IEEE 802 LAN/MAN STANDARDS COMMITTEE (LMSC)

CRITERIA FOR STANDARDS DEVELOPMENT (CSD)

P802.1ASdm Standard for Local and Metropolitan Area Networks – Timing and Synchronization for Time-Sensitive Applications Amendment: Hot Standby and Clock Drift Error Tracking

1. IEEE 802 criteria for standards development (CSD)

The CSD documents an agreement between the WG and the Sponsor that provides a description of the project and the Sponsor's requirements more detailed than required in the PAR. The CSD consists of the project process requirements, 1.1, and the 5C requirements, 1.2.

1.1 Project process requirements

1.1.1 Managed objects

Describe the plan for developing a definition of managed objects. The plan shall specify one of the following:

a) The definitions will be part of this project.
b) The definitions will be part of a different project and provide the plan for that project or anticipated future project.
c) The definitions will not be developed and explain why such definitions are not needed.

Item a) is applicable. Additional managed objects will be specified as part of the hot-standby feature.

IEEE Std 802.1AS-2020 specifies MIB, and this amendment will specify MIB for its managed objects. IEEE Std 802.1AS-2020 does not specify YANG. Nevertheless, another PAR/CSD is in work to specify YANG (P802.1ASdn). There is no formal dependency, but if P802.1ASdn completes prior to this amendment, this amendment will specify both MIB and YANG for its managed objects.

1.1.2 Coexistence

A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.

a) Will the WG create a CA document as part of the WG balloting process as described in Clause 13? (yes/no)
b) If not, explain why the CA document is not applicable.

Item b) is applicable. This project is not a wireless project; therefore, the CA document is not applicable.

1.2 5C requirements

1.2.1 Broad market potential

Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:

a) Broad sets of applicability.
b) Multiple vendors and numerous users.

a) This project applies to industrial automation applications and provides a basis for automotive in-vehicle applications.

b) The need for this project is driven by requirements of industrial automation applications, as part of ongoing work on IEC/IEEE 60802 Time-Sensitive Networking Profile for Industrial Automation. These requirements include 1 µs time synchronization accuracy over 64 network hops, with a goal of 100 network hops if possible, while using existing silicon and low-cost crystal oscillators, i.e., not, for example, temperature compensated crystal oscillators. A new TLV will enable calculation of Neighbor Rate Ratio using the Sync mechanism and provide additional information that is used when tracking Rate Ratio to compensate for time synchronization errors due to clock frequency drift, both of which are required to achieve the time synchronization goal. The IEC/IEEE 60802 project applies to multiple industrial automation applications, and multiple industrial automation vendors and users are participating in its development.

1.2.2 Compatibility

Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.

a) Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q?
b) If the answer to a) is no, supply the response from the IEEE 802.1 WG.

a) Yes, the proposed standard will comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q.

b) Not applicable.

The review and response is not required if the proposed standard is an amendment or revision to an existing standard for which it has been previously determined that compliance with the above IEEE 802 standards is not possible. In this case, the CSD statement shall state that this is the case.

1.2.3 Distinct Identity

Each proposed IEEE 802 LMSC standard shall provide evidence of a distinct identity. Identify standards and standards projects with similar scopes and for each one describe why the proposed project is substantially different.

IEEE Std 802.1AS specifies the transport of synchronized time; however, it does not provide for hot-standby in the transport. There is no other IEEE standard or project that defines hot-standby for IEEE Std 802.1AS. There is no other IEEE standard or project that is defining a solution for IEEE Std 802.1AS to enable calculation of Neighbor Rate Ratio using the Sync mechanism or provide the additional information used when tracking Rate Ratio.

1.2.4 Technical Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:

a) Demonstrated system feasibility.
b) Proven similar technology via testing, modeling, simulation, etc.

a) Hot-standby techniques have been feasibly used in existing standards for fieldbus applications (e.g., IEC 61784-2). The improvements enabled by the new TLV will not alter the already demonstrated feasibility of 802.1AS systems.

b) The proposed standard will use hot-standby techniques for which the technology has been proven. In other contexts, hot-standby techniques can be referred to as a method to achieve seamless redundancy, high availability, resiliency, and protection for time synchronization. See item a) for references. The effectiveness of the techniques enabled by a new TLV at reducing dynamic time error (dTE) have been demonstrated by extensive simulations.

1.2.5 Economic Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

a) Balanced costs (infrastructure versus attached stations).
b) Known cost factors.
c) Consideration of installation costs.
d) Consideration of operational costs (e.g., energy consumption).
e) Other areas, as appropriate.

a) The well-established cost balance between infrastructure and attached stations will not be changed by the proposed standard.

b) The cost factors are known for the IEEE 802.1AS standard, and will apply to the proposed standard. Specifically, it is expected that hot standby can be implemented with small additional costs.

c) There are small incremental installation costs relative to the IEEE 802.1AS standard that will apply to the proposed standard.

d) There are small incremental one-time operational costs for configuration for the benefit of increased availability.

e) No other areas have been identified.