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Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements —

Part 1Q: Bridges and bridged networks

AMENDMENT 5: Enhancements to bridging of IEEE 802.11 media

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux locaux et métropolitains — Exigences spécifiques —

Partie 1Q: Ponts et réseaux pontés

AMENDEMENT 5: Améliorations en vue de ponter les supports IEEE 802.11

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IEEE Std 802.1Qbz™-2016
(Amendment to
IEEE Std 802.1Q™-2014)

IEEE Standard for
Local and metropolitan area networks—

Bridges and Bridged Networks—Amendment 27: Enhancements to Bridging of IEEE 802.11 Media

Sponsor

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Abstract: Protocols, procedures, and managed objects to allow IEEE 802.11 media to provide internal connections within bridged networks, as well as access to bridged networks, are provided in this amendment.

Keywords: amendment, IEEE 802.1Q™, IEEE 802.11™, LANs, local area networks, MAC Bridges, transparent bridging, VLANs, Wi-Fi, wireless

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IEEE Std 802.1Qbz-2016
IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks—
Amendment 27: Enhancements to Bridging of IEEE 802.11 Media

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Introduction

This introduction is not part of IEEE Std 802.1Qbz-2016, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—Amendment 27: Enhancements to Bridging of IEEE 802.11 Media.

This amendment to IEEE Std 802.1Q-2014 specifies protocols, procedures, and managed objects to allow IEEE 802.11 media to provide internal connections within bridged networks, as well as access to bridged networks.

MAC Bridges, as specified by this standard, allow the compatible interconnection of information technology equipment attached to separate individual LANs.

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

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IEEE Standard for
Local and metropolitan area networks—

Bridges and Bridged Networks—

Amendment 27: Enhancements to Bridging of IEEE 802.11 Media

(This amendment is based on IEEE Std 802.1Q™-2014 as amended by IEEE Std 802.1Qbv-2015 and IEEE Std 802.1Qbu-2016.)

NOTE—The editing instructions contained in this amendment define how to merge the material contained here into the base document and its other amendments to form the new comprehensive standard.

Editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed either by using ~~strikethrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.[1]

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

1. Overview

1.3 Introduction

Insert the following at end of subclause 1.3, relettering the bullet points so that they follow in order from those in the existing text.

by) Provide for the use of IEEE 802.11 media as links internal to, as well as links providing access to, a Bridged Network or Virtual Bridged Network.

3. Definitions

Insert the following definitions in the appropriate collating sequence and renumber appropriately:

3.x1 EtherType Protocol Discrimination (EPD): A method for identifying the protocol contained in a frame in which the first two octets are an EtherType. See Clause 9 of IEEE Std 802-2014.

3.x2 LLC Protocol Discrimination (LPD): A method for identifying the protocol contained in a frame in which the first three or four octets are a destination LSAP, a source LSAP, and one or two Control octets. See Clause 9 of IEEE Std 802-2014.

4. Abbreviations

Insert the following definitions in the appropriate collating sequence and reorder appropriately:

EPD EtherType Protocol Discrimination

LPD Logical Link Control (LLC) Protocol Discrimination

6. Support of the MAC Service in VLANs

Insert the following new subclause at the end of Clause 6:

6.22 PDU and protocol discrimination and media

As described more fully in Clause 9 of IEEE Std 802-2014, there are two methods that can be used to identify the format of the data parameter passed to or from a specific MAC procedure (see Figure 6-1 and 6.7), using the first few octets of the data parameter:

a) LLC protocol discrimination (LPD) uses a three- or four-octet string consisting of destination and source Logical Service Access Point identifiers (LSAPs) and one or two Control octets (see ISO/IEC 8802-2).
b) EtherType protocol discrimination (EPD) uses a two-octet EtherType.

LLC media (e.g., IEEE 802.11) employ LPD as the initial discriminant in a data parameter. The first three or four octets of the data parameter are the LSAP and Control octets. Specific values of those octets can be used to indicate the use of EPD, following the LSAP and Control octets, to identify the data format.

Length/Type media (e.g., IEEE 802.3) have a Length/Type field in the first two octets of the data parameter. Depending on the value of the Length/Type field (see IEEE Std 802.1AC), the Length/Type field is either an EtherType (i.e., EPD), or is a Length followed immediately by the LSAPs and Control octets (i.e., a Length and LPD).

The first two octets of an ISS mac_service_data_unit parameter are always a Length/Type, whether that instance of the ISS has a underlying physical medium or not, and whether that physical medium is an LLC medium or a Length/Type medium. If required by the underlying medium, a Media Access Method Dependent Convergence Function performs the necessary format translations. See Clause 13 of IEEE Std 802.1AC-2016.

NOTE—The encoding of tagged frames on LLC media, e.g., an IEEE Std 802.11 frame containing a VLAN Tag (Clause 9), has been clarified from previous revisions of IEEE Std 802.1Q. See G.3.

7. Principles of network operation

7.5 Locating end stations

Insert a new paragraph following NOTE 1:

As specified in 13.6.2 of IEEE Std 802.1AC-2016, a Bridge with a Point-to-Multipoint Network port (PMPN, G.4.2, G.4.3) can detect when an attached PMPN node establishes or breaks a connection to another PMPN node.

9. Tagged frame format

Change 9.4 as follows:

9.4 Tag Protocol Identifier (TPID) format

The TPID includes an EtherType value that is used to identify the frame as a tagged frame and to select the correct tag decoding functions. Such an EtherType is known as the Tag EtherType. The TPID is EtherType encoded, i.e., is two octets in length and contains only the assigned EtherType value.

~~Where the ISS instance used to transmit and receive tagged frames is provided by a media access control method that can support EtherType encoding directly (e.g., is an IEEE 802.3 MAC) or is media access method independent (e.g., 6.8), the TPID is EtherType encoded, i.e., is two octets in length and comprises solely the assigned EtherType value.~~

~~Where the ISS instance is provided by a media access method that cannot directly support EtherType encoding (e.g., is an IEEE 802.11 MAC) the TPID is encoded according to the rule for a Subnetwork Access Protocol (Clause 10 of IEEE Std 802) that encapsulates Ethernet frames over LLC, and comprises the SNAP header (AA-AA-03) followed by the SNAP PID (00-00-00) followed by the two octets of the assigned EtherType value.~~

13. Spanning Tree Protocols

13.18 Managing spanning tree topologies

Add the following paragraph at the end of subclause 13.18:

There exist media for which it is difficult to define a Link Speed. This includes, for example, Ethernet-over-packet-network technologies, where the frames are carried over a layer 3 best-effort network. Another example is IEEE 802.11 wireless media, where the effective bandwidth is shared among stations operating at different speeds, all varying on short timescales. Individual media specifications provide values for Link Speed suitable for use with Table 13-1 to determine a Port Path Cost.

21. Encoding of CFM PDUs

Change subclause 21.2 as follows:

21.2 CFM encapsulation

The means for identifying CFM PDUs ~~depend on the medium. For media using a Length/Type field, e.g., IEEE 802.3 media, the identification~~ consists of two octets containing the EtherType value shown (in hexadecimal notation) in Table 21-1. ~~Media requiring an LLC encapsulation (e.g., IEEE 802.11) use the SNAP encoding shown (in hexadecimal notation) in Table 21-2.~~

Change the title of Table 21-1 as follows:

Table 21-1—CFM PDU Encapsulation~~: Length/Type Media~~

Delete Table 21-2 and renumber remainder of tables in Clause 21 as necessary.

23. MAC status propagation

23.13 MSPDU transmission, addressing, and protocol identification

23.13.4 EtherType use and encoding

Change subclause 23.13.4 as follows (the table is unchanged):

All MSPDUs are identified by the EtherType specified in Table 23-3.

~~Where an individual LAN MAC supports direct encoding of EtherTypes (as does IEEE Std 802.3, for example) the LLC entity shall encode the MSP EtherType as the first two octets of the MPDU. Otherwise (for IEEE Std 802.11, for example) the MSP EtherType shall be encoded in the initial octets of the MPDU according to the procedures specified in IEEE Std 802 for Subnetwork Access Protocols (SNAP).~~

~~NOTE—The SNAP discriminator comprises the octets AA-AA-03-00-00-00 prepended to the MSP EtherType.~~

33. Encoding of congestion notification PDUs

33.2 Congestion Notification Tag format

Change subclause 33.2 as follows (footnote is unchanged):

The means for identifying Congestion Notification Tag PDUs ~~depend on the medium. For media using a Length/Type field, e.g., IEEE 802.3 media, the identification~~ consists of two octets containing the EtherType value shown (in hexadecimal notation) in ~~Table 33-3~~Table 33-1. ~~Media requiring an LLC encapsulation (e.g., IEEE 802.11) use the SNAP encoding shown (in hexadecimal notation) in Table 33-4.~~

In a VLAN-aware Bridge, the shim that supports the Enhanced Internal Sublayer Service (6.1, 6.8, also see Figure 22-4) is below the Queuing shim (8.6.6, 8.6.7, 8.6.8, 31.1.1). The CN-TAG is examined by the CP, which is part of the Queuing shim. Therefore, the CN-TAG will be further from the source_address and destination_address fields, and closer to the end of the frame, than a VLAN tag added by 6.8, if any. In order for a bridge to be able to recognize the CN-TAG in a data frame, an end station shall insert the CN-TAG and VLAN tag in the relative order required by a bridge: addresses, VLAN tag, CN-TAG, data.

Change the title of Table 33-1 as follows:

Table 33-1—Congestion Notification Tag Encapsulation~~: Length/Type Media~~

Delete Table 33-2 and renumber remainder of tables in Clause 33 as necessary.

33.3 Congestion Notification Message

Change subclause 33.3 as follows:

The means for identifying Congestion Notification Message PDUs ~~depend on the medium. For media using a Length/Type field, e.g., IEEE 802.3 media, the identification~~ consists of two octets containing the EtherType value shown (in hexadecimal notation) in Table 33-3. ~~Media requiring an LLC encapsulation (e.g., IEEE 802.11) use the SNAP encoding shown (in hexadecimal notation) in Table 33-4.~~

Change the title of Table 33-3 (to be renumbered 33-2) as follows:

Table 33-2—Congestion Notification Message Encapsulation~~: Length/Type Media~~

Delete Table 33-4 and renumber remainder of tables in Clause 33 as necessary.