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IEEE Standard for

Local and metropolitan area networks—

Virtual Bridged Local Area Networks—Bridge Port Extension

IEEE Computer Society

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IEEE Standard for
Local and metropolitan area networks—

Virtual Bridged Local Area Networks—
Bridge Port Extension

Sponsor

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Approved 14 May 2012

IEEE-SA Standards Board

Abstract: This standard specifies the operation of Bridge Port Extenders, including management, protocols, and algorithms. Bridge Port Extenders operate in support of the MAC Service by Extended Bridges.

Keywords: Bridged Local Area Networks, Data Center Bridging, DCB, Edge Virtual Bridging, EVB, IEEE 802.1BR, LANs, local area networks, MAC Bridges, MANs, metropolitan area networks, Virtual Bridged Local Area Networks

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Introduction

This introduction is not part of IEEE Std 802.1BR-2012, IEEE Standard for Local and metropolitan area networks—Virtual Bridged Local Area Networks—Bridge Port Extension.

This standard specifies the devices, protocols, procedures, and managed objects necessary to extend a bridge and its management beyond its physical enclosure using IEEE 802® LAN technologies.

To this end, it:

a) Identifies and isolates traffic between ports within an Extended Bridge;
b) Specifies a tag format for this identification;
c) Establishes an Extended Bridge consisting of a Controlling Bridge and one or more Bridge Port Extenders;
d) Specifies the functionality and the specific requirements of a Bridge Port Extender;
e) Extends the MAC service of a Bridge Port across the interconnected Bridge Port Extenders, including support of Customer Virtual Local Area Networks (C-VLANs).
f) Establishes the requirements of bridge components and systems for the attachment of Bridge Port Extenders;
g) Specifies a protocol to provide for the configuration and monitoring of Bridge Port Extenders by a Controlling Bridge; and
h) Establishes the requirements for Bridge Management to support Port Extension, identifying the managed objects and defining the management operations.

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 may be obtained from:

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Contents

1. Overview ... 1

1.1 Scope ... 1
1.2 Purpose ... 2

2. Normative references ... 3

3. Definitions ... 4

4. Acronyms and abbreviations ... 6

5. Conformance ... 7

5.1 Terminology ... 7
5.2 Protocol Implementation Conformance Statement (PICS) ... 7
5.3 Bridge Port Extender Conformance ... 7
5.4 Controlling Bridge Conformance ... 8

6. Principles of Bridge Port Extension ... 10

6.1 Bridge Port Extension Overview ... 10
6.2 Extended Bridge ... 11
6.3 Base and aggregating Bridge Port Extenders ... 13
6.4 Bridge Port Extender operation ... 14
6.5 Bridge Port Extender architecture ... 16
6.6 Bridge Port Extender Model of operation ... 17
6.7 Bridge Port Extender Frame Reception ... 19
6.8 Bridge Port Extender Transmit and Receive ... 19
6.9 Bridge Port Extender tag handler ... 20
6.10 Bridge Port Extender Internal Sublayer Service ... 21
6.11 Bridge Port Extender Forwarding Process ... 25
6.12 Bridge Port Extender Filtering Database ... 29
6.13 Determination of the Upstream Port ... 29
6.14 Upstream Port Addressing ... 30
6.15 Bridge Port Extender Initialization ... 30
6.16 Support of Congestion Points ... 31

7. Tagged frame format ... 32

7.1 Representation and encoding of tag fields ... 32
7.2 Tag format ... 32
7.3 Tag Protocol Identifier (TPID) formats ... 32
7.4 Tag Protocol Identification ... 32
7.5 E-TAG Control Information ... 32

8. Support of Bridge Port Extension by C-VLAN components ... 35

8.1 Use of Tags ... 36
8.2 Bridge Port Extension Port Types ... 36
8.3 Internal Bridge Port Extender Cascade Ports ... 37
8.4 Bridge Port Extender Upstream Ports ... 39

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8.5 External Extended Ports 39
8.6 External Bridge Port Extender Cascade Ports 40
8.7 Traffic isolation 41
8.8 Support of Port Extension by a C-VLAN component MAC Relay 41
8.9 Remote replication 42
8.10 Support of Remote Replication by a Controlling Bridge 43
8.11 Assignment of E-CIDs 44
8.12 Support of Congestion Notification 45

9. Port Extender Control and Status Protocol 46

9.1 Port Selection and Addressing 46
9.2 PE CSP State Machines 46
9.3 Protocol Errors 52
9.4 PE CSP PDUs 52
9.5 Basic TLV format 52
9.6 Command TLV 54
9.7 Flow Control 56
9.8 Messages 56
9.9 Additional TLVs 61

10. Bridge management 72

10.1 Data types 72
10.2 Bridge Port Extension Entries 72

11. Management Information Base (MIB) 75

11.1 Structure of the IEEE8021-PE MIB 75
11.2 Relationship to other MIBs 76
11.3 Security considerations 76
11.4 Definition of the IEEE8021-PE MIB Module 78

Annex A (normative) PICS proforma 89

Annex B (normative) IEEE 802.1 Organizationally Specific TLVs 105

Annex C (informative) Utilizing VDP with Port Extension 114

Annex D (informative) Extended Bridge Initialization 116

Annex E (informative) Bibliography 121

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Figures

Figure 6-1—Extended Bridge 10
Figure 6-2—Aggregating and base Bridge Port Extenders 14
Figure 6-3—External Bridge Port Extender architecture 16
Figure 6-4—Internal Bridge Port Extender architecture 17
Figure 6-5—Relaying MAC frames in an External Bridge Port Extender 18
Figure 6-6—Operation of Bridge Port Extender Control and Status Protocol Agent 18
Figure 6-7—Port connectivity 20
Figure 6-8—Bridge Port Extender Forwarding Process functions 26
Figure 7-1—E-TAG TCI format 32
Figure 8-1—Internal organization of the MAC sublayer in an Extended Bridge 35
Figure 8-2—Extended Bridge Interconnection 37
Figure 8-3—Cascaded Bridge Port Extenders 40
Figure 8-4—Extended Bridge traffic isolation 41
Figure 9-1—PE CSP Receive PDU state machine 47
Figure 9-2—PE CSP Transmit PDU state machine 47
Figure 9-3—PE CSP Local Request state machine 48
Figure 9-4—PE CSP Remote Request state machine 48
Figure 9-5—Basic TLV format 52
Figure 9-6—Command TLV 54
Figure 9-7—Resource Limit Capability TLV 61
Figure 9-1—Port Parameters TLV 63
Figure 9-8—Port Array TLV 64
Figure 9-9—Port Entry 64
Figure 9-10—VID Array TLV 65
Figure 9-11—VID Entry 65
Figure 9-12—Port Status TLV 66
Figure 9-13—Statistics TLV 66
Figure 9-14—Object Name TLV 67
Figure 9-15—Object Value TLV 67
Figure 9-16—CN Parameters TLV 70
Figure 9-17—Basic format for Organizationally Specific TLVs 71
Figure B.1—Port Extension TLV format 105
Figure C.1—Relationship of Port Extension and EVB 114
Figure C.2—Port Extension and EVB combined architecture 115
Figure D.1—Attachment of a physical Bridge Port Extender 117
Figure D.2—Attachment of a downstream Bridge Port Extender 118
Figure D.3—Example Initialization Message Flow 120

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Tables

Table 6-1—Bridge Port Extender Initialization 31
Table 6-2—Bridge Port Extender Port Initialization 31
Table 7-1—E-TAG EtherType allocation 32
Table 8-1—Bridge Port Extender parameter settings 38
Table 9-1—Port Extender Control and Status Protocol—Time out Values 52
Table 9-2—TLV type values 53
Table 9-3—Completion Codes 54
Table 9-4—Message Types 55
Table 9-5—Priority Code Point Selection Encoding 64
Table 9-6—Action Values 65
Table 9-8—Statistics TLV contents 66
Table 9-7—Action Values 66
Table 9-9—Reference 67
Table 9-10—Get Objects Value Error Codes 68
Table 9-11—Set Object Value Error Codes 68
Table 9-12—CN Parameter Fields 70
Table 10-1—Port Extension Port Table row elements 73
Table 10-3—Port Extension Upstream Port ETS Table row elements 74
Table 10-2—Port Extension Remote Replication Table row elements 74
Table 11-1—PE MIB structure and object cross reference 75
Table B.1—IEEE 802.1 Organizationally Specific TLVs 105
Table B.2—IEEE 802.1/LLDP extension MIB object cross reference 106

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Virtual Bridged Local Area Networks—
Bridge Port Extension

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1. Overview

This standard specifies a Bridge Port Extender that provides the capability to extend MAC service over an Extended Bridge. This capability may be used, for example, to extend a bridge over multiple physical devices or to extend the MAC service of a bridge to a virtual end station.

1.1 Scope

This standard specifies the devices, protocols, procedures, and managed objects necessary to extend a bridge and its management beyond its physical enclosure using IEEE 802® LAN technologies.

To this end, it:

a) Identifies and isolates traffic between ports within an Extended Bridge;
b) Specifies a tag format for this identification;
c) Establishes an Extended Bridge consisting of a Controlling Bridge and one or more Bridge Port Extenders;
d) Specifies the functionality and the specific requirements of a Bridge Port Extender;
e) Extends the MAC service of a Bridge Port across the interconnected Bridge Port Extenders, including support of Customer Virtual Local Area Networks (C-VLANs).

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f) Establishes the requirements of bridge components and systems for the attachment of Bridge Port Extenders;

g) Specifies a protocol to provide for the configuration and monitoring of Bridge Port Extenders by a Controlling Bridge; and

h) Establishes the requirements for Bridge Management to support Port Extension, identifying the managed objects and defining the management operations.

1.2 Purpose

The purpose of this standard is to extend a bridge, and the management of its objects, beyond its physical enclosure using IEEE 802 LAN technologies and interoperable interfaces.

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2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in the text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 802.1AB™, IEEE Standard for Local and metropolitan area networks—Station and Media Access Control—Connectivity Discovery.[1, 2]

IEEE Std 802.1Q™-2011, IEEE Standard for Local and Metropolitan Area Networks—Media Access Control (MAC) and Virtual Bridged Local Area Networks (as amended).

IEEE Std 802.1Qaz™-2011, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—Amendment 18: Enhanced Transmission Selection for Bandwidth Sharing Between Traffic Classes.

IEEE Std 802.1Qbb™-2011, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—Amendment 17: Priority-based Flow Control.

IEEE Std 802.1Qbc™-2011, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—Amendment 16: Provider Bridging—Remote Customer Service Interfaces.

IEEE Std 802.1Qbe™-2011, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—Amendment 15: Multiple I-SID Registration Protocol.

IEEE Std 802.1Qbg™-2012, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks—Admendment 21: Edge Virtual Bridging.

IEEE Std 802.3.1™-2011, IEEE Standard for Management Information Base (MIB) Definitions for Ethernet.

IETF RFC 1042, A Standard for the Transmission of IP Datagrams over IEEE 802 Networks, Postel, J., and Reynolds, J., February 1988.[3]

IETF RFC 1390, STD 36, Transmission of IP and ARP over FDDI Networks, Katz, D., January 1993.

IETF RFC 2578, STD 58, Structure of Management Information Version 2 (SMIv2), McCloghrie, K., et al., April 1999.

ISO/IEC TR 11802-5:1997, Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Technical reports and guidelines—Part 5: Media Access Control (MAC) Bridging of Ethernet V2.0 in Local Area Networks.[4]

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3. Definitions

For the purposes of this document, the definitions in Clause 3 of IEEE Std 802.1Q and the following terms and definitions apply.[5] The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.[6]

Aggregating Port Extender: A Bridge Port Extender that supports the full E-channel Identifier (E-CID) space and is capable of aggregating base Port Extenders.

Base Port Extender: A Bridge Port Extender that supports a subset of the E-channel Identifier (E-CID) space.

Bridge Port Extender: A device used to extend the MAC service of a C-VLAN component to form a Controlling Bridge and to extend the MAC service of a Controlling Bridge to form an Extended Bridge.

Cascade Port: A Port of a Controlling Bridge or Bridge Port Extender that connects to an Upstream Port. In the case of the connection between two Bridge Port Extenders, the Cascade Port is the Port closest to the Controlling Bridge.

Controlling Bridge: A Bridge that supports one or more Bridge Port Extenders.

E-channel: An instance of the MAC service supported by a set of two E-paths forming a bidirectional service. An E-channel is point-to-point or point-to-multipoint.

E-channel Identifier (E-CID): A value conveyed in a E-TAG that identifies an E-channel.

E-path: A configured unidirectional connectivity path between an internal Extended Port and one or more external Extended Ports and/or Upstream Ports. E-paths originating from the Internal Bridge Port Extender can be point-to-point or point-to-multipoint. E-paths originating from an External Bridge Port Extender can be point-to-point or multipoint-to-point.

E-TAG: A tag header with a Tag Protocol Identification value allocated for “IEEE 802.1BR E-Tag Type.”

Extended Bridge: A Controlling Bridge and at least one Bridge Port Extender under the Controlling Bridge’s control.

Extended Port: A Port of a Bridge Port Extender that is not operating as a Cascade Port or Upstream Port. This includes the Ports of a Bridge Port Extender connected via internal LANs to the Port of a C-VLAN component within a Controlling Bridge.

External Bridge Port Extender: A Bridge Port Extender that is not physically part of a Controlling Bridge but is controlled by the Controlling Bridge.

external Extended Port: An Extended Port that is part of an External Bridge Port Extender.

Internal Bridge Port Extender: A Bridge Port Extender that is physically part of a Controlling Bridge.

internal Extended Port: An Extended Port that is part of an Internal Bridge Port Extender.

[5]Information on references can be found in Clause 2.

[6]*IEEE Standards Dictionary Online* subscription is available at: http://www.ieee.org/portal/innovate/products/standard/standards_dictionary.html.

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Port Extender Control and Status Agent: The entity within a Bridge Port Extender that implements the Port Extender Control and Status Protocol (PE CSP).

Port Extender Control and Status Protocol (PE CSP): A protocol used between a Controlling Bridge and Bridge Port Extenders that provides the ability of the Controlling Bridge to assert control over and retrieve status information from its associated Bridge Port Extenders.

Replication Group: Within a Controlling Bridge, the set of C-VLAN component Ports connected to a single Bridge Port Extender.

Upstream Port: A Port on a Bridge Port Extender that connects to a Cascade Port. In the case of the connection between two Bridge Port Extenders, the Upstream Port is the Port furthest from the Controlling Bridge.

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