PAR and 5C notes for Synchronized Queuing and Forwarding

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PAR

- Title
- Scope
- Purpose
- Need

Title

- Standard for Local and metropolitan area networks—Bridges and Bridged Networks Amendment: Synchronized Queuing and Forwarding

Scope

- This amendment specifies synchronized enqueuing and queue draining procedures, managed objects and extensions to existing protocols that enable bridges and end stations to schedule the transmission of frames within time-sensitive streams based on IEEE Std 802.1AS time (Generalized Precision Time Protocol) and (in the case of bridges) specified stream characteristics (including arrival time) of those frames at ingress bridge ports.

Purpose and need

- This amendment specifies a transmission selection algorithm that allows deterministic delays through a bridged network to be easily calculated regardless of network topology.
- This is an improvement of the existing credit-based shaper that provides much simpler determination of network delays, reduces delivery jitter, and simplifies provision of deterministic services across a bridged LAN.

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 will 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 delays through 802 bridged VLAN systems. These capabilities have been requested by the industrial, automotive, and audio/video 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.)

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. Existing shapers can reduce delays or improve the delay characteristics, but do not provide easily calculated deterministic network delays.
- 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 this specification are based on methods used in digital telecom circuit switches and IEEE 1394 (Firewire) systems which have been proven to be reliable.
- This amendment is based on externally observable synchronized buffering and queuing techniques.

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.