802.1Qau™

IEEE

IEEE Standard for

Local and metropolitan area networks—

Virtual Bridged Local Area Networks

Amendment 13: Congestion Notification

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

IEEE
3 Park Avenue
New York, NY 10016-5997, USA

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(Amendment to
IEEE Std 802.1Q™-2005)

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Approved 25 March 2010

IEEE-SA Standards Board

Abstract: This amendment specifies protocols, procedures and managed objects that support congestion management of long-lived data flows within network domains of limited bandwidth-delay product. This is achieved by enabling bridges to signal congestion to end stations capable of transmission rate limiting to avoid frame loss.

Keywords: congestion, congestion notification, LANs, local area networks, MAC Bridges, transparent bridging, VLANs

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Introduction

This introduction is not part of IEEE Std 802.1Qau-2010, IEEE Standard for Local and Metropolitan Area Networks—Virtual Bridged Local Area Networks—Amendment 13: Congestion Notification.

This standard amends IEEE Std 802.1Q™-2005, providing congestion notification capabilities useful to Virtual Bridged Local Area Networks to support congestion management of long-lived data flows within network domains of limited bandwidth-delay product. Congestion notification mechanisms defined in this standard include the following:

a) The ability of bridges and end stations to create Congestion Notification Domains for certain priority levels by signaling using the Link Layer Discovery Protocol defined in IEEE Std 802.1AB™-2009.[a]
b) The ability for bridges to use priority remapping to automatically defend a Congestion Notification Domain against sources that are not aware of congestion notification.
c) Mechanisms by which bridges detect the congestion state of specified output queues, and send Congestion Notification Messages to the sources of a sampling of the frames in the queue.
d) Mechanisms by which an end station responds to Congestion Notification Messages by stopping, increasing, decreasing, or disabling control of the rate of output for frames.
e) A set of managed objects to provide controls for these capabilities in both bridges and end stations.

This standard contains state-of-the-art material. The area covered by this standard is undergoing evolution. Revisions are anticipated within the next few years to clarify existing material, to correct possible errors, and to incorporate new related material. Information on the current revision state of this and other IEEE 802 standards can be obtained from

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[a]Information of references can be found in Clause 2.

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Editorial Note

This amendment specifies changes to the forwarding and queueing functions described in IEEE Std 802.1Q™. Changes are applied to the base text of IEEE Std 802.1Q-2005, as modified by those amendments that had been approved, but not incorporated into the base text of the standard, at the time that this amendment was approved, namely (in chronological order) IEEE Std 802.1ad™, IEEE Std 802.1ak™, IEEE Std 802.1ag™, IEEE Std 802.1ah™, IEEE Std 802.1Q-2005/Cor 1, IEEE Std 802.1ap™, IEEE Std 802.1Qaw™, IEEE Std 802.1Qay™, IEEE Std 802.1aj™, and IEEE Std 802.1Qav™. Text shown in bold italics in this amendment defines the editing instructions necessary to changes to this base text. Three editing instructions are used: ***change***, ***delete***, and ***insert***. ***Change*** is used to make a change to existing material. The editing instruction specifies the location of the change and describes what is being changed. Changes to existing text may be clarified using ~~strikeout~~ markings to indicate removal of old material, and underscore markings to indicate addition of new material. ***Delete*** removes existing material. ***Insert*** adds new material without changing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. Editorial notes will not be carried over into future editions of IEEE Std 802.1Q.

1. Overview

Insert the following after the initial paragraphs of Clause 1:

This standard specifies protocols, procedures, and managed objects that support congestion management of long-lived data flows within network domains with a bandwidth-delay product on the order of 5 Mbits or less. Such flows are typically encountered in data centers, backplane fabrics, computing clusters, and storage networks. This is achieved by enabling bridges to signal congestion to end stations capable of transmission rate limiting to avoid frame loss. This mechanism enables support for higher layer protocols that are highly loss or latency sensitive. VLAN tag encoded priority values are allocated to segregate frames subject to congestion control, allowing simultaneous support of both congestion controlled and other higher layer protocols. This standard does not specify communication or reception of congestion notification information to or from end stations outside the congestion controlled domain or encapsulation of frames from those end stations across the domain.

1.1 Scope

Insert the following at end of 1.1, relettering the bullet points so that they follow in order from those in the existing text.

This standard specifies protocols, procedures, and managed objects to support congestion notification. These allow a Virtual Bridged Local Area Network or a portion thereof, with a limited bandwidth-delay product, to transfer long-lived data flows with a significantly reduced chance of frame loss compared to a network without congestion notification. To this end, it

aa) Defines a means for VLAN-aware Bridges that support congestion notification to form Congestion Managed Domains within a Virtual Bridged LAN.
ab) Defines a means for detecting congested queues in end stations and VLAN-aware Bridges, for signaling such congestion to the end stations sourcing the frames causing the congestion, and for those end stations to control the rate of transmission of those frames.