-3:

Table 17-3—IEEE8021-BRIDGE MIB structure and relationship to IETF RFC 4188 and this standard

ieee8021BridgePortTable		12.5.1
	ieee8021BridgePhyPort	
	ieee8021BridgePhyIfIndex	
	8021BridgePhyMacAddress	
	ieee8021BridgePhyPortToComponentId	
	ieee8021BridgePhyPortToInternalPort	
ieee8021BridgeBaseIfToPortTable		17.3.2.2
	ieee8021BridgeBaseIfToPortComponentID	
	ieee8021BridgeBaseIfIndexPort	

Insert new subclause 17.2.20 as shown, following all existing subclauses of 17.2, renumbering as necessary:

17.2.20 Structure of the IEEE8021-EVB MIB

The IEEE8021-EVB MIB provides objects to configure and manage an EVB station system or EVB Bridge system. Objects in this MIB module are arranged into subtrees. Each subtree is organized as a set of related objects. Where appropriate, the corresponding Clause 12 management reference is also included. Table 17-26 indicates the structure of the IEEE8021-EVB MIB module.

Table 17-26—EVB MIB structure and object cross reference

MIB table	MIB object	References
ieee8021BridgeEvbNotifications subtree		
ieee8021BridgeEvbObjects subtree		
ieee8021BridgeEvbSys		12.26.1
	ieee8021BridgeEvbSysType	
	ieee8021BridgeEvbSysNumExternalPorts	
	ieee8021BridgeEvbSysEvbLldpTxEnable	
	ieee8021BridgeEvbSysEvbLldpManual	
	ieee8021BridgeEvbSysEvbLldpGidCapable	
	ieee8021BridgeEvbSysEcpAckTimer	
	ieee8021BridgeEvbSysEcpMaxRetries	
	ieee8021BridgeEvbSysVdpDfltRsrcWaitDelay	
	ieee8021BridgeEvbSysVdpDfltReinitKeepAlive	
ieee8021BridgeEvbSbpTable		12.26.2
	ieee8021BridgeEvbSbpComponentID	
	ieee8021BridgeEvbSbpPortNumber	
	ieee8021BridgeEvbSbpLldpManual	
	ieee8021BridgeEvbSbpVdpOperRsrcWaitDelay	
	ieee8021BridgeEvbSbpVdpOperReinitKeepAlive	
	ieee8021BridgeEvbSbpVdpOperToutKeepAlive	
	ieee8021BridgeEvbSbpRowStatus	
ieee8021BridgeEvbVsiDbTable		12.26.3
	ieee8021BridgeEvbVsiComponentID	
	ieee8021BridgeEvbVsiPortNumber	
	ieee8021BridgeEvbVsiID	
	ieee8021BridgeEvbVsiTimeSinceCreate	
	ieee8021BridgeEvbVsiVdpOperCmd	
	ieee8021BridgeEvbVsiOperRevert	
	ieee8021BridgeEvbVsiOperHard	
	ieee8021BridgeEvbVsiOperReason	
	ieee8021BridgeEvbVsiMgrID	
	ieee8021BridgeEvbVsiType	
	ieee8021BridgeEvbVsiTypeVersion	

Table 17-26—EVB MIB structure and object cross reference (continued)

MIB table	MIB object	References
	ieee8021BridgeEvbVsiMvFormat	
	ieee8021BridgeEvbVsiNumMACs	
	ieee8021BridgeEvbVDPMachineState	
	ieee8021BridgeEvbVDPCommandsSucceeded	
	ieee8021BridgeEvbVDPCommandsFailed	
	ieee8021BridgeEvbVDPCommandReverts	
	ieee8021BridgeEvbVsiDbMacTable	12.26.3
	ieee8021BridgeEvbVsiComponentID	
	ieee8021BridgeEvbVsiPortNumber	
	ieee8021BridgeEvbVsiID	
	ieee8021BridgeEvbGroupID	
	ieee8021BridgeEvbVsiMac	
	ieee8021BridgeEvbVsiVlanId	
	ieee8021BridgeEvbUapConfigTable	12.26.4.1
	ieee8021BridgePort	
	ieee8021BridgeEvbUapComponentId	
	ieee8021BridgeEvbUapPort	
	ieee8021BridgeEvbUapConfigIfIndex	
	ieee8021BridgeEvbUapCdcAdminEnable	
	ieee8021BridgeEvbUapAdminCdcRole	
	ieee8021BridgeEvbUapAdminCdcChanCap	
	ieee8021BridgeEvbUapOperCdcChanCap	
	ieee8021BridgeEvbUapAdminCdcSVIDPoolLow	
	ieee8021BridgeEvbUapAdminCdcSVIDPoolHigh	
	ieee8021BridgeEvbUapOperState	
	ieee8021BridgeEvbUapCdcRemoteEnabled	
	ieee8021BridgeEvbUapCdcRemoteRole	
	ieee8021BridgeEvbUapConfigRowStatus	
	ieee8021BridgeEvbCapConfigTable	12.26.4.2
	ieee8021BridgeBridgePort	
	ieee8021BridgeEvbCapSchID	
	ieee8021BridgeEvbCapComponentId	
	ieee8021BridgeEvbCapIfIndex	

Table 17-26—EVB MIB structure and object cross reference (continued)

MIB table	MIB object	References
	ieee8021BridgeEvbCapPortNumber	
	ieee8021BridgeEvbCapSChannelID	
	ieee8021BridgeEvbCapAssociateSbpOrUrpCompID	
	ieee8021BridgeEvbCapAssociateSbpOrUrpPort	
	ieee8021BridgeEvbCapRowStatus	
ieee8021BridgeEvbUrpTable		12.26.5
	ieee8021BridgeEvbUrpComponentID	
	ieee8021BridgeEvbUrpPort	
	ieee8021BridgeEvbUrpIfIndex	
	ieee8021BridgeEvbUrpBindToIssPort	
	ieee8021BridgeEvbUrpLldpManual	
	ieee8021BridgeEvbUrpVdpOperRsrcWaitDelay	
	ieee8021BridgeEvbUrpVdpOperRespWaitDelay	
	ieee8021BridgeEvbUrpVdpOperReinitKeepAlive	
	ieee8021BridgeEvbUrpRowStatus	
ieee8021BridgeEvbEcpTable		12.27.1
	ieee8021BridgeEvbEcpComponentID	
	ieee8021BridgeEvbEcpPort	
	ieee8021BridgeEvbEcpOperAckTimerInit	
	ieee8021BridgeEvbEcpOperMaxTries	
	ieee8021BridgeEvbEcpTxFrameCount	
	ieee8021BridgeEvbEcpTxRetryCount	
	ieee8021BridgeEvbEcpFailures	
	ieee8021BridgeEvbEcpRxFrameCount	
ieee8021BridgeEvbConformance subtree		
ieee8021BridgeEvbGroups		
	ieee8021BridgeEvbSysGroup	
	ieee8021BridgeEvbSbpConfigGroup	
	ieee8021BridgeEvbVsiDbGroup	
	ieee8021BridgeEvbUapConfigGroup	
	ieee8021BridgeEvbCapConfigGroup	