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Technical requirements of automotive audio video bridging (AVB)

车载音视频桥（AVB）技术要求

(English Translation)

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1 Scope

This standard specifies the system functional requirements and node requirements of the on-board audio and video bridge.

This standard is applicable to the development of vehicle audio and video bridge enterprise standards of car manufacturers, and the vehicle audio and video bridge systems and nodes of system manufacturers and equipment manufacturers.

Development guidance.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article Pieces. For undated

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reference documents, the latest version (including all amendments) is applicable to this document.

IEEE Std 802.1AS Local and metropolitan area network bridging the timing and synchronization of time-sensitive applications in the local area network (Local and metropolitan area networks-Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks) IEEE Std 802.1BA local and metropolitan area networks audio and video bridging system (Local and metropolitan area networks-Audio Video Bridging (AVB) Systems) IEEE Std 802.1Qat Local and Metropolitan Area Network Virtual Bridge LAN Patch 14.Stream Reservation (Local and Metropolitan area networks-Virtual Bridged Local Area Networks-Amendment 14.Stream Reservation Protocol(SRP)) IEEE Std 802.1Qav Local and Metropolitan Area Network Virtual Bridge Local Area Network Patch 12.Time-sensitive service flow forwarding and queuing enhancement (Local and metropolitan area networks-Virtual Bridged Local Area Networks-Amendment 12.

Forwarding and Queuing Enhancements for Time-Sensitive Streams) IEEE Std 1722 A Transport Protocol for Time-Sensitive Application Transmission Protocol for Bridged LANs Applications in Bridged Local Area Networks)

3 Terms and definitions

The following terms and definitions apply to this standard.

Automotive audio video bridging (AVB) system the vehicle audio and video bridge network and the carried vehicle audio and video streams together constitute the vehicle audio and video bridge system.

Automotive AVB network the bridge nodes, end nodes and other nodes that meet the requirements of this standard are a continuous collection of in-vehicle Ethernet connections.

Automotive AVB stream in the vehicle-mounted AVB network, audio and video streams with transmission bandwidth are reserved.

Stream reservation protocol (SRP) domain in a vehicle-mounted AVB network, a logical collection of consecutive nodes with the same stream reservation class (SR Class) and AVB stream transmission priority.

Generalized precision time protocol (gPTP) domain in the vehicle-mounted AVB network, a logical collection of continuous nodes that meet the time synchronization requirements of this standard.

Automotive AVB domain the intersection of the SRP domain and the gPTP domain.

Bridging node

In the vehicle AVB network, the bridge device that transfers the AVB stream.

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Source node

In the vehicle-mounted AVB network, the source terminal device of the AVB stream.

Target node

In the vehicle-mounted AVB network, the target terminal device of the AVB stream.

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End node

The collective term for Source Node and Target Node.

4 Abbreviations

The following abbreviations apply to this standard.

node

Not within the scope of this standard.

6.1 Ethernet transmission

The relevant requirements are as follows.

--Transmission rate. Support at least 100 Mbps in-vehicle Ethernet, such as IEEE Std 802.3bw, IEEE Std 802.3bp.

--Auto-negotiation AN. The 1000BASE-T1 PHY of the in-vehicle Ethernet carrying the AVB stream should not be turned on.

--Efficient Ethernet EEE. EEE should not be enabled on the vehicle-mounted Ethernet port that carries AVB streams.

--Package length restriction. Ethernet packet payload should not exceed 1500 bytes.

6.2.1 Synchronization accuracy

This standard uses the time synchronization mechanism defined by IEEE Std802.1AS to meet the needs of on-board AVB stream counterparts, multi-screen synchronized playback, etc.

For time synchronization basis. All nodes in the vehicle AVB network should support IEEE Std 802.1AS. In the vehicle AVB network with no more than 7 hops, the time error between any two nodes does not exceed 1 μs.

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6.2.2 Time synchronization types of nodes and ports

In the vehicle AVB network, the best master clock algorithm BMCA should not be used to determine the time synchronization master node GM, and the pre-configuration method should be used Determine the role of the node in the gPTP domain and the clock type of the port carrying the AVB stream to shorten the startup time of the vehicle AVB system.

At one moment, there should be and only one node in the gPTP domain of the vehicle AVB network as a GM, and the remaining nodes are all timing slave nodes.

As shown in Figure 3, node 1 is GM, and the remaining nodes are slaves. GM docking bridge node

6.2.3 Adjacent node conduction delay

The neighborPropDelay is used to calculate the current time. In a vehicle-mounted closed environment, the conduction delay of adjacent nodes is relatively for fixed, the timing slave node Slave should pre-configure the adjacent node conduction delay in the non-destructible storage. At startup, use the pre-configured neighbor the node conduction delay corrects the local clock of the Slave. After startup, through the standard method defined by IEEE Std 802.1AS, calculate and obtain neighbors the current stable value of the node conduction delay. The current stable value can be used to refresh the transmission delay of the pre-configured neighboring node and obtain a new pre-configured neighboring node Transmission delay. The difference between the current stable value and the transmission delay of the pre-configured neighbor node exceeds 100 ns, and the current stable value is used as the new pre-configured neighbor node.

Node transmission delay. A variety of filtering methods can be used to obtain the current stable value, which is not restricted by this standard.

In IEEE Std 802.1AS, when the transmission delay of the neighboring node exceeds the neighborPropDelayThresh, Will cause port synchronization to fail. This standard does not allow this to happen.

Slave can pre-configure the rate ratio rateRatio and the neighbor rate ratio neighborRateRatio to accelerate time synchronization.

6.2.4 Time synchronization information sending interval

In different stages of time synchronization, the sending interval of time synchronization messages can be flexibly adjusted to balance different needs. Initial synchronization phase, configuration Shorter sending interval speeds up synchronization convergence and supports quick start. In the synchronization maintenance phase, configure a longer sending interval to reduce the equipment load, Reduce bandwidth usage. All nodes in the gPTP domain shall support the time synchronization information sending interval configuration

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