

IEEE 802 LAN/MAN STANDARDS COMMITTEE (LMSC)

CRITERIA FOR STANDARDS DEVELOPMENT (CSD)

Based on IEEE 802 LMSC Operations Manuals approved 4 August 2020
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[P802.1Qdw Standard for Local and Metropolitan Area Networks--Bridges and Bridged Networks Amendment: Source Flow Control](#)

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 to this project. This project will develop necessary managed objects described by a YANG model.](#)

1.1.2 Coexistence

A WG proposing a wireless project shall prepare a Coexistence Assessment (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.

[NA. 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.

The data center market continues to grow very fast. Networks with tens of thousands of nodes are common in cloud data centers. There is a trend to converge computing and storage on Ethernet in data center networks, supporting cloud services and high-performance applications such as Artificial Intelligence (AI), Machine Learning (ML), and High-Performance Computing (HPC). These and many new applications place high transient loads on data center networks which demand fast responding flow control techniques to prevent packet loss. For instance, Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCEv2) is widely deployed, both within data centers and across data center interconnects. RoCEv2 requires lossless operation on Ethernet to avoid wasteful retransmissions. Priority-based Flow Control (PFC, specified in IEEE Std 802.1Q) is currently used in data center environments, and Source Flow Control (SFC) will improve its efficiency by asserting it at the source of transmission while avoiding its deficiencies operating at scale.

b) Multiple vendors and numerous users.

Most cloud data center providers are using RoCEv2 in addition to other new high-performance applications, within their networks, requiring lossless or very low loss operation. RoCEv2 and other high-performance applications are also used by large enterprises, financial institutions, and other high-performance computing environments. Further there is strong interest in accessing new high-speed solid-state data storage technologies over Ethernet networks using non-volatile memory express (NVMe) over fabrics (NVMe-oF).

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.

The project will be in conformance with IEEE Std 802, IEEE Std 802.1AC, and the existing provisions of IEEE Std 802.1Q.

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.

There are no other IEEE 802 standards or projects that specify the remote invocation of flow control at the source of transmission in the data center.

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.

Techniques, similar to the proposed project have been implemented in a proprietary fashion by multiple vendors. The proposed amendment will be applied only in networks of limited bandwidth-delay product and where both bridges and end stations are typically under the control of a single administration. This reduces the risk that the benefits of the technique will be eroded by over extended control loops or by end stations acting as adversaries. Source Flow Control may remotely invoke Priority-based Flow Control (PFC) and works in conjunction with higher-layer congestion control. SFC has similar complexity to these congestion management techniques. PFC and higher-layer congestion control algorithms are broadly implemented in hardware at acceptable cost.

b) Proven similar technology via testing, modeling, simulation, etc.

The proposed project implements backward congestion signaling which has extensive simulation and analysis over the course of 30 years. The proposed project enables peer nodes to advertise the new capability through the Data Center Bridging Capability Exchange (DCBX, specified in IEEE Std 802.1Q) mechanism which is widely deployed today using “Link Layer Discovery Protocol” (LLDP, specified in IEEE Std 802.1AB).

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) Known cost factors.

The proposed amendment will retain existing cost characteristics of bridges including simplicity of queue structures and will not require maintenance of additional queues or queue state beyond the existing per traffic class (priority) queues for conformance to either its mandatory or optional provisions. In particular, per-flow queuing and state will not be required. The technique may remotely invoke Priority-based Flow Control which has been implemented in hardware at acceptable cost. The proposed technology further enables a converged network within the data center and is expected to reduce overall costs where separate networks are currently required.

b) Balanced costs.

The proposed project does not change the cost characteristics of bridges and end stations.

c) Consideration of installation costs.

Installation costs of bridges and end stations within the data center are not expected to be significantly affected; any increase in network costs is expected to be more than offset by a reduction in the number of separate networks required.

There are no incremental installation costs relative to existing PFC and DCBX that may be used by the proposed standard.

- d) Consideration of operational costs (e.g., energy consumption).

There are no incremental operational costs relative to existing PFC and DCBX that may be used by the proposed standard.

- e) Other areas, as appropriate.

No other areas have been identified.