

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

Station and Media Access Control Connectivity Discovery

Corrigendum 1: Technical and Editorial Corrections

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

IEEE Std 802.1AB™-2009/Cor 1-2013

(Corrigendum to
IEEE Std 802.1AB-2009)

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

**Station and Media Access Control
Connectivity Discovery**

**Corrigendum 1:
Technical and Editorial Corrections**

Sponsor

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

Approved 14 June 2013

IEEE-SA Standards Board

Abstract: Technical and editorial errors identified by the IEEE 802.1 Working Group's maintenance activity are corrected by this corrigendum.

Keywords: IEEE 802.1AB™, link layer discovery protocol, management information base, topology discovery, topology information

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

Copyright © 2013 by the Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 14 June 2013. 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 978-0-7381-8476-0 STD98268

IEEE prohibits discrimination, harassment, and bullying. For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.

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.

Notice and Disclaimer of Liability Concerning the Use of IEEE Documents: IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. 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 IEEE administers the process and establishes rules to promote fairness in the consensus development process, 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. 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 any IEEE Standard document.

IEEE does not warrant or represent the accuracy or content of the material contained in its standards, 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 in its standards 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 ten years. When a document is more than ten years old and has not undergone a revision process, 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 its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

Translations: The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE should be considered the approved IEEE standard.

Official Statements: 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 position of 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 of IEEE.

Comments on Standards: Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide consulting information or advice pertaining to IEEE Standards documents. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important to ensure that any responses to comments and questions also receive 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 comments or questions except in those cases where the matter has previously been addressed. Any person who would like to participate in evaluating comments or revisions to an IEEE standard is welcome to join the relevant IEEE working group at <http://standards.ieee.org/develop/wg/>.

Comments on standards should be submitted to the following address:

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

Photocopies: 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.

Notice to users

Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document 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 documents 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-SA Website](http://standards.ieee.org) 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](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/findstds/errata/index.html>. Users are encouraged to check this URL for errata periodically.

Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE-SA Website at <http://standards.ieee.org/about/sasb/patcom/patents.html>. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. 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 standard 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 standard was submitted to the IEEE-SA Standard Board for approval, the IEEE P802.1 Working Group had the following membership:

Tony Jeffree, *Chair*

Glenn Parsons, *Vice-Chair and Maintenance Task Group Chair*

Ting Ao	Robert Grow	Karen Randall
Kenneth Boehlke	Yingjie Gu	Josef Roesse
Christian Boiger	Craig Gunther	Dan Romascanu
Brad Booth	Stephen Haddock	Jessy Rouyer
Paul Bottorff	Hitoshi Hayakawa	Ali Sajassi
Jeffrey Catlin	Mirko Jakovljevic	Panagiotis Saltsidis
Xin Chang	Markus Jochim	Rick Schell
Weiyang Cheng	Michael Johas Teener	Michael Seaman
Diego Crupnicoff	Girault Jones	Koichiro Seto
Rodney Cummings	Daya Kamath	Daniel Sexton
Donald Eastlake, III	Hal Keen	Rakesh Sharma
Janos Farkas	Yongbum Kim	Johannes Specht
Donald Fedyk	Philippe Klein	Kevin Stanton
Norman Finn	Oliver Kleineberg	Wilfried Steiner
Andre Fredette	Jeff Lynch	Patricia Thaler
Geoffrey Garner	Ben Mack-Crane	Jeremy Touve
Anoop Ghanwani	John Messenger	Albert Tretter
Franz Goetz	Eric Multanen	Maarten Vissers
Mark Gravel	Henry Muyshondt	Yuehua Wei
Eric Gray	David Olsen	Min Xiao
	Donald Pannell	

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

Thomas Alexander	Chol Kang	Maximilian Riegel
Martin J. Bishop	Piotr Karocki	Jeff Rockower
Christian Boiger	Stuart Kerry	Benjamin Rolfe
Ashley Butterworth	Yuri Khersonsky	Dan Romascanu
Keith Chow	Yongbum Kim	Randall Safier
Rodney Cummings	Jeff Koftinoff	Peter Sanderson
James Davis	Bruce Kraemer	Bartien Sayogo
Richard Eckard	Thomas Kurihara	Gil Shultz
Andre Fournier	Geoff Ladwig	Kevin Stanton
James Gilb	Jan-Ray Liao	Walter Struppler
Patrick Gonia	Shen Loh	William Taylor
Sudheer Grandhi	Greg Luri	David Thompson
Randall Groves	Jeffery Masters	Kazuyoshi Tsukada
Michael Gundlach	Michael McInnis	Stephen Turner
Craig Gunther	Matthew Mora	Dmitri Varsanofiev
Jerome Henry	Jose Morales	Prabodh Varshney
Marco Hernandez	Michael S. Newman	John Vergis
Werner Hoelzl	Charles Ngethe	Haiming Wang
Osedum Igumbor	Satoshi Obara	Colin Whitby-Stevens
Atsushi Ito	David Olsen	Forrest Wright
Tony Jeffree	Satoshi Oyama	Oren Yuen
Michael Johas Teener	Chris Pane	A Yuill-Thornton
Girault Jones		Daidi Zhong

When the IEEE-SA Standards Board approved this standard on 14 June 2013, it had the following membership:

John Kulick, *Chair*
David J. Law, *Vice-Chair*
Richard H. Hulett, *Past Chair*
Konstantinos Karachalios, *Secretary*

Masayuki Ariyoshi
Peter Balma
Farooq Bari
Ted Burse
Wael William Diab
Stephen Dukes
Jean-Philippe Faure
Alexander Gelman

Mark Halpin
Gary Hoffman
Paul Houzé
Jim Hughes
Michael Janezic
Joseph L. Koepfinger*
Oleg Logvinov
Ron Peterson

Gary Robinson
Jon Walter Rosdahl
Adrian Stephens
Peter Sutherland
Yatin Trivedi
Phil Winston
Yu Yuan

*Member Emeritus

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

Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Michelle Turner
IEEE Senior Standards Program Manager, Document Development

Kathryn Bennett
IEEE Standards Program Manager, Technical Program Development

Contents

6. Principles of operation	2
6.1 Transmission and reception	2
6.6 Reception principles	2
6.7 Systems with multiple LLDP Agents	2
8. LLDPDU and TLV formats	4
8.2 LLDPDU format	4
8.4 Basic TLV format	4
8.5 Basic management TLV set formats and definitions	5
9. LLDP agent operation	6
9.1 Overview	6
9.2 State machines	6
10. LLDP management	7
10.2 The LLDP management entity's responsibilities	7
11. LLDP MIB definitions	8
11.5 LLDP MIB modules	8
Annex A (normative) PICS proforma	9
A.4 Major capabilities and options	9
Annex E (normative) IEEE 802.1 Organizationally Specific TLVs	10
Annex F (normative) IEEE 802.3 Organizationally Specific TLVs	11

Figures

Figure 8-1—LLDPDU format 4

Figure 8-10—System Capabilities TLV format 5

Tables

Table 8-1—TLV type values	4
---------------------------------	---

IEEE Standard for Local and metropolitan area networks— Station Media Access Control Connectivity Discovery

Corrigendum 1: Technical and Editorial Corrections

IMPORTANT NOTICE: IEEE Standards documents are not intended to ensure safety, health, or environmental protection, or ensure against interference with or from other devices or networks. Implementers of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

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>.

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~striketrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Deletions and insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.

6. Principles of operation

6.1 Transmission and reception

Change the second paragraph and subsequent list items as shown:

Each LLDPDU contains the following ~~four~~ three mandatory TLVs (see Table 8-1), and can contain optional TLVs as selected by network management:

- d) A Chassis ID TLV.
- e) A Port ID TLV.
- f) A Time To Live TLV.
- g) Zero or more optional TLVs, as allowed by the maximum size of the LLDPDU.
- h) An optional End Of LLDPDU TLV.

Insert the following NOTE immediately following paragraph 3, and re-label the existing NOTE as NOTE 2:

NOTE 1—The statement above is true for any LLDP agent; however, there can be multiple LLDP agents sending and receiving LLDPDUs using different MAC addresses.

6.6 Reception principles

6.6.1 LLDPDU and TLV error handling

Change the text of 6.6.1 as shown:

The LLDPDU is checked to ensure that it contains the correct sequence of three mandatory TLVs at the beginning of the frame (Chassis ID TLV, Port ID TLV and Time To Live TLV) and then each optional TLV is validated in succession. LLDPDUs ~~and TLVs~~ that contain detectable errors in the first three mandatory TLVs are discarded. Optional TLVs that contain detectable errors are discarded (see 9.2.7.7.2 c)). TLVs that are not recognized, but that also contain no basic format errors, are assumed to be valid and are stored for possible later retrieval by network management (see 9.2.7.7.1 and 9.2.7.4). If the End Of LLDPDU TLV is present, any octets that follow it are discarded.

TLVs in which the information string length field contains a value that is greater than the sum of the lengths of the fields within the information string are not discarded.

NOTE—This approach allows later versions of a TLV to define additional fields at the end of the information string; implementations based on an earlier version of the TLV can therefore continue to process the fields that were defined in that version and ignore any new fields added at the end of the information string in later versions. Any information contained in such new fields is not made available to network management protocols via the standard MIB.

6.7 Systems with multiple LLDP Agents

Change the first paragraph as shown:

Each LLDP agent advertises a single set of information in the various TLVs it encodes in each transmitted LLDPDU, and is associated with the MSAP that supports the LLC entity that the agent uses to transmit and receive. Each LLDP agent uses its LSAP directly, without the use of any additional multiplexing or addressing above the LSAP to support the use of that LSAP by multiple agents; and each LLC entity provides service to one and only one protocol entity at each of its LSAPs that it supports, using the service provided by a single MSAP. It follows that each LLDP agent makes use of a unique MSAP, and that the

agent can be uniquely identified ~~by that MSAP's identifier~~ by the receiving agent using the MSAP's identifier as specified ~~above (7.2) in 6.1~~. A single LLDP management entity can support the operation of multiple LLDP agents within the same system. Figure 6-2 illustrates the relationship between the LLDP agents, LLC Entities, MSAPs, and the LLDP management entity.

8. LLDPDU and TLV formats

8.2 LLDPDU format

Change the text of 8.2, and replace Figure 8-1, as shown:

The LLDPDU shall contain the following ordered sequence of three mandatory TLVs followed by zero or more optional TLVs ~~plus an End Of LLDPDU TLV~~, as shown in Figure 8-1. An End of LLDPDU TLV may be present as the last TLV in the LLDPDU.

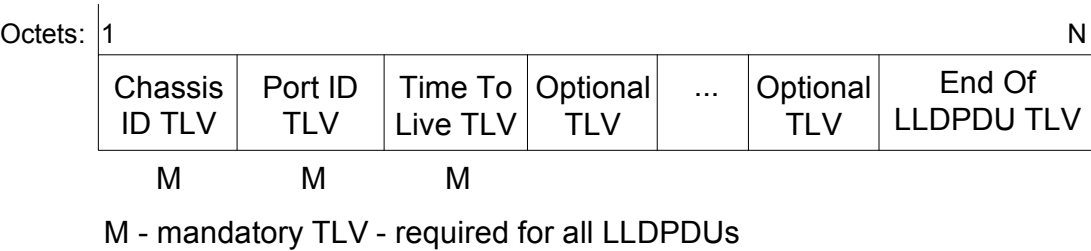


Figure 8-1—LLDPDU format

- a) Three mandatory TLVs shall be included at the beginning of each LLDPDU and shall be in the order shown.

1) Chassis ID TLV

2) Port ID TLV

3) Time To Live TLV
- b) Optional TLVs as selected by network management (may be inserted in any order).

NOTE 1—"Optional" in the sense that they are not required for LLDP operation; however, their presence could be required by other system elements that use LLDP.

- c) ~~The If the~~ End Of LLDPDU TLV is present, it shall be the last TLV in the LLDPDU.

The maximum length of the LLDPDU shall be the maximum information field length allowed by the particular transmission rate and protocol. In IEEE 802.3 MACs, for example, the maximum LLDPDU length is the maximum data field length for the basic, untagged MAC frame (1500 octets).

NOTE 2—There is no defined minimum length of an LLDPDU, other than that implied by the requirement that conformant implementations support the mandatory TLVs specified in Table 8-1.

8.4 Basic TLV format

8.4.1 TLV type

Change the first row of Table 8-1 as shown:

Table 8-1—TLV type values

TLV type	TLV name	Usage in LLDPDU	Reference
0	End Of LLDPDU	Mandatory <u>Optional</u>	8.5.1

8.5 Basic management TLV set formats and definitions

8.5.1 End Of LLDPDU TLV

Change the NOTE as shown:

NOTE—Some IEEE 802 MACs require the data field in a frame to contain a minimum number of octets. For example, the IEEE 802.3 MAC adds pad octets to complete a minimum length data field if the user's data is less than the minimum required length. Since pad octets are unspecified, an End Of LLDPDU TLV ~~is necessary~~ can be used to prevent non-zero pad octets from being interpreted by the receiving LLDP agent as another TLV.

8.5.8 System Capabilities TLV

Replace Figure 8-10 as shown:

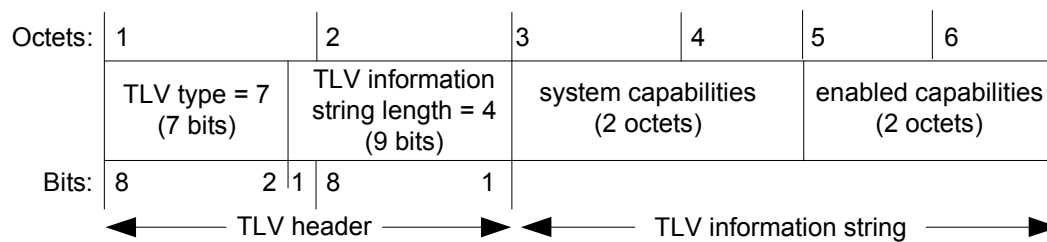


Figure 8-10—System Capabilities TLV format

9. LLDP agent operation

9.1 Overview

9.1.2 LLDPDU types

9.1.2.1 Normal LLDPDUs

Change list item c) as shown:

- c) ~~An~~ Optionally, an End Of LLDPDU TLV.

9.1.2.2 Shutdown LLDPDUs

Change list item d) and the subsequent paragraph, as shown:

- d) ~~An~~ Optionally, an End Of LLDPDU TLV.

The shutdown LLDPDU does not include any other optional TLVs and, if possible, should be transmitted before the interface is disabled.

9.2 State machines

9.2.7 State machine procedures

9.2.7.2 mibConstrInfoLLDPDU()

Change list item c) as shown:

- c) ~~An~~ Optionally, an End Of LLDPDU TLV.

9.2.7.3 mibConstrShutdownLLDPDU()

Change list item c) as shown:

- c) ~~An~~ Optionally, an End Of LLDPDU TLV.

9.2.7.7 rxProcessFrame()

9.2.7.7.2 General validation rules for all TLVs

Change the text of 9.2.7.7.2 list item b) as shown:

- b) If the TLV information string length value is not exactly greater than or equal to the sum of the lengths of all fields contained in the TLV information string:

Change the text of 9.2.7.7.2 list item c) as shown:

- c) If any TLV contains an error condition specified for that particular TLV ~~(for example, see E.3.3):~~

10. LLDP management

10.2 The LLDP management entity's responsibilities

10.2.3 Transmission management

Change list item d) as shown:

- d) Optionally. ~~A~~ppending an End Of LLDPDU TLV after the last optional TLV in the LLDPDU.

11. LLDP MIB definitions

11.5 LLDP MIB modules

Change the text in 11.5 as shown:

Two MIB modules are defined—a textual conventions MIB module (11.5.1) that contains the textual conventions used by the LLDP version 2 MIB module and by the version 2 extension MIB ~~s~~ module in Annex ~~D and Annex~~, and the LLDP version 2 MIB module itself (11.5.2). The textual conventions defined in the Textual-Convention MIB module are also available by extension MIB modules defined in other standards, such as the extension MIB modules defined in IEEE Std 802.1Q.

Annex A

(normative)

PICS proforma

A.4 Major capabilities and options

Change the basicity row of the table as shown:

basicity	Is each TLV in the basic management set implemented?			
	End Of LLDPDU TLV	M <u>O</u>	8.5.1	Yes [] No []
	Chassis ID TLV	M	8.5.2	Yes []
	Port ID TLV	M	8.5.3	Yes []
	Time To Live TLV	M	8.5.4	Yes []
	Port Description TLV	M	8.5.5	Yes []
	System Name TLV	M	8.5.6	Yes []
	System Description TLV	M	8.5.7	Yes []
	System Capabilities TLV	M	8.5.8	Yes []
	Management Address TLV	M	8.5.9	Yes []

Annex E

(normative)

IEEE 802.1 Organizationally Specific TLVs

Delete the text of Annex E and insert the following NOTE:

NOTE—The IEEE 802.1 Organizationally Specific TLVs, the corresponding extension MIB, and the PICs proforma are now documented in Annex D of IEEE Std 802.1Q. This annex, and this NOTE, will be removed from this standard during a future revision.

Annex F

(normative)

IEEE 802.3 Organizationally Specific TLVs

Delete the text of Annex F and insert the following NOTE:

NOTE—The IEEE 802.3 Organizationally Specific TLVs, the corresponding extension MIB, and the PICs proforma are now documented in Clause 79 of IEEE Std 802.3. This annex, and this NOTE, will be removed from this standard during a future revision.