
Priority-based Flow Control (PFC): Draft 5 Criteria

Data Center Bridging Task Group

Broad Market Potential

a) Broad sets of applicability

- ❑ Mechanisms to avoid frame loss due to congestion are essential to support the highly loss sensitive higher layer protocols used in Data Center Bridging networks for data storage, clustering, and backplane fabrics. Back-end data storage networks, clustering networks and backplane fabrics with limited number of hops are amenable to a flow control mechanism that operates hop-by-hop.
- ❑ The data traffic to be controlled by the proposed flow control mechanism will be segregated using priority values in the VLAN tag, ensuring that traffic types that are not amenable to hop-by-hop flow control may co-exist with those that are.

b) Multiple vendors and numerous users

- ❑ Multiple equipment vendors, as well as INCITS T11 Technical Committee, have expressed interest in the proposed project. In addition, multiple vendors have announced product supporting similar technologies in a proprietary way. There is strong and continued user interest in combining separate existing networks into a converged infrastructure, based on international standards, resulting in the realization of operational and equipment cost savings.

c) Balanced costs (LAN versus attached stations)

- ❑ The introduction of this flow control mechanism is not expected to materially alter the balance of costs between end stations and bridges. Significant equipment and operational costs savings are expected as compared to the use of separate networks for traditional LAN connectivity and for loss sensitive applications.
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Compatibility

- The proposed standard will be an amendment to 802.1Q, and will interoperate and coexist with all prior revisions and amendments of the 802.1Q standard.
 - The data traffic to be controlled by the proposed flow control mechanism will be segregated using priority values in the VLAN tag, thus ensuring that traffic types already supported by VLAN Bridges are not affected.
 - The proposed amendment will contain MIB modules, or additions to existing MIB modules, to provide management operations for configuration and performance monitoring for both end stations and bridges.
 - The proposed standard will contain managed objects that will enable its use in conjunction with P802.1Qau and P802.1Qaz.
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Distinct Identity

a) Substantially different from other IEEE 802 standards.

IEEE Std 802.1Q is the authoritative specification for priority aware Bridges and their participation in LAN protocols. No other IEEE 802 standard addresses priority-based flow control by bridges.

b) One unique solution per problem (not two solutions to a problem)

IEEE 802.3x defines a link flow control that pauses traffic on the whole link. The need to subject certain classes of traffic to flow control mechanisms, while allowing others to operate without flow control, has not been anticipated by any other IEEE 802 specification. Consequently, this proposal is the only solution to the problem of allowing a coexistence of such traffic types.

c) Easy for the document reader to select the relevant specification.

IEEE Std 802.1Q is the natural reference for priority based handling of traffic flows, which will make the capabilities added by this amendment easy to locate. The amendment will clearly state where its use is appropriate.

Technical Feasibility

a) Demonstrated system feasibility.

Similar techniques are widely deployed in other networking technologies of similar extent, such as Fibre Channel and InfiniBand, as well as in proprietary enhancements to 802.1Q bridging. These deployments have demonstrated that the proposed techniques are preferable to discarding packets during congestion for certain traffic types in networks of limited extent.

b) Proven technology, reasonable testing.

These and similar techniques have been proven in real world deployments of Fibre Channel, InfiniBand, in proprietary enhancements to 802.1Q bridging, and other networking technologies of similar extent. These techniques have been shown to be reasonably testable.

c) Confidence in reliability.

These and similar techniques have been proven reliable in real-world deployments of Fibre Channel, InfiniBand, and other networking technologies of similar extent.

d) Coexistence of 802 wireless standards specifying devices for unlicensed operation.

Not applicable.

Economic Feasibility

a) Known cost factors, reliable data.

The proposed amendment will retain existing cost characteristics of bridges including simplicity of queue structures and will not require maintenance of additional queues beyond the existing per traffic class (priority) queues for conformance to either its mandatory or optional provisions. In particular per flow queuing will not be required.

b) Reasonable cost for performance.

The proposed technology will reduce overall costs where separate networks are currently required by enabling the use of a converged network. The proposed solution allows a network to avoid frame loss due to congestion without significant throughput reduction.

c) Consideration of installation costs.

Installation costs of VLAN Bridges or end stations 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 to be installed and managed.
