



**IEEE Standard for
Local and metropolitan area networks—**

**Virtual Bridged Local Area Networks
Amendment 12: Forwarding and
Queuing Enhancements for
Time-Sensitive Streams**

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

IEEE
3 Park Avenue
New York, NY 10016-5997, USA
5 January 2010

IEEE Std 802.1Qav™-2009
(Amendment to
IEEE Std 802.1Q™-2005)

IEEE Std 802.1Qav™-2009

(Amendment to
IEEE Std 802.1Q™-2005)

**IEEE Standard for
Local and metropolitan area networks—**

Virtual Bridged Local Area Networks

**Amendment 12: Forwarding and
Queuing Enhancements for
Time-Sensitive Streams**

Sponsor

**LAN/MAN Standards Committee
of the
IEEE Computer Society**

Approved 9 December 2009

IEEE-SA Standards Board

Abstract: This amendment to IEEE Std 802.1Q defines enhancements to the forwarding and queueing functions of a VLAN Bridge to support the transmission of time-sensitive data streams.

Keywords: Bridged Local Area Networks, local area networks (LANs), MAC Bridges, metropolitan area networks, time-sensitive data streams, Virtual Bridged Local Area Networks (virtual LANs)

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

Copyright © 2010 by the Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 5 January 2010. Printed in the United States of America.

IEEE and 802 are registered trademarks in the U.S. Patent & Trademark Office, owned by The Institute of Electrical and Electronics Engineers, Incorporated.

PDF: ISBN 978-0-7381-6143-3 STD96007
Print: ISBN 978-0-7381-6144-0 STDPD96007

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. The IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While the IEEE administers the process and establishes rules to promote fairness in the consensus development process, the IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

Use of an IEEE Standard is wholly voluntary. The IEEE disclaims liability for any personal injury, property or other damage, of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance upon this, or any other IEEE Standard document.

The IEEE does not warrant or represent the accuracy or content of the material contained herein, and expressly disclaims any express or implied warranty, including any implied warranty of merchantability or fitness for a specific purpose, or that the use of the material contained herein is free from patent infringement. IEEE Standards documents are supplied “**AS IS.**”

The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation, or every ten years for stabilization. When a document is more than five years old and has not been reaffirmed, or more than ten years old and has not been stabilized, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

In publishing and making this document available, the IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is the IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing this, and any other IEEE Standards document, should rely upon the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration. A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal interpretation of the IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE. Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Recommendations to change the status of a stabilized standard should include a rationale as to why a revision or withdrawal is required.

Comments and recommendations on standards, and requests for interpretations should be addressed to:

Secretary, IEEE-SA Standards Board
445 Hoes Lane
Piscataway, NJ 08854
USA

Authorization to photocopy portions of any individual standard for internal or personal use is granted by the Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Introduction

This introduction is not part of IEEE Std 802.1Qav-2009, IEEE Standards for Local and Metropolitan Area Networks—Virtual Bridged Local Area Networks—Amendment 12: Forwarding and Queuing Enhancements for Time-Sensitive Streams.

Notice to users

Laws and regulations

Users of these documents should consult all applicable laws and regulations. Compliance with the provisions of this standard does not imply compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

This document is copyrighted by the IEEE. It is made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making this document available for use and adoption by public authorities and private users, the IEEE does not waive any rights in copyright to this document.

Updating of IEEE documents

Users of IEEE standards should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect. In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit the IEEE Standards Association website at <http://ieeexplore.ieee.org/xpl/standards.jsp>, or contact the IEEE at the address listed previously.

For more information about the IEEE Standards Association or the IEEE standards development process, visit the IEEE-SA website at <http://standards.ieee.org>.

Errata

Errata, if any, for this and all other standards can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/updates/errata/index.html>. Users are encouraged to check this URL for errata periodically.

Interpretations

Current interpretations can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/interp/index.html>.

Patents

Attention is called to the possibility that implementation of this amendment may require use of subject matter covered by patent rights. By publication of this amendment, no position is taken with respect to the existence or validity of any patent rights in connection therewith. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this amendment are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

Participants

At the time this amendment was submitted to the IEEE-SA for approval, the IEEE 802.1 Working Group had the following membership:

Tony Jeffree, *Chair*

Paul Congdon, *Vice Chair*

Michael Johas Teener, *Chair, AV Bridging Task Group*

Zehavit Alon
Siamack Ayandeh
Jan Bialkowski
Rob Boatright
Jean-Michel Bonnamy
Paul Bottorff
Rudolf Brandner
Craig W. Carlson
Weiyang Cheng
Rao Cherukuri
Jin-Seek Choi
Diego Crupnicoff
Claudio Desanti
Zheming Ding
Linda Dunbar
Hesham M. Elbakoury
David Elie-Dit-Cosaque
Janos Farkas
Donald Fedyk
Norman Finn
Robert Frazier
John Fuller
Geoffrey Garner
Anoop Ghanwani
Franz Goetz
Yannick Le Goff
Eric Gray
Karanvir Grewal
Craig Gunther
Mitch Gusat
Stephen Haddock
Asif Hazarika

Charles Hudson
Romain Insler
Abhay Karandikar
Prakash Kashyap
Hal Keen
Keti Kilcrease
Doyeon Kim
Yongbum Kim
Philippe Klein
Mike Ko
Vinod Kumar
Bruce Kwan
Kari Laihonon
Ashvin Lakshmikantha
Michael Lerer
Marina Lipshteyn
Gael Mace
Ben Mack-Crane
David Martin
Alan McGuire
James McIntosh
Menucher Menuchery
John Messenger
Gabriel Montenegro
Matthew Mora
John Morris
Eric Multanen
Kevin Nolish
Don O'Connor
David Olsen
Donald Pannell
Glenn Parsons
Joseph Pelissier

David Peterson
Hayim Porat
Max Pritikin
Karen Randall
Josef Roesse
Derek J. Rohde
Dan Romascanu
Jessy V. Rouyer
Jonathan Sadler
Ali Sajassi
Panagiotis Saltsidis
Joseph Salowey
Satish Sathe
John Sauer
Michael Seaman
Koichiro Seto
Himanshu Shah
Nurit Sprecher
Kevin B. Stanton
Robert A. Sultan
Muneyoshi Suzuki
Patricia Thaler
Oliver Thorp
Manoj Wadekar
Yuehua Wei
Brian Weis
Martin White
Bert Wijnen
Michael D. Wright
Chien-Hsien Wu
Ken Young
Glen Zorn

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Thomas Alexander	C. Guy	Benjamin Rolfe
Butch Anton	Stephen Haddock	Randall Safier
Khin Mi Mi Aung	John Harauz	John Sargent
Hugh Barrass	John Hawkins	John Sauer
Robert Boatright	C. Huntly	Peter Saunderson
Tomo Bogataj	Atsushi Ito	Bartien Sayogo
Edward Carley	Raj Jain	Michael Seaman
James Carlo	Tony Jeffree	Suman Sharma
Juan Carreon	Shinkyo Kaku	Gil Shultz
Keith Chow	Piotr Karocki	Kapil Sood
Charles Cook	Stuart J. Kerry	Amjad Soomro
Thomas Dineen	Yongbum Kim	Kevin B. Stanton
Linda Dunbar	Shen Loh	Thomas Starai
Sourav Dutta	William Lumpkins	Walter Struppler
David Elie-Dit-Cosaque	G. Luri	Robert Sultan
Donald Fedyk	Peter Martini	Joseph Tardo
C. Fitzgerald	Jonathon Melendon	William Taylor
Prince Francis	Gary Michel	Michael Johas Teener
Yukihiro Fujimoto	Jose Morales	Patricia Thaler
John Fuller	Michael S. Newman	Geoffrey Thompson
Venkatasubramaniyan Ganesan	Nick S. A. Nikjoo	Mark-Rene Uchida
Geoffrey Garner	Paul Nikolich	Prabodh Varshney
Devon Gayle	Satoshi Obara	Niel Warren
James Gilb	David Olsen	Stephen Webb
Randall Groves	Hayim Porat	Kunpeng Wu
Robert M. Grow	June-Koo Rhee	Oren Yuen
Craig Gunther	Robert Robinson	

When the IEEE-SA Standards Board approved this standard on 9 December 2009, it had the following membership:

Robert M. Grow, *Chair*
Thomas Prevost, *Vice Chair*
Steve M. Mills, *Past Chair*
Judith Gorman, *Secretary*

John Barr	Alexander Gelman	David J. Law
Karen Bartleson	Jim Hughes	Ted Olsen
Victor Berman	Richard H. Hulett	Glenn Parsons
Ted Burse	Young Kyun Kim	Ronald C. Petersen
Richard DeBlasio	Joseph L. Koepfinger*	Narayanan Ramachandran
Andy Drozd	John Kulick	Jon Walter Rosdahl
Mark Epstein		Sam Sciacca

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

Howard L. Wolfman, TAB Representative
Michael Janezic, NIST Representative
Satish K. Aggarwal, NRC Representative

Michelle Turner
IEEE Standards Program Manager, Document Development

Kathryn Cush
IEEE Standards Program Manager, Technical Program Development

Contents

1. Overview.....	2
1.1 Scope.....	2
2. Normative references.....	3
3. Definitions.....	5
4. Abbreviations.....	7
5. Conformance.....	9
5.19 End station requirements—forwarding and queuing for time-sensitive streams.....	9
6. Support of the MAC service.....	11
6.6 Internal Sublayer Service.....	11
6.9 Support of the EISS.....	11
8. Principles of bridge operation.....	15
8.6 The Forwarding Process.....	15
8.8 The Filtering Database.....	18
12. Bridge management.....	25
12.21 Management entities for forwarding and queuing for time-sensitive streams.....	25
17. Management protocol.....	27
17.2 Structure of the MIB.....	27
17.3 Relationship to other MIBs.....	28
17.4 Security considerations.....	28
17.7 MIB modules.....	29
34. Forwarding and queuing for time-sensitive streams.....	41
34.1 Overview.....	41
34.2 Detection of SRP domains.....	41
34.3 The bandwidth availability parameters.....	42
34.4 Deriving actual bandwidth requirements from the size of the MSDU.....	43
34.5 Mapping priorities to traffic classes for time-sensitive streams.....	44
34.6 End station behavior.....	46
Annex A (normative) PICS proforma—Bridge implementations.....	49
A.5 Major capabilities.....	49
A.14 Bridge management.....	49
A.24 Management Information Base (MIB).....	49
A.31 Forwarding and queuing for time-sensitive streams.....	50
Annex H (informative) Bibliography.....	51
Annex I (normative) PICS proforma—End station implementations.....	53
I.5 Major capabilities.....	53

I.9	Forwarding and queuing for time-sensitive streams	54
Annex L (informative) Operation of the credit-based shaper algorithm		55
L.1	Overview of credit-based shaper operation	55
L.2	“Class measurement intervals” in Bridges.....	59
L.3	Determining worst-case latency contribution and buffering requirements	60
L.4	Operation of the credit-based shaper in a coordinated shared network	71

Figures

Figure 34-1	Queuing model for a Talker station	46
Figure L-1	Credit-based shaper operation—no conflicting traffic.....	57
Figure L-2	Credit-based shaper operation—conflicting traffic.....	58
Figure L-3	Credit-based shaper operation—burst traffic.....	59
Figure L-4	Interference and latency	63
Figure L-5	Burst behavior and credit	63
Figure L-6	Fan-in scenario.....	67
Figure L-7	Permanent delay scenario.....	68
Figure L-8	Building up buffer occupancy - 1	69
Figure L-9	Building up buffer occupancy - 2	69
Figure L-10	Building up buffer occupancy - 3	69
Figure L-11	Building up buffer occupancy - 4	70

Tables

Table 6-5	Priority regeneration	12
Table 6-6	Default SRP domain boundary port priority regeneration override values	12
Table 8-3	Recommended priority to traffic class mappings	15
Table 8-4	Transmission selection algorithm identifiers	16
Table 8-5	Combining Static and Dynamic Filtering Entries for an individual MAC Address	21
Table 8-6	Combining Static Filtering Entry and MAC Address Registration Entry for “All Group Addresses” and “All Unregistered Group Addresses”	22
Table 8-7	Forwarding or Filtering for specific group MAC Addresses	23
Table 8-8	Forwarding or Filtering with Dynamic Reservation Entries	24
Table 12-1	Bandwidth Availability Parameter Table row elements	25
Table 12-2	Transmission Selection Algorithm Table row elements	26
Table 12-3	Priority Regeneration Override Table row elements	26
Table 17-1	Structure of the MIB modules	27
Table 17-18	FQTSS MIB structure and object cross reference	28
Table 34-1	Recommended priority to traffic class mappings for SR classes A and B	45
Table 34-2	Recommended priority to traffic class mappings for SR class B only	45

IEEE Standard for Local and metropolitan area networks— Virtual Bridged Local Area Networks Amendment 12: Forwarding and Queuing Enhancements for Time-Sensitive Streams

IMPORTANT NOTICE: This standard is not intended to ensure safety, security, health, or environmental protection in all circumstances. Implementers of the standard are responsible for determining appropriate safety, security, environmental, and health practices or regulatory requirements.

This IEEE document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Documents.” They can also be obtained on request from IEEE or viewed at <http://standards.ieee.org/IPR/disclaimers.html>.

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™, and IEEE Std 802.1aj™. 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 underline 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

1.1 Scope

Insert the following text at the end of 1.1, renumbering the list items and NOTES as necessary:

This standard allows bridges to provide performance guarantees for time-sensitive (i.e., bounded latency and latency variation) loss-sensitive real-time audio video (AV) data stream transmission (AV traffic). It specifies priority regeneration and controlled bandwidth queue draining algorithms. Virtual Local Area Network (VLAN) tag encoded priority values are allocated, in aggregate, to segregate frames among queues that support AV traffic and queues that support non-AV traffic, allowing simultaneous support of both AV traffic and other bridged traffic over and between wired and wireless Local Area Networks (LANs). To this end, it

- a) Defines status parameters that allow the boundaries of a Stream Reservation Protocol (SRP—see Clause 35¹) domain (6.6.4) to be identified and maintained
- b) Specifies how the priority information in frames received at SRP domain boundary ports is regenerated

NOTE 1—The priorities in frames transmitted from outside an SRP domain to a Bridge inside an SRP domain are re-mapped in order to ensure that traffic that is not associated with a reservation does not disrupt traffic that is associated with a reservation. Hence, traffic entering an SRP domain that uses priority code point values associated with reserved traffic classes will be re-mapped to priority code point values that are not associated with reserved traffic classes.²

- c) Specifies how priority information is used to determine the traffic classes to be used for time-sensitive streams
- d) Defines a credit-based shaper algorithm to shape traffic in accordance with stream reservations

NOTE 2—The credit-based shaper algorithm operates on the outbound queues; the mechanisms specified for the support of time-sensitive AV traffic do not involve any form of ingress metering or policing.

¹Clause 35 is defined in IEEE P802.1Qat™ [B31] that was a draft standard under development at the time of publication.

²Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

2. Normative references

Insert the following references into Clause 2 in appropriate collating sequence:

IEEE Std 802.1AX™-2008, IEEE Standard for Local and Metropolitan Area Networks—Link Aggregation.

3. Definitions

Insert the following text immediately after the first paragraph of Clause 3:

This standard makes use of the following terms defined in IEEE Std 802:

- end station
- station

Insert the following definitions into Clause 3, in alphabetical order, renumbering existing definitions as needed:

3.1 audio video (AV) traffic: Traffic associated with audio and/or video applications that is sensitive to transmission latency and latency variation, and, for some applications, packet loss.

3.2 latency: The delay experienced by a frame in the course of its propagation between two points in a network, measured from the time that a known reference point in the frame passes the first point to the time that the reference point in the frame passes the second point.

NOTE 1—Latency is sometimes referred to as *frame delay*.

NOTE 2—The term *frame* is used in this standard to refer to a data frame, and not to a video frame.

3.3 stream reservation (SR) class: A traffic class whose bandwidth can be reserved for AV traffic. A priority value is associated with each SR class. SR classes are denoted by consecutive letters of the alphabet, starting with A and continuing for up to seven classes.

3.4 Stream Reservation Protocol (SRP) domain boundary port: A Port of a station that is a member of an SRP domain for a given SR class, and that is connected via an individual LAN to a Port of a station that is either within a different SRP domain for that SR class, or is not part of any SRP domain.

NOTE—The term *SRP domain* is defined in 6.6.4.

3.5 Stream Reservation Protocol (SRP) domain core port: A Port of a station that is a member of an SRP domain for a given SR class, and that is connected, via an individual LAN that is part of the active topology, to a Port of a station that is a member of the same SRP domain for that SR class.

NOTE—The term *SRP domain* is defined in 6.6.4.

3.6 time-sensitive stream: A stream of data frames that are required to be delivered with a bounded latency.

4. Abbreviations

Insert the following abbreviations into Clause 4 in alphabetical order:

AV	audio/video
AVB	audio/video bridging
CSN	Coordinated Shared Network
FQTSS	Forwarding and Queuing Enhancements for time-sensitive streams
SR	stream reservation
SRP	Stream Reservation Protocol
TSpec	traffic specification

5. Conformance

5.4.1 VLAN-aware bridge component options

Insert new bullet item p) as shown, following existing bullet item o):

- p) Support forwarding and queuing for time-sensitive streams (5.4.1.5).

Insert new 5.4.1.5 as shown, following existing 5.4.1.4:

5.4.1.5 Forwarding and queuing for time-sensitive streams—requirements

A VLAN-aware Bridge component implementation that conforms to the provisions of this standard for forwarding and queuing for time-sensitive streams shall:

- a) Support a minimum of two traffic classes on all Ports, of which
 - 1) A minimum of one traffic class supports the strict priority algorithm for transmission selection (8.6.8.1), and
 - 2) One traffic class is an SR class.
- b) Support the operation of the credit-based shaper algorithm (8.6.8.2) on all Ports as the transmission selection algorithm used for the SR class.
- c) Support SRP domain boundary port priority regeneration override as defined in 6.9.4, and the default priority regeneration override value defined in Table 6-6, for SR class “B”.
- d) Support the tables and procedures for mapping priorities to traffic classes as defined in 34.5.

A VLAN-aware Bridge component implementation that conforms to the provisions of this standard for forwarding and queuing for time-sensitive streams may:

- e) Support the management entities defined in 12.21 by means of the SNMP MIB module defined in 17.7.13.
- f) Support two or more SR classes (a maximum of seven), and support the operation of the credit-based shaper algorithm (8.6.8.2) on all Ports as the transmission selection algorithm used for those SR classes. The number of SR classes supported shall be stated in the PICS.
- g) Support SRP domain boundary port priority regeneration override as defined in 6.9.4, and the default priority regeneration override value defined in Table 6-6, for SR class “A”. If more than two SR classes are supported, the default priority regeneration override values used for the additional SR classes shall be stated in the PICS.

Insert the following new subclause after existing 5.17, renumbering as necessary:

5.18 End station requirements—forwarding and queuing for time-sensitive streams

An end station implementation that conforms to the provisions of this standard for forwarding and queuing for time-sensitive streams shall:

- a) Support a minimum of two traffic classes on all Ports, of which
 - 1) A minimum of one traffic class supports the strict priority algorithm for transmission selection (8.6.8.1), and
 - 2) One traffic class is an SR class.
- b) Support the operation of the credit-based shaper algorithm (8.6.8.2) as the transmission selection algorithm used for frames transmitted for each stream associated with the SR class.
- c) Support the operation of the credit-based shaper algorithm (8.6.8.2) on all Ports as the transmission selection algorithm used for the SR class.

- d) Use the default priority associated with SR class “B” as shown in Table 6-6 as the priority value carried in transmitted SR class “B” data frames.

An end station implementation that conforms to the provisions of this standard for forwarding and queuing for time-sensitive streams may:

- e) Support two or more SR classes (a maximum of seven), and support the operation of the credit-based shaper algorithm (8.6.8.2) on all Ports as the transmission selection algorithm used for those SR classes. The number of SR classes supported shall be stated in the PICS.
- f) Use the default priority associated with SR class “A” as shown in Table 6-6 as the priority value carried in transmitted SR class “A” data frames. If more than two SR classes are supported, the priority value carried in transmitted data frames for the additional SR classes shall be stated in the PICS.

6. Support of the MAC service

6.6 Internal Sublayer Service

Insert new 6.6.4 as follows:

6.6.4 Stream Reservation Protocol (SRP) Domain status parameters

A Stream Reservation Protocol (SRP) domain is a set of stations (end stations and/or Bridges), their Ports, and the attached individual LANs, that satisfy all of the following conditions for a given SR class:

- a) Those stations that transmit streams all support the credit-based shaper algorithm, defined in 8.6.8, as the transmission selection method for the SR class.
- b) The stations all support SRP, as defined in Clause 35, as the means of creating bandwidth reservations for the SR class.
- c) Those stations that transmit streams all associate the same priority value with the SR class.
- d) Each Port in the set is either an SRP domain core port or an SRP domain boundary port.
- e) Each SRP domain core Port in the set is connected, via an individual LAN that is part of the active topology, to an SRP domain core Port of another station in the set.

In Bridges that support the Stream Reservation Protocol (SRP), and for each SR class supported by the Bridge, an **SRPdomainBoundaryPort** parameter is associated with each Port of the Bridge.

Each SRPdomainBoundaryPort parameter has a Boolean value. The value of the SRPdomainBoundaryPort parameter for a given SR class is TRUE if the operation of SRP has determined that the Port is an SRP domain boundary port (3.4) for that SR class; otherwise, the Port is either an SRP domain core port (3.5) for that SR class or is not part of that SRP domain, and the SRPdomainBoundaryPort parameter value is FALSE.

6.9 Support of the EISS

6.9.4 Regenerating priority

Change 6.9.4, and insert new Table 6-6, renumbering subsequent tables, as follows:

The priority of each received frames is regenerated using priority information contained in the frame and the Priority Regeneration Table for the reception Port. For each reception Port, the Priority Regeneration Table has eight entries, corresponding to the eight possible values of priority (0 through 7). Each entry specifies, for the given value of received priority, the corresponding regenerated value.

For untagged frames, the priority parameter signaled in the corresponding M_UNITDATA.indication is taken to be the received priority. For tagged frames, the priority signaled in the PCP field of the tag header is taken to be the received priority.

NOTE 1—IEEE 802 LAN technologies signal a maximum of eight priority values. Annex G further explains the use of priority values and how they map to traffic classes.

Table 6-5 specifies default regenerated priority values for each of the eight possible values of the received priority. These default values shall be used as the initial values of the corresponding entries of the Priority Regeneration Table for each Port.

The values in the Priority Regeneration Table may be modified by management, as described in Clause 12. If this capability is provided, the value of the table entries shall be independently settable for each reception