PAR and 5C notes for Peristaltic Shaper

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PAR

- Title
- Scope
- Purpose
- Need

Title

- Standard for Local and metropolitan area networks—Bridges and Bridged Networks Amendment: Forwarding and Queuing for Simply-Calculated Delays of Time-Sensitive Streams

Scope

- This amendment specifies time-aware queue-draining procedures, managed objects and extensions to existing protocols that enable bridges and end stations to schedule the transmission of frames based on both the global time derived from IEEE Std 802.1AS and (in the case of bridges) the arrival time of those frames at ingress ports. Virtual Local Area Network (VLAN) tag encoded priority values are allocated allowing simultaneous support of other types of bridged traffic over Local Area Networks (LANs).

Purpose and need

- MAC Bridges, as specified by this standard, allow the compatible interconnection of information technology equipment attached to separate individual LANs.
- The first generation of the FQTSS specification has been accepted by the professional, industrial, consumer, and automotive markets. This enhancement of FQTSS provides much simpler determination of network delays and reduces delivery jitter, which reduces buffering requirements in bridges and makes those requirements independent of network topology.

5 Criteria

- Broad market potential
- Compatibility
- Distinct identity
- Technical feasibility
- Economic feasibility

Broad Market Potential

a. Broad sets of applicability
b. Multiple vendors and numerous user

- The proposed amendment would apply to 802 networks composed of full duplex IEEE 802.3, and Coordinated Shared Networks (CSN) such as: IEEE 802.11 networks and Multimedia over Coax Alliance (MoCA) networks.
- This amendment is proposed based on requests from customers, equipment providers, and silicon providers who want to provide truly deterministic (and low) delays through 802 bridged VLAN systems.

Compatibility

IEEE 802 LMSC defines a family of standards. All standards should be in conformance: IEEE Std 802, IEEE 802.1D, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions.

a. Does the PAR mandate that the standard shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q?

b. If not, how will the Working Group ensure that the resulting draft standard is compliant, or if not, receives appropriate review from the IEEE 802.1 Working Group?

- This is an amendment to IEEE Std 802.1Q and will be internally consistent.
- n/a

Distinct Identity

a. Substantially different from other IEEE 802 LMSC 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 the easily calculated deterministic and distributed delays specified in the Scope of this project.
- The proposed amendment will consist of a single set of specifications for the enhancements. There are existing shapers that can reduce delays or improve the delay statistics, but there are none that provide bounded network delay that can be easily calculated.
- The proposed project will be formatted as an amendment to IEEE 802.1Q-2011.

Technical Feasibility

a. Demonstrated system feasibility
b. Proven technology, reasonable testing
c. Confidence in reliability

- The techniques used in the peristaltic shaper are based on the methods used in telecom circuit switches since digital transmission began to replace analog circuits. It has also been used in IEEE 1394 (Firewire) systems. The previous generation of 802.1 AV shaper (FQTSS, clause 34 of 802.1Q-2011) has been accepted by the Professional Audio, Consumer, and Automotive markets and is included in AVB Compliance and Interoperability certification program specified by the AVnu Alliance. The capabilities of the peristaltic shaper have been requested by the above mentioned markets. (The Avnu Alliance is an industry alliance that promotes industry standards for AV, including the AV support provided by IEEE Std 802.1Q – see www.avnu.org.)
- This amendment is based on simple buffering and queuing techniques and is expected to be included in future AVnu Alliance's conformance & interoperability testing criteria.
- This project represents a set of simple enhancements to existing and emerging updates to existing mechanisms. Those existing mechanisms have been standardized and implemented and have demonstrated reliability in the field.

Economic Feasibility

a. Known cost factors, reliable data
b. Reasonable cost for performance
c. Consideration of installation costs

- This enhancement will require minimal changes to existing AVB systems as defined by 802.1BA.
- Adding the enhancements will have a negligible impact on the cost of 802 networks.
- It will be possible for configuration related to the enhancements to be automatic and require no action by the user; therefore, there are no incremental installation costs for the provision of these enhancements.