1 This document contains suggested text to resolve comments regarding P802-REVc-d1.0.

2 3. Definitions, acronyms and abbreviations

3 3.1 Definitions

4 3.2 Acronyms and abbreviations

5 *The following are to be inserted in alphabetical order. The comment(s) that prompts the insertion is indi-*
6 *cated at the end of line and will not be put in the draft.*

7   DCN   data center networking (CID 80)
8   OMG   Object Management Group (CID 80)
9   TSN   time sensitive networking (CID 80)
10 UML   unified modeling language (CID 80)

11 5. Reference models (RMs)

12 5.3 Interconnection and networking

13 5.3.2 MAC-sublayer interconnection: Bridges

14 *Comment 80: Add "5.3.2.6 Time sensitive network Bridging" and "5.3.2.7 Data center network bridging"*
15 *renumbering current 5.3.2.6 to 5.3.2.8.*

16 5.3.2.6 Time sensitive networking (TSN)

17 TSN features are a set of protocols and mechanisms specified by IEEE 802 standards from which one can
18 select the mechanisms that are best suited to meet the needs of the applications supported by a given net-
19 work. These TSN mechanisms are add-ons to generic networking mechanisms in order to establish a com-
20 mon network that supports TSN Streams as well as other kinds of traffic. The goals of using TSN features
21 typically include providing guaranteed data transport with low and bounded latency, low and bounded delay
22 variation, and extremely low packet loss for TSN Streams. TSN features evolve and new capabilities are
23 added as part of IEEE 802 standardization efforts. Therefore, the following list is incomplete and just pro-
24 vides a snapshot of TSN features:

25 a)   Timing and Synchronization for Time-Sensitive Applications (IEEE Std 802.1AS-2020 [B1])
26 b)   Credit-Based Shaper: (IEEE Std 802.1Q-2022, 5.4.1.5)
27 c)   Frame Preemption (IEEE Std 802.3-2018 [B6] and IEEE Std 802.1Q-2022, 5.26)
28 d)   Scheduled Traffic (IEEE Std 802.1Q-2022, 8.6.8.4)
29 e)   Cyclic Queuing and Forwarding (IEEE Std 802.1Q-2022, 5.4.1.9)
30 f)   Asynchronous Traffic Shaping (IEEE Std 802.1Q-2022, 5.4.1.10)
31 g)   Per-Stream Filtering and Policing (IEEE Std 802.1Q-2022, 5.4.1.8)
32 h)   Frame Replication and Elimination for Reliability (IEEE Std 802.1CB-2017 [B3])
33 i)   Stream Reservation Protocol (IEEE Std 802.1Q-2022, clause 35.)
34 j)   Link-local Registration Protocol (IEEE Std 802.1CS-2020 [B5])
35 k)   Path Control and Reservation (IEEE Std 802.1Q-2022, 5.4.6)

l) TSN Configuration (IEEE Std 802.1Q-2022, 5.29)

m) Configuration Enhancements for Time-Sensitive Networking (IEEE Std 802.1Qdj-2023)

NOTE-There is no need to apply all the TSN features in a network and none of the TSN features are a requirement. The application area or actual deployment determine which TSN features are used in a given network, e.g., whether or not time synchronization is used. TSN profile standards, e.g., IEEE Std 802.1BA [B2] and IEEE Std 802.1CM [B4] select TSN features and give guidelines on their use in a particular application area.

5.3.2.7 Data center network bridging

The IEEE 802.1 Working Group provides a series of standards and Bridging enhancements for data center networking (DCN). A data center is a facility composed of compute and storage servers interconnected by a high bandwidth network and located in a small area, typically not exceeding 100 m in diameter. DCN standards target network congestion for data centers and data center network virtualization. The DCN features can provide networks free of congestion loss and support for in server virtualized networking for attachment of containers and virtual machines. DCN features evolve and new capabilities are added as part of IEEE 802 standardization efforts. Therefore, the following list is incomplete and just provides a snapshot of DCN features:

a) Congestion Notification (IEEE Std 802.1Q-2022, Clause 30, Clause 31, Clause 32, Clause 33)

b) Priority-based Flow Control (IEEE Std 802.1Q-2022, Clause 36)

c) Enhanced Transmission Selection (IEEE Std 802.1Q-2022, Clause 37)

d) Congestion Isolation (IEEE Std 802.1Qcz-2023)

e) Edge Virtual Bridging (IEEE Std 802.1Q-2022, Clause 40, Clause 41, Clause 42, Clause 43)

Sublclause 5.2.3.6 is now 5.2.3.8 with the changes shown to address CID 4, CID 37, CID 59, and CID 94

5.3.2.8 Bridging example

Some Bridges are used to interconnect access domains that each contain a very small number of end stations (often, a single end station). Other Bridges interconnect multiple access domains that contain principally other Bridges, thus forming a backbone for the bridged. These Bridges and links are referred to as an IEEE 802 backbone networks. Bridged IEEE 802 network configurations that involve these kinds of interconnection have become widespread as the technologies have developed. These configurations allow the construction of networks with much larger numbers of end stations and much higher aggregate throughput than was previously achievable.

Figure 1 illustrates an example of a bridged IEEE 802 network that can be configured with bridge-style interconnection. The Bridges A and B, and the IEEE 802.3 LAN configurations to which they attach, are typical of the older style of bridged IEEE 802 network in which a Bridge interconnects a small number of access domains, each containing many end stations, as is similar with K and, L and Mtheir IEEE 802.17™ ring. The IEEE 802.17 ring and the IEEE 802.3 connections to M and those between S and T and S and U form IEEE 802 backbone networks. On the other hand, the Bridges S, T, and U function as Bridges that combines IEEE 802.17, IEEE 802.3, and IEEE 802.16™ networks. S and M are is backbone Bridges on an IEEE 802 backbone network, handling a number of network attachments. T and U are Bridges that support multiple end stations, with connection to an IEEE 802 backbone network. B and K also provide access to an IEEE 802 backbone network. The end station shown connected to S by a point-to-point link could be a server system.
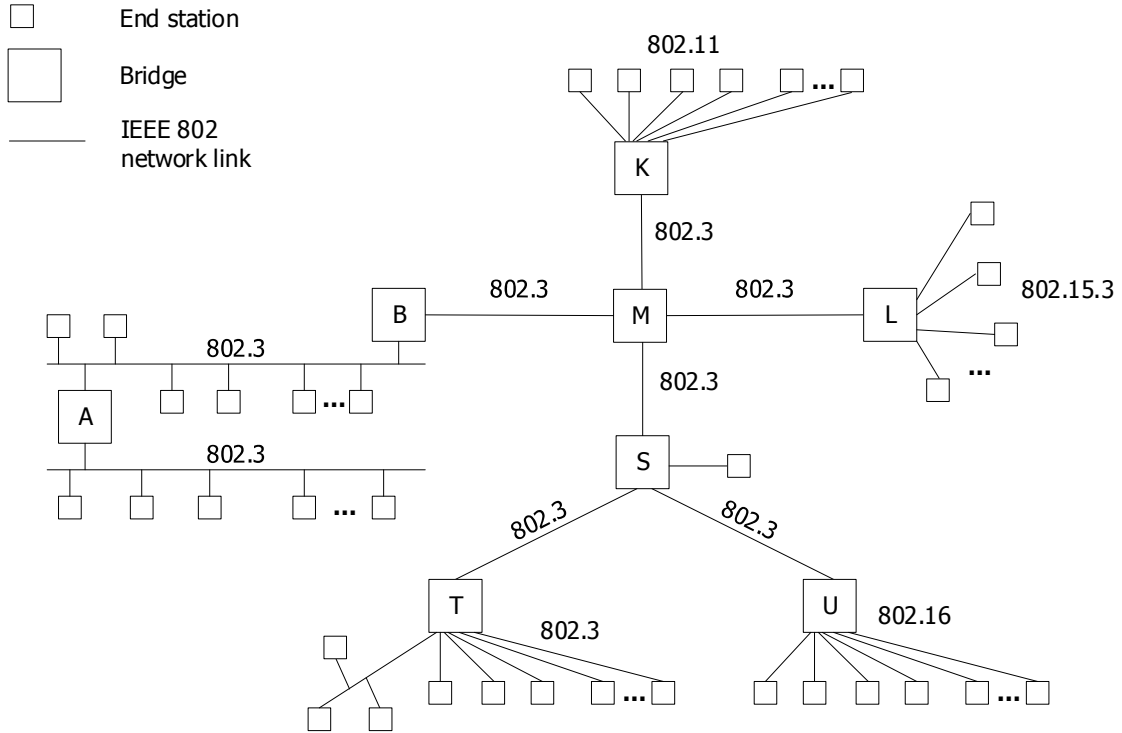
End station

Bridge

IEEE 802
network link

802.11

802.3

802.3

802.3

802.3

802.3

802.15.3

802.3

802.3

802.3

802.3

802.16

Figure 1—An example of a bridged IEEE 802 network

7. IEEE 802 network management

7.2 General-purpose IEEE 802 network management

7.2.3 Managed object definitions

Comment 83: Add a paragraph in 7.2.3 for YANG: IEEE P802f/D2.0 additions are shown in <u>blue underline</u>*, additions for IEEE P802-REVc are shown in* <u>green underline</u>*.*

In order for an IEEE 802 standard to specify management facilities, it is necessary for it to specify managed objects that model the operations that can be performed on the communications resources specified in the standard. The components of a managed object definition are as follows:

   a) A definition of the functionality provided by the managed object, and the relationship between this functionality and the resource to which it relates.
   b) A definition of the syntax that is used to convey management operations, and their arguments and results, in a management protocol.
   c) An address that allows the management protocol to specifically communicate with the managed object in question. In IEEE 802 this is done with an object identifier (OID), as described in Clause 10<u>, or a uniform Resource Name (URN), as described in Clause 11</u>.

The functionality of a managed object can be described in a manner that is independent of the protocol that is used; this abstract definition can then be used in conjunction with a definition of the syntactic elements required in order to produce a complete definition of the object for use with specific management protocols.

SNMP is used in many cases together with the structure of management information known as SMIv2 (IETF RFC 2578, IETF RFC 2579 [B6], and IETF RFC 2580 [B7]), which uses a set of macros based on a subset of ASN.1 for defining managed objects. <u>YANG (IETF RFC 7950) is a data modeling language used to model configuration data, state data, remote procedure calls, and notifications for network management protocols. The YANG objects are modeled in IEEE 802 standards using the Object Management Group (OMG) unified modelling language (UML) diagrams.</u>

<u>IEEE 802 networks can support management with SNMP MIBs or YANG to describe management objects.</u>

Ed. 802.11 still uses SNMP MIBs, so "historical" is not correct. "commonly" should be "common". Where does "OMG" come from in OMG UML? I thought is was UML-like.

The choice of notational tools for defining managed objects depends on which of the available management protocols the standard supports.

Annex A

(informative)

Bibliography

Insert the following bibliography reference into Annex A in alphanumeric order:

[B1]