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IEEE Standard for a Transport Protocol for Time-Sensitive Applications in Bridged Local Area Networks

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Microprocessor Standards Committee

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IEEE Standard for a Transport Protocol for Time-Sensitive Applications in Bridged Local Area Networks

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Abstract: The protocol, device discovery, connection management, and device-control procedures used to facilitate interoperability between audio- and video-based end stations that use IEEE 1722–based streams on IEEE 802–based networks are specified.

Keywords: advanced encryption standard (AES), bridged local area network (LAN), clock recovery, elliptic curve cryptography (ECC), encryption, IEC 61883, IEEE 802.1™ AVB protocols, IEEE 802.1AS™, IEEE 802.1BA™-2011, IEEE 802.1Q™-2014, IEEE 1722™-2011, National Institute of Standards and Technology (NIST), QoS, serial digital interface (SDI), SMPTE ST 2022-6, time-sensitive media streaming, Time-Sensitive Networking (TSN), time synchronization

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Introduction

This introduction is not part of IEEE Std 1722-2016, IEEE Standard for a Transport Protocol for Time-Sensitive Applications in Bridged Local Area Networks.

Increasingly, entertainment media are digitally transported. Streaming audio/video and interactive applications over local area networks is becoming more common.

This standard builds on the work done by the IEEE 802.1 AVB task group by providing a common audio/video transport protocol capable of supporting the needs of both consumer and professional audio/video applications.

Contents

IEEE Standard for a Transport Protocol for Time-Sensitive Applications in Bridged Local Area Networks

1. Overview

Increasingly, entertainment media are digitally transported. Streaming audio/video and interactive applications over bridged local area networks (LANs) need to have comparable real-time performance with legacy analog distribution. There is significant end-user and vendor interest in defining a simple yet common method for handling real-time audio/video suitable for consumer electronics, professional audio/video applications, etc. Technologies such as IEEE Std 1394™,[1, 2] Bluetooth®, and USB exist today, but each has their own encapsulation, protocols, timing control, etc., such that building interworking functions is difficult. The use of a common audio/video transport over multiple IEEE 802™ network types will realize operational and equipment cost benefits. By ensuring that all IEEE 802 wired and wireless devices share a common set of transport mechanisms for time-sensitive audio, video, and control streams, the effort of producing interworking units between IEEE 802 devices and other digital networks is lessened.

1.1 Scope

This standard specifies the protocol, data encapsulations, and synchronization procedures used to enable interoperability between time-sensitive audio, video, and control applications using the quality of service capabilities provided by IEEE 802 Time-Sensitive Networking standards.

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1.2 Purpose

This standard facilitates interoperability between end stations that transport time-sensitive media across LANs providing time synchronization, latency, and bandwidth services by defining additional packet format protocols, synchronization mechanisms, and diagnostic counters.

1.3 Notes about this revision

1.3.1 Compatibility

Although some field definitions have changed from those defined in the previous version of this standard, this revision of the document is fully backward-compatible with the previous version. For example, the **cd** bit of the Audio Video Transport Protocol Data Units (AVTPDU) common header (see 4.4.3) has been removed, but formats that used this bit in the previous revision have been updated to have the most-significant bit of the **subtype** field set, retaining binary compatibility.

1.3.2 Use of TSN and AVB

With the expansion of use cases to industrial control and other applications that are not audio or video in nature, updated standards have been created that collectively use the moniker Time-Sensitive Networking (TSN). In this document, AVB is considered a subset of the TSN standards, and as such, both names are used. The term AVB is used for audio and video specific applications for which the term Audio Video Bridging (AVB) was originally envisioned, and TSN is used for formats that are not audio or video in nature.

1.3.3 New additions

In addition to the formats defined in the previous version of this standard, this revision adds new formats that add features that were not present in the previous revision or allow for easier implementation of common use cases. A summary of the additions present in this revision is given in Table 1.