INTERNATIONAL STANDARD

ISO/ IEC/IEEE 8802-1BA

Second edition
2023-03

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

Part 1BA: Audio video bridging (AVB) systems

Technologies de l'information — Télécommunications et échange d'informations entre systèmes — Réseaux de zones locales et métropolitaines — Exigences spécifiques —

Partie 1BA: Systèmes de pontage audio-vidéo (AVB)

Reference number
ISO/IEC/IEEE 8802-1BA:2023(E)

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Institute of Electrical and Electronics Engineers, Inc
3 Park Avenue, New York
NY 10016-5997, USA

Email: stds.ipr@ieee.org
Website: www.ieee.org

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IEEE Std 802.1BA™-2021
(Revision of IEEE Std 802.1BA-2011)

IEEE Standard for Local and Metropolitan Area Networks—

Audio Video Bridging (AVB) Systems

Developed by the

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 8 December 2021

IEEE SA Standards Board

Abstract: Profiles that select features, options, configurations, defaults, protocols, and procedures of bridges, stations, and LANs that are necessary to build networks that are capable of transporting time-sensitive audio and/or video data streams are defined in this standard.

Keywords: audio video bridging, AVB, Bridged Local Area Networks, IEEE 802.1BA, LANs, local area networks, MAC Bridges, MANs, metropolitan area networks, time-sensitive data streams, time-sensitive networking, TSN, Virtual Bridged Local Area Networks, virtual LANs

The Institute of Electrical and Electronics Engineers, Inc.
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PDF: ISBN 978-1-5044-8239-4 STD25135
Print: ISBN 978-1-5044-8240-0 STDPD25135

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Introduction

This introduction is not part of IEEE Std 802.1BA-2021, IEEE Standard for Local and Metropolitan Area Networks—Audio Video Bridging (AVB) Systems.

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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Contents

1. Overview ... 13

1.1 Scope ... 13
1.2 Purpose ... 13
1.3 Word usage ... 13
1.4 Introduction ... 14
1.5 Objectives ... 14

2. Normative references ... 15

3. Definitions ... 16

4. Acronyms and abbreviations ... 17

5. Architecture of AVB networks ... 18

6. AVB functions ... 22

6.1 Energy Efficient Ethernet ... 22
6.2 Flow control ... 22
6.3 Frame sizes ... 23
6.4 Detection of AVB domains ... 23
6.5 Credit based shaper combined with timed gate operation ... 24
6.6 Meeting latency targets for SR classes A and B ... 25
6.7 Variable data rate LANs ... 28
6.8 Basic support for streams ... 28
6.9 Minimum Bridge requirements ... 30
6.10 IEEE 802.1AS time-synchronization event message transmission interval ... 31
6.11 Effect of hop count on IEEE 802.1AS accuracy ... 31

7. AVB profiles ... 32

7.1 Introduction to PCS proformas ... 32
7.2 Abbreviations and special symbols ... 33
7.3 Instructions for completing the PCS proforma ... 33
7.4 Common requirements ... 35

Annex A (informative) Bibliography ... 43

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List of figures

Figure 5-1 An AVB network 18
Figure 5-2 AVB domain boundaries created by non-AVB systems..... 19
Figure 5-3 AVB domain boundaries created by different SR class A priorities 20
Figure 5-4 AVB domain boundaries created by different SR class B priorities..... 21

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List of tables

Table 6-1 AVB support in LAN technologies 24
Table 6-2 Latency targets for SR classes A and B 25

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IEEE Standard for Local and Metropolitan Area Networks—

Audio Video Bridging (AVB) Systems

1. Overview

1.1 Scope

This standard defines profiles that select features, options, configurations, defaults, protocols, and procedures of bridges, stations, and Local Area Networks (LANs) that are necessary to build networks that are capable of transporting time-sensitive audio and/or video data streams.

1.2 Purpose

The purpose of this standard is to specify defaults and profiles that manufacturers of LAN equipment can use to develop AVB-compatible LAN components, and to enable a person not skilled in networking to build a network, using those components, that does not require configuration to provide working audio and/or video services.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).[6, 7]

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

[6] The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.

[7] The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.

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1.4 Introduction

The successful support of time-sensitive audio and/or video data streams in a Bridged LAN requires the selection of specific features and options that are specified in a number of different standards, some of which are standards developed in IEEE 802®, and others (in particular, those that relate to functionality in OSI layer 3 and above in ISO/IEC 7498-1:1994 [B7]) that are developed by other bodies. In this standard, it is the selection of features and options that support OSI layer 1 and 2 LAN functionality that is of interest, in order to specify the requirements for LAN support in Bridges and the end stations that attach to them.

The standards from which features and options are selected by this standard are as follows:

a) The VLAN Bridge specification in IEEE Std 802.1Q.

b) The time-synchronization standard, IEEE Std 802.1AS.

c) The MAC and PHY standards specified for the various LAN MAC/PHY technologies, such as IEEE Std 802.3, IEEE Std 802.11, ITU-T G.9960 & ITU-T G.9961 (Powerline), and MoCA.

These features and options are selected by means of the profiles described in Clause 7. These profiles support specific functions within an AVB network, such as the Bridges and LAN technologies used to carry the AV streams, and the end stations that attach to the LAN and that provide the source(s) and the destination(s) of the stream data.

In some cases, there are functions that are needed in order to construct a usable AVB network, but that are not described in any other standard. In those cases, the technical specification is included in Clause 6 of this standard, along with a statement of the conformance requirements associated with the function, so that the function can be referenced by a profile in the same way as functions defined in any other standard.

Clause 5 introduces the architecture for AVB systems and AVB networks, and some of the terminology used in describing them.

1.5 Objectives

The architecture described in Clause 5, the AVB functions specified in Clause 6, and the profiles specified in Clause 7, are intended to meet the following objectives:

a) Describe the components that can be combined to form an AVB network (i.e., a network whose components cooperate and interoperate to allow the transmission of AV streams) and how those components can be combined.

b) Describe some of the consequences and limitations for AVB streaming that result from the incorporation of non-AV capable devices in an AVB network.

c) Define additional functions that are required for AVB operation that are not otherwise documented in contributing standards.

d) Provide guidance in terms of meeting the end-to-end latency requirements for successful AVB operation.

e) Define conformance requirements for AVB systems, in terms of the standards to which conformance is required for the various system components and the optional features of those standards that are required to be implemented. These conformance requirements address the guaranteed delivery, end-to-end latency, and time-synchronization requirements for successful AVB operation.

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IEEE Std 802®, IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture.[8, 9]

IEEE Std 802.1AS™, IEEE Standard for Local and Metropolitan Area Networks—Timing and Synchronization for Time-Sensitive Applications.

IEEE Std 802.1Q™, IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks.

IEEE Std 802.1Qcc™, IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks—Amendment 31: Stream Reservation Protocol (SRP) Enhancements and Performance Improvements.

IEEE Std 802.3™, IEEE Standard for Ethernet.

IEEE Std 802.11™, IEEE Standard for Information Technology—Telecommunications and Information Exchange between Systems—Local and Metropolitan Area Networks—Specific Requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications.

ITU-T Recommendation G.9960 (11/2018), Unified high-speed wireline-based home networking transceivers—System architecture and physical layer specification.[10]

ITU-T Recommendation G.9961 (11/2018), Unified high-speed wireline-based home networking transceivers—Data link layer specification.

MoCA MAC/PHY SPECIFICATION v2.0, (MoCA-M/P-SPEC-V2.0-170601) Multimedia over Coax Alliance (www.mocalliance.org).

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3. Definitions

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AV Bridge: Relay device (e.g., an IEEE 802.1Q Bridge or an IEEE 802.11 access point) that conforms to the requirements stated in the AVB profile for a Bridge as specified in this standard.

AVB domain: The intersection of a gPTP domain 0, which implements BMCA, and an SRP domain.

NOTE—The term "SRP domain" is defined in IEEE Std 802.1Q. The terms "gPTP domain" and "BMCA" are defined in IEEE Std 802.1AS. IEEE Std 802.1AS supports multiple gPTP domains. AVB operation requires support for a single domain 0.[12]

AVB network: A contiguous set of Bridges and end stations that meet the conformance requirements of IEEE Std 802.1BA.

AVB profile: A set of feature and option selections that specifies aspects of Bridge and end station operation, and states the conformance requirements for support of AVB functionality for a specific class of user applications.

AVB stream: A data stream associated with a stream reservation established using the Stream Reservation Protocol (SRP).

AVB system: A system (a piece of equipment that implements Bridge and/or end station functionality) that meets the conformance requirements for an AVB profile.

end station, station: These terms are defined in IEEE Std 802.

grandmaster-capable PTP instance: This term is defined in IEEE Std 802.1AS.

Listener: An end station that is the destination, receiver, or consumer of a stream.

MRP participant: The MRP state machine that participates in MRP protocol, as defined in Clause 10 of IEEE Std 802.1Q-2018 and Clause 10 of IEEE Std 802.1Qcc-2018. There are five variants as follows:

a) Full Participant
b) Full Participant, point-to-point subset
c) New-Only Participant
d) Applicant-Only Participant
e) Simple-Applicant Participant

Talker: An end station that is the source, transmitter, or producer of a stream.

[11] *The IEEE Standards Dictionary Online* is available at https://dictionary.ieee.org/. An IEEE Account is required for access to the dictionary, and one can be created at no charge on the dictionary sign-in page.
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