

IEC 61883 compatible Transport of Time-Sensitive Audio/Video Streams Audio/Video over IEEE 802 and IETF IP Networks

Boilerplate Draft PAR version 0.02

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Title (2.1)

Draft: IEEE Standard for IEC 61883 compatible Transport of Time-Sensitive Audio/Video Streams over IEEE 802 and IETF IP Networks

Misc

- Number of people expected to work on standard (5.1)
 - 30
- Stakeholders (5.6)
 - Developers and Users of bridged LAN and end-point systems supporting audio/video applications.

PAR Scope (5.2)

- This standard specifies the protocol, data encapsulations and procedures used to ensure that audio and video based end stations can communicate and interoperate using standard lower layer networking services that meet the requirements for time sensitive applications.
- This standard is also to provide compatibility and interoperability with IEC 61883 streams as currently defined for IEEE 1394 networks.
- For operation using Ethernet Layer 2 services, it specifies the use of 802.1AS, 802.1Qat, 802.1Qav.
- For operation using Internet Protocol Layer 3 services, it specifies the use of RTP, UDP and IP.
- Operations of other lower layer protocols will not be precluded, but they will be beyond the initial scope of this standard.

PAR Scope (5.3)

Is the completion of this document contingent upon the completion of another document?

- Yes, this standard uses
 - IEEE Standard for Local and Metropolitan Area Networks - Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks (802.1AS)
 - IEEE Standard for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks - Amendment 9: Stream Reservation Protocol (SRP) (P802.1Qat)
- Yes, this standard refers to
 - IEEE Standard for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks - Amendment 11: Forwarding and Queuing for Time-Sensitive Streams (P802.1Qav)

PAR Purpose (14)

- This standard enables stations attached to bridged LANs that meet the respective jitter, wander, and time synchronization requirements for time-sensitive applications to communicate and interoperate for audio and video streams using a common packet format and similar abstracted stream setup, control and teardown protocols.

PAR Reason (5.4)

- A great deal of work and effort of late has been applied to the development and specification of 802 based networks that provide networking services for real time applications. To further the work and to provide maximum interoperability of real-time audio and video streaming applications, additional protocol definition is needed above layer 2
- Unfortunately for end stations wishing to provide real time audio and video applications, there are numerous protocol mechanisms and formats often based on specifics of the lower level network protocol specifics.
- For IEEE 1394 bus based networks, a working implementation exists today that meets most of the needs for real-time audio and video streams and that is embodied in the IEC 61883 series standards.
- Unfortunately for both IEEE 802 and IETF Internet Protocol technologies, the IEC 61883 series of standards uses in both its mechanisms and formats specific low level services and functions in IEEE 1394 that are different and/or not provided by IEEE 802 or IETF Internet Protocol.
- With all of the above, the reason for a new standard is to provide a more common set of protocol encapsulations and mechanisms by starting with 61883 type of protocol encapsulations and mechanisms and modifying them to accommodate alternate lower layer protocols besides IEEE 1394.

5.5 Need for the Project

- Most if not all entertainment media going forward is in digital form. Audio and video streaming and interactive applications over bridged LANs need to be enhanced to have comparable real-time performance of legacy out-of-band analog media distribution. There is significant vendor and end-user interest and market opportunity to simplify and come up with a more common method for handling real-time audio video services (e.g. home consumer electronics, professional A/V applications, etc). The use of more common audio video transport over multiple network types will realize operational and equipment cost benefits.
- This standard defines a set of enhancements and modifications to the existing IEC 61883 class of protocols to work over IEEE 802 and IETF IP networks. This will enable better end-to-end interoperability of audio and video streaming protocols by defining more common operations that are less tied to the specifics of IEEE 1394. There are currently multiple methods based on media and/or network type and the goal of this effort is for the case of adding 61883 type services to achieve more commonality and interoperability.

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Broad Market Potential

- a) Broad sets of applicability.
- b) Multiple vendors and numerous users
- c) Balanced costs (LAN versus attached stations)
- Provide guarantees for time-sensitive (i.e. bounded latency and delivery variation), loss-sensitive real-time audio video data transmission to interconnect consumer electronics devices such as TVs, PVRs, cable and satellite set-top boxes, residential gateways and professional A/V devices. With the entertainment content moving from analog to digital, LAN interconnect is expected to become the mainstream method.
- Many consumer electronics producers and service providers have expressed their support for this standard. Every household in the world is a potential user of this technology.
- The cost of enhancements is not expected to increase the cost of LAN interfaces and expect to decrease the cost of the connectivity by consolidation of legacy, often analog, interfaces.

Compatibility with IEEE Std. 802.1

802. Overview and Architecture,

802.1Q and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.

Each standard in the IEEE 802 family of standards shall include a definition of managed objects which are compatible with systems management standards.

- The proposed standard will be an addition to the IEEE AVB standards and IETF Internet Protocol standards to define operation of 61883 type streams over those network types. It will interoperate and coexist with systems and networks compliant to IEEE 802 and IETF IP.
- The proposed standard defines the formats and operations of 61883 type audio video streams over IEEE 802 and IETF IP networks. These formats and operations only apply to the end stations that are confined to a domain solely of audio video capable bridges and routers and frames that are identified as such. The proposed amendment will not introduce additional requirements to IEEE 802 networks above and beyond those already being added as part of the IEEE AVB effort.

Distinct Identity

- a) Substantially different from other IEEE 802 standards.
- b) One unique solution per problem (not two solutions to a problem)
- c) Easy for the document reader to select the relevant specification.
- There is no existing 802 standard or approved project that provides standard formats and procedures for end stations that need time-sensitive (i.e. bounded latency and delivery variation), loss-sensitive real-time audio video data transmission over bridged LAN and IP networks. It exists in the form for IEC-61883, but this standard is specifically tied to IEEE 1394 only.

Technical Feasibility

- a) Demonstrated system feasibility.
- b) Proven technology, reasonable testing.
- c) Confidence in reliability.
- Several proprietary methods exist and in use that addresses similar needs.
- There are number of technical papers with specific solutions and satisfactory performance simulations
- Ingress metering, timing-aware forwarding algorithms has been proven and in use, such as in IEEE 1394, proprietary systems, etc.

Economic Feasibility

- a) Known cost factors, reliable data.
- b) Reasonable cost for performance
- c) Consideration of installation costs.
 - The proposed standard does not materially change the cost structure of end stations. It specifies queue handling and forwarding rules to achieve interoperable quality of service. The use of the capabilities introduced by this standard is deemed to have marginal effect in cost.
 - This proposed standard adds new capabilities to end stations without substantially adding cost of them. It will also reduce overall cost of audio video distribution by consolidation of interfaces. Such consolidation would further allow for operational and equipment cost benefits.
 - It is expected that solution will require no additional installation nor configuration compared to existing IEEE 1394 or proprietary solutions.