Proposed changes to IEEE P802.1Q-Rev/D0.2 to resolve WG Ballot Comments #21, #22, #23, and #24 related to EPD and LPD

Roger Marks (after revision in Maintenance TG Ad Hoc meeting)
2020-11-06

4. Abbreviations

~~EPD EtherType Protocol Discrimination~~
~~LPD Logical Link Control (LLC) Protocol Discrimination~~

~~3.87 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.~~

~~3.128 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.~~

6.22 PDU and protocol discrimination and media

As described more fully in Clause 9 of IEEE Std 802-2014 [B6], ~~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) is identified, using the first few octets of the ~~data parameter~~MSDU,~~:~~

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

~~b) EtherType protocol discrimination (EPD) uses~~

by either source and destination LLC addresses or a two-octet EtherType.

~~LLC media (e.g., many uses of 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)~~ networks have a Length/Type field in the first two octets of the ~~data parameter~~MSDU (e.g., IEEE Std 802.3). 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)~~.

Networks that do not use a Length/Type field in the MSDU (e.g., some applications of IEEE Std 802.11) can implement a Media Access Method Dependent Convergence Function to perform

any necessary translations from Length/Type-encoded protocol identifiers. See Clause 13 of IEEE Std 802.1AC-2016 [B9].

~~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 [B9].~~

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

C.3.3.1 MSRPDU Encapsulation/De-encapsulation

In order to preserve the priority of an MSRPDU when traversing through an IEEE 802.11 ~~LPD~~ network not using a Length/Type field in the MSDU, the priority shall be encapsulated while the MSRPDU is in the IEEE 802.11 network and shall be de-encapsulated as it exits. See IEEE Std 802.11 for additional information.

NOTE—For example, if the priority of the MSRPDU is 4, DEI=0 and VID = 1893, the equivalent VLAN tag field (32 bits) is 81-00-87-65. When the frame enters the IEEE 802.11 ~~LPD~~ network, the encapsulated 802.11 LLC header is AA-AA-03-00-00-00-81-00-87-65-08-00, where AA-AA-03-00-00-00-81-00-87-65 is the SNAP encoded VLAN header. When the frame exits the IEEE 802.11 ~~LPD~~ network, a de-encapsulation operation is performed and the resulting VLAN tag field is 81-00-87-65.

G.3 Tag insertion and removal for LLC media

In IEEE Std 802.1Q-2014 and all previous revisions of ~~IEEE Std 802.1D and~~ IEEE Std 802.1Q, the method of inserting and deleting tags ~~on media employing Logical Link Control protocol discrimination (LPD, e.g., IEEE 802.5 or many uses of IEEE 802.11) is similar, except for the actual format of the Tag Protocol Identifier (TPID), to that used on media employing a is~~was independent of whether a Length/Type field ~~to distinguish between LPD and EtherType protocol discrimination (EPD), e.g., IEEE 802.3~~is used for protocol identifier encoding.~~ That is~~In ~~either case, the~~ The tag ~~is~~ was inserted into or deleted from the first octets of the mac_service_data_unit and the remainder of the mac_service_data_unit ~~is~~ was unchanged.

~~The~~ This deletion/insertion method ~~above does~~did not provide for ~~easy~~ interoperability between VLAN-aware end stations ~~stations on IEEE 802.11 LPD media and VLAN-aware end stations on IEEE 802.3 media~~where only one used a Length/Type field to encode protocol identifiers. It specifie~~d~~s that~~, on an IEEE 802.11 LPD end station, the LPD/~~ the station on the LLC media used a SNAP encoded VLAN tag ~~is~~ followed by a~~n LPD/~~SNAP encoded data unit, whereas on the ~~IEEE 802.3 end station~~network using Length/Type, the ~~EPD~~ VLAN tag ~~is~~ was followed by an ~~EPD~~ EtherType ~~data unit~~protocol identifier. These multiple encodings require~~d~~ a bridge to translate both the VLAN tag and the ~~data unit~~ following protocol identifier~~between LPD and Length/Type when bridging a frame between the media~~, along with any other tags defined ~~to date or in the future~~previously or subsequently. ~~This not only requires additional processing by a Bridge, but should~~ Translation of the second and any subsequent protocol identifiers is impossible if the contents of the frame ~~be~~ are protected against modification or rendered confidential, as in the case of a frame ~~transmitted~~ protected by ~~the~~ MAC Security ~~Entity~~ (IEEE Std 802.1AE)~~ passing through a provider bridged network to a peer MAC Security Entity, it might be impossible to modify the contents of the frame, or indeed to determine their contents~~.

To avoid this problem, revisions of IEEE Std 802.1Q subsequent to 2014, and IEEE Std 802.1AC subsequent to 2012, specify that ~~the ISS and EISS invariably use~~ following the first protocol identifier, all subsequent protocol identifiers (if any) use Length/Type encoding. ~~The Media Access Method Convergence functions defined in IEEE Std 802.1AC describe the required mapping of the mac_service_data_unit.~~

~~Readers of this standard who have already encountered this interoperability issue will find this new specification a clarification, rather than a change. Note that this change to IEEE Std 802.1Q has no net effect, either on end stations or on Bridges, that are attached to Length/Type media networks such as those specified in IEEE 802.3.~~

The net result ~~of this change is~~ was that the expected format for a tagged frame ~~on LLC media~~without an initial Length/Type field ~~has~~ changed. For example, on LLC media, the first 18 octets of a VLAN-tagged SNAP-encoded ~~LPD frame~~ MSDU carrying an EtherType of 08-00

(hexadecimal) for the user data, priority 0, VLAN 123, was, in ~~previous~~ revisions previous to IEEE Std 802.1Q-2018:

AA-AA-03-00-00-00-81-00-01-23-AA-AA-03-00-00-00-08-00

and ~~now~~subsequently, is:

AA-AA-03-00-00-00-81-00-01-23-08-00

The underlined octets are no longer present. That is, on ~~an~~ LLC ~~medium~~media, ~~only the first tag, or the user data, if there are no tags, uses the LPD encoding. A~~all ~~subsequent~~ tags and protocol identifiers after the first ~~, and the user data, if there is at least one tag, is~~are Length/Type encoded. ~~The underlined octets are no longer present.~~

~~See IEEE Std 802.1AC for a more complete discussion of this topic.~~