

IEEE P802.3.2a™/D1.1

Draft Standard for Ethernet YANG Data Model Definition

Prepared by the

LAN/MAN Standards Committee
of the
IEEE Computer Society

This draft is a revision of IEEE Std 802.3.2-2019. Draft D1.1 is prepared for the 1st Working Group recirculation ballot. This draft expires 6 months after the date of publication or when the next version is published, whichever comes first.

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Abstract: YANG models for IEEE Std 802.3 are defined in this standard. This standard also publishes these models in a machine-readable format.

Keywords: 802.3, 802.3.2, Ethernet, YANG

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PDF: ISBN 978-1-5044-5671-5 STD23620
Print: ISBN 978-1-5044-5672-2 STDPD23620

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Introduction

This introduction is not part of IEEE Std 802.3.2a-202x, IEEE Draft Standard for Ethernet YANG Data Model Definitions.

The YANG modules included in this standard provide YANG versions of attributes defined in IEEE Std 802.3™-2022, Clause 30, as well as derivative attributes defined in other management information bases (e.g., SNMP attributes included in IEEE Std 802.3.1, YANG versions of IETF Etherlike MIB attributes, etc.). The YANG modules defined in this standard accommodate IEEE Std 802.3-2022, excluding any currently published or future amendments.

IEEE Std 802.3 will continue to evolve. New Ethernet capabilities are anticipated to be added within the next few years as amendments to this standard.

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IEEE Standard for Ethernet YANG Data Model Definitions

1. Overview

This standard defines YANG modules for various Ethernet devices specified in IEEE Std 802.3. This includes half-duplex and full-duplex data terminal equipment (DTE) using either Carrier Sense Multiple Access/Collision Detection (CSMA/CD) or Multipoint Control Protocol (MPCP), and Power Sourcing Equipment (PSE).

1.1 Scope

This standard defines YANG data models for IEEE Std 802.3 Ethernet.

1.2 Purpose

The purpose of the standard is to define YANG modules for IEEE Std 802.3 and publish these modules in a machine-readable format.

1.3 Machine-readable YANG modules

Editor's Note (to be removed prior to publication):

Yang files contained in <https://github.com/YangModels/yang/tree/main/standard/ieee/published/802.3> are IEEE 802.3.1-2019 version and will be updated at the publication time.

The machine-readable files are available for download at the following URL: <https://github.com/YangModels/yang/tree/master/standard/ieee/published/802.3> as text files with a .yang extension, e.g., *ieee802-ether-net-interface.yang*. The use of specialized tools to view YANG modules may be useful to create tree, UML image, and HTML outputs from the YANG modules.

Like other languages, YANG (see IETF RFC 7950) has an accepted style for machine-readable files, which was followed during the development of this standard. This formatting may not be preserved when importing the machine-readable YANG modules into the PDF. In case of any formatting discrepancies, the published machine-readable files should be consulted.

1.4 Summary of YANG-based management framework

The structure of YANG-based management framework closely resembles the structure of the Internet-Standard Management Framework, described in detail in section 7 of IETF RFC 3410.

Managed objects defined using YANG modeling language are hosted on the managed device and accessed through NETCONF (see IETF RFC 7803) or RESTCONF (see IETF RFC 8040). This standard specifies YANG modules that are compliant to YANG 1.1 (see IETF RFC 7950).

1.5 Security considerations

The YANG modules defined in this standard are designed to be accessed via network management protocols, including NETCONF (see IETF RFC 7803) or RESTCONF (see IETF RFC 8040). The lowest NETCONF layer is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) (see IETF RFC 6242) or TLS (see IETF RFC 8446). The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS (see IETF RFC 8446).

The NETCONF access control model (see IETF RFC 8341) provides the means to restrict access for particular NETCONF or RESTCONF users to a pre-configured subset of all available NETCONF or RESTCONF protocol operations and content.

There are a number of data nodes defined in these YANG modules that are writable/creatable/deletable, i.e., have the config property set to true, which is the default setting. These data nodes may be considered sensitive or vulnerable in some network environments. Write operations (e.g., edit-config) to these data nodes without proper protection can have a negative effect on network operations.

Some of the readable data nodes in these YANG modules may be considered sensitive or vulnerable in some network environments. It is thus important to control read access (e.g., via get, get-config, or notification) to these data nodes.

Some of the RPC operations in these YANG modules may be considered sensitive or vulnerable in some network environments. Therefore, it is important to control access to these operations.

1.6 YANG module syntax validation

All YANG modules included in this standard are YANG 1.1 (see IETF RFC 7950) compliant and pass automated checks using tools available at the time of publication.

The following open source and/or free versions of YANG validation tools may be used: Pyang (see <https://github.com/mbj4668/pyang>), ConfD (see <http://www.tail-f.com/confd-basic>), as well as other YANG model validation tools listed at <http://www.yangvalidator.com>.

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 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®-2014, IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture.^{f, g}

IEEE Std 802d™-2017, IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture Amendment 1: Allocation of Uniform Resource Name (URN) Values in IEEE 802 Standards.

IEEE Std 802.1Q™-2014, IEEE Standard for Local and metropolitan area networks—Bridges and Bridged Networks.

IEEE Std 802.3™-2022, IEEE Standard for Ethernet.

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 to be updated to correct date once project is complete

IEEE Std 802.3.1™-2013, IEEE Standard for Management Information Base (MIB) Definitions for Ethernet.

IETF RFC 2819, Remote Network Monitoring Management Information Base, S. Waldbusser, May 2000.^h

IETF RFC 3410, *Introduction and Applicability Statements for Internet Standard Management Framework*, J. Case, R. Mundy, D. Partain, B. Stewart, December 2002.

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IETF RFC 3635, *Definitions of Managed Objects for the Ethernet-like Interface Types*, J. Flick, September 2003.

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^fThe IEEE standards or products referred to in this clause are trademarks owned by the Institute of Electrical and Electronics Engineers, Incorporated.

^gIEEE publications are available from the Institute of Electrical and Electronics Engineers (<http://standards.ieee.org/>).

^hInternet Requests for Comments (RFCs) are available on the World Wide Web at the following ftp site: venera.isi.edu; logon: anonymous; password: user's e-mail address; directory: in-inotes.

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3. Definitions

For the purposes of this document, the following terms and definitions apply. Some terms used in this document are defined in IEEE Std 802.3, and where alternative definitions occur in the IEEE Standards Dictionary, the IEEE Std 802.3 definition should be used. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.¹

3.1 data model: A data model describes how data is represented and accessed.

3.2 YANG module: A YANG module defines a hierarchy of nodes that can be used for NETCONF-based (see IETF RFC 7803) and RESTCONF-based (see IETF RFC 8040) operations. With its definitions and the definitions it imports or includes from elsewhere, a module is self-contained and can be compiled.

¹*IEEE Standards Dictionary Online* is available at: <http://dictionary.ieee.org/>.

4. Abbreviations

This standard contains the following abbreviations:

CO	Central Office
CPE	Customer Premise Equipment
CSMA/CD	carrier sense multiple access with collision detection
DTE	data terminal equipment
ELO	Ethernet Link OAM
EPON	Ethernet passive optical networks
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
LLID	Link Local Identifier
MPCP	Multi-Point Control Protocol
NETCONF	Network Configuration Protocol
OAM	Operations, Administration, and Maintenance
ONU	Optical Network Unit
OLT	Optical Line terminal
PoE	Power over Ethernet
PoDL	Power over Data Line
RESTCONF	RESTful Configuration Protocol
TDM	Time Division Multiplexing
TDMA	Time Division Multiple Access
WDM	Wavelength Division Multiplexing
YANG	Yet Another Next Generation

5. Ethernet YANG Module

5.1 YANG module structure

Four modules defined in this clause are focused on the configuration and monitoring of IEEE Std 802.3 Ethernet interfaces.

ieee802-ethernet-interface YANG module contains definitions of current attributes used widely in the industry in current products,

ieee802-ethernet-interface-half-duplex YANG module contains definitions of half-duplex attributes.

ieee802-ethernet-lldp YANG module contains definitions for configuring LLDP for IEEE Std 802.3 compliant interfaces.

ieee802-ethernet-mac-merge modules contain definition for configuration of MAC Merge for IEEE Std 802.1Qcw frame preemption.

This standard does not have a normative requirement for data nodes of the base ietf-interfaces YANG module, but the following data nodes are supported: name, description, type, enabled, admin-status, oper-status, if-index, and phys-address.

5.2 Mapping of IEEE Std 802.3, Clause 30 managed objects

This subclause contains the mapping between YANG data nodes included in *ieee802-ethernet-interface* (see Table 5–1), *ieee802-ethernet-interface-half-duplex* (see Table 5–4), *ieee802-ethernet-mac-merge* (see Table 5–5), and *ieee802-ethernet-lldp* (see Table 5–6) YANG modules, managed objects, and attributes defined in IEEE Std 802.3, Clause 30.

Table 5–1—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-ethernet-interface* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-interface</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oAutoNegotiation	acAutoNegAdminControl	30.6.1.2.2	interfaces/interface/ethernet/	auto-negotiation/enable	R/W
	aAutoNegAutoConfig	30.6.1.1.4		negotiation-status	R
N/A	N/A			flow-control/pause/direction	R/W
oMACControlFunctionEntity	aPAUSEMACCtrlFramesReceived	30.3.4.3		flow-control/pause/statistics/in-frames-pause	R
	aPAUSEMACCtrlFramesTransmitted	30.3.4.2		flow-control/pause/statistics/out-frames-pause	R
N/A	dot3HCOOutPFCFrames				
N/A	N/A			flow-control/force-flow-control	R/W
N/A	N/A			speed	R/W
oMACEntity	aDuplexStatus	30.3.1.1.32		duplex	R/W
	aMaxFrameLength	30.3.1.1.37		max-frame-length	R
	aSlowProtocolFrameLimit	30.3.1.1.38		frame-limit-slow-protocol	R
oEXTENSION	aEXTENSIONMACCtrlStatus	30.3.8.3		mac-control-extension-control	R
N/A	N/A			capabilities/auto-negotiation	R

Table 5–1—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-ethernet-interface* YANG data nodes (continued)

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-interface</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oMACEntity	aFramesReceivedOK	30.3.1.1.5	interfaces/interface/ethernet/statistics/frame	in-frames	R
	aMulticastFramesReceivedOK	30.3.1.1.21		in-multicast-frames	R
	aBroadcastFramesReceivedOK	30.3.1.1.22		in-broadcast-frames	R
	aFrameCheckSequenceErrors + aAlignmentErrors	30.4.3.1.6, 30.4.3.1.7		in-error-fcs-frames	R
oMACEntity	aFrameTooLongErrors	30.3.1.1.25		in-error-oversize-frames	R
	aFramesLostDueToIntMACRcvError	30.3.1.1.15		in-error-mac-internal-frames	R
	aFramesTransmittedOK	30.3.1.1.2		out-frames	R
	aMulticastFramesXmittedOK	30.3.1.1.18		out-multicast-frames	R
	aBroadcastFramesXmittedOK	30.3.1.1.19		out-broadcast-frames	R
	aFramesLostDueToIntMACXmitError	30.3.1.1.12		out-error-mac-internal-frames	R
oPHYEntity	aSymbolErrorDuringCarrier	30.3.2.1.5	interfaces/interface/ethernet/statistics/phy	in-error-symbol	R
	aReceiveLPITransitions	30.3.2.1.11	interfaces/interface/ethernet/statistics/phy/lpi	in-lpi-transitions	R
	aReceiveLPIMicroseconds	30.3.2.1.9		in-lpi-time	R
	aTransmitLPITransitions	30.3.2.1.10		out-lpi-transitions	R
	aTransmitLPIMicroseconds	30.3.2.1.8		out-lpi-time	R

Table 5–1—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-ethernet-interface* YANG data nodes (continued)

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-interface</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oMACControlEntity	aUnsupportedOpcodesReceived	30.3.3.5	interfaces/interface/ethernet/statistics/mac-control	in-frames-mac-control-unknown	R
oEXTENSION	aEXTENSIONMACCtrlFramesReceived	30.3.8.2		in-frames-mac-control-extension	R
	aEXTENSIONMACCtrlFramesTransmitted	30.3.8.1		out-frames-mac-control-extension	R

Table 5–2—Mapping between IETF RFC 2819 managed objects and *ieee802-ethernet-interface* YANG data nodes

IETF RFC 2819 Attribute(s)	Corresponding <i>ieee802-ethernet-interface</i> YANG data nodes		
	Container(s)	Data node(s)	R/W
no direct object ^a	interfaces/interface/ethernet/statistics/frame	in-total-frames	R
etherStatsOctets		in-total-octets	R
etherStatsUndersizePkts + etherStatsFragments		in-error-undersize-frames	R

^a Can be calculated as: aFramesReceivedOK + aFrameCheckSequenceErrors + aAlignmentErrors + aFrameTooLongErrors + aFramesLostDueToIntMACRcvError.

Table 5–3—Mapping between IETF RFC 3635 managed objects and *ieee802-ethernet-interface* YANG data nodes

ETHERLIKE MIB Attribute(s)	Corresponding <i>ieee802-ethernet-interface</i> YANG data nodes		
	Container(s)	Data node(s)	R/W
dot3HCInPFCFrames	interfaces/interface/ethernet/	flow-control/pfc {ethernet-pfc} / statistics/in-frames-pfc	R
dot3HCOutPFCFrames		flow-control/pfc {ethernet-pfc} / statistics/out-frames-pfc	R

Table 5–4—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-ethernet-interface-half-duplex* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-interface-half-duplex</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oMACEntity	aRateControlAbility	30.3.1.1.33	interfaces/interface/ethernet	dynamic-rate-control	R/W
			interfaces/interface/ethernet/capability	dynamic-rate-control-supported	R
oPHYEntity	aSQETestErrors	30.3.2.1.4	interfaces/interface/ethernet/statistics/frame/csmacd{csma-cd}	in-errors-sqe-test	R
oMACEntity	aSingleCollisionFrames	30.3.1.1.3		out-frames-collision-single	R
	aMultipleCollisionFrames	30.3.1.1.4		out-frames-collision-multiple	R
	aFramesWithDeferredXmissions	30.3.1.1.9		out-frames-deferred	R
	aFramesAbortedDueToXSColls	30.3.1.1.11		out-frames-collisions-excessive	R
	aLateCollisions	30.3.1.1.10		out-collisions-late	R
	aCarrierSenseErrors	30.3.1.1.13		out-errors-carrier-sense	R
	aCollisionFrames	30.3.1.1.30		collision-histogram/collision-count	R
	collision-histogram/collision-count-frames			R	

Table 5–5—Mapping between IEEE Std 802.3, 30.14 managed objects and *ieee802-ethernet-mac-merge* YANG data nodes

IEEE Std 802.3, 30.14		Reference	Corresponding <i>ieee802-ethernet-mac-merge</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oMacMergeEntity	aMACMergeSupport	30.14.1.1	Interfaces/interface/ethernet/mac-merge/admin-status	merge-support	R
	aMACMergeStatusVerify	30.14.1.2		verify-status	R
	aMACMergeStatusTx	30.14.1.5		status-tx	R
	aMACMergeEnableTx	30.14.1.3	Interfaces/interface/ethernet/mac-merge/admin-control	merge-enable-tx	R/W
	aMACMergeVerifyDisableTx	30.14.1.4		verify-disable-tx	R/W
	aMACMergeVerifyTime	30.14.1.6		verify-time	R/W
	aMACMergeAddFragSize	30.14.1.7		frag-size	R/W
	aMACMergeFrameAssErrorCount	30.14.1.8	Interfaces/interface/ethernet/mac-merge/statistics	assembly-error-count	R
	aMACMergeFrameSmdErrorCount	30.14.1.9		smd-error-count	R
	aMACMergeFrameAssOkCount	30.14.1.10		assembly-ok-count	R
	aMACMergeFragCountRx	30.14.1.11		fragment-count-rx	R
	aMACMergeFragCountTx	30.14.1.12		fragment-count-tx	R
	aMACMergeHoldCount	30.14.1.13		hold-count	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oLldpXdot3Config	aLldpXdot3PortConfigTLVsTxEnable	30.12.1.1.1	lldp/port	tlvs-port-config-enable	R/W
oLldpXdot3LocSystemsGroup	aLldpXdot3LocPortAutoNegSupported	30.12.2.1.1		auto-negotiation-supported	R
	aLldpXdot3LocPortAutoNegEnabled	30.12.2.1.2		auto-negotiation-enabled	R
	aLldpXdot3LocPortAutoNegAdvertisedCap	30.12.2.1.3		auto-negotiation-cap	R
	aLldpXdot3LocPortOperMauType	30.12.2.1.4		operational-mau-type	R
	aLldpXdot3LocPowerPortClass	30.12.2.1.5		power-port-class	R
	aLldpXdot3LocPowerMDISupported	30.12.2.1.6		mdi-power-supported	R
	aLldpXdot3LocPowerMDIEnabled	30.12.2.1.7		mdi-power-enabled	R
	aLldpXdot3LocPowerPairControllable	30.12.2.1.8		power-pair-controlable	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3LocPowerPairs	30.12.2.1.9		power-pairs	R
	aLldpXdot3LocPowerClass	30.12.2.1.10		local-power-class	R
	aLldpXdot3LocLinkAggStatus	30.12.2.1.11		link-aggregation-status	R
	aLldpXdot3LocLinkAggPortId	30.12.2.1.12		aggregation-port-id	R
	aLldpXdot3LocMaxFrameSize	30.12.2.1.13		local-max-frame-size	R
	aLldpXdot3LocPowerType	30.12.2.1.14		power-type	R
	aLldpXdot3LocPowerSource	30.12.2.1.15		power-source	R
	aLldpXdot3LocPowerPriority	30.12.2.1.16		local-power-priority	R/W
	aLldpXdot3LocPDRequestedPowerValue	30.12.2.1.17		pd-requested-power-value	R
	aLldpXdot3LocPDRequestedPowerValueA	30.12.2.1.18		pd-requested-power-value-a	R
	aLldpXdot3LocPDRequestedPowerValueB	30.12.2.1.19		pd-requested-power-value-b	R
	aLldpXdot3LocPSEAllocatedPowerValue	30.12.2.1.20		pse-allocated-power-value	R
	aLldpXdot3LocPSEAllocatedPowerValueA	30.12.2.1.21		pse-allocated-power-value-a	R
	aLldpXdot3LocPSEAllocatedPowerValueB	30.12.2.1.22		pse-allocated-power-value-b	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3LocPSEPoweringStatus	30.12.2.1.23		pse-powering-status	R
	aLldpXdot3LocPDPoweredStatus	30.12.2.1.24		pd-powered-status	R
	aLldpXdot3LocPowerPairsExt	30.12.2.1.25		power-pairs-ext	R
	aLldpXdot3LocPowerClassExtA	30.12.2.1.26		power-class-ext-A	R
	aLldpXdot3LocPowerClassExtB	30.12.2.1.27		power-class-ext-B	R
	aLldpXdot3LocPowerClassExt	30.12.2.1.28		power-class-ext	R
	aLldpXdot3LocPowerTypeExt	30.12.2.1.29		power-type-ext	R
	aLldpXdot3LocPDLload	30.12.2.1.30		pd-load	R
	aLldpXdot3LocPD4PID	30.12.2.1.31		pd-4pid	R
	aLldpXdot3LocPSEMaxAvailPower	30.12.2.1.32		pse-max-avail-power	R
	aLldpXdot3LocPSEAutoclassSupport	30.12.2.1.33		pse-autoclass-support	R
	aLldpXdot3LocAutoclassCompleted	30.12.2.1.34		autoclass-completed	R
	aLldpXdot3LocAutoclassRequest	30.12.2.1.35		autoclass-request	R
	aLldpXdot3LocPowerDownRequest	30.12.2.1.36		power-down-request	R
	aLldpXdot3LocPowerDownTime	30.12.2.1.37		power-down-time	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3LocMeasVoltageSupport	30.12.2.1.38		meas-voltage-support	R
	aLldpXdot3LocMeasCurrentSupport	30.12.2.1.39		meas-current-support	R
	aLldpXdot3LocMeasPowerSupport	30.12.2.1.40		meas-power-support	R
	aLldpXdot3LocMeasEnergySupport	30.12.2.1.41		meas-energy-support	R
	aLldpXdot3LocMeasurementSource	30.12.2.1.42		measurement-source	R
	aLldpXdot3LocMeasVoltageRequest	30.12.2.1.43		meas-voltage-request	R
	aLldpXdot3LocMeasCurrentRequest	30.12.2.1.44		meas-current-request	R
	aLldpXdot3LocMeasCurrentRequest	30.12.2.1.45		meas-power-request	R
	aLldpXdot3LocMeasEnergyRequest	30.12.2.1.46		meas-energy-request	R
	aLldpXdot3LocMeasVoltageValid	30.12.2.1.47		meas-voltage-valid	R
	aLldpXdot3LocMeasCurrentValid	30.12.2.1.48		meas-current-valid	R
	aLldpXdot3LocMeasPowerValid	30.12.2.1.49		meas-power-valid	R
	aLldpXdot3LocMeasEnergyValid	30.12.2.1.50		meas-energy-valid	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-llDP</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3LocMeasVoltageUncertainty	30.12.2.1.51		meas-voltage-uncertainty	R
	aLldpXdot3LocMeasCurrentUncertainty	30.12.2.1.52		meas-current-uncertainty	R
	aLldpXdot3LocMeasPowerUncertainty	30.12.2.1.53		meas-power-uncertainty	R
	aLldpXdot3LocMeasEnergyUncertainty	30.12.2.1.54		meas-energy-uncertainty	R
	aLldpXdot3LocVoltageMeasurement	30.12.2.1.55		voltage-measurement	R
	aLldpXdot3LocCurrentMeasurement	30.12.2.1.56		current-measurement	R
	aLldpXdot3LocPowerMeasurement	30.12.2.1.57		power-measurement	R
	aLldpXdot3LocEnergyMeasurement	30.12.2.1.58		energy-measurement	R
	aLldpXdot3LocPSEPowerPriceIndex	30.12.2.1.59		pse-power-price-index	R
	aLldpXdot3LocResponseTime	30.12.2.1.60		local-response	R
	aLldpXdot3LocReady	30.12.2.1.61		local-system-ready	R
	aLldpXdot3LocTxTwSys	30.12.2.1.62		tx-system-value	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-llDP</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3LocTxTwSysEcho	30.12.2.1.63		tx-system-value-echo	R
	aLldpXdot3LocRxTwSys	30.12.2.1.64		rx-system-value	R
	aLldpXdot3LocRxTwSysEcho	30.12.2.1.65		rx-system-value-echo	R
	aLldpXdot3LocFbTwSys	30.12.2.1.66		fallback-system-value	R
	aLldpXdot3TxDllReady	30.12.2.1.67		tx-dll-ready	R
	aLldpXdot3RxDllReady	30.12.2.1.68		rx-dll-ready	R
	aLldpXdot3LocDllEnabled	30.12.2.1.69		dll-ready	R
	aLldpXdot3LocTxFw	30.12.2.1.70		tx-system-fw	R
	aLldpXdot3LocTxFwEcho	30.12.2.1.71		tx-system-fw-echo	R
	aLldpXdot3LocRxFw	30.12.2.1.72		rx-system-fw	R
	aLldpXdot3LocRxFwEcho	30.12.2.1.73		rx-system-fw-echo	R
	aLldpXdot3LocPreemptSupported	30.12.2.1.74		preemption-supported	R
	aLldpXdot3LocPreemptEnabled	30.12.2.1.75		preemption-enabled	R
	aLldpXdot3LocPreemptActive	30.12.2.1.76		preemption-active	R
	aLldpXdot3LocAddFragSize	30.12.2.1.77		additional-fragment-size	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oLldpXdot3RemSystemsGroup	aLldpXdot3RemPortAutoNegSupported	30.12.3.1.1	lldp/port/remote-systems-data	auto-negotiation-supported	R
	aLldpXdot3RemPortAutoNegEnabled	30.12.3.1.2		auto-negotiation-enabled	R
	aLldpXdot3RemPortAutoNegAdvertisedCap	30.12.3.1.3		auto-negotiation-cap	R
	aLldpXdot3RemPortOperMauType	30.12.3.1.4		operational-mau-type	R
	aLldpXdot3RemPowerPortClass	30.12.3.1.5		power-port-class	R
	aLldpXdot3RemPowerMDISupported	30.12.3.1.6		mdi-power-supported	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-llDP</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3RemPowerMDIEnabled	30.12.3.1.7		mdi-power-enabled	R
	aLldpXdot3RemPowerPairControllable	30.12.3.1.8		power-pair-controllable	R
	aLldpXdot3RemPowerPairs	30.12.3.1.9		power-pairs	R
	aLldpXdot3RemPowerClass	30.12.3.1.10		power-class	R
	aLldpXdot3RemLinkAggStatus	30.12.3.1.11		link-aggregation-status	R
	aLldpXdot3RemLinkAggPortId	30.12.3.1.12		aggregation-port-id	R
	aLldpXdot3RemMaxFrameSize	30.12.3.1.13		local-max-frame-size	R
	aLldpXdot3RemPowerType	30.12.3.1.14		power-type	R
	aLldpXdot3RemPowerSource	30.12.3.1.15		power-source	R
	aLldpXdot3RemPowerPriority	30.12.3.1.16		power-priority	RW
	aLldpXdot3RemPDRrequestedPowerValue	30.12.3.1.17		pd-requested-power-value	R
	aLldpXdot3RemPDRrequestedPowerValueA	30.12.3.1.18		pd-requested-power-value-a	R
	aLldpXdot3RemPDRrequestedPowerValueB	30.12.3.1.19		pd-requested-power-value-b	R
	aLldpXdot3RemPSEAllocatedPowerValue	30.12.3.1.20		pse-allocated-power-value	R
	aLldpXdot3RemPSEAllocatedPowerValueA	30.12.3.1.21		pse-allocated-power-value-a	R
	aLldpXdot3RemPSEAllocatedPowerValueB	30.12.3.1.22		pse-allocated-power-value-b	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3RemPSEPoweringStatus	30.12.3.1.23		pse-powering-status	R
	aLldpXdot3RemPDPoweredStatus	30.12.3.1.24		pd-powered-status	R
	aLldpXdot3RemPowerPairsExt	30.12.3.1.25		power-pairs-ext	R
	aLldpXdot3RemPowerClassExtA	30.12.3.1.26		power-class-ext-A	R
	aLldpXdot3RemPowerClassExtB	30.12.3.1.27		power-class-ext-B	R
	aLldpXdot3RemPowerClassExt	30.12.3.1.28		power-class-ext	R
	aLldpXdot3RemPowerTypeExt	30.12.3.1.29		power-type-ext	R
	aLldpXdot3RemPDLload	30.12.3.1.30		pd-load	R
	aLldpXdot3RemPD4PID	30.12.3.1.31		pd-4pid	R
	aLldpXdot3RemPSEMaxAvailPower	30.12.3.1.32		pse-max-avail-power	R
	aLldpXdot3RemPSEAutoclassSupport	30.12.3.1.33		pse-autoclass-support	R
	aLldpXdot3RemAutoclassCompleted	30.12.3.1.34		autoclass-completed	R
	aLldpXdot3RemAutoclassRequest	30.12.3.1.35		autoclass-request	R
	aLldpXdot3RemPowerDownRequest	30.12.3.1.36		power-down-request	R
	aLldpXdot3RemPowerDownTime	30.12.3.1.37		power-down-time	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3RemMeasVoltageSupport	30.12.3.1.38		meas-voltage-support	R
	aLldpXdot3RemMeasCurrentSupport	30.12.3.1.39		meas-current-support	R
	aLldpXdot3RemMeasPowerSupport	30.12.3.1.40		meas-power-support	R
	aLldpXdot3RemMeasEnergySupport	30.12.3.1.41		meas-energy-support	R
	aLldpXdot3RemMeasurementSource	30.12.3.1.42		measurement-source	R
	aLldpXdot3RemMeasVoltageRequest	30.12.3.1.43		meas-voltage-request	R
	aLldpXdot3RemMeasCurrentRequest	30.12.3.1.44		meas-current-request	R
	aLldpXdot3RemMeasCurrentRequest	30.12.3.1.45		meas-power-request	R
	aLldpXdot3RemMeasEnergyRequest	30.12.3.1.46		meas-energy-request	R
	aLldpXdot3RemMeasVoltageValid	30.12.3.1.47		meas-voltage-valid	R
	aLldpXdot3RemMeasCurrentValid	30.12.3.1.48		meas-current-valid	R
	aLldpXdot3RemMeasPowerValid	30.12.3.1.49		meas-power-valid	R
	aLldpXdot3RemMeasEnergyValid	30.12.3.1.50		meas-energy-valid	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-llDP</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3RemMeasVoltageUncertainty	30.12.3.1.51		meas-voltage-uncertainty	R
	aLldpXdot3RemMeasCurrentUncertainty	30.12.3.1.52		meas-current-uncertainty	R
	aLldpXdot3RemMeasPowerUncertainty	30.12.3.1.53		meas-power-uncertainty	R
	aLldpXdot3RemMeasEnergyUncertainty	30.12.3.1.54		meas-energy-uncertainty	R
	aLldpXdot3RemVoltageMeasurement	30.12.3.1.55		voltage-measurement	R
	aLldpXdot3RemCurrentMeasurement	30.12.3.1.56		current-measurement	R
	aLldpXdot3RemPowerMeasurement	30.12.3.1.57		power-measurement	R
	aLldpXdot3RemEnergyMeasurement	30.12.3.1.58		energy-measurement	R
	aLldpXdot3RemPSEPowerPriceIndex	30.12.3.1.59		pse-power-price-index	R
	aLldpXdot3RemTxTwSys	30.12.3.1.60		tx-system-value	R
	aLldpXdot3RemTxTwSysEcho	30.12.3.1.61		tx-system-value-echo	R
	aLldpXdot3RemRxTwSys	30.12.3.1.62		rx-system-value	R

Table 5–6—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-lldp* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aLldpXdot3RemRxTwSysEcho	30.12.3.1.63		rx-system-value-echo	R
	aLldpXdot3RemFbTwSys	30.12.3.1.64		fallback-system-value	R
	aLldpXdot3RemTxFw	30.12.3.1.65		tx-system-fw	R
	aLldpXdot3RemTxFwEcho	30.12.3.1.66		tx-system-fw-echo	R
	aLldpXdot3RemRxFw	30.12.3.1.67		rx-system-fw	R
	aLldpXdot3RemRxFwEcho	30.12.3.1.68		rx-system-fw-echo	R
	aLldpXdot3RemPreemptSupported	30.12.3.1.69		preemption-supported	R
	aLldpXdot3RemPreemptEnabled	30.12.3.1.70		preemption-enabled	R
	aLldpXdot3RemPreemptActive	30.12.3.1.71		preemption-active	R
	aLldpXdot3RemAddFragSize	30.12.3.1.72		additonal-fragment-size	R

5.3 YANG module definition^j

The YANG module tree hierarchy uses terms defined in IETF RFC 8407.

5.3.1 Tree hierarchy

module: ieee802-ethernet-interface

```
augment /if:interfaces/if:interface:
  +--rw ethernet
    +--rw auto-negotiation!
      | +--rw enable?          boolean
      | +--ro negotiation-status? enumeration
    +--rw duplex?              duplex-type
    +--rw speed?                eth-if-speed-type
    +--rw flow-control
      | +--rw pause {ethernet-pause}?
      | | +--rw direction?    pause-fc-direction-type
      | | +--ro statistics
      | |   +--ro in-frames-pause? yang:counter64
      | |   +--ro out-frames-pause? yang:counter64
      | +--rw pfc {ethernet-pfc}?
      | | +--rw enable?        boolean
      | | +--ro statistics
      | |   +--ro in-frames-pfc? yang:counter64
      | |   +--ro out-frames-pfc? yang:counter64
      | +--rw force-flow-control? boolean
    +--ro max-frame-length?    uint16
    +--ro mac-control-extension-control? boolean
    +--ro frame-limit-slow-protocol? uint64
    +--ro capabilities
      | +--ro auto-negotiation? boolean
    +--ro statistics
      +--ro frame
```

^jCopyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.

```

|   +--ro in-total-frames?          yang:counter64
|   +--ro in-total-octets?          yang:counter64
|   +--ro in-frames?                yang:counter64
|   +--ro in-multicast-frames?      yang:counter64
|   +--ro in-broadcast-frames?      yang:counter64
|   +--ro in-error-fcs-frames?      yang:counter64
|   +--ro in-error-undersize-frames? yang:counter64
|   +--ro in-error-oversize-frames? yang:counter64
|   +--ro in-error-mac-internal-frames? yang:counter64
|   +--ro out-frames?                yang:counter64
|   +--ro out-multicast-frames?      yang:counter64
|   +--ro out-broadcast-frames?      yang:counter64
|   +--ro out-error-mac-internal-frames? yang:counter64
+--ro phy
|   +--ro in-error-symbol?          yang:counter64
|   +--ro lpi
|       +--ro in-lpi-transitions?    yang:counter64
|       +--ro in-lpi-time?           decimal64
|       +--ro out-lpi-transitions?    yang:counter64
|       +--ro out-lpi-time?           decimal64
+--ro mac-control
|   +--ro in-frames-mac-control-unknown?
|       | yang:counter64
|   +--ro in-frames-mac-control-extension?
|       | yang:counter64
|   +--ro out-frames-mac-control-extension?
|       | yang:counter64

```

module: ieee802-ethernet-interface-half-duplex

```

augment /if:interfaces/if:interface/ieee802-eth-if:ethernet:
  +--rw dynamic-rate-control? dynamic-rate-control-type
    {dynamic-rate-control}?
augment /if:interfaces/if:interface/ieee802-eth-if:ethernet
  /ieee802-eth-if:capabilities:
    +--ro dynamic-rate-control-supported? boolean

```

```
{dynamic-rate-control}}?
augment /if:interfaces/if:interface/ieee802-eth-if:ethernet
  /ieee802-eth-if:statistics/ieee802-eth-if:frame:
  +--ro csma-cd {csma-cd}?
    +--ro in-errors-sqe-test?          yang:counter64
    +--ro out-frames-collision-single? yang:counter64
    +--ro out-frames-collision-multiple? yang:counter64
    +--ro out-frames-deferred?         yang:counter64
    +--ro out-frames-collisions-excessive? yang:counter64
    +--ro out-collisions-late?         yang:counter64
    +--ro out-errors-carrier-sense?    yang:counter64
    +--ro collision-histogram* [collision-count]
      +--ro collision-count          yang:counter64
      +--ro collision-count-frames? yang:counter64

module: ieee802-ethernet-mac-merge

augment /if:interfaces/if:interface/ieee802-eth-if:ethernet:
  +--rw mac-merge {mac-merge}?
    +--rw admin-control
      | +--rw merge-enable-tx?      enumeration
      | +--rw verify-disable-tx?    enumeration
      | +--rw verify-time?          uint16
      | +--rw frag-size?            uint8
    +--ro admin-status
      | +--ro merge-support?        enumeration
      | +--ro verify-status?        enumeration
      | +--ro status-tx?            enumeration
    +--ro statistics
      +--ro assembly-error-count?   yang:counter64
      +--ro smd-error-count?        yang:counter64
      +--ro assembly-ok-count?      yang:counter64
      +--ro fragment-count-rx?      yang:counter64
      +--ro fragment-count-tx?      yang:counter64
      +--ro hold-count?             yang:counter64
```



```
module: ieee802-ethernet-lldp

augment /lldp:lldp/lldp:port:
  +---rw tlvs-port-config-enable?      bits
  +---ro auto-negotiation-supported?   boolean
  +---ro auto-negotiation-enabled?     boolean
  +---ro auto-negotiation-cap?         binary
  +---ro operational-mau-type?         int32
  +---ro power-port-class?             port-class-type
  +---ro mdi-power-supported?          boolean
  +---ro mdi-power-enabled?            boolean
  +---ro power-pair-controlable?       boolean
  +---ro power-pairs?                  pse-pinout-type
  +---ro local-power-class?            pse-power-class-type
  +---ro link-aggregation-status?      bits
  +---ro aggregation-port-id?          int32
  +---ro local-max-frame-size?         int32
  +---ro power-type?                   bits
  +---ro power-source?                 power-source-type
  +---rw local-power-priority?         power-priority-type
  +---ro pd-requested-power-value?     int32
  +---ro pd-requested-power-value-a?   int32
  +---ro pd-requested-power-value-b?   int32
  +---ro pse-allocated-power-value?    int32
  +---ro pse-allocated-power-value-a?  int32
  +---ro pse-allocated-power-value-b?  int32
  +---ro pse-powering-status?          powering-status-type
  +---ro pd-powered-status?            powered-status-type
  +---ro power-pairs-ext?              power-pairs-type
  +---ro power-class-ext-A?            power-class-ext-AB-type
  +---ro power-class-ext-B?            power-class-ext-AB-type
  +---ro power-class-ext?              power-class-ext-type
  +---ro power-type-ext?               power-type
  +---ro pd-load?                      boolean
  +---ro pd-4pid?                      boolean
```

+--ro pse-max-avail-power?	int32
+--ro pse-autoclass-support?	boolean
+--ro autoclass-completed?	boolean
+--ro autoclass-request?	boolean
+--rw power-down-request?	int32
+--rw power-down-time?	int32
+--ro meas-voltage-support?	boolean
+--ro meas-current-support?	boolean
+--ro meas-power-support?	boolean
+--ro meas-energy-support?	boolean
+--rw measurement-source?	bits
+--ro meas-voltage-request?	boolean
+--ro meas-current-request?	boolean
+--ro meas-power-request?	boolean
+--ro meas-energy-request?	boolean
+--ro meas-voltage-valid?	boolean
+--ro meas-current-valid?	boolean
+--ro meas-power-valid?	boolean
+--ro meas-energy-valid?	boolean
+--ro meas-voltage-uncertainty?	int32
+--ro meas-current-uncertainty?	int32
+--ro meas-power-uncertainty?	int32
+--ro meas-energy-uncertainty?	int32
+--ro voltage-measurement?	int32
+--ro current-measurement?	int32
+--ro power-measurement?	int32
+--ro energy-measurement?	int32
+--ro pse-power-price-index?	int32
+--ro local-response?	int32
+--ro local-system-ready?	boolean
+--ro tx-system-value?	int32
+--ro tx-system-value-echo?	int32
+--ro rx-system-value?	int32
+--ro rx-system-value-echo?	int32
+--ro fallback-system-value?	int32
+--ro tx-dll-ready?	boolean

```

+---ro rx-dll-ready?                boolean
+---ro dll-enabled?                 boolean
+---ro tx-system-fw?                boolean
+---ro tx-system-fw-echo?           boolean
+---ro rx-system-fw?                boolean
+---ro rx-system-fw-echo?           boolean
+---ro preemption-supported?        boolean
+---ro preemption-enabled?          boolean
+---ro preemption-active?           boolean
+---ro additional-fragment-size?    int32
augment /lldp:lldp/lldp:port/lldp:remote-systems-data:
+---ro auto-negotiation-supported?  boolean
+---ro auto-negotiation-enabled?    boolean
+---ro auto-negotiation-cap?        binary
+---ro operational-mau-type?        int32
+---ro power-port-class?            port-class-type
+---ro mdi-power-supported?         boolean
+---ro mdi-power-enabled?           boolean
+---ro power-pair-controlable?      boolean
+---ro power-pairs?                 pse-pinout-type
+---ro power-class?                 pse-power-class-type
+---ro link-aggregation-status?     bits
+---ro aggregation-port-id?         int32
+---ro local-max-frame-size?        int32
+---ro power-type?                  bits
+---ro power-source?                 power-source-type
+---ro power-priority?               power-priority-type
+---ro pd-requested-power-value?    int32
+---ro pd-requested-power-value-a?  int32
+---ro pd-requested-power-value-b?  int32
+---ro pse-allocated-power-value?   int32
+---ro pse-allocated-power-value-a? int32
+---ro pse-allocated-power-value-b? int32
+---ro pse-powering-status?         powering-status-type
+---ro pd-powered-status?           powered-status-type
+---ro power-pairs-ext?              power-pairs-type

```

+++ro power-class-ext-A?	power-class-ext-AB-type
+++ro power-class-ext-B?	power-class-ext-AB-type
+++ro power-class-ext?	power-class-ext-type
+++ro power-type-ext?	power-type
+++ro pd-load?	boolean
+++ro pd-4pid?	boolean
+++ro pse-max-avail-power?	int32
+++ro pse-autoclass-support?	boolean
+++ro autoclass-completed?	boolean
+++ro autoclass-request?	boolean
+++ro power-down-request?	int32
+++ro power-down-time?	int32
+++ro meas-voltage-support?	boolean
+++ro meas-current-support?	boolean
+++ro meas-power-support?	boolean
+++ro meas-energy-support?	boolean
+++ro measurement-source?	bits
+++ro meas-voltage-request?	boolean
+++ro meas-current-request?	boolean
+++ro meas-power-request?	boolean
+++ro meas-energy-request?	boolean
+++ro meas-voltage-valid?	boolean
+++ro meas-current-valid?	boolean
+++ro meas-power-valid?	boolean
+++ro meas-energy-valid?	boolean
+++ro meas-voltage-uncertainty?	int32
+++ro meas-current-uncertainty?	int32
+++ro meas-power-uncertainty?	int32
+++ro meas-energy-uncertainty?	int32
+++ro voltage-measurement?	int32
+++ro current-measurement?	int32
+++ro power-measurement?	int32
+++ro energy-measurement?	int32
+++ro pse-power-price-index?	int32
+++ro tx-system-value?	int32
+++ro tx-system-value-echo?	int32

```

+--ro rx-system-value?          int32
+--ro rx-system-value-echo?     int32
+--ro fallback-system-value?    int32
+--ro tx-system-fw?             boolean
+--ro tx-system-fw-echo?        boolean
+--ro rx-system-fw?             boolean
+--ro rx-system-fw-echo?        boolean
+--ro preemption-supported?     boolean
+--ro preemption-enabled?       boolean
+--ro preemption-active?        boolean
+--ro additional-fragment-size? int32

```

```

module: ieee802-dot1ab-lldp
+--rw lldp
|   +--rw message-fast-tx?          uint32
|   +--rw message-tx-hold-multiplier? uint32
|   +--rw message-tx-interval?      uint32
|   +--rw reinit-delay?             uint32
|   +--rw tx-credit-max?            uint32
|   +--rw tx-fast-init?             uint32
|   +--rw notification-interval?    uint32
|   +--ro remote-statistics
|   |   +--ro last-change-time?      yang:timestamp
|   |   +--ro remote-inserts?        yang:zero-based-counter32
|   |   +--ro remote-deletes?        yang:zero-based-counter32
|   |   +--ro remote-drops?          yang:zero-based-counter32
|   |   +--ro remote-ageouts?        yang:zero-based-counter32
|   +--ro local-system-data
|   |   +--ro chassis-id-subtype-type      ieee:chassis-id-subtype-type
|   |   +--ro chassis-id?                 ieee:chassis-id-type
|   |   +--ro system-name?                 string
|   |   +--ro system-description?          string
|   |   +--ro system-capabilities-supported? lldp-types:system-capabilities-map
|   |   +--ro system-capabilities-enabled? lldp-types:system-capabilities-map
|   +--rw port* [name dest-mac-address]
|       +--rw name                                if:interface-ref

```

```

+--rw dest-mac-address          ieee:mac-address
+--rw admin-status?             enumeration
+--rw notification-enable?      boolean
+--rw tlvs-tx-enable?           bits
+--rw message-fast-tx?          uint32
+--rw message-tx-hold-multiplier? uint32
+--rw message-tx-interval?      uint32
+--rw reinit-delay?             uint32
+--rw tx-credit-max?            uint32
+--rw tx-fast-init?             uint32
+--rw notification-interval?    uint32
+--rw management-address-tx-port* [address-subtype man-address]
|   +--rw address-subtype      identityref
|   +--rw man-address          lldp-types:man-addr-type
|   +--rw tx-enable?           boolean
|   +--ro addr-len?            uint32
|   +--ro if-subtype?          lldp-types:man-addr-if-subtype
|   +--ro if-id?               uint32
+--ro port-id-subtype?          ieee:port-id-subtype-type
+--ro port-id?                  ieee:port-id-type
+--ro port-desc?                string
+--ro tx-statistics
|   +--ro total-frames?         yang:counter32
|   +--ro total-length-errors? yang:counter32
+--ro rx-statistics
|   +--ro total-ageouts?        yang:zero-based-counter32
|   +--ro total-discarded-frames? yang:counter32
|   +--ro error-frames?         yang:counter32
|   +--ro total-frames?         yang:counter32
|   +--ro total-discarded-tlvs? yang:counter32
|   +--ro total-unrecognized-tlvs? yang:counter32
+--ro remote-systems-data* [time-mark remote-index]
|   +--ro time-mark             yang:timeticks
|   +--ro remote-index          uint32
|   +--ro remote-too-many-neighbors? boolean
|   +--ro remote-changes?      boolean

```

```

|   +---ro chassis-id-subtype?                               ieee:chassis-id-subtype-type
|   +---ro chassis-id?                                       ieee:chassis-id-type
|   +---ro port-id-subtype?                                   ieee:port-id-subtype-type
|   +---ro port-id?                                           ieee:port-id-type
|   +---ro port-desc?                                         string
|   +---ro system-name?                                       string
|   +---ro system-description?                                string
|   +---ro system-capabilities-supported?                    lldp-types:system-capabilities-map
|   +---ro system-capabilities-enabled?                      lldp-types:system-capabilities-map
|   +---ro management-address* [address-subtype address]
|   |   +---ro address-subtype      identityref
|   |   +---ro address               lldp-types:man-addr-type
|   |   +---ro if-subtype?           lldp-types:man-addr-if-subtype
|   |   +---ro if-id?                uint32
|   +---ro remote-unknown-tlv* [tlv-type]
|   |   +---ro tlv-type              uint32
|   |   +---ro tlv-info?             binary
|   +---ro remote-org-defined-info* [info-identifier info-subtype info-index]
|   |   +---ro info-identifier        uint32
|   |   +---ro info-subtype           uint32
|   |   +---ro info-index             uint32
|   |   +---ro remote-info?          binary
|   +---ro ieee802-eth-lldp:auto-negotiation-supported?     boolean
|   +---ro ieee802-eth-lldp:auto-negotiation-enabled?       boolean
|   +---ro ieee802-eth-lldp:auto-negotiation-cap?           binary
|   +---ro ieee802-eth-lldp:operational-mau-type?           int32
|   +---ro ieee802-eth-lldp:power-port-class?               port-class-type
|   +---ro ieee802-eth-lldp:mdi-power-supported?            boolean
|   +---ro ieee802-eth-lldp:mdi-power-enabled?              boolean
|   +---ro ieee802-eth-lldp:power-pair-controlable?         boolean
|   +---ro ieee802-eth-lldp:power-pairs?                    pse-pinout-type
|   +---ro ieee802-eth-lldp:power-class?                     pse-power-class-type
|   +---ro ieee802-eth-lldp:link-aggregation-status?        bits
|   +---ro ieee802-eth-lldp:aggregation-port-id?            int32
|   +---ro ieee802-eth-lldp:local-max-frame-size?           int32
|   +---ro ieee802-eth-lldp:power-type?                      bits

```

---ro ieee802-eth-lldp:power-source?	power-source-type
---ro ieee802-eth-lldp:power-priority?	power-priority-type
---ro ieee802-eth-lldp:pd-requested-power-value?	int32
---ro ieee802-eth-lldp:pse-allocated-power-value?	int32
---ro ieee802-eth-lldp:tx-system-value?	int32
---ro ieee802-eth-lldp:tx-system-value-echo?	int32
---ro ieee802-eth-lldp:rx-system-value?	int32
---ro ieee802-eth-lldp:rx-system-value-echo?	int32
---ro ieee802-eth-lldp:fallback-system-value?	int32
---ro ieee802-eth-lldp:tx-system-fw?	boolean
---ro ieee802-eth-lldp:tx-system-fw-echo?	boolean
---ro ieee802-eth-lldp:rx-system-fw?	boolean
---ro ieee802-eth-lldp:rx-system-fw-echo?	boolean
---ro ieee802-eth-lldp:preemption-supported?	boolean
---ro ieee802-eth-lldp:preemption-enabled?	boolean
---ro ieee802-eth-lldp:preemption-active?	boolean
---ro ieee802-eth-lldp:additional-fragment-size?	int32
+++rw ieee802-eth-lldp:tlvs-port-config-enable?	bits
+++ro ieee802-eth-lldp:auto-negotiation-supported?	boolean
+++ro ieee802-eth-lldp:auto-negotiation-enabled?	boolean
+++ro ieee802-eth-lldp:auto-negotiation-cap?	binary
+++ro ieee802-eth-lldp:operational-mau-type?	int32
+++ro ieee802-eth-lldp:power-port-class?	port-class-type
+++ro ieee802-eth-lldp:mdl-power-supported?	boolean
+++ro ieee802-eth-lldp:mdl-power-enabled?	boolean
+++ro ieee802-eth-lldp:power-pair-controlable?	boolean
+++ro ieee802-eth-lldp:power-pairs?	pse-pinout-type
+++ro ieee802-eth-lldp:local-power-class?	pse-power-class-type
+++ro ieee802-eth-lldp:link-aggregation-status?	bits
+++ro ieee802-eth-lldp:aggregation-port-id?	int32
+++ro ieee802-eth-lldp:local-max-frame-size?	int32
+++ro ieee802-eth-lldp:power-type?	bits
+++ro ieee802-eth-lldp:power-source?	power-source-type
+++rw ieee802-eth-lldp:local-power-priority?	power-priority-type
+++ro ieee802-eth-lldp:pd-requested-power-value?	int32
+++ro ieee802-eth-lldp:pse-allocated-power-value?	int32


```

+--ro ieee802-eth-lldp:local-response-time?          int32
+--ro ieee802-eth-lldp:local-system-ready?           boolean
+--ro ieee802-eth-lldp:reduced-operation-power-value? int32
+--ro ieee802-eth-lldp:tx-system-value?              int32
+--ro ieee802-eth-lldp:tx-system-value-echo?         int32
+--ro ieee802-eth-lldp:rx-system-value?              int32
+--ro ieee802-eth-lldp:rx-system-value-echo?         int32
+--ro ieee802-eth-lldp:fallback-system-value?        int32
+--ro ieee802-eth-lldp:tx-dll-ready?                 boolean
+--ro ieee802-eth-lldp:rx-dll-ready?                 boolean
+--ro ieee802-eth-lldp:dll-enabled?                  boolean
+--ro ieee802-eth-lldp:tx-system-fw?                 boolean
+--ro ieee802-eth-lldp:tx-system-fw-echo?            boolean
+--ro ieee802-eth-lldp:rx-system-fw?                 boolean
+--ro ieee802-eth-lldp:rx-system-fw-echo?            boolean
+--ro ieee802-eth-lldp:preemption-supported?         boolean
+--ro ieee802-eth-lldp:preemption-enabled?           boolean
+--ro ieee802-eth-lldp:preemption-active?            boolean
+--ro ieee802-eth-lldp:additional-fragment-size?     int32

```

notifications:

```

+---n remote-table-change
+--ro remote-insert?      -> /lldp/remote-statistics/remote-inserts
+--ro remote-delete?      -> /lldp/remote-statistics/remote-deletes
+--ro remote-drops?       -> /lldp/remote-statistics/remote-drops
+--ro remote-ageouts?     -> /lldp/remote-statistics/remote-ageouts

```

module: ietf-interfaces

```

+--rw interfaces
|   +--rw interface* [name]
|       +--rw name                string
|       +--rw description?        string
|       +--rw type                identityref
|       +--rw enabled?            boolean
|       +--rw link-up-down-trap-enable? enumeration {if-mib}?
|       +--ro admin-status        enumeration {if-mib}?

```

```

|      +---ro oper-status          enumeration
|      +---ro last-change?        yang:date-and-time
|      +---ro if-index            int32 {if-mib}?
|      +---ro phys-address?       yang:phys-address
|      +---ro higher-layer-if*    interface-ref
|      +---ro lower-layer-if*     interface-ref
|      +---ro speed?              yang:gauge64
|      +---ro statistics
|          +---ro discontinuity-time yang:date-and-time
|          +---ro in-octets?         yang:counter64
|          +---ro in-unicast-pkts?   yang:counter64
|          +---ro in-broadcast-pkts? yang:counter64
|          +---ro in-multicast-pkts? yang:counter64
|          +---ro in-discards?       yang:counter32
|          +---ro in-errors?         yang:counter32
|          +---ro in-unknown-protos? yang:counter32
|          +---ro out-octets?        yang:counter64
|          +---ro out-unicast-pkts?  yang:counter64
|          +---ro out-broadcast-pkts? yang:counter64
|          +---ro out-multicast-pkts? yang:counter64
|          +---ro out-discards?      yang:counter32
|          +---ro out-errors?        yang:counter32
x--ro interfaces-state
  x--ro interface* [name]
    x--ro name          string
    x--ro type          identityref
    x--ro admin-status  enumeration {if-mib}?
    x--ro oper-status   enumeration
    x--ro last-change?  yang:date-and-time
    x--ro if-index      int32 {if-mib}?
    x--ro phys-address? yang:phys-address
    x--ro higher-layer-if* interface-state-ref
    x--ro lower-layer-if* interface-state-ref
    x--ro speed?        yang:gauge64
    x--ro statistics
      x--ro discontinuity-time yang:date-and-time

```

```

x--ro in-octets?          yang:counter64
x--ro in-unicast-pkts?    yang:counter64
x--ro in-broadcast-pkts? yang:counter64
x--ro in-multicast-pkts? yang:counter64
x--ro in-discards?       yang:counter32
x--ro in-errors?         yang:counter32
x--ro in-unknown-protos? yang:counter32
x--ro out-octets?        yang:counter64
x--ro out-unicast-pkts?  yang:counter64
x--ro out-broadcast-pkts? yang:counter64
x--ro out-multicast-pkts? yang:counter64
x--ro out-discards?      yang:counter32
x--ro out-errors?        yang:counter32

```

```

module: ietf-routing
+--rw routing
|   +--rw router-id?          yang:dotted-quad {router-id}?
|   +--ro interfaces
|   |   +--ro interface*    if:interface-ref
|   +--rw control-plane-protocols
|   |   +--rw control-plane-protocol* [type name]
|   |   |   +--rw type          identityref
|   |   |   +--rw name          string
|   |   |   +--rw description?  string
|   |   |   +--rw static-routes
|   +--rw ribs
|   |   +--rw rib* [name]
|   |   |   +--rw name          string
|   |   |   +--rw address-family identityref
|   |   |   +--ro default-rib?  boolean {multiple-ribs}?
|   |   +--ro routes
|   |   |   +--ro route* []
|   |   |   |   +--ro route-preference?  route-preference
|   |   |   |   +--ro next-hop
|   |   |   |   |   +--ro (next-hop-options)
|   |   |   |   |   +--:(simple-next-hop)

```

```

|         |         |         | +--ro outgoing-interface?  if:interface-ref
|         |         |         | +---:(special-next-hop)
|         |         |         | | +--ro special-next-hop?      enumeration
|         |         |         | +---:(next-hop-list)
|         |         |         | | +--ro next-hop-list
|         |         |         | | | +--ro next-hop* []
|         |         |         | | | +--ro outgoing-interface?  if:interface-ref
|         |         |         | +--ro source-protocol      identityref
|         |         |         | +--ro active?              empty
|         |         |         | +--ro last-updated?        yang:date-and-time
|         |         | +---x active-route
|         |         | | +--ro output
|         |         | | | +--ro route
|         |         | | | | +--ro next-hop
|         |         | | | | | +--ro (next-hop-options)
|         |         | | | | | +---:(simple-next-hop)
|         |         | | | | | | +--ro outgoing-interface?  if:interface-ref
|         |         | | | | | +---:(special-next-hop)
|         |         | | | | | | +--ro special-next-hop?      enumeration
|         |         | | | | | +---:(next-hop-list)
|         |         | | | | | | +--ro next-hop-list
|         |         | | | | | | | +--ro next-hop* []
|         |         | | | | | | | +--ro outgoing-interface?  if:interface-ref
|         |         | | | | | +--ro source-protocol      identityref
|         |         | | | | | +--ro active?              empty
|         |         | | | | | +--ro last-updated?        yang:date-and-time
|         |         | +---rw description?      string
| o--ro routing-state
|   +--ro router-id?          yang:dotted-quad
| o--ro interfaces
| | o--ro interface*  if:interface-state-ref
| o--ro control-plane-protocols
| | o--ro control-plane-protocol* [type name]
| |   o--ro type      identityref
| |   o--ro name      string
| o--ro ribs

```

```

o--ro rib* [name]
  o--ro name string
  +--ro address-family identityref
  o--ro default-rib? boolean {multiple-ribs}?
  o--ro routes
    | o--ro route* []
    |   o--ro route-preference? route-preference
    |   o--ro next-hop
    |     | +--ro (next-hop-options)
    |     |   +--:(simple-next-hop)
    |     |   | +--ro outgoing-interface? if:interface-ref
    |     |   +--:(special-next-hop)
    |     |   | +--ro special-next-hop? enumeration
    |     |   +--:(next-hop-list)
    |     |     +--ro next-hop-list
    |     |       +--ro next-hop* []
    |     |       | +--ro outgoing-interface? if:interface-ref
    |     +--ro source-protocol identityref
    |     +--ro active? empty
    |     +--ro last-updated? yang:date-and-time
o---x active-route
  +--ro output
    o--ro route
      o--ro next-hop
        | +--ro (next-hop-options)
        |   +--:(simple-next-hop)
        |   | +--ro outgoing-interface? if:interface-ref
        |   +--:(special-next-hop)
        |   | +--ro special-next-hop? enumeration
        |   +--:(next-hop-list)
        |     +--ro next-hop-list
        |       +--ro next-hop* []
        |       | +--ro outgoing-interface? if:interface-ref
        +--ro source-protocol identityref
        +--ro active? empty
        +--ro last-updated? yang:date-and-time

```

5.3.2 YANG module

In the following YANG module definitions, should any discrepancy between the text of the description for individual YANG nodes and the corresponding definition in 5.2 through 5.3 of this clause occur, the definitions and mappings in 5.3 shall take precedence.

Editor's Note (to be removed prior to publication):

Yang files contained in <https://github.com/YangModels/yang/tree/main/standard/ieee/published/802.3> are IEEE 802.3.2-2019 version and will be updated at the publication time.

An ASCII text version of the Ethernet YANG module can be found at the following URL:^k
<https://github.com/YangModels/yang/tree/master/standard/ieee/published/802.3>.

Editor's Note (to be removed prior to publication):

There is missing content from *oPhyEntity*, at least *aPhyType* and *aPhyTypeList*. In 802.3.1 these come in as *IANAifMauTypeListBits* and *ifMauType(AutonomousType)* from IANA-MAU-MIB. We need the equivalent definitions and attributes for the YANG model. IEEE 802.3.2 task force is encouraged to provide contributions defining the missing Yang definitions

5.3.2.1 Ethernet interface module

Editor's Note (to be removed prior to publication):

Pretty printing of *ieee802-ethernet-interface.yang* file may change the appearance by adding whitespace and reformatting lines

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 and IEEE Std 802.3.2 to be updated at the publication time

```
module ieee802-ethernet-interface {
  yang-version "1.1";
  namespace urn:ieee:std:802.3:yang:ieee802-ethernet-interface;
  prefix ieee802-eth-if;
  import ietf-yang-types {
    prefix yang;
    reference
      "IETF RFC 6991";
  }
  import ietf-interfaces {
    prefix if;
    reference
      "IETF RFC 8343";
  }
  import iana-if-type {
    prefix ianaif;
    reference
      "http://www.iana.org/assignments/yang-parameters/
      iana-if-type@2023-01-26.yang";
  }
  organization
    "IEEE Std 802.3 Ethernet Working Group
    Web URL: http://www.ieee802.org/3/";
  contact
```

^kCopyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.

```
1      "Web URL: http://www.ieee802.org/3/";
2  description
3      "This module contains YANG definitions for configuring IEEE Std 802.3
4      Ethernet Interfaces. In this YANG module, 'Ethernet interface' can be
5      interpreted as referring to 'IEEE Std 802.3 compliant Ethernet
6      interfaces'.";
7  revision 2024-02-12 {
8      description
9          "Updates under IEEE Std 802.3.2-202x, Draft 1.1";
10     reference
11         "IEEE Std 802.3-2022 and IEEE Std 802.3.1-202X, unless dated
12         explicitly";
13 }
14 feature ethernet-pfc {
15     description
16         "This device supports Ethernet priority flow-control.";
17 }
18 feature ethernet-pause {
19     description
20         "This device supports Ethernet PAUSE.";
21 }
22 typedef eth-if-speed-type {
23     type decimal64 {
24         fraction-digits "3";
25     }
26     units "Gb/s";
27     description
28         "Used to represent the configured, negotiated, or actual speed of
29         an Ethernet interface in Gigabits per second (Gb/s), accurate to 3
30         decimal places (i.e., accurate to 1 Mb/s).";
31 }
32 typedef duplex-type {
33     type enumeration {
34         enum full {
35             description
36                 "Full duplex.";
37         }
38         enum half {
39             description
40                 "Half duplex.";
41         }
42         enum unknown {
43             description
44                 "Link is currently disconnected or initializing.";
45         }
46     }
47     default "full";
48     description
49         "Used to represent the configured, negotiated, or actual duplex
50         mode of an Ethernet interface.";
51     reference
52         "IEEE Std 802.3, 30.3.1.1.32, aDuplexStatus";
53 }
54 typedef pause-fc-direction-type {
55     type enumeration {
56         enum disabled {
57             description
58                 "Flow-control disabled in both ingress and egress directions,
59                 i.e., PAUSE frames are not transmitted and PAUSE frames
60                 received in the ingress direction are discarded without
61                 processing.";
62         }
63         enum ingress-only {
64             description
```

```

1      "PAUSE frame based flow control is enabled in the ingress
2      direction only, i.e., PAUSE frames may be transmitted to reduce
3      the ingress traffic flow, but PAUSE frames received in the
4      ingress direction are discarded without reducing the egress
5      traffic rate.";
6  }
7  enum egress-only {
8      description
9          "PAUSE frame based flow control is enabled in the egress
10         direction only, i.e., PAUSE frames are not transmitted, but
11         PAUSE frames received in the ingress direction are processed to
12         reduce the egress traffic rate.";
13  }
14  enum bi-directional {
15      description
16          "PAUSE frame based flow control is enabled in both ingress and
17         egress directions, i.e., PAUSE frames may be transmitted to
18         reduce the ingress traffic flow, and PAUSE frames received on
19         ingress are processed to reduce the egress traffic rate.";
20  }
21  enum undefined {
22      description
23          "Link is currently disconnected or initializing.";
24  }
25  }
26  description
27      "Used to represent the configured, negotiated, or actual PAUSE
28      frame-based flow control setting.";
29  reference
30      "IEEE Std 802.3.1, dot3PauseAdminMode and dot3PauseOperMode";
31  }
32  augment "/if:interfaces/if:interface" {
33      when
34          "derived-from-or-self(if:type, 'ianaift:ethernetCsmacd')";
35      description
36          "Applies to all P2P Ethernet interfaces.";
37  }
38  description
39      "Augment interface model with Ethernet interface specific
40      configuration nodes.";
41  container ethernet {
42      description
43          "Contains all Ethernet interface related configuration.";
44      container auto-negotiation {
45          presence
46              "The presence of this container indicates that"+
47              "auto-negotiation is supported on this Ethernet interface.";
48          description
49              "Contains auto-negotiation transmission parameters
50
51              This container contains a data node that allows the advertised
52              duplex value in the negotiation to be restricted.
53
54              If not specified then the default behavior for the duplex data
55              node is to negotiate all available values for the particular
56              type of Ethernet PHY associated with the interface.
57
58              If auto-negotiation is enabled, and PAUSE frame based flow
59              control has not been explicitly configured, then the default
60              PAUSE frame based flow control capabilities that are negotiated
61              allow for bi-directional or egress-only PAUSE frame based flow
62              control.
63
64              If auto-negotiation is enabled, and PAUSE frame based flow
65

```



```
1         control has been explicitly configured, then the configuration
2         settings restrict the values that may be negotiated. However,
3         it should be noted that the protocol does not allow only egress
4         PAUSE frame based flow control to be negotiated without also
5         allowing bi-directional PAUSE frame based flow control.";
6     reference
7         "IEEE Std 802.3, Clause 28 and Annexes 28A-D";
8     leaf enable {
9         type boolean;
10        default "true";
11        description
12            "Controls whether auto-negotiation is enabled or disabled.
13            For interface types that support auto-negotiation then it
14            defaults to being enabled.
15
16            For interface types that do not support auto-negotiation, the
17            related configuration data is ignored.";
18    }
19    leaf negotiation-status {
20        when
21            "../enable = 'true'";
22        type enumeration {
23            enum in-progress {
24                description
25                    "The auto-negotiation protocol is running and negotiation
26                    is currently in-progress.";
27            }
28            enum complete {
29                description
30                    "The auto-negotiation protocol has completed
31                    successfully.";
32            }
33            enum failed {
34                description
35                    "The auto-negotiation protocol has failed.";
36            }
37            enum unknown {
38                description
39                    "The auto-negotiation status is not currently known, this
40                    could be because it is still negotiating or the protocol
41                    cannot run (e.g., if no medium is present).";
42            }
43            enum no-negotiation {
44                description
45                    "No auto-negotiation is executed. The auto-negotiation
46                    function is either not supported on this interface or has
47                    not been enabled.";
48            }
49        }
50        config false;
51        description
52            "The status of the auto-negotiation protocol.";
53        reference
54            "IEEE 802.3, 30.6.1.1.4, aAutoNegAutoConfig";
55    }
56 }
57
58 leaf duplex {
59     type duplex-type;
60     description
61         "Operational duplex mode of the Ethernet interface.";
62     reference
63         "IEEE Std 802.3, 30.3.1.1.32 aDuplexStatus";
64 }
65 leaf speed {
```

```
1      type eth-if-speed-type;
2      units "Gb/s";
3      description
4          "Operational speed (data rate) of the Ethernet interface. The
5           default value is implementation-dependent.";
6  }
7  container flow-control {
8      description
9          "Holds the different types of Ethernet PAUSE frame based flow
10         control that can be enabled.";
11      container pause {
12          if-feature "ethernet-pause";
13          description
14              "IEEE Std 802.3 PAUSE frame based PAUSE frame based flow
15               control.";
16          reference
17              "IEEE Std 802.3, Annex 31B";
18          leaf direction {
19              type pause-fc-direction-type;
20              description
21                  "Indicates which direction PAUSE frame based flow control
22                   is enabled in, or whether it is disabled. The default
23                   flow-control settings are vendor specific. If
24                   auto-negotiation is enabled, then PAUSE based flow-control
25                   is negotiated by default. The default value is
26                   implementation-dependent.";
27          }
28          container statistics {
29              config false;
30              description
31                  "Contains the number of PAUSE frames received or
32                   transmitted.
33
34                   Discontinuities in the values of counters in this container
35                   can occur at re-initialization of the management system,
36                   and at other times as indicated by the value of the
37                   'discontinuity-time' leaf defined in the ietf-interfaces
38                   YANG module (IETF RFC 8343).";
39              leaf in-frames-pause {
40                  type yang:counter64;
41                  units "frames";
42                  description
43                      "A count of PAUSE MAC Control frames transmitted on this
44                       Ethernet interface.";
45                  reference
46                      "IEEE Std 802.3, 30.3.4.3 aPAUSEMACCtrlFramesReceived";
47              }
48              leaf out-frames-pause {
49                  type yang:counter64;
50                  units "frames";
51                  description
52                      "A count of PAUSE MAC Control frames transmitted on this
53                       Ethernet interface.";
54                  reference
55                      "IEEE Std 802.3, 30.3.4.2
56                       aPAUSEMACCtrlFramesTransmitted";
57              }
58          }
59      }
60  }
61  container pfc {
62      if-feature "ethernet-pfc";
63      description
64          "IEEE Std 802.3 Priority-based flow control.";
65      reference
```

```
1      "IEEE Std 802.3, Annex 31D";
2  leaf enable {
3      type boolean;
4      description
5          "True indicates that IEEE Std 802.3 priority-based flow
6           control is enabled, false indicates that IEEE Std 802.3
7           priority-based flow control is disabled. For interfaces
8           that have auto-negotiation, the priority-based flow control
9           is enabled by default.";
10 }
11 container statistics {
12     config false;
13     description
14         "This container collects all statistics for Ethernet
15         interfaces.
16
17         Discontinuities in the values of counters in this container
18         can occur at re-initialization of the management system,
19         and at other times as indicated by the value of the
20         'discontinuity-time' leaf defined in the ietf-interfaces
21         YANG module (IETF RFC 8343).";
22     leaf in-frames-pfc {
23         status deprecated;
24         type yang:counter64;
25         units "frames";
26         description
27             "Deprecated in-frames-pfc as not defined in base
28             standard. A count of PFC MAC Control frames received on
29             this Ethernet interface.";
30         reference
31             "IEEE Std 802.3.1, dot3HCInPFCFrames";
32     }
33     leaf out-frames-pfc {
34         status deprecated;
35         type yang:counter64;
36         units "frames";
37         description
38             "Deprecated out-frames-pfc as not defined in base
39             standard. A count of PFC MAC Control frames transmitted on
40             this interface.";
41         reference
42             "IEEE Std 802.3.1, dot3HCInPFCFrames";
43     }
44 }
45 }
46 }
47 leaf force-flow-control {
48     type boolean;
49     default "false";
50     description
51         "Explicitly forces the local PAUSE frame based flow control
52         settings regardless of what has been negotiated.
53
54         Since the auto-negotiation of flow-control settings does not
55         allow all sane combinations to be negotiated (e.g., consider
56         a device that is only capable of sending PAUSE frames
57         connected to a peer device that is only capable of receiving
58         and acting on PAUSE frames) and failing to agree on the
59         flow-control settings does not cause the auto-negotiation to
60         fail completely, then it is sometimes useful to be able to
61         explicitly enable particular PAUSE frame based flow control
62         settings on the local device regardless of what is being
63         advertised or negotiated.";
64     reference
65         "IEEE Std 802.3, Table 28B-3";
```

```
1     }
2   }
3   leaf max-frame-length {
4     type uint16;
5     units "octets";
6     config false;
7     description
8       "This indicates the MAC frame length (including FCS bytes) at
9       which frames are dropped for being too long.";
10    reference
11      "IEEE Std 802.3, 30.3.1.1.37 aMaxFrameLength";
12  }
13  leaf mac-control-extension-control {
14    type boolean;
15    config false;
16    description
17      "A value that identifies the current EXTENSION MAC Control
18      function, as specified in IEEE Std 802.3, Annex 31C.";
19    reference
20      "IEEE Std 802.3, 30.3.8.3 aEXTENSIONMACCtrlStatus
21      IEEE Std 802.3.1, dot3ExtensionMacCtrlStatus ";
22  }
23  leaf frame-limit-slow-protocol {
24    type uint64;
25    units "f/s";
26    default "10";
27    config false;
28    description
29      "The maximum number of Slow Protocol frames of a given subtype
30      that can be transmitted in a one second interval. The default
31      value is 10.";
32    reference
33      "IEEE Std 802.3, 30.3.1.1.38 aSlowProtocolFrameLimit";
34  }
35  container capabilities {
36    config false;
37    description
38      "Container all Ethernet interface specific capabilities.";
39    leaf auto-negotiation {
40      type boolean;
41      description
42        "Indicates whether auto-negotiation may be configured on this
43        interface.";
44    }
45  }
46  container statistics {
47    config false;
48    description
49      "Contains statistics specific to Ethernet interfaces.
50
51      Discontinuities in the values of counters in the container can
52      occur at re-initialization of the management system, and at
53      other times as indicated by the value of the
54      'discontinuity-time' leaf defined in the ietf-interfaces YANG
55      module (IETF RFC 8343).";
56    container frame {
57      description
58        "Contains frame statistics specific to Ethernet interfaces.
59
60        All octet frame lengths include the 4 byte FCS.
61
62        Error counters are only reported once. The count represented
63        by an instance of this object is incremented when the
64        frameCheckError status is returned by the MAC service to the
65
```

MAC Client. Received frames for which multiple error conditions pertain are, according to the conventions of IEEE Std 802.3 Layer Management, counted exclusively according to the error status presented to the MAC Client.

A frame that is counted by an instance of this object is also counted by the corresponding instance of 'in-errors' leaf defined in the ietf-interfaces YANG module (IETF RFC 8343).

Discontinuities in the values of counters in the container can occur at re-initialization of the management system, and at other times as indicated by the value of the 'discontinuity-time' leaf defined in the ietf-interfaces YANG module (IETF RFC 8343).";

```
leaf in-total-frames {
  type yang:counter64;
  units "frames";
  description
    "The total number of frames (including bad frames) received
    on the Ethernet interface.

    This counter is calculated by summing the following IEEE
    Std 802.3, Clause 30 counters: aFramesReceivedOK +
    aFrameCheckSequenceErrors + aAlignmentErrors +
    aFrameTooLongErrors + aFramesLostDueToIntMACRcvError";
  reference
    "IEEE Std 802.3, Clause 30 counters, as specified
    in the description above.";
```

```
}
leaf in-total-octets {
  type yang:counter64;
  units "octets";
  description
    "The total number of octets of data (including those in bad
    frames) received on the Ethernet interface.

    Includes the 4-octet FCS.";
```

```
reference
  "IETF RFC 2819, etherStatsOctets";
}
leaf in-frames {
  type yang:counter64;
  units "frames";
  description
    "A count of frames (including unicast, multicast and
    broadcast) that have been successfully received on the
    Ethernet interface.

    This count does not include frames received with
    frame-too-long, FCS, length or alignment errors, or frames
    lost due to internal MAC sublayer error.";
```

```
reference
  "IEEE Std 802.3, 30.3.1.1.5 aFramesReceivedOK";
}
leaf in-multicast-frames {
  type yang:counter64;
  units "frames";
  description
    "A count of multicast frames that have been successfully
    received on the Ethernet interface.

    This counter represents a subset of the frames counted by
    in-frames.
```

```
1         This count does not include frames received with
2         frame-too-long, FCS, length or alignment errors, or frames
3         lost due to internal MAC sublayer error.";
4     reference
5         "IEEE Std 802.3, 30.3.1.1.21 aMulticastFramesReceivedOK";
6 }
7 leaf in-broadcast-frames {
8     type yang:counter64;
9     units "frames";
10    description
11        "A count of broadcast frames that have been successfully
12        received on the Ethernet interface.
13
14        This counter represents a subset of the frames counted by
15        in-frames.
16
17        This count does not include frames received with
18        frame-too-long, FCS, length or alignment errors, or frames
19        lost due to internal MAC sublayer error.";
20    reference
21        "IEEE Std 802.3, 30.3.1.1.22 aBroadcastFramesReceivedOK";
22 }
23 leaf in-error-fcs-frames {
24     type yang:counter64;
25     units "frames";
26     description
27        "A count of receive frames that are of valid length, but do
28        not pass the FCS check, regardless of whether or not the
29        frames are an integral number of octets in length.
30
31        This counter is calculated by summing the following
32        counters: aFrameCheckSequenceErrors + aAlignmentErrors";
33    reference
34        "IEEE Std 802.3, 30.3.1.1.6 aFrameCheckSequenceErrors;
35        IEEE Std 802.3, 30.3.1.1.7 aAlignmentErrors";
36 }
37 leaf in-error-undersize-frames {
38     status deprecated;
39     type yang:counter64;
40     units "frames";
41     description
42        "Function is deprecated. A count of frames received on a
43        particular Ethernet interface that are less than 64 bytes
44        in length, and are discarded.
45
46        This counter is incremented regardless of whether the frame
47        passes the FCS check.";
48    reference
49        "IETF RFC 2819, etherStatsUndersizePkts and
50        etherStatsFragments";
51 }
52 leaf in-error-oversize-frames {
53     type yang:counter64;
54     units "frames";
55     description
56        "A count of frames received on a particular Ethernet
57        interface that exceed the maximum permitted frame size,
58        that is specified in max-frame-length, and are discarded.
59
60        This counter is incremented regardless of whether the frame
61        passes the FCS check.";
62    reference
63        "IEEE Std 802.3, 30.3.1.1.25 aFrameTooLongErrors";
64 }
65 }
```

```
1      leaf in-error-mac-internal-frames {
2          type yang:counter64;
3          units "frames";
4          description
5              "A count of frames for which reception on a particular
6              Ethernet interface fails due to an internal MAC sublayer
7              receive error.
8
9              A frame is only counted by an instance of this object if it
10             is not counted by the corresponding instance of either the
11             in-error-fcs-frames, in-error-undersize-frames, or
12             in-error-oversize-frames. The precise meaning of the count
13             represented by an instance of this object is
14             implementation-specific.
15
16             In particular, an instance of this object may represent a
17             count of receive errors on a particular Ethernet interface
18             that are not otherwise counted.";
19          reference
20              "IEEE Std 802.3, 30.3.1.1.15
21              aFramesLostDueToIntMACRcvError";
22      }
23      leaf out-frames {
24          type yang:counter64;
25          units "frames";
26          description
27              "A count of frames (including unicast, multicast and
28              broadcast) that have been successfully transmitted on the
29              Ethernet interface.";
30          reference
31              "IEEE Std 802.3, 30.3.1.1.2 aFramesTransmittedOK";
32      }
33      leaf out-multicast-frames {
34          type yang:counter64;
35          units "frames";
36          description
37              "A count of multicast frames that have been successfully
38              transmitted on the Ethernet interface.
39
40              This counter represents a subset of the frames counted by
41              out-frames.";
42          reference
43              "IEEE Std 802.3, 30.3.1.1.18 aMulticastFramesXmittedOK";
44      }
45      leaf out-broadcast-frames {
46          type yang:counter64;
47          units "frames";
48          description
49              "A count of broadcast frames that have been successfully
50              transmitted on the Ethernet interface.
51
52              This counter represents a subset of the frames counted by
53              out-frames.";
54          reference
55              "IEEE Std 802.3, 30.3.1.1.19 aBroadcastFramesXmittedOK";
56      }
57      leaf out-error-mac-internal-frames {
58          type yang:counter64;
59          units "frames";
60          description
61              "A count of frames for which transmission on a particular
62              Ethernet interface fails due to an internal MAC sublayer
63              transmit error.
64
65
```

```
1         The precise meaning of the count represented by an instance
2         of this object is implementation-specific. In particular,
3         an instance of this object may represent a count of
4         transmission errors on a particular Ethernet interface that
5         are not otherwise counted.";
6     reference
7         "IEEE Std 802.3, 30.3.1.1.12
8         aFramesLostDueToIntMACXmitError";
9     }
10 }
11 container phy {
12     description
13         "Ethernet statistics related to the PHY layer.
14
15         Discontinuities in the values of counters in the container
16         can occur at re-initialization of the management system, and
17         at other times as indicated by the value of the
18         'discontinuity-time' leaf defined in the ietf-interfaces YANG
19         module (IETF RFC 8343).";
20     leaf in-error-symbol {
21         type yang:counter64;
22         units "errors";
23         description
24             "A count of the number of symbol errors that have occurred.
25
26             For the precise definition of when the symbol error counter
27             is incremented, please see the 'description' text
28             associated with aSymbolErrorDuringCarrier, specified in
29             IEEE Std 802.3, 30.3.2.1.5.";
30         reference
31             "IEEE Std 802.3, 30.3.2.1.5 aSymbolErrorDuringCarrier";
32     }
33     container lpi {
34         description
35             "Physical Ethernet statistics for the energy efficiency
36             related low power idle indications.";
37         leaf in-lpi-transitions {
38             type yang:counter64;
39             units "transitions";
40             description
41                 "A count of occurrences of the transition from DEASSERT
42                 to ASSERT of the LPI_INDICATE parameter. The indication
43                 reflects the state of the PHY according to the
44                 requirements of the RS (see IEEE Std 802.3, 22.7, 35.4,
45                 and 46.4).";
46             reference
47                 "IEEE Std 802.3, 30.3.2.1.11 aReceiveLPITransitions";
48         }
49         leaf in-lpi-time {
50             type decimal64 {
51                 fraction-digits "6";
52             }
53             units "seconds";
54             description
55                 "A count reflecting the total amount of time (in seconds)
56                 that the LPI_REQUEST parameter has the value ASSERT. The
57                 request is indicated to the PHY according to the
58                 requirements of the RS (see IEEE Std 802.3, 22.7, 35.4,
59                 and 46.4).";
60             reference
61                 "IEEE Std 802.3, 30.3.2.1.9 aReceiveLPIMicroseconds";
62         }
63         leaf out-lpi-transitions {
64             type yang:counter64;
```



```

1         units "transitions";
2         description
3             "A count of occurrences of the transition from state
4             LPI_DEASSERTED to state LPI_ASSERTED in the LPI transmit
5             state diagram of the RS. The state transition corresponds
6             to the assertion of the LPI_REQUEST parameter. The
7             request is indicated to the PHY according to the
8             requirements of the RS (see IEEE Std 802.3, 22.7, 35.4,
9             46.4).";
10        reference
11            "IEEE Std 802.3, 30.3.2.1.10 aTransmitLPITransitions";
12    }
13    leaf out-lpi-time {
14        type decimal64 {
15            fraction-digits "6";
16        }
17        units "seconds";
18        description
19            "A count reflecting the total amount of time (in seconds)
20            that the LPI_INDICATION parameter has the value ASSERT.
21            The request is indicated to the PHY according to the
22            requirements of the RS (see IEEE 802.3, 22.7, 35.4, and
23            46.4).";
24        reference
25            "IEEE Std 802.3, 30.3.2.1.8 aTransmitLPIMicroseconds";
26    }
27 }
28 }
29 }
30 container mac-control {
31     description
32         "A group of statistics specific to MAC Control operation of
33         selected Ethernet interfaces.
34
35         Discontinuities in the values of counters in the container
36         can occur at re-initialization of the management system, and
37         at other times as indicated by the value of the
38         'discontinuity-time' leaf defined in the ietf-interfaces YANG
39         module (IETF RFC 8343).";
40     reference
41         "IEEE Std 802.3.1, dot3ExtensionTable";
42     leaf in-frames-mac-control-unknown {
43         type yang:counter64;
44         units "frames";
45         description
46             "A count of MAC Control frames with an unsupported opcode
47             received on this Ethernet interface.
48
49             Frames counted against this counter are also counted
50             against in-discards defined in the ietf-interfaces YANG
51             module (IETF RFC 8343).";
52         reference
53             "IEEE Std 802.3, 30.3.3.5 aUnsupportedOpCodesReceived";
54     }
55     leaf in-frames-mac-control-extension {
56         type yang:counter64;
57         units "frames";
58         description
59             "The count of Extension MAC Control frames received on this
60             Ethernet interface.";
61         reference
62             "IEEE Std 802.3, 30.3.8.2
63             aEXTENSIONMACCtrlFramesReceived";
64     }
65     leaf out-frames-mac-control-extension {

```

```

1      type yang:counter64;
2      units "frames";
3      description
4          "The count of Extension MAC Control frames transmitted on
5          this Ethernet interface.";
6      reference
7          "IEEE Std 802.3, 30.3.8.1
8          aEXTENSIONMACCtrlFramesTransmitted";
9      }
10     }
11 }
12 }
13 }
14 }

```

5.3.2.2 Ethernet interface module (half-duplex)

Editor's Note (to be removed prior to publication):

Pretty printing of ieee802-ethernet-interface-half-duplex.yang file may change the appearance by adding whitespace and reformatting lines

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 and IEEE Std 802.3.2 to be updated at the publication time

```

30
31 module ieee802-ethernet-interface-half-duplex {
32     yang-version "1.1";
33     namespace
34         urn:ieee:std:802.3:yang:ieee802-ethernet-interface-half-duplex;
35     prefix ieee802-eth-half-duplex;
36     import ietf-yang-types {
37         prefix yang;
38         reference
39             "IETF RFC 6991";
40     }
41     import ietf-interfaces {
42         prefix if;
43         reference
44             "IETF RFC 8343";
45     }
46     import iana-if-type {
47         prefix ianaift;
48         reference
49             "http://www.iana.org/assignments/yang-parameters/
50             iana-if-type@2023-01-26.yang";
51     }
52     import ieee802-ethernet-interface {
53         prefix ieee802-eth-if;
54     }
55     organization
56         "IEEE Std 802.3 Ethernet Working Group
57         Web URL: http://www.ieee802.org/3/";
58     contact
59         "Web URL: http://www.ieee802.org/3/";
60     description
61         "This module contains YANG definitions for configuring Ethernet
62         interfaces that are deprecated, and are no longer widely used in the
63         industry. The definitions are maintained for backwards compatibility
64         purposes, but the general expectation is that this module is not
65         anticipated to be widely implemented.";

```

```

1  revision 2024-02-12 {
2      description
3          "Updates under IEEE Std 802.3.2-202x, Draft 1.1";
4      reference
5          "IEEE Std 802.3-2022, unless dated explicitly";
6  }
7  feature dynamic-rate-control {
8      description
9          "This feature indicates that the device supports Ethernet
10         interfaces lowering the average data rate of the MAC sublayer, with
11         frame granularity, by using Rate Control to dynamically increase
12         the inter-packet gap for some types of Ethernet interface. Only
13         valid for Ethernet interfaces operating at speeds (data rates) above
14         1000 Mb/s.";
15      reference
16          "IEEE Std 802.3, 30.3.1.1.33 aRateControlAbility";
17  }
18  feature csma-cd {
19      description
20          "This feature indicates that the device supports Ethernet
21         interfaces running at half-duplex using CSMA/CD.";
22  }
23  typedef dynamic-rate-control-type {
24      type enumeration {
25          enum disabled {
26              description
27                  "Dynamic rate control is disabled";
28          }
29          enum sonet-oc192 {
30              value 2;
31              description
32                  "Dynamic rate control is enabled for a 10 Gb/s Ethernet
33                 interface to SONET/SDH OC192/STM64.";
34          }
35      }
36      default "disabled";
37      description
38          "Allowed values for dynamic-rate-control.";
39      reference
40          "IEEE Std 802.3, 4.4.2 ipgStretchRatio and 30.3.1.1.34
41         aRateControlStatus";
42  }
43  augment "/if:interfaces/if:interface/ieee802-eth-if:ethernet" {
44      when
45          "derived-from-or-self(..if:type, 'ianaift:ethernetCsmacd') and "+
46          "ieee802-eth-if:duplex = 'half'" {
47          description
48              "Applies to half-duplex Ethernet interfaces.";
49      }
50      description
51          "Augment with Ethernet interface configuration parameters for
52         half-duplex operation.";
53      leaf dynamic-rate-control {
54          if-feature "dynamic-rate-control";
55          type dynamic-rate-control-type;
56          description
57              "Enables dynamic rate control and specifies what speed (data
58             rate) the dynamic rate control is operating at. The value of this
59             attribute is constrained by the MAC data rate and hardware
60             support. The default value is implementation-dependent.";
61          reference
62              "IEEE Std 802.3, 30.3.1.1.34 aRateControlStatus";
63      }
64  }
65  }

```

```

1  augment
2    "/if:interfaces"+
3    "/if:interface"+
4    "/ieee802-eth-if:ethernet"+
5    "/ieee802-eth-if:capabilities" {
6    when
7      "derived-from-or-self(..../if:type, 'ianaift:ethernetCsmacd') "+
8      "and ../ieee802-eth-if:duplex = 'half'" {
9      description
10       "Applies to half-duplex Ethernet interfaces";
11    }
12    description
13     "Augment with configuration capabilities for half-duplex Ethernet
14     interface.";
15    leaf dynamic-rate-control-supported {
16      if-feature "dynamic-rate-control";
17      type boolean;
18      default "false";
19      description
20       "Indicates whether the Ethernet interface supports lowering the
21       average data rate of the MAC sublayer, with frame granularity, by
22       using Rate Control to dynamically increase the inter-packet gap.
23       Only valid for Ethernet interfaces operating at speeds (data
24       rates) above 1000 Mb/s.";
25      reference
26       "IEEE Std 802.3, 30.3.1.1.33 aRateControlAbility";
27    }
28  }
29  augment
30    "/if:interfaces"+
31    "/if:interface"+
32    "/ieee802-eth-if:ethernet"+
33    "/ieee802-eth-if:statistics"+
34    "/ieee802-eth-if:frame" {
35    when
36      "derived-from-or-self(..../if:type, "+
37      "'ianaift:ethernetCsmacd') and ../ieee802-eth-if:duplex = "+
38      "'half'" {
39      description
40       "Applies to half-duplex Ethernet interfaces.";
41    }
42    description
43     "Augment with statistics for half-duplex Ethernet interface.";
44    container csma-cd {
45      if-feature "csma-cd";
46      description
47       "Holds counters that are specific to CDMA/CD half-duplex
48       operation of Ethernet interfaces. This counter does not increment
49       on Ethernet interfaces operating at speeds (data rates) greater
50       than 10 Mb/s, or on Ethernet interfaces operating in full-duplex
51       mode. Discontinuities in the value of this counter can occur at
52       re-initialization of the management system, and at other times as
53       indicated by the value of the 'discontinuity-time' leaf defined
54       in the ietf-interfaces YANG module (IETF RFC 8343).";
55      leaf in-errors-sqe-test {
56        type yang:counter64;
57        units "errors";
58        description
59         "A count of times that the SQE TEST ERROR is received on a
60         particular interface. The SQE TEST ERROR is set in accordance
61         with the rules for verification of the SQE detection mechanism
62         in the PLS Carrier Sense Function as described in IEEE Std
63         802.3, 7.2.4.6.";
64      }
65      reference

```

```
1      "IEEE Std 802.3, 7.2.4.6, and 30.3.2.1.4 aSQETestErrors";
2  }
3  leaf out-frames-collision-single {
4      type yang:counter64;
5      units "frames";
6      description
7          "A count of frames that are involved in a single collision, and
8           are subsequently transmitted successfully. A frame that is
9           counted by an instance of this object is also counted by the
10          corresponding instance of either 'out-unicast-frames',
11          'out-broadcast-frames', or 'out-multicast-frames', and is not
12          counted by the corresponding instance of the
13          'out-frames-collision-multiple'.";
14      reference
15          "IEEE Std 802.3, 30.3.1.1.3 aSingleCollisionFrames";
16  }
17  leaf out-frames-collision-multiple {
18      type yang:counter64;
19      units "frames";
20      description
21          "A count of frames that are involved in multiple collisions,
22           and are subsequently transmitted successfully. A frame that is
23           counted by an instance of this object is also counted by the
24           corresponding instance of either 'out-unicast-frames',
25           'out-broadcast-frames', or 'out-multicast-frames', and is not
26           counted by the corresponding instance of the
27           'out-frames-collision-single'.";
28      reference
29          "IEEE Std 802.3, 30.3.1.1.4 aMultipleCollisionFrames";
30  }
31  leaf out-frames-deferred {
32      type yang:counter64;
33      units "frames";
34      description
35          "A count of frames for which the first transmission attempt on
36           a particular Ethernet interface is delayed because the medium
37           is busy. A deferred frame that is not subject to any number of
38           collisions is not counted by an instance of
39           'out-frames-collision-single' or
40           'out-frames-collision-multiple' objects.";
41      reference
42          "IEEE Std 802.3, 30.3.1.1.9 aFramesWithDeferredXmissions";
43  }
44  leaf out-frames-collisions-excessive {
45      type yang:counter64;
46      units "frames";
47      description
48          "A count of frames for which transmission on a particular
49           Ethernet interface fails due to excessive collisions.";
50      reference
51          "IEEE Std 802.3, 30.3.1.1.11 aFramesAbortedDueToXSColls";
52  }
53  leaf out-collisions-late {
54      type yang:counter64;
55      units "collisions";
56      description
57          "The number of times that a collision is detected on a
58           particular Ethernet interface later than one slotTime into the
59           transmission of a packet. A (late) collision included in a
60           count represented by an instance of this object is also
61           considered as a (generic) collision for purposes of other
62           collision-related statistics.";
63      reference
64          "IEEE Std 802.3, 30.3.1.1.10 aLateCollisions";
65  }
```

```

1      }
2      leaf out-errors-carrier-sense {
3          type yang:counter64;
4          units "errors";
5          description
6              "The number of times that the carrier sense condition was lost
7              or never asserted when attempting to transmit a frame on a
8              particular Ethernet interface. The count represented by an
9              instance of this object is incremented at most once per
10             transmission attempt, even if the carrier sense condition
11             fluctuates during a transmission attempt.";
12         reference
13             "IEEE Std 802.3, 30.3.1.1.13 aCarrierSenseErrors";
14     }
15     list collision-histogram {
16         key "collision-count";
17         description
18             "A collection of collision histograms for a particular
19             interface.";
20         reference
21             "IEEE Std 802.3, 30.3.1.1.30 aCollisionFrames";
22         leaf collision-count {
23             type yang:counter64;
24             units "collisions";
25             description
26                 "The number of per-frame media collisions for which a
27                 particular collision histogram cell represents the frequency
28                 on a particular interface.";
29         }
30         leaf collision-count-frames {
31             type yang:counter64;
32             units "frames";
33             description
34                 "A count of individual MAC frames for which the transmission
35                 (successful or otherwise) on a particular interface occurs
36                 after the frame has experienced exactly the number of
37                 collisions in the associated dot3CollCount object. For
38                 example, a frame which is transmitted on an interface after
39                 experiencing exactly 4 collisions would be indicated by
40                 incrementing only collision-count-frames object associated
41                 with the collision-count value of 4. No other instance of
42                 collision-count-frames would be incremented in this example.";
43         }
44     }
45 }
46 }
47 }
48
49
50

```

5.3.2.3 Ethernet MAC merge module

Editor's Note (to be removed prior to publication):

Pretty printing of ieee802-mac-merge.yang file may change the appearance by adding whitespace and reformatting lines

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 and IEEE Std 802.3.2 to be updated at the publication time

```

63 module ieee802-ethernet-mac-merge {
64     yang-version "1.1";
65

```

```

1  namespace urn:ieee:std:802.3:yang:ieee802-ethernet-mac-merge;
2  prefix mac-merge;
3  import ietf-yang-types {
4      prefix yang;
5      reference
6          "IETF RFC 6991";
7  }
8  import ietf-interfaces {
9      prefix if;
10     reference
11         "IETF RFC 8343";
12 }
13 import ieee802-ethernet-interface {
14     prefix ieee802-eth-if;
15     reference
16         "IEEE Std 802.3.2-2019";
17 }
18 organization
19     "IEEE Std 802.3 Ethernet Working Group
20     Web URL: http://www.ieee802.org/3/";
21 contact
22     "Web URL: http://www.ieee802.org/3/";
23 description
24     "The Yang model for managing devices that support the MAC merge
25     sublayer as defined in Clause 99. Unless otherwise indicated, the
26     references in this model module are to IEEE Std 802.3-2022.";
27 revision 2024-02-12 {
28     description
29         "Updates under IEEE Std 802.3.2-202x, Draft 1.1";
30     reference
31         "IEEE Std 802.3-2022, unless dated explicitly";
32 }
33 feature mac-merge {
34     description
35         "Each Port supports the MAC merge sublayer.";
36     reference
37         "IEEE Std 802.3-2022";
38 }
39 augment "/if:interfaces/if:interface/ieee802-eth-if:ethernet" {
40     if-feature "mac-merge";
41     container mac-merge {
42         container admin-control {
43             leaf merge-enable-tx {
44                 type enumeration {
45                     enum Disabled {
46                         description
47                             "Transmit preemption is disabled";
48                     }
49                     enum Enabled {
50                         description
51                             "Transmit preemption is enabled";
52                     }
53                 }
54             }
55             default "Disabled";
56             description
57                 "This attribute indicates (when accessed via a GET operation)
58                 the status of the MAC Merge sublayer on the given device in
59                 the transmit direction. The status of the MAC Merge sublayer
60                 may be modified to the indicated value via a read-write
61                 operation. This attribute maps to the variable pEnable (see
62                 99.4.7.3).";
63             reference
64                 "IEEE Std 802.3, 30.14.1.3";
65         }

```

```
1      leaf verify-disable-tx {
2          type enumeration {
3              enum Disabled {
4                  description
5                      "Verify is disabled";
6              }
7              enum Enabled {
8                  description
9                      "Verify is enabled";
10             }
11         }
12         default "Disabled";
13         description
14             "This attribute indicates (when accessed via a GET operation)
15             the status of the Verify function of MAC Merge sublayer on
16             the given device in the transmit direction. The status of the
17             Verify function may be modified to the indicated value via a
18             read-write operation. This attribute maps to the variable
19             disableVerify (see 99.4.7.3).";
20         reference
21             "IEEE Std 802.3, 30.14.1.4";
22     }
23     leaf verify-time {
24         type uint16 {
25             range "1..128";
26         }
27         units "milliseconds";
28         default "10";
29         description
30             "The value of this attribute defines the nominal wait time
31             between verification attempts in milliseconds. Valid range is
32             1 to 128 inclusive. The default value is 10. This attribute
33             maps to the variable verifyTime (see 99.4.7.3).";
34         reference
35             "IEEE Std 802.3, 30.14.1.6";
36     }
37     leaf frag-size {
38         type uint8 {
39             range "0..3";
40         }
41         default "0";
42         description
43             "A 2-bit integer value used to indicate the value of
44             addFragSize variable used by the Transmit Processing State
45             Diagram (see Figure IEEE Std 802.3, 99-5).";
46         reference
47             "IEEE Std 802.3, 30.14.1.7";
48     }
49 }
50
51 container admin-status {
52     config false;
53     leaf merge-support {
54         type enumeration {
55             enum Supported {
56                 description
57                     "MAC Merge sublayer is supported on the device";
58             }
59             enum NotSupported {
60                 description
61                     "MAC Merge sublayer is not supported on the device";
62             }
63         }
64         description
65             "This attribute indicates (when accessed via a GET operation)
```



```

1         whether the given device supports a MAC Merge sublayer. The
2         SET operation shall have no effect on a device.";
3     reference
4         "IEEE Std 802.3, 30.14.1.1";
5 }
6 leaf verify-status {
7     type enumeration {
8         enum unknown {
9             description
10                "Verification status is unknown";
11        }
12        enum initial {
13            description
14                "The Verify State diagram Figure 99-8 IEEE Std 802.3 is
15                in the state INIT_VERIFICATION";
16        }
17        enum verifying {
18            description
19                "The Verify State diagram is in the state
20                VERIFICATION_IDLE, SEND_VERIFY or WAIT_FOR_RESPONSE";
21        }
22        enum succeeded {
23            description
24                "Indicates that the Verify State diagram is in the state
25                VERIFIED";
26        }
27        enum failed {
28            description
29                "The Verify State diagram is in the state VERIFY_FAIL";
30        }
31        enum disabled {
32            description
33                "Verification of preemption operation is disabled";
34        }
35    }
36    description
37        "This attribute indicates (when accessed via a GET operation)
38        the status of the MAC Merge sublayer verification on the
39        given device. The SET operation shall have no effect on a
40        device.";
41    reference
42        "IEEE Std 802.3, 30.14.1.2";
43 }
44 leaf status-tx {
45     type enumeration {
46         enum unknown {
47             description
48                "transmit preemption status is unknown";
49        }
50        enum inactive {
51            description
52                "transmit preemption is inactive";
53        }
54        enum active {
55            description
56                "transmit preemption is active";
57        }
58    }
59 }
60 description
61     "This attribute indicates (when accessed via a GET operation)
62     the status of the MAC Merge sublayer on the given device in
63     the transmit direction. The SET operation shall have no
64     effect on a device. This attribute maps to the variable
65     preempt (see 99.4.7.3).";

```

```

1      reference
2      "IEEE Std 802.3, 30.14.1.5";
3    }
4  }
5  container statistics {
6    config false;
7    leaf assembly-error-count {
8      type yang:counter64;
9      description
10       "A count of MAC frames with reassembly errors. The counter is
11        incremented by one every time the ASSEMBLY_ERROR state in the
12        Receive Processing State Diagram is entered";
13      reference
14       "IEEE Std 802.3, 30.14.1.8";
15    }
16    leaf smd-error-count {
17      type yang:counter64;
18      description
19       "A count of received MAC frames / MAC frame fragments
20        rejected due to unknown SMD value or arriving with an SMD-C
21        when no frame is in progress. The counter is incremented by
22        one every time the BAD_FRAG state in the Receive Processing
23        State Diagram is entered and every time the WAIT_FOR_DV_FALSE
24        state is entered due to the invocation of the SMD_DECODE
25        function returning the value ERR";
26      reference
27       "IEEE Std 802.3, 30.14.1.9";
28    }
29    leaf assembly-ok-count {
30      type yang:counter64;
31      description
32       "count of MAC frames that were successfully reassembled and
33        delivered to MAC. The counter is incremented by one every
34        time the FRAME_COMPLETE state in the Receive Processing state
35        diagram (see Figure 99-6) is entered if the state
36        CHECK_FOR_RESUME was previously entered while processing the
37        packet";
38      reference
39       "IEEE Std 802.3, 30.14.1.10";
40    }
41    leaf fragment-count-rx {
42      type yang:counter64;
43      description
44       "A count of the number of additional mPackets received due to
45        preemption. The counter is incremented by one every time the
46        state CHECK_FRAG_CNT in the Receive Processing State Diagram
47        (see Figure 99-6) is entered";
48      reference
49       "IEEE Std 802.3, 30.14.1.11";
50    }
51    leaf fragment-count-tx {
52      type yang:counter64;
53      description
54       "A count of the number of additional mPackets transmitted due
55        to preemption. This counter is incremented by one every time
56        the SEND_SMD_C state in the Transmit Processing State Diagram
57        (see Figure 99-5) is entered.;";
58      reference
59       "IEEE Std 802.3, 30.14.1.12";
60    }
61    leaf hold-count {
62      type yang:counter64;
63      description
64       "A count of the number of times the variable hold (see
65
```

```
1         99.4.7.3) transitions from FALSE to TRUE.";
2     reference
3         "IEEE Std 802.3, 30.14.1.13";
4     }
5 }
6 }
7 }
8 }
9 }
```

5.3.2.4 Ethernet LLDP module

Editor's Note (to be removed prior to publication):

Pretty printing of ieee802-ethernet-lldp.yang file may change the appearance by adding whitespace and reformatting lines

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 and IEEE Std 802.3.2 to be updated at the publication time

```
24
25 module ieee802-ethernet-lldp {
26     yang-version "1.1";
27     namespace urn:ieee:std:802.3:yang:ieee802-ethernet-lldp;
28     prefix ieee802-eth-lldp;
29     import ieee802-dot1ab-lldp {
30         prefix lldp;
31         reference
32             "IEEE Std 802.1ABcu-2021";
33     }
34     organization
35         "IEEE Std 802.3 Ethernet Working Group
36         Web URL: http://www.ieee802.org/3/";
37     contact
38         "Web URL: http://www.ieee802.org/3/";
39     description
40         "This module contains YANG definitions for configuring LLDP for 802.3
41         Ethernet Interfaces. In this YANG module, 'Ethernet interface' can be
42         interpreted as referring to 'IEEE Std 802.3 compliant Ethernet
43         interfaces'.";
44     revision 2024-02-12 {
45         description
46             "Updates under IEEE Std 802.3.2-202x, Draft 1.1";
47         reference
48             "IEEE Std 802.3-2022, unless dated explicitly";
49     }
50     typedef port-class-type {
51         type enumeration {
52             enum p-class-pse {
53                 value 0;
54                 description
55                     "Power Sourcing Equipment";
56             }
57             enum p-class-pd {
58                 value 1;
59                 description
60                     "Powered Device";
61             }
62         }
63     }
64     description
65         "Enumeration for the power port class";
66     reference
```

```
1      "IEEE Std 802.3, 30.12.2.1.5";
2  }
3  typedef pse-pinout-type {
4      type enumeration {
5          enum signal {
6              value 0;
7              description
8                  "PSE Pinout Alternative A";
9          }
10         enum spare {
11             value 1;
12             description
13                 "PSE Pinout Alternative B";
14         }
15     }
16     description
17         "Enumeration for the pinout alternatives used for PD detection and
18         power";
19     reference
20         "IEEE Std 802.3, 30.12.2.1.9";
21 }
22 typedef pse-power-class-type {
23     type enumeration {
24         enum class0 {
25             value 0;
26             description
27                 "Class 0 PD";
28         }
29         enum class1 {
30             value 1;
31             description
32                 "Class 1 PD";
33         }
34         enum class2 {
35             value 2;
36             description
37                 "Class 2 PD";
38         }
39         enum class3 {
40             value 3;
41             description
42                 "Class 3 PD";
43         }
44         enum class4 {
45             value 4;
46             description
47                 "Class 4 PD";
48         }
49     }
50     description
51         "Enumeration for the PD class";
52     reference
53         "IEEE Std 802.3, 30.12.2.1.10";
54 }
55 typedef power-class-ext-AB-type {
56     type enumeration {
57         enum singlesig {
58             value 0;
59             description
60                 "Single-signature PD or 2-pair only PSE";
61         }
62         enum class1 {
63             value 1;
64             description
65
```

```
1         "Class 1";
2     }
3     enum class2 {
4         value 2;
5         description
6         "Class 2";
7     }
8     enum class3 {
9         value 3;
10        description
11        "Class 3";
12    }
13    enum class4 {
14        value 4;
15        description
16        "Class 4";
17    }
18    enum class5 {
19        value 5;
20        description
21        "Class 5";
22    }
23 }
24 description
25 "Enumeration for the assigned power class";
26 reference
27 "IEEE Std 802.3, 30.12.3.1.26";
28 }
29 typedef power-class-ext-type {
30     type enumeration {
31         enum dualsig {
32             value 0;
33             description
34             "Dual-signature PD";
35         }
36         enum class1 {
37             value 1;
38             description
39             "Class 1";
40         }
41         enum class2 {
42             value 2;
43             description
44             "Class 2";
45         }
46         enum class3 {
47             value 3;
48             description
49             "Class 3";
50         }
51         enum class4 {
52             value 4;
53             description
54             "Class 4";
55         }
56         enum class5 {
57             value 5;
58             description
59             "Class 5";
60         }
61         enum class6 {
62             value 6;
63             description
64             "Class 6";
65         }
```

```
1      }
2      enum class7 {
3          value 7;
4          description
5              "Class 7";
6      }
7      enum class8 {
8          value 8;
9          description
10             "Class 8";
11     }
12 }
13 description
14     "Enumeration for the assigned power class";
15 reference
16     "IEEE Std 802.3, 30.12.3.1.28";
17 }
18 typedef power-type {
19     type enumeration {
20         enum type4dualsigPD {
21             value 0;
22             description
23                 "Type 4 dual-signature PD";
24         }
25         enum type4singlesigPD {
26             value 1;
27             description
28                 "Type 4 single-signature PD";
29         }
30         enum type3dualsigPD {
31             value 2;
32             description
33                 "Type 3 dual-signature PD";
34         }
35         enum type3singlesigPD {
36             value 3;
37             description
38                 "Type 3 single-signature PD";
39         }
40         enum type4PSE {
41             value 4;
42             description
43                 "Type 4 PSE";
44         }
45         enum type3PSE {
46             value 5;
47             description
48                 "Type 3 PSE";
49         }
50     }
51 }
52 description
53     "Enumeration for the PD class";
54 reference
55     "IEEE Std 802.3, 30.12.2.1.29";
56 }
57 typedef power-priority-type {
58     type enumeration {
59         enum low {
60             value 0;
61             description
62                 "low priority PD";
63         }
64         enum high {
65             value 1;
```

```

1      description
2          "high priority PD";
3      }
4      enum critical {
5          value 2;
6          description
7              "critical priority PD";
8      }
9      enum unknown {
10         value 3;
11         description
12             "priority unknown";
13     }
14 }
15 description
16     "Enumeration for possible priorities of a PD system";
17 reference
18     "IEEE Std 802.3, 30.12.2.1.16";
19 }
20 typedef power-source-type {
21     type enumeration {
22         enum pse-primary {
23             value 0;
24             description
25                 "PSE powered by a primary power source";
26         }
27         enum pse-backup {
28             value 1;
29             description
30                 "PSE powered by a backup power source";
31         }
32         enum pse-unknown {
33             value 2;
34             description
35                 "PSE powered by an unknown power source";
36         }
37         enum pd-pse-and-local {
38             value 3;
39             description
40                 "PD powered by a PSE and locally";
41         }
42         enum pd-local-only {
43             value 4;
44             description
45                 "PD powered only locally";
46         }
47         enum pd-pse-only {
48             value 5;
49             description
50                 "PD powered by PD only";
51         }
52         enum pd-unknown {
53             value 6;
54             description
55                 "PD powered by an unknown source";
56         }
57     }
58 }
59 description
60     "Enumeration for the power sources of the remote system. When the
61     remote system is a PSE, it indicates whether it is being powered by
62     a primary power source; a backup power source; or unknown. When the
63     remote system is a PD, it indicates whether it is being powered by
64     a PSE and locally; locally only; by a PSE only; or unknown.";
65 reference

```

```
1      "IEEE Std 802.3, 30.12.2.1.15";
2  }
3  typedef powering-status-type {
4      type enumeration {
5          enum 4PdualsigPD {
6              value 0;
7              description
8                  "4-pair powering a dual-signature PD";
9          }
10         enum 4PsinglesigPD {
11             value 1;
12             description
13                 "4-pair powering a single-signature PD";
14         }
15         enum 2P {
16             value 2;
17             description
18                 "2-pair powering";
19         }
20     }
21     description
22         "Enumeration for the power status of the PSE";
23     reference
24         "IEEE Std 802.3, 30.12.2.1.23";
25 }
26 typedef powered-status-type {
27     type enumeration {
28         enum 4PdualsigPD {
29             value 0;
30             description
31                 "4-pair powered dual-signature PD";
32         }
33         enum 2PdualsigPD {
34             value 1;
35             description
36                 "2-pair powered dual-signature PD";
37         }
38         enum singlesigPD {
39             value 2;
40             description
41                 "powered single-signature PD";
42         }
43     }
44     description
45         "Enumeration for the power status of the PSE";
46     reference
47         "IEEE Std 802.3, 30.12.2.1.24";
48 }
49 typedef power-pairs-type {
50     type enumeration {
51         enum altA {
52             value 0;
53             description
54                 "Alternative A";
55         }
56         enum altB {
57             value 1;
58             description
59                 "Alternative B";
60         }
61         enum both {
62             value 2;
63             description
64                 "both";
65         }
66     }
67 }
```



```
1      }
2    }
3    description
4      "Enumeration for the PSE Pinout Alternative";
5    reference
6      "IEEE Std 802.3, 30.12.2.1.25";
7  }
8  augment "/lldp:lldp/lldp:port" {
9    description
10     "Augments port with 802.3 port config tlvs";
11    leaf tlvs-port-config-enable {
12      type bits {
13        bit mac-phy-config-status {
14          position 0;
15          description
16            "IEEE Std 802.3, 30.12.1.1.1";
17        }
18        bit power-via-mdi {
19          position 1;
20          description
21            "IEEE Std 802.3, 30.12.1.1.1";
22        }
23        bit unused {
24          position 2;
25          description
26            "IEEE Std 802.3, 30.12.1.1.1";
27        }
28        bit max-frame-size {
29          position 3;
30          description
31            "IEEE Std 802.3, 30.12.1.1.1";
32        }
33        bit eee-tlv {
34          position 4;
35          description
36            "IEEE Std 802.3, 30.12.1.1.1";
37        }
38        bit eee-fast-wake-tlv {
39          position 5;
40          description
41            "IEEE Std 802.3, 30.12.1.1.1";
42        }
43        bit additional-ethernet-capabilities-tlv {
44          position 6;
45          description
46            "IEEE Std 802.3, 30.12.1.1.1";
47        }
48      }
49    }
50    description
51     "Bitmap that corresponds to an IEEE 802.3 subtype associated with
52     a specific IEEE 802.3 port config TLV";
53    reference
54     "IEEE Std 802.3, 30.12.1.1.1";
55  }
56  leaf auto-negotiation-supported {
57    type boolean;
58    config false;
59    description
60     "True if the port supports Auto-negotiation";
61    reference
62     "IEEE Std 802.3, 30.12.2.1.1";
63  }
64  leaf auto-negotiation-enabled {
65    type boolean;
```

```
1      config false;
2      description
3          "True if Auto-negotiation is enabled";
4      reference
5          "IEEE Std 802.3, 30.12.2.1.2";
6  }
7  leaf auto-negotiation-cap {
8      type binary {
9          length "2";
10     }
11     config false;
12     description
13         "A read-only 2-octet value that contains the value (bitmap) of
14         the ifMauAutoNegCapAdvertisedBits object (defined in IETF RFC
15         4836) which is associated with the given port on the local
16         system.";
17     reference
18         "IEEE Std 802.3, 30.12.2.1.3";
19 }
20 leaf operational-mau-type {
21     type int32;
22     config false;
23     description
24         "32-bit integer value that indicates the operational MAU type of
25         the given port";
26     reference
27         "IEEE Std 802.3, 30.12.2.1.4";
28 }
29 leaf power-port-class {
30     type port-class-type;
31     config false;
32     description
33         "A read-only value that identifies the port Class of the given
34         port";
35     reference
36         "IEEE Std 802.3, 30.12.2.1.5";
37 }
38 leaf mdi-power-supported {
39     type boolean;
40     config false;
41     description
42         "True if MDI power is supported";
43     reference
44         "IEEE Std 802.3, 30.12.2.1.6";
45 }
46 leaf mdi-power-enabled {
47     type boolean;
48     config false;
49     description
50         "True if MDI power is enabled";
51     reference
52         "IEEE Std 802.3, 30.12.2.1.7";
53 }
54 leaf power-pair-controllable {
55     type boolean;
56     config false;
57     description
58         "True if the pair selection can be controlled";
59     reference
60         "IEEE Std 802.3, 30.12.2.1.8";
61 }
62 leaf power-pairs {
63     type pse-pinout-type;
64     config false;
```

```
1      description
2          "Indicates which pinout alternative is used for PD detection and
3          power";
4      reference
5          "IEEE Std 802.3, 30.12.2.1.9";
6  }
7  leaf local-power-class {
8      type pse-power-class-type;
9      config false;
10     description
11         "PD Power Class";
12     reference
13         "IEEE Std 802.3, 30.12.2.1.10";
14 }
15 leaf link-aggregation-status {
16     type bits {
17         bit aggregation-capability {
18             position 0;
19             description
20                 "IEEE Std 802.3, 79.3.3.1";
21         }
22         bit aggregation-status {
23             position 1;
24             description
25                 "IEEE Std 802.3, 79.3.3.1";
26         }
27     }
28     config false;
29     description
30         "The bitmap value which contains the link aggregation
31         capabilities and the current aggregation status of the link";
32     reference
33         "IEEE Std 802.3, 30.12.2.1.11";
34 }
35 leaf aggregation-port-id {
36     type int32;
37     config false;
38     description
39         "The unique identifier allocated to this Aggregation Port by the
40         local System.";
41     reference
42         "IEEE Std 802.3, 30.12.2.1.12";
43 }
44 leaf local-max-frame-size {
45     type int32;
46     config false;
47     description
48         "An integer value indicating the maximum supported frame size in
49         octets on the given port of the local system.";
50     reference
51         "IEEE Std 802.3, 30.12.2.1.13";
52 }
53 leaf power-type {
54     type bits {
55         bit type1-or-greater {
56             position 0;
57             description
58                 "0-type1, 1-greater than type1";
59         }
60     }
61     bit pse-or-pd {
62         position 1;
63         description
64             "0-pse, 1-pd";
65     }
```

```
1      }
2      config false;
3      description
4          "A read-only attribute that returns a bit string indicating
5           whether the local system is a PSE or a PD and whether it is Type
6           1 or greater than Type 1. The first bit indicates Type 1 or
7           greater than Type 1. The second bit indicates PSE or PD. A PSE
8           sets this bit to indicate a PSE. A PD sets this bit to indicate a
9           PD. See also aLldpXdot3LocPowerTypeExt..";
10     reference
11         "IEEE Std 802.3, 30.12.2.1.14";
12 }
13 leaf power-source {
14     type power-source-type;
15     config false;
16     description
17         "Indicates the power sources of the local system. A PSE indicates
18         whether it is being powered by a primary power source; a backup
19         power source; or unknown. A PD indicates whether it is being
20         powered by a PSE and locally; by a PSE only; or unknown.";
21     reference
22         "IEEE Std 802.3, 30.12.2.1.15";
23 }
24 leaf local-power-priority {
25     type power-priority-type;
26     description
27         "Priority of a PD system. For a PSE, this is the priority that
28         the PSE assigns to the PD. For a PD, this is the priority that
29         the PD requests from the PSE";
30     reference
31         "IEEE Std 802.3, 30.12.2.1.16";
32 }
33 leaf pd-requested-power-value {
34     type int32;
35     config false;
36     description
37         "PD requested power value. For a PD, it is the power value that
38         the PD has currently requested from the remote system. For a PSE,
39         it is the power value that the PSE mirrors back to the remote
40         system";
41     reference
42         "IEEE Std 802.3, 30.12.2.1.17";
43 }
44 leaf pd-requested-power-value-a {
45     type int32;
46     config false;
47     description
48         "A read-only attribute that returns the PD requested power value
49         for the Mode A pairset in units of 0.1 W. For a PD, it is the
50         power value that the PD has currently requested from the remote
51         system for the Mode A pairset. For a PSE, it is the power value
52         for the Alternative A pairset that the PSE echoes back to the
53         remote system";
54     reference
55         "IEEE Std 802.3, 30.12.2.1.18";
56 }
57 leaf pd-requested-power-value-b {
58     type int32;
59     config false;
60     description
61         "A read-only attribute that returns the PD requested power value
62         for the Mode B pairset in units of 0.1 W. For a PD, it is the
63         power value that the PD has currently requested from the remote
64         system for the Mode B pairset. For a PSE, it is the power value
65         for the Alternative B pairset that the PSE echoes back to the
66         remote system";
```

```
1         for the Alternative B pairset that the PSE echoes back to the
2         remote system";
3     reference
4         "IEEE Std 802.3, 30.12.2.1.19";
5 }
6 leaf pse-allocated-power-value {
7     type int32;
8     config false;
9     description
10        "PSE allocated power value. For a PSE, it is the power value that
11        the PSE has currently allocated to the remote system. For a PD,
12        it is the power value that the PD mirrors back to the remote
13        system";
14    reference
15        "IEEE Std 802.3, 30.12.2.1.20";
16 }
17 leaf pse-allocated-power-value-a {
18     type int32;
19     config false;
20     description
21        "PSE allocated power value for the Alternative A pairset in units
22        of 0.1 W. For a PSE, it is the power value for the Alternative A
23        pairset that the PSE has currently allocated to the remote
24        system. For a PD, it is the power value for the Mode A pairset
25        that the PD echoes back to the remote system.";
26    reference
27        "IEEE Std 802.3, 30.12.2.1.21";
28 }
29 leaf pse-allocated-power-value-b {
30     type int32;
31     config false;
32     description
33        "PSE allocated power value for the Alternative B pairset in units
34        of 0.1 W. For a PSE, it is the power value for the Alternative B
35        pairset that the PSE has currently allocated to the remote
36        system. For a PD, it is the power value for the Mode B pairset
37        that the PD echoes back to the remote system.";
38    reference
39        "IEEE Std 802.3, 30.12.2.1.22";
40 }
41 leaf pse-powering-status {
42     type powering-status-type;
43     config false;
44     description
45        "A read only value that indicates the powering status of the PSE.
46        For a PD, the contents of this attribute are undefined.";
47    reference
48        "IEEE Std 802.3, 30.12.2.1.23";
49 }
50 leaf pd-powered-status {
51     type powered-status-type;
52     config false;
53     description
54        "A read only value that indicates the powering status of the PD.
55        For a PSE, the contents of this attribute are undefined";
56    reference
57        "IEEE Std 802.3, 30.12.2.1.24";
58 }
59 leaf power-pairs-ext {
60     type power-pairs-type;
61     config false;
62     description
63        "A read-only value that identifies the supported PSE Pinout
64        Alternative specified in 145.2.4. For a PSE, this attribute
65
```

```

1         contains the value of the aPSEPowerPairs attribute (see
2         30.9.1.1.4). For a PD, the contents of this attribute are
3         undefined";
4     reference
5         "IEEE Std 802.3, 30.12.2.1.25";
6 }
7 leaf power-class-ext-A {
8     type power-class-ext-AB-type;
9     config false;
10    description
11        "For a dual-signature PD, a read-only value that indicates the
12        requested Class for Mode A during Physical Layer Classification
13        (see 145.3.6). For a single-signature PD, a read-only value set
14        to 'singlesig'. For a PSE connected to a dual-signature PD, a
15        read-only value that indicates the currently assigned Class for
16        Mode A (see 145.2.8). For a PSE connected to a single-signature
17        PD or a PSE that operates only in 2-pair mode, a read-only value
18        set to 'singlesig'";
19    reference
20        "IEEE Std 802.3, 30.12.2.1.26";
21 }
22 leaf power-class-ext-B {
23     type power-class-ext-AB-type;
24     config false;
25    description
26        "For a dual-signature PD, a read-only value that indicates the
27        requested Class for Mode B during Physical Layer Classification
28        (see 145.3.6). For a single-signature PD, a read-only value set
29        to 'singlesig'. For a PSE connected to a dual-signature PD, a
30        read-only value that indicates the currently assigned Class for
31        Mode B (see 145.2.8). For a PSE connected to a single-signature
32        PD or a PSE that operates only in 2-pair mode, a read-only value
33        set to 'singlesig'";
34    reference
35        "IEEE Std 802.3, 30.12.2.1.27";
36 }
37 leaf power-class-ext {
38     type power-class-ext-type;
39     config false;
40    description
41        "For a single-signature PD, a read-only value that indicates the
42        requested Class during Physical Layer Classification (see
43        145.3.6). For a dual-signature PD, a read-only value set to
44        'dualsig'. For a PSE connected to a single-signature PD or a PSE
45        that operates only in 2-pair mode, a read-only value that
46        indicates the currently assigned Class (see 145.2.8). For a PSE
47        connected to a dual-signature PD, a read-only value set to
48        'dualsig'.";
49    reference
50        "IEEE Std 802.3, 30.12.2.1.28";
51 }
52 leaf power-type-ext {
53     type power-type;
54     config false;
55    description
56        "A read-only attribute that returns a value to indicate if the
57        local system is a Type 3 or Type 4 PSE or PD and, in the case of
58        a Type 3 or Type 4 PD, if it is a single-signature PD or a
59        dual-signature PD";
60    reference
61        "IEEE Std 802.3, 30.12.2.1.29";
62 }
63 leaf pd-load {
64     type boolean;
65 }

```

```
1      config false;
2      description
3          "For a dual-signature PD, a read-only attribute that returns
4           whether the load of a dual-signature PD is electrically isolated,
5           as defined in 79.3.2.10.2. For a single-signature PD or a PSE,
6           the value of this attribute is FALSE";
7      reference
8          "IEEE Std 802.3, 30.12.2.1.30";
9  }
10 leaf pd-4pid {
11     type boolean;
12     config false;
13     description
14         "A read-only Boolean attribute indicating whether the local PD
15         system supports powering of both PD Modes.";
16     reference
17         "IEEE Std 802.3, 30.12.2.1.31";
18 }
19 leaf pse-max-avail-power {
20     type int32;
21     config false;
22     description
23         "A read-only attribute that returns the local PSE maximum
24         available power value in units of 0.1 W";
25     reference
26         "IEEE Std 802.3, 30.12.2.1.32";
27 }
28 leaf pse-autoclass-support {
29     type boolean;
30     config false;
31     description
32         "Indicates whether the local PSE system supports Autoclass.";
33     reference
34         "IEEE Std 802.3, 30.12.2.1.33";
35 }
36 leaf autoclass-completed {
37     type boolean;
38     config false;
39     description
40         "Indicates whether the local PSE system has completed the
41         Autoclass measurement.";
42     reference
43         "IEEE Std 802.3, 30.12.2.1.34";
44 }
45 leaf autoclass-request {
46     type boolean;
47     config false;
48     description
49         "A read-only Boolean attribute indicating whether the local PD
50         system is requesting an Autoclass measurement.";
51     reference
52         "IEEE Std 802.3, 30.12.2.1.35";
53 }
54 leaf power-down-request {
55     type int32;
56     description
57         "A read-write attribute that indicates the local PD system is
58         requesting a power down when the value is 0x1D.";
59     reference
60         "IEEE Std 802.3, 30.12.2.1.36";
61 }
62 leaf power-down-time {
63     type int32;
64     description
```

```
1         "A read-write attribute that indicates the number of seconds the
2         PD requests to stay powered off. A value of zero indicates an
3         indefinite amount of time;";
4     reference
5         "IEEE Std 802.3, 30.12.2.1.37";
6 }
7 leaf meas-voltage-support {
8     type boolean;
9     config false;
10    description
11        "A read-only attribute that indicates the local device is capable
12        of providing a voltage measurement.";
13    reference
14        "IEEE Std 802.3, 30.12.2.1.38";
15 }
16 leaf meas-current-support {
17     type boolean;
18     config false;
19    description
20        "A read-only attribute that indicates the local device is capable
21        of providing a current measurement.";
22    reference
23        "IEEE Std 802.3, 30.12.2.1.39";
24 }
25 leaf meas-power-support {
26     type boolean;
27     config false;
28    description
29        "A read-only attribute that indicates the local device is capable
30        of providing a power measurement.";
31    reference
32        "IEEE Std 802.3, 30.12.2.1.40";
33 }
34 leaf meas-energy-support {
35     type boolean;
36     config false;
37    description
38        "A read-only attribute that indicates the local device is capable
39        of providing a energy measurement.";
40    reference
41        "IEEE Std 802.3, 30.12.2.1.41";
42 }
43 leaf measurement-source {
44     type bits {
45         bit bit1 {
46             position 0;
47             description
48                 "-";
49         }
50         bit bit2 {
51             position 1;
52             description
53                 "-";
54         }
55     }
56 }
57 description
58     "A read-write attribute value that indicates to local device on
59     which Alternative or Mode the measurement is to be taken";
60 reference
61     "IEEE Std 802.3, 30.12.2.1.42";
62 }
63 leaf meas-voltage-request {
64     type boolean;
65     config false;
```



```
1      description
2          "A read-only attribute that indicates the local device is
3          requesting a voltage measurement from the remote device.";
4      reference
5          "IEEE Std 802.3, 30.12.2.1.43";
6  }
7  leaf meas-current-request {
8      type boolean;
9      config false;
10     description
11         "A read-only attribute that indicates the local device is
12         requesting a current measurement from the remote device.";
13     reference
14         "IEEE Std 802.3, 30.12.2.1.44";
15 }
16 leaf meas-power-request {
17     type boolean;
18     config false;
19     description
20         "A read-only attribute that indicates the local device is
21         requesting a power measurement from the remote device.";
22     reference
23         "IEEE Std 802.3, 30.12.2.1.45";
24 }
25 leaf meas-energy-request {
26     type boolean;
27     config false;
28     description
29         "A read-only attribute that indicates the local device is
30         requesting an energy measurement from the remote device.";
31     reference
32         "IEEE Std 802.3, 30.12.2.1.46";
33 }
34 leaf meas-voltage-valid {
35     type boolean;
36     config false;
37     description
38         "A read-only attribute that indicates the local device's voltage
39         measurement is valid.";
40     reference
41         "IEEE Std 802.3, 30.12.2.1.47";
42 }
43 leaf meas-current-valid {
44     type boolean;
45     config false;
46     description
47         "A read-only attribute that indicates the local device's current
48         measurement is valid.";
49     reference
50         "IEEE Std 802.3, 30.12.2.1.48";
51 }
52 leaf meas-power-valid {
53     type boolean;
54     config false;
55     description
56         "A read-only attribute that indicates the local device's power
57         measurement is valid.";
58     reference
59         "IEEE Std 802.3, 30.12.2.1.49";
60 }
61 leaf meas-energy-valid {
62     type boolean;
63     config false;
64     description
```

```
1         "A read-only attribute that indicates the local device's energy
2         measurement is valid.";
3         reference
4         "IEEE Std 802.3, 30.12.2.1.50";
5     }
6     leaf meas-voltage-uncertainty {
7         type int32;
8         config false;
9         description
10        "A read-only attribute that indicates the expanded uncertainty
11        (coverage factor k = 2) for the device's voltage measurement.";
12        reference
13        "IEEE Std 802.3, 30.12.2.1.51";
14    }
15    leaf meas-current-uncertainty {
16        type int32;
17        config false;
18        description
19        "A read-only attribute that indicates the expanded uncertainty
20        (coverage factor k = 2) for the device's current measurement.";
21        reference
22        "IEEE Std 802.3, 30.12.2.1.52";
23    }
24    leaf meas-power-uncertainty {
25        type int32;
26        config false;
27        description
28        "A read-only attribute that indicates the expanded uncertainty
29        (coverage factor k = 2) for the device's power measurement.";
30        reference
31        "IEEE Std 802.3, 30.12.2.1.53";
32    }
33    leaf meas-energy-uncertainty {
34        type int32;
35        config false;
36        description
37        "A read-only attribute that indicates the expanded uncertainty
38        (coverage factor k = 2) for the device's energy measurement.";
39        reference
40        "IEEE Std 802.3, 30.12.2.1.54";
41    }
42    leaf voltage-measurement {
43        type int32;
44        config false;
45        description
46        "A read-only attribute that returns the measured device voltage.";
47        reference
48        "IEEE Std 802.3, 30.12.2.1.55";
49    }
50    leaf current-measurement {
51        type int32;
52        config false;
53        description
54        "A read-only attribute that returns the measured device current.";
55        reference
56        "IEEE Std 802.3, 30.12.2.1.56";
57    }
58    leaf power-measurement {
59        type int32;
60        config false;
61        description
62        "A read-only attribute that returns the measured device power.";
63        reference
64        "IEEE Std 802.3, 30.12.2.1.57";
65    }
```

```
1      }
2      leaf energy-measurement {
3          type int32;
4          config false;
5          description
6              "A read-only attribute that returns the measured device energy.";
7          reference
8              "IEEE Std 802.3, 30.12.2.1.58";
9      }
10     leaf pse-power-price-index {
11         type int32;
12         config false;
13         description
14             "A read-only attribute that returns an index of the price of
15             power being sourced by the PSE. For a PD, this value is undefined";
16         reference
17             "IEEE Std 802.3, 30.12.2.1.59";
18     }
19     leaf local-response {
20         type int32;
21         config false;
22         description
23             "The maximum time required to update pse-allocated-power-value";
24         reference
25             "IEEE Std 802.3, 30.12.2.1.60";
26     }
27     leaf local-system-ready {
28         type boolean;
29         config false;
30         description
31             "Initialization status of the Data Link Layer classification
32             engine on the local system";
33         reference
34             "IEEE Std 802.3, 30.12.2.1.61";
35     }
36     leaf tx-system-value {
37         type int32;
38         config false;
39         description
40             "Returns the value of Tw_sys_tx that the local system can support
41             in the transmit direction.";
42         reference
43             "IEEE Std 802.3, 30.12.2.1.62";
44     }
45     leaf tx-system-value-echo {
46         type int32;
47         config false;
48         description
49             "Returns the value of Tw_sys_tx that the emote system is
50             advertising that it can support in the transmit direction and is
51             echoed by the local system under the control of the EEE DLL
52             receiver state diagram.";
53         reference
54             "IEEE Std 802.3, 30.12.2.1.63";
55     }
56     leaf rx-system-value {
57         type int32;
58         config false;
59         description
60             "Returns the value of Tw_sys_tx that the local system is
61             requesting in the receive direction.";
62         reference
63             "IEEE Std 802.3, 30.12.2.1.64";
64     }
65 }
```

```
1  leaf rx-system-value-echo {
2    type int32;
3    config false;
4    description
5      "Returns the value of Tw_sys_tx that the remote system is
6      advertising that it is requesting in the receive direction and is
7      echoed by the local system under the control of the EEE DLL
8      transmitter state diagram.";
9    reference
10     "IEEE Std 802.3, 30.12.2.1.65";
11  }
12  leaf fallback-system-value {
13    type int32;
14    config false;
15    description
16      "Returns the value of the fallback Tw_sys_tx that the local
17      system is advertising to the remote system.";
18    reference
19     "IEEE Std 802.3, 30.12.2.1.66";
20  }
21  leaf tx-dll-ready {
22    type boolean;
23    config false;
24    description
25      "Returns the initialization status of the EEE transmit Data Link
26      Layer management function on the local system.";
27    reference
28     "IEEE Std 802.3, 30.12.2.1.67";
29  }
30  leaf rx-dll-ready {
31    type boolean;
32    config false;
33    description
34      "Returns the initialization status of the EEE receive Data Link
35      Layer management function on the local system.";
36    reference
37     "IEEE Std 802.3, 30.12.2.1.68";
38  }
39  leaf dll-enabled {
40    type boolean;
41    config false;
42    description
43      "Returns the status of the EEE capability negotiation on the
44      local system.";
45    reference
46     "IEEE Std 802.3, 30.12.2.1.69";
47  }
48  leaf tx-system-fw {
49    type boolean;
50    config false;
51    description
52      "Returns the value of LPI_FW that the local system can support in
53      the transmit direction.";
54    reference
55     "IEEE Std 802.3, 30.12.2.1.70";
56  }
57  leaf tx-system-fw-echo {
58    type boolean;
59    config false;
60    description
61      "Returns the value of LPI_FW that the remote system is
62      advertising that it can support in the transmit direction and is
63      echoed by the local system under the control of the EEE DLL
64      receiver state diagram.";
65  }
```

```
1      reference
2        "IEEE Std 802.3, 30.12.2.1.71";
3    }
4    leaf rx-system-fw {
5      type boolean;
6      config false;
7      description
8        "Returns the value of LPI_FW that the local system is requesting
9        in the receive direction.";
10     reference
11       "IEEE Std 802.3, 30.12.2.1.72";
12   }
13   leaf rx-system-fw-echo {
14     type boolean;
15     config false;
16     description
17       "Returns the value of LPI_FW that the remote system is
18       advertising that it is requesting in the receive direction and is
19       echoed by the local system under the control of the IEEE DLL
20       transmitter state diagram.";
21     reference
22       "IEEE Std 802.3, 30.12.2.1.73";
23   }
24   leaf preemption-supported {
25     type boolean;
26     config false;
27     description
28       "Indicates whether the given port (associated with the local
29       System) supports the preemption capability.";
30     reference
31       "IEEE Std 802.3, 30.12.2.1.74";
32   }
33   leaf preemption-enabled {
34     type boolean;
35     config false;
36     description
37       "Indicates whether the preemption capability is enabled on the
38       given port associated with the local System.";
39     reference
40       "IEEE Std 802.3, 30.12.2.1.75";
41   }
42   leaf preemption-active {
43     type boolean;
44     config false;
45     description
46       "Indicates whether the preemption capability is active on the
47       given port associated with the local System.";
48     reference
49       "IEEE Std 802.3, 30.12.2.1.76";
50   }
51   leaf additional-fragment-size {
52     type int32;
53     config false;
54     description
55       "Indicate the minimum size of non-final fragments supported by
56       the receiver on the given port associated with the local System.
57       This value is expressed in units of 64 octets of additional
58       fragment length.";
59     reference
60       "IEEE Std 802.3, 30.12.2.1.77";
61   }
62 }
63 }
64 augment "/lldp:lldp/lldp:port/lldp:remote-systems-data" {
65   description
```

```
1      "Augments port with 802.3 port config tlvs";
2  leaf auto-negotiation-supported {
3      type boolean;
4      config false;
5      description
6          "True if the port supports Auto-negotiation";
7      reference
8          "IEEE Std 802.3, 30.12.3.1.1";
9  }
10 leaf auto-negotiation-enabled {
11     type boolean;
12     config false;
13     description
14         "True if Auto-negotiation is enabled";
15     reference
16         "IEEE Std 802.3, 30.12.3.1.2";
17 }
18 leaf auto-negotiation-cap {
19     type binary {
20         length "2";
21     }
22     config false;
23     description
24         "A read-only 2-octet value that contains the value (bitmap) of
25         the ifMauAutoNegCapAdvertisedBits object (defined in IETF RFC
26         4836) which is associated with the given port on the local
27         system.";
28     reference
29         "IEEE Std 802.3, 30.12.3.1.3";
30 }
31 leaf operational-mau-type {
32     type int32;
33     config false;
34     description
35         "32-bit integer value that indicates the operational MAU type of
36         the given port";
37     reference
38         "IEEE Std 802.3, 30.12.3.1.4";
39 }
40 leaf power-port-class {
41     type port-class-type;
42     config false;
43     description
44         "A read-only value that identifies the port Class of the given
45         port";
46     reference
47         "IEEE Std 802.3, 30.12.3.1.5";
48 }
49 leaf mdi-power-supported {
50     type boolean;
51     config false;
52     description
53         "True if MDI power is supported";
54     reference
55         "IEEE Std 802.3, 30.12.3.1.6";
56 }
57 leaf mdi-power-enabled {
58     type boolean;
59     config false;
60     description
61         "True if MDI power is enabled";
62     reference
63         "IEEE Std 802.3, 30.12.3.1.7";
64 }
65 }
```

```
1  leaf power-pair-controlable {
2      type boolean;
3      config false;
4      description
5          "True if the pair selection can be controlled";
6      reference
7          "IEEE Std 802.3, 30.12.3.1.8";
8  }
9  leaf power-pairs {
10     type pse-pinout-type;
11     config false;
12     description
13         "Indicates which pinout alternative is used for PD detection and
14         power";
15     reference
16         "IEEE Std 802.3, 30.12.3.1.9";
17 }
18 leaf power-class {
19     type pse-power-class-type;
20     config false;
21     description
22         "PD Power Class";
23     reference
24         "IEEE Std 802.3, 30.12.3.1.10";
25 }
26 leaf link-aggregation-status {
27     type bits {
28         bit aggregation-capability {
29             position 0;
30             description
31                 "IEEE Std 802.3, 79.3.3.1";
32         }
33         bit aggregation-status {
34             position 1;
35             description
36                 "IEEE Std 802.3, 79.3.3.1";
37         }
38         bit bit2-reserved {
39             position 2;
40             description
41                 "IEEE Std 802.3, 79.3.3.1";
42         }
43         bit bit3-reserved {
44             position 3;
45             description
46                 "IEEE Std 802.3, 79.3.3.1";
47         }
48         bit bit4-reserved {
49             position 4;
50             description
51                 "IEEE Std 802.3, 79.3.3.1";
52         }
53         bit bit5-reserved {
54             position 5;
55             description
56                 "IEEE Std 802.3, 79.3.3.1";
57         }
58         bit bit6-reserved {
59             position 6;
60             description
61                 "IEEE Std 802.3, 79.3.3.1";
62         }
63         bit bit7-reserved {
64             position 7;
```

```

1      description
2          "IEEE Std 802.3, 79.3.3.1";
3      }
4  }
5  config false;
6  description
7      "The bitmap value which contains the link aggregation
8      capabilities and the current aggregation status of the link";
9  reference
10     "IEEE Std 802.3, 30.12.3.1.11";
11 }
12 leaf aggregation-port-id {
13     type int32;
14     config false;
15     description
16         "The unique identifier allocated to this Aggregation Port by the
17         local System.";
18     reference
19         "IEEE Std 802.3, 30.12.3.1.12";
20 }
21 leaf local-max-frame-size {
22     type int32;
23     config false;
24     description
25         "An integer value indicating the maximum supported frame size in
26         octets on the given port of the local system.";
27     reference
28         "IEEE Std 802.3, 30.12.3.1.13";
29 }
30 leaf power-type {
31     type bits {
32         bit type1-or-greater {
33             position 0;
34             description
35                 "0-type1, 1-greater than type1";
36         }
37         bit pse-or-pd {
38             position 1;
39             description
40                 "0-pse, 1-pd";
41         }
42     }
43     config false;
44     description
45         "A read-only attribute that returns a bit string indicating
46         whether the local system is a PSE or a PD and whether it is Type
47         1 or greater than Type 1. The first bit indicates Type 1 or
48         greater than Type 1. The second bit indicates PSE or PD. A PSE
49         sets this bit to indicate a PSE. A PD sets this bit to indicate a
50         PD. See also aLldpXdot3LocPowerTypeExt..";
51     reference
52         "IEEE Std 802.3, 30.12.3.1.14";
53 }
54 leaf power-source {
55     type power-source-type;
56     config false;
57     description
58         "Indicates the power sources of the remote system. A PSE
59         indicates whether it is being powered by a primary power source;
60         a backup power source; or unknown. A PD indicates whether it is
61         being powered by a PSE and locally; by a PSE only; or unknown.";
62     reference
63         "IEEE Std 802.3, 30.12.3.1.15";
64 }
65 }

```



```
1  leaf power-priority {
2      type power-priority-type;
3      description
4          "the priority of the PD system received from the remote system";
5      reference
6          "IEEE Std 802.3, 30.12.3.1.16";
7  }
8  leaf pd-requested-power-value {
9      type int32;
10     config false;
11     description
12         "PD requested power value that was used by the remote system to
13         compute the power value that is has currently allocated to the
14         PD.";
15     reference
16         "IEEE Std 802.3, 30.12.3.1.17";
17 }
18 leaf pd-requested-power-value-a {
19     type int32;
20     config false;
21     description
22         "A read-only attribute that returns the PD requested power value
23         for the Mode A pairset that was used by the remote system to
24         compute the power value that it has currently allocated to the
25         PD. For a PSE, it is the PD requested power value for the
26         Alternative A pairset received from the remote system. For a PD,
27         it is the PD requested power value for the Alternative A pairset
28         that the PSE echoes back to the remote system. The definition and
29         encoding of PD requested power value for the Mode A pairset is
30         the same as described in aLldpXdot3LocPDRequestedPowerValueA";
31     reference
32         "IEEE Std 802.3, 30.12.3.1.18";
33 }
34 leaf pd-requested-power-value-b {
35     type int32;
36     config false;
37     description
38         "A read-only attribute that returns the PD requested power value
39         for the Mode B pairset that was used by the remote system to
40         compute the power value that it has currently allocated to the
41         PD. For a PSE, it is the PD requested power value for the
42         Alternative B pairset received from the remote system. For a PD,
43         it is the PD requested power value for the Alternative B pairset
44         that the PSE echoes back to the remote system. The definition and
45         encoding of PD requested power value for the Mode B pairset is
46         the same as described in aLldpXdot3LocPDRequestedPowerValueB";
47     reference
48         "IEEE Std 802.3, 30.12.3.1.19";
49 }
50 leaf pse-allocated-power-value {
51     type int32;
52     config false;
53     description
54         "PSE allocated power value. For a PSE, it is the power value that
55         the PSE has currently allocated to the remote system. For a PD,
56         it is the power value that the PD mirrors back to the remote
57         system";
58     reference
59         "IEEE Std 802.3, 30.12.3.1.20";
60 }
61 leaf pse-allocated-power-value-a {
62     type int32;
63     config false;
64     description
65
```

```

1      "A read-only attribute that returns the PSE allocated power value
2      for the Alternative A pairset received from the remote system.
3      For a PSE, it is the PSE allocated power value for the
4      Alternative A pairset that was echoed back by the remote PD. For
5      a PD, it is the PSE allocated power value for the Mode A pairset
6      received from the remote system. The definition and encoding of
7      PSE allocated power value for the Alternative A pairset is the
8      same as described in aLldpXdot3LocPSEAllocatedPowerValueA";
9      reference
10     "IEEE Std 802.3, 30.12.3.1.21";
11 }
12 leaf pse-allocated-power-value-b {
13     type int32;
14     config false;
15     description
16     "A read-only attribute that returns the PSE allocated power value
17     for the Alternative B pairset received from the remote system.
18     For a PSE, it is the PSE allocated power value for the
19     Alternative B pairset that was echoed back by the remote PD. For
20     a PD, it is the PSE allocated power value for the Mode B pairset
21     received from the remote system. The definition and encoding of
22     PSE allocated power value for the Alternative B pairset is the
23     same as described in aLldpXdot3LocPSEAllocatedPowerValueB";
24     reference
25     "IEEE Std 802.3, 30.12.3.1.22";
26 }
27 leaf pse-powering-status {
28     type powering-status-type;
29     config false;
30     description
31     "A read only value that indicates the powering status of the
32     remote PSE. For a PD, the contents of this attribute are
33     undefined.";
34     reference
35     "IEEE Std 802.3, 30.12.3.1.23";
36 }
37 leaf pd-powered-status {
38     type powered-status-type;
39     config false;
40     description
41     "A read only value that indicates the powering status of the PD.
42     For a PSE, the contents of this attribute are undefined";
43     reference
44     "IEEE Std 802.3, 30.12.3.1.24";
45 }
46 leaf power-pairs-ext {
47     type power-pairs-type;
48     config false;
49     description
50     "A read-only value that identifies the supported PSE Pinout
51     Alternative specified in 145.2.4. For a PD, this attribute
52     contains the value of the aPSEPowerPairs attribute (see
53     30.9.1.1.4). For a PSE, the contents of this attribute are
54     undefined";
55     reference
56     "IEEE Std 802.3, 30.12.3.1.25";
57 }
58 leaf power-class-ext-A {
59     type power-class-ext-AB-type;
60     config false;
61     description
62     "For a dual-signature PD, a read-only value that indicates the
63     currently assigned Class for Mode A by the remote 4-pair PSE. For
64     a single-signature PD or a dual-signature PD connected to a
65 
```

```

1         2-pair only PSE, a read-only value set to 'singlesig' by the
2         remote PSE. For a PSE connected to a dual- signature PD, a
3         read-only value that indicates the requested Class for Mode A
4         during Physical Layer classification (see 145.2.8) by the remote
5         PD. For a PSE connected to a single-signature PD, a read-only
6         value set to 'singlesig' by the remote PD";
7     reference
8         "IEEE Std 802.3, 30.12.3.1.26";
9 }
10 leaf power-class-ext-B {
11     type power-class-ext-AB-type;
12     config false;
13     description
14         "For a dual-signature PD, a read-only value that indicates the
15         currently assigned Class for Mode B by the remote 4-pair PSE. For
16         a single-signature PD or a dual-signature PD connected to a
17         2-pair only PSE, a read-only value set to 'singlesig' by the
18         remote PSE. For a PSE connected to a dual- signature PD, a
19         read-only value that indicates the requested Class for Mode B
20         during Physical Layer classification (see 145.2.8) by the remote
21         PD. For a PSE connected to a single-signature PD, a read-only
22         value set to 'singlesig' by the remote PD";
23     reference
24         "IEEE Std 802.3, 30.12.3.1.27";
25 }
26 leaf power-class-ext {
27     type power-class-ext-type;
28     config false;
29     description
30         "For a single-signature PD or a dual-signature PD connected to a
31         2-pair only PSE, a read-only value that indicates the currently
32         assigned Class by the remote PSE. For a dual-signature PD
33         connected to a 4-pair capable PSE, a read-only value set to
34         'dualsig' by the remote PSE. For a PSE connected to a
35         single-signature PD, a read-only value that indicates the
36         requested Class during Physical Layer classification (see
37         145.2.8) by the remote PD. For a PSE connected to a
38         dual-signature PD, a read- only value set to 'dualsig' by the
39         remote PD.";
40     reference
41         "IEEE Std 802.3, 30.12.3.1.28";
42 }
43 leaf power-type-ext {
44     type power-type;
45     config false;
46     description
47         "A read-only attribute that returns a value to indicate if the
48         remote system is a Type 3 or Type 4 PSE or PD and, in the case of
49         a Type 3 or Type 4 PD, if it is a single-signature PD or
50         dual-signature PD.";
51     reference
52         "IEEE Std 802.3, 30.12.3.1.29";
53 }
54 leaf pd-load {
55     type boolean;
56     config false;
57     description
58         "For a PSE, a read-only attribute that returns whether the load
59         of the remote dual-signature PD is electrically isolated, as
60         defined in 79.3.2.10.2. For a PD, this attribute is set to FALSE.";
61     reference
62         "IEEE Std 802.3, 30.12.3.1.30";
63 }
64 leaf pd-4pid {
65

```

```
1      type boolean;
2      config false;
3      description
4          "A read-only Boolean attribute indicating whether the remote PD
5           system supports powering of both PD Modes.";
6      reference
7          "IEEE Std 802.3, 30.12.3.1.31";
8  }
9  leaf pse-max-avail-power {
10     type int32;
11     config false;
12     description
13         "A read-only attribute that returns the remote PSE maximum
14          available power value in units of 0.1 W";
15     reference
16         "IEEE Std 802.3, 30.12.3.1.32";
17 }
18 leaf pse-autoclass-support {
19     type boolean;
20     config false;
21     description
22         "Indicates whether the remote PSE system supports Autoclass.";
23     reference
24         "IEEE Std 802.3, 30.12.3.1.33";
25 }
26 leaf autoclass-completed {
27     type boolean;
28     config false;
29     description
30         "Indicates whether the remote PSE system has completed the
31          Autoclass measurement.";
32     reference
33         "IEEE Std 802.3, 30.12.3.1.34";
34 }
35 leaf autoclass-request {
36     type boolean;
37     config false;
38     description
39         "A read-only Boolean attribute indicating whether the remote PD
40          system is requesting an Autoclass measurement.";
41     reference
42         "IEEE Std 802.3, 30.12.3.1.35";
43 }
44 leaf power-down-request {
45     type int32;
46     description
47         "A read-write attribute that indicates the remote PD system is
48          requesting a power down when the value is 0x1D.";
49     reference
50         "IEEE Std 802.3, 30.12.3.1.36";
51 }
52 leaf power-down-time {
53     type int32;
54     description
55         "A read-only attribute that indicates the number of seconds the
56          remote PD requests to stay powered off. A value of zero indicates
57          an indefinite amount of time";
58     reference
59         "IEEE Std 802.3, 30.12.3.1.37";
60 }
61 leaf meas-voltage-support {
62     type boolean;
63     config false;
64     description
```

```
1         "A read-only attribute that indicates the remote device is
2         capable of providing a voltage measurement.>";
3     reference
4         "IEEE Std 802.3, 30.12.3.1.38";
5 }
6 leaf meas-current-support {
7     type boolean;
8     config false;
9     description
10        "A read-only attribute that indicates the remote device is
11        capable of providing a current measurement.>";
12    reference
13        "IEEE Std 802.3, 30.12.3.1.39";
14 }
15 leaf meas-power-support {
16     type boolean;
17     config false;
18     description
19        "A read-only attribute that indicates the remote device is
20        capable of providing a power measurement.>";
21    reference
22        "IEEE Std 802.3, 30.12.3.1.40";
23 }
24 leaf meas-energy-support {
25     type boolean;
26     config false;
27     description
28        "A read-only attribute that indicates the remote device is
29        capable of providing a energy measurement.>";
30    reference
31        "IEEE Std 802.3, 30.12.3.1.41 ";
32 }
33 leaf measurement-source {
34     type bits {
35         bit bit1 {
36             position 0;
37             description
38                 "-";
39         }
40         bit bit2 {
41             position 1;
42             description
43                 "-";
44         }
45     }
46     description
47        "A read-write attribute value that indicates on which Alternative
48        or Mode the measurement was taken by the remote device.";
49    reference
50        "IEEE Std 802.3, 30.12.3.1.42";
51 }
52 leaf meas-voltage-request {
53     type boolean;
54     config false;
55     description
56        "A read-only attribute that indicates the remote device is
57        requesting a voltage measurement from the local device.>";
58    reference
59        "IEEE Std 802.3, 30.12.3.1.43";
60 }
61 leaf meas-current-request {
62     type boolean;
63     config false;
64     description
```

```
1         "A read-only attribute that indicates the remote device is
2         requesting a current measurement from the local device.";
3     reference
4         "IEEE Std 802.3, 30.12.3.1.44";
5 }
6 leaf meas-power-request {
7     type boolean;
8     config false;
9     description
10        "A read-only attribute that indicates the remote device is
11        requesting a power measurement from the local device.";
12    reference
13        "IEEE Std 802.3, 30.12.3.1.45";
14 }
15 leaf meas-energy-request {
16     type boolean;
17     config false;
18     description
19        "A read-only attribute that indicates the remote device is
20        requesting an energy measurement from the local device.";
21    reference
22        "IEEE Std 802.3, 30.12.3.1.46";
23 }
24 leaf meas-voltage-valid {
25     type boolean;
26     config false;
27     description
28        "A read-only attribute that indicates the remote device's voltage
29        measurement is valid.";
30    reference
31        "IEEE Std 802.3, 30.12.3.1.47";
32 }
33 leaf meas-current-valid {
34     type boolean;
35     config false;
36     description
37        "A read-only attribute that indicates the remote device's current
38        measurement is valid.";
39    reference
40        "IEEE Std 802.3, 30.12.3.1.48";
41 }
42 leaf meas-power-valid {
43     type boolean;
44     config false;
45     description
46        "A read-only attribute that indicates the remote device's power
47        measurement is valid.";
48    reference
49        "IEEE Std 802.3, 30.12.3.1.49";
50 }
51 leaf meas-energy-valid {
52     type boolean;
53     config false;
54     description
55        "A read-only attribute that indicates the remote device's energy
56        measurement is valid.";
57    reference
58        "IEEE Std 802.3, 30.12.3.1.50";
59 }
60 leaf meas-voltage-uncertainty {
61     type int32;
62     config false;
63     description
64        "A read-only attribute that indicates the expanded uncertainty
```

```
1         (coverage factor k = 2) for the remote device's voltage
2         measurement.";
3         reference
4         "IEEE Std 802.3, 30.12.3.1.51";
5     }
6     leaf meas-current-uncertainty {
7         type int32;
8         config false;
9         description
10        "A read-only attribute that indicates the expanded uncertainty
11        (coverage factor k = 2) for the remote device's current
12        measurement.";
13        reference
14        "IEEE Std 802.3, 30.12.3.1.52";
15    }
16    leaf meas-power-uncertainty {
17        type int32;
18        config false;
19        description
20        "A read-only attribute that indicates the expanded uncertainty
21        (coverage factor k = 2) for the remote device's power
22        measurement.";
23        reference
24        "IEEE Std 802.3, 30.12.3.1.53";
25    }
26    leaf meas-energy-uncertainty {
27        type int32;
28        config false;
29        description
30        "A read-only attribute that indicates the expanded uncertainty
31        (coverage factor k = 2) for the remote device's energy
32        measurement.";
33        reference
34        "IEEE Std 802.3, 30.12.3.1.54";
35    }
36    leaf voltage-measurement {
37        type int32;
38        config false;
39        description
40        "A read-only attribute that returns the measured remote device
41        voltage.";
42        reference
43        "IEEE Std 802.3, 30.12.3.1.55";
44    }
45    leaf current-measurement {
46        type int32;
47        config false;
48        description
49        "A read-only attribute that returns the measured remote device
50        current.";
51        reference
52        "IEEE Std 802.3, 30.12.3.1.56";
53    }
54    leaf power-measurement {
55        type int32;
56        config false;
57        description
58        "A read-only attribute that returns the measured remote device
59        power.";
60        reference
61        "IEEE Std 802.3, 30.12.3.1.57";
62    }
63    leaf energy-measurement {
64        type int32;
```

```
1      config false;
2      description
3          "A read-only attribute that returns the measured remote device
4          energy.";
5      reference
6          "IEEE Std 802.3, 30.12.3.1.58";
7  }
8  leaf pse-power-price-index {
9      type int32;
10     config false;
11     description
12         "A read-only attribute that returns an index of the price of
13         power being sourced by the remote PSE. For a PSE, this value is
14         undefined.";
15     reference
16         "IEEE Std 802.3, 30.12.3.1.59";
17 }
18 leaf tx-system-value {
19     type int32;
20     config false;
21     description
22         "Returns the value of Tw_sys_tx that the remote system can
23         support in the transmit direction.";
24     reference
25         "IEEE Std 802.3, 30.12.3.1.60";
26 }
27 leaf tx-system-value-echo {
28     type int32;
29     config false;
30     description
31         "Returns the value of Tw_sys_tx that the local system is
32         advertising that it can support in the transmit direction and is
33         echoed by the local system under the control of the IEEE DLL
34         receiver state diagram.";
35     reference
36         "IEEE Std 802.3, 30.12.3.1.61";
37 }
38 leaf rx-system-value {
39     type int32;
40     config false;
41     description
42         "Returns the value of Tw_sys_tx that the remote system is
43         requesting in the receive direction.";
44     reference
45         "IEEE Std 802.3, 30.12.3.1.62";
46 }
47 leaf rx-system-value-echo {
48     type int32;
49     config false;
50     description
51         "Returns the value of Tw_sys_tx that the local system is
52         advertising that it is requesting in the receive direction and is
53         echoed by the local system under the control of the IEEE DLL
54         transmitter state diagram.";
55     reference
56         "IEEE Std 802.3, 30.12.3.1.63 ";
57 }
58 leaf fallback-system-value {
59     type int32;
60     config false;
61     description
62         "Returns the value of the fallback Tw_sys_tx that the remote
63         system is advertising to the remote system.";
64     reference
```



```
1         "IEEE Std 802.3, 30.12.3.1.64";
2     }
3     leaf tx-system-fw {
4         type boolean;
5         config false;
6         description
7             "Returns the value of LPI_FW that the remote system can support
8             in the transmit direction.";
9         reference
10            "IEEE Std 802.3, 30.12.3.1.65";
11    }
12    leaf tx-system-fw-echo {
13        type boolean;
14        config false;
15        description
16            "Returns the value of LPI_FW that the local system is advertising
17            that it can support in the transmit direction and is echoed by
18            the local system under the control of the EEE DLL receiver state
19            diagram.";
20        reference
21            "IEEE Std 802.3, 30.12.3.1.66";
22    }
23    leaf rx-system-fw {
24        type boolean;
25        config false;
26        description
27            "Returns the value of LPI_FW that the remote system is requesting
28            in the receive direction.";
29        reference
30            "IEEE Std 802.3, 30.12.3.1.67";
31    }
32    leaf rx-system-fw-echo {
33        type boolean;
34        config false;
35        description
36            "Returns the value of LPI_FW that the local system is advertising
37            that it is requesting in the receive direction and is echoed by
38            the local system under the control of the EEE DLL transmitter
39            state diagram.";
40        reference
41            "IEEE Std 802.3, 30.12.3.1.68";
42    }
43    leaf preemption-supported {
44        type boolean;
45        config false;
46        description
47            "Indicates whether the given port (associated with the remote
48            System) supports the preemption capability.";
49        reference
50            "IEEE Std 802.3, 30.12.3.1.69";
51    }
52    leaf preemption-enabled {
53        type boolean;
54        config false;
55        description
56            "Indicates whether the preemption capability is enabled on the
57            given port associated with the remote System.";
58        reference
59            "IEEE Std 802.3, 30.12.3.1.70";
60    }
61    leaf preemption-active {
62        type boolean;
63        config false;
64        description
```

```
1         "Indicates whether the preemption capability is active on the
2         given port associated with the remote System.";
3     reference
4         "IEEE Std 802.3, 30.12.3.1.72";
5 }
6 leaf additional-fragment-size {
7     type int32;
8     config false;
9     description
10        "Indicate the minimum size of non-final fragments supported by
11        the receiver on the given port associated with the remote System.
12        This value is expressed in units of 64 octets of additional
13        fragment length.";
14    reference
15        "IEEE Std 802.3, 30.12.3.1.72 ";
16 }
17 }
18 }
```

6. YANG module for Ethernet data terminal equipment (DTE) power via medium dependent interface (MDI) and Power over Data Lines (PoDL)

6.1 Introduction

This clause defines a YANG module to manage power via MDI Power Sourcing Equipment (PSE) and Power over Data Line (PoDL) PSE.

IEEE Std 802.3 defines the hardware registers that allow management interfaces to be built for a DTE Power via MDI and Power over Data Line device. The YANG module defined in this clause extends the Ethernet-interface YANG data modules defined in Clause 5 with the management objects required for the management of PoE and PoDL devices and ports.

6.2 YANG module structure

The *ieee802-ethernet-pse* YANG module of this clause is focused on the configuration and monitoring of the Power over Ethernet (PoE) function defined in IEEE Std 802.3, including power via MDI, as well as Power over Data Line which can also be considered as the single pair PoE. The module augments the *ieee802-ethernet-interface* YANG module with attributes for the PoE function. The module is partitioned into two major containers.

The PoE PSE container describes a multi-pair PSE, while the PoDL PSE describes a single-pair PSE.

6.3 Security considerations for Ethernet data terminal equipment (DTE) power via medium dependent interface (MDI) and Power over Data Line Module

There are a number of data nodes defined in this YANG module that are configurable as read-write. Such data nodes may be considered sensitive or vulnerable in some network environments. The support for configuration operations in a non-secure environment without proper protection can have a negative effect on network operations.

Setting the following data nodes to incorrect values can result in improper operation of the PSE, including the possibility that the Powered Device (PD) does not receive power from the PSE port:

- `pse-enable`
- `powering-pairs`

Some of the readable operational states in this module may be considered sensitive or vulnerable in some network environments. These are as follows:

- `pairs-control-ability`
- `classifications`
- `pd-power-class`
- `pse-type`
- `detected-pd-type`

It is thus important to control GET access to these data nodes and to possibly encrypt their values when sending them over the network.

6.4 Mapping of IEEE Std 802.3, Clause 30 managed objects

This subclause contains the mapping between YANG data nodes included in *ieee802-ethernet-pse* (see Table 6-1) YANG module, managed objects, and attributes defined in IEEE Std 802.3, Clause 30.

Table 6–1—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-ethernet-pse* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-pse</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
N/A	N/A		interfaces/interface/ethernet/pse	supported-pse-type	R
oPSE	aPSEAdminState	30.9.1	interfaces/interface/ethernet/pse/multi-pair	pse-enable	R
	aPSEPowerPairs			powering-pairs	R/W
	aPSEPowerPairsControlAbility			pairs-control-ability	R
	aPSEPowerDetectionStatus			detection-status	R
	aPSEPowerClassification			classifications	R
	aPSEActualPower			actual-power	R
	aPSEPowerAccuracy			power-accuracy	R
	aPSEInvalidSignatureCounter		interfaces/interface/ethernet/pse/multi-pair/statistics	invalid-signature	R
	aPSEPowerDeniedCounter			power-denied	R
	aPSEOverLoadCounter			overload	R
	aPSEShortCounter			short	R
	aPSEMPSAbsentCounter			mps-absent	R
	aPSECumulativeEnergy			cumulative-energy	R

Table 6–1—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-ethernet-pse* YANG data nodes (continued)

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-pse</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oPoDLPSE	aPoDLPSEAdminState	30.15	interfaces/interface/ethernet/pse/single-pair	pse-enable	R
	aPoDLPSEPowerDetectionStatus			detection-status	R
	aPoDLPSEType			podl-type	R
	aPoDLPSEDetectedPDType			detected-pd-type	R
	aPoDLPSEDetectedPDPowerClass			pd-power-class	R
	aPoDLPSEActualPower			actual-power	R
	aPoDLPSEPowerAccuracy			power-accuracy	R
	aPoDLPSEInvalidSignatureCounter		interfaces/interface/ethernet/pse/single-pair/statistics	invalid-signature	R
	aPoDLPSEInvalidClassCounter			invalid-class	R
	aPoDLPSEPowerDeniedCounter			power-denied	R
	aPoDLPSEOverLoadCounter			overload	R
	aPoDLPSEMaintainFullVoltageSignatureAbsentCounter			fvs-absent	R
	aPoDLPSECumulativeEnergy			cumulative-energy	R

6.5 YANG module definition¹

The YANG module tree hierarchy uses terms defined in IETF RFC 8407.

6.5.1 Tree hierarchy

module: ieee802-ethernet-pse

```
augment /if:interfaces/if:interface/ieee802-eth-if:ethernet:
  +--rw pse
    +--ro supported-pse-type?  identityref
    +--rw multi-pair!
      | +--rw pse-enable?      boolean
      | +--rw powering-pairs?  identityref
      | +--ro pairs-control-ability?  boolean
      | +--ro detection-status?  multi-pair-detection-state
      | +--ro classifications?  power-class
      | +--ro statistics
      | | +--ro power-denied?    yang:counter64
      | | +--ro invalid-signature? yang:counter64
      | | +--ro mps-absent?      yang:counter64
      | | x--ro overload?        yang:counter64
      | | +--ro short?           yang:counter64
      | | +--ro cumulative-energy? yang:counter64
      | +--ro actual-power?      decimal64
      | +--ro power-accuracy?    int64
    +--rw single-pair!
      +--rw pse-enable?      boolean
      +--ro detection-status? single-pair-detection-state
      +--ro pod1-type?        enumeration
      +--ro detected-pd-type? enumeration
      +--ro pd-power-class?   power-class
      +--ro statistics
      | +--ro power-denied?    yang:counter64
```

¹Copyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.

```
|  +--ro invalid-signature?  yang:counter64
|  +--ro invalid-class?      yang:counter64
|  +--ro overload?           yang:counter64
|  +--ro fvs-absence?         yang:counter64
|  +--ro cumulative-energy?    yang:counter64
+--ro actual-power?          decimal64
+--ro power-accuracy?        int64
```

6.5.2 YANG module

In the following YANG module definition, should any discrepancy between the text of the description for individual YANG nodes and the corresponding definition in 6.2 through 6.5 of this clause occur, the definitions and mappings in 6.5 shall take precedence.

Editor's Note (to be removed prior to publication):

Yang files contained in <https://github.com/YangModels/yang/tree/main/standard/ieee/published/802.3> are IEEE 802.3.1-2019 version and will be updated at the publication time.

An ASCII text version of the YANG module can be found at the following URL:^m <https://github.com/YangModels/yang/tree/master/standard/ieee/published/802.3>.

Editor's Note (to be removed prior to publication):

Contributions to complete the ieee802-ethernet-pse is encouraged

Editor's Note (to be removed prior to publication):

Pretty printing of ieee802-ethernet-pse.yang file may change the appearance by adding whitespace and reformatting lines

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 and IEEE Std 802.3.2 to be updated at the publication time

```
module ieee802-ethernet-pse {
  yang-version "1.1";
  namespace urn:ieee:std:802.3:yang:ieee802-ethernet-pse;
  prefix ieee802-pse;
  import ietf-interfaces {
    prefix if;
    reference
      "IETF RFC 8343";
  }
  import ietf-yang-types {
    prefix yang;
    reference
      "IETF RFC 6991";
  }
  import ieee802-ethernet-interface {
    prefix ieee802-eth-if;
  }
  organization
    "IEEE 802.3 Ethernet Working Group
    Web URL: http://www.ieee802.org/3/";
  contact
    "Web URL: http://www.ieee802.org/3/";
  description
    "This module contains YANG definitions for configuring and managing
    ports with Power Over Ethernet feature defined by IEEE 802.3. It
    provides functionality roughly equivalent to that of the
    POWER-ETHERNET-MIB defined in IETF RFC 3621.";
  revision 2024-02-12 {
    description
```

^mCopyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.


```
1      "Updates under IEEE Std 802.3.2-202x, Draft 1.1";
2      reference
3      "IEEE Std 802.3-2022, unless dated explicitly";
4  }
5  identity pse-type {
6      description
7      "Base type for PSE.";
8  }
9  identity all {
10     base powering-pairs;
11     description
12     "All pairs are in use.";
13 }
14 identity four-pair {
15     base pse-type;
16     description
17     "PSE support IEEE Std 802.3, Clause 145.";
18 }
19 identity two-pair {
20     base pse-type;
21     description
22     "PSE supports IEEE Std 802.3, Clause 33.";
23 }
24 identity single-pair {
25     base pse-type;
26     description
27     "PSE support IEEE Std 802.3, Clause 104.";
28 }
29 identity powering-pairs {
30     description
31     "Base type for powering pairs.";
32 }
33 identity signal {
34     base powering-pairs;
35     description
36     "The signal pairs are in use.";
37 }
38 identity spare {
39     base powering-pairs;
40     description
41     "The spare pairs are in use.";
42 }
43
44 typedef multi-pair-detection-state {
45     type enumeration {
46         enum disabled {
47             value 1;
48             description
49             "PSE disabled.";
50         }
51         enum searching {
52             value 2;
53             description
54             "PSE is searching.";
55         }
56         enum deliveringPower {
57             value 3;
58             description
59             "PSE is delivering power.";
60         }
61         enum fault {
62             value 4;
63             description
64             "PSE fault detected.";
65         }
66     }
67 }
```

```

1      enum test {
2          value 5;
3          description
4              "PSE test mode.";
5      }
6      enum otherFault {
7          value 6;
8          description
9              "PSE implementation specific fault detected.";
10     }
11 }
12 description
13     "Detection state of a multi-pair PSE.";
14 reference
15     "IEEE Std 802.3, 30.9.1.1.5";
16 }
17 typedef single-pair-detection-state {
18     type enumeration {
19         enum unknown {
20             value 1;
21             description
22                 "True detection state unknown.";
23         }
24         enum disabled {
25             value 2;
26             description
27                 "PoDL PSE is disabled.";
28         }
29         enum searching {
30             value 3;
31             description
32                 "PoDL PSE is searching.";
33         }
34         enum deliveringPower {
35             value 4;
36             description
37                 "PoDL PSE is delivering power.";
38         }
39         enum sleep {
40             value 5;
41             description
42                 "PoDL PSE is in sleep state.";
43         }
44         enum idle {
45             value 6;
46             description
47                 "PoDL PSE is idle.";
48         }
49         enum error {
50             value 7;
51             description
52                 "PoDL PSE error.";
53         }
54     }
55 }
56 description
57     "Detection state of a PoDL PSE.";
58 reference
59     "IEEE Std 802.3, 30.15.1.1.3";
60 }
61 typedef power-class {
62     type enumeration {
63         enum class0 {
64             value 1;
65             description

```

```

1      "Class 0";
2  }
3  enum class1 {
4      value 2;
5      description
6          "Class 1";
7  }
8  enum class2 {
9      value 3;
10     description
11         "Class 2";
12 }
13 enum class3 {
14     value 4;
15     description
16         "Class 3";
17 }
18 enum class4 {
19     value 5;
20     description
21         "Class 4";
22 }
23 enum class5 {
24     value 6;
25     description
26         "Class 5 (for PoDL-only)";
27 }
28 enum class6 {
29     value 7;
30     description
31         "Class 6 (for PoDL-only)";
32 }
33 enum class7 {
34     value 8;
35     description
36         "Class 7 (for PoDL-only)";
37 }
38 enum class8 {
39     value 9;
40     description
41         "Class 8 (for PoDL-only)";
42 }
43 enum class9 {
44     value 10;
45     description
46         "Class 9 (for PoDL-only)";
47 }
48 enum unknown {
49     value 11;
50     description
51         "Initializing, true Power Class not yet known (only for PoDL
52         PSE).";
53 }
54 }
55 }
56 description
57     "Power class.";
58 reference
59     "IEEE Std 802.3, 30.9.1.1.8 aPSEPowerClassification and
60     IEEE Std 802.3, 30.15.1.1.6 aPoDLPSEDetectedPDPowerClass.";
61 }
62 augment "/if:interfaces/if:interface/ieee802-eth-if:ethernet" {
63     description
64         "Augments ethernet interface configuration model with nodes
65         specific to DTE Power via MDI devices and ports";

```

```

1  container pse {
2    description
3      "DTE Power via MDI port configuration";
4    reference
5      "IEEE Std 802.3, 30.9.1 PoE PSE & IEEE Std 802.3, 30.15.1 PoDL
6      PSE";
7    leaf supported-pse-type {
8      type identityref {
9        base ieee802-pse:pse-type;
10     }
11    config false;
12    description
13      "PSE supports one or more of IEEE Std 802.3 Clause 33, Clause
14      104, or Clause 145.";
15  }
16  container multi-pair {
17    presence "PSE port supports IEEE Std 802.3, Clause 33.";
18    description
19      "PSE port configuration in IEEE Std 802.3, 30.9.1.";
20    leaf pse-enable {
21      type boolean;
22      default "false";
23      description
24        "When true enables the PSE function on the interface, when
25        false disables the PSE function on the interface.";
26      reference
27        "IEEE Std 802.3, 30.9.1.1.2 aPSEAdminState";
28    }
29    leaf powering-pairs {
30      type identityref {
31        base powering-pairs;
32      }
33      description
34        "Describes or controls the PSE pairs in use. If the value of
35        pairs-control-ability is true, this object is writeable.";
36      reference
37        "IEEE Std 802.3, 30.9.1.1.4 aPSEPowerPairs";
38    }
39  }
40
41
42
43
44
45
46
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```

Editor's Note (to be removed prior to publication):

Request contribution for using conditional construct with Yang Syntax for this variable

```

46
47    leaf pairs-control-ability {
48      type boolean;
49      default "true";
50      config false;
51      description
52        "Describes the ability to control switching the power
53        sourcing pins of the PSE.";
54      reference
55        "IEEE Std 802.3, 30.9.1.1.3 aPSEPowerPairsControlAbility";
56    }
57    leaf detection-status {
58      type multi-pair-detection-state;
59      config false;
60      description
61        "Describes the operational status of the port PD detection.";
62      reference
63        "IEEE Std 802.3, 30.9.1.1.5 aPSEPowerDetectionStatus";
64    }
65    leaf classifications {

```

```

1      when
2          "../detection-status = 'deliveringPower'" {
3              description
4                  "This node only applies when the detection status is
5                  delivering power.";
6              }
7          type power-class;
8          config false;
9          description
10             "The power class of the PSE port.";
11         reference
12             "IEEE Std 802.3, 30.9.1.1.6 aPSEPowerClassification";
13     }
14     container statistics {
15         config false;
16         description
17             "statistics information of the multi-pair port.";
18         leaf power-denied {
19             type yang:counter64;
20             description
21                 "This counter is incremented when the PSE state diagram
22                 enters the POWER_DENIED state, per IEEE Std 802.3, Figure
23                 33-9.";
24             reference
25                 "IEEE Std 802.3, 30.9.1.1.14";
26         }
27         leaf invalid-signature {
28             type yang:counter64;
29             description
30                 "This counter is incremented when the PSE state diagram
31                 enters the SIGNATURE_INVALID state per IEEE Std 802.3,
32                 Figure 33-9.";
33             reference
34                 "IEEE Std 802.3, 30.9.1.1.11";
35         }
36         leaf mps-absent {
37             type yang:counter64;
38             description
39                 "This counter is incremented when the PSE transitions
40                 directly from the POWER_ON state to the IDLE state due to
41                 tmpdo_timer_done being asserted, per IEEE Std 802.3, Figure
42                 33-9.";
43             reference
44                 "IEEE Std 802.3, 30.9.1.1.20";
45         }
46         leaf overload {
47             type yang:counter64;
48             status "deprecated";
49             description
50                 "This counter is incremented when the PSE state diagram
51                 enters the ERROR_DELAY state due to the ovld_detected
52                 variable being TRUE, per IEEE Std 802.3, Figure 33-9.";
53             reference
54                 "IEEE Std 802.3, 30.9.1.1.17";
55         }
56         leaf short {
57             status deprecated;
58             type yang:counter64;
59             description
60                 "This Yang object is deprecated as its not defined in base
61                 standard. This counter is incremented when the PSE state
62                 diagram enters the ERROR_DELAY state due to the
63                 short_detected variable being TRUE, per IEEE Std 802.3,
64                 Figure 33-9.";
65         }

```

```
1         reference
2             "IEEE Std 802.3, 30.9.1.1.10 aPSEShortCounter";
3     }
4     leaf cumulative-energy {
5         type yang:counter64;
6         units "millijoules";
7         description
8             "The cumulative energy supplied by the PSE as measured at
9             the MDI in millijoules.";
10        reference
11            "IEEE Std 802.3, 30.9.1.1.25";
12    }
13 }
14 leaf actual-power {
15     type decimal64 {
16         fraction-digits "4";
17     }
18     units "milliwatts";
19     config false;
20     description
21         "The actual power drawn by a PD over the port.";
22     reference
23         "IEEE Std 802.3, 30.9.1.1.23";
24 }
25 leaf power-accuracy {
26     type int64;
27     units "milliwatts";
28     config false;
29     description
30         "An integer value indicating the accuracy associated with
31         power-accuracy in +/- milliwatts.";
32     reference
33         "IEEE Std 802.3, 30.9.1.1.24";
34 }
35 }
36 container single-pair {
37     presence "PSE port working in PoDL.";
38     description
39         "PoDL PSE configuration as defined in IEEE Std 802.3, 30.15.1.";
40     leaf pse-enable {
41         type boolean;
42         default "false";
43         description
44             "When true enables the PSE function on the interface, when
45             false disables the PSE function on the interface.";
46         reference
47             "IEEE Std 802.3, 30.15.1.1.2 aPoDLPSEAdminState";
48     }
49     leaf detection-status {
50         type single-pair-detection-state;
51         config false;
52         description
53             "Indicates the current status of the PoDL PSE.";
54         reference
55             "IEEE Std 802.3, 30.15.1.1.3 aPoDLPSEPowerDetectionStatus";
56     }
57     leaf podl-type {
58         type enumeration {
59             enum unknown {
60                 description
61                     "Unknown PSE type.";
62             }
63             enum typeA {
64                 description
```

```

1         "TypeA PSE";
2     }
3     enum typeB {
4         description
5             "TypeB PSE";
6     }
7     enum typeC {
8         description
9             "Type PSEC";
10    }
11    enum typeD {
12        description
13            "TypeD PSE";
14    }
15    enum typeE {
16        description
17            "TypeE PSE";
18    }
19    enum typeF {
20        description
21            "TypeF PSE";
22    }
23 }
24 config false;
25 description
26     "PSE type specified in and IEEE Std 802.3, 30.15.1.1.4.";
27 }
28 leaf detected-pd-type {
29     when
30         "../detection-status = 'deliveringPower'" {
31         description
32             "This node only applies when the detection status is
33             delivering power.";
34     }
35     type enumeration {
36         enum unknown {
37             description
38                 "Unknown PD type";
39         }
40         enum typeA {
41             description
42                 "TypeA PD";
43         }
44         enum typeB {
45             description
46                 "TypeB PD";
47         }
48         enum typeC {
49             description
50                 "TypeC PD";
51         }
52         enum typeD {
53             description
54                 "TypeD PD";
55         }
56         enum typeE {
57             description
58                 "TypeE PD";
59         }
60         enum typeF {
61             description
62                 "TypeF PD";
63         }
64     }
65 }

```

```
1      config false;
2      description
3          "Indicates the Type of the detected PoDL PD as specified in
4              IEEE Std 802.3, 104.5.1.";
5      reference
6          "IEEE Std 802.3, 30.15.1.1.5 aPoDLPSEDetectedPDType";
7  }
8  leaf pd-power-class {
9      when
10         "../detection-status = 'deliveringPower'" {
11             description
12                 "This node only applies when the detection status is
13                     delivering power.";
14             }
15         type power-class;
16         config false;
17         description
18             "Power class of the PD detected on the PSE port.";
19         reference
20             "IEEE Std 802.3, 30.15.1.1.6 aPoDLPSEDetectedPDPowerClass";
21     }
22     container statistics {
23         config false;
24         description
25             "Statistics information of the single-pair PSE
26                 Discontinuities in the values of counters in this container
27                 can occur at re-initialization of the management system, and
28                 at other times as indicated by the value of the
29                 'discontinuity-time' leaf defined in the ietf-interfaces YANG
30                 module (IETF RFC 8343).";
31         leaf power-denied {
32             type yang:counter64;
33             description
34                 "This counter is incremented when the PoDL PSE state
35                     diagram variable power_available transitions from true to
36                     false (see IEEE Std 802.3, 104.4.3.3).";
37             reference
38                 "IEEE Std 802.3, 30.15.1.1.9 aPoDLPSEPowerDeniedCounter";
39         }
40         leaf invalid-signature {
41             type yang:counter64;
42             description
43                 "This counter is incremented when the PSE state diagram
44                     enters the SIGNATURE_INVALID state per IEEE Std 802.3,
45                     Figure 33-9.";
46             reference
47                 "IEEE Std 802.3, 30.15.1.1.7
48                     aPoDLPSEInvalidSignatureCounter";
49         }
50         leaf invalid-class {
51             type yang:counter64;
52             description
53                 "This counter is incremented when the PoDL PSE state
54                     diagram variable tclass_timer_done transitions from false
55                     to true or when the valid_class variable transitions from
56                     true to false (see IEEE Std 802.3, 104.4.3.3).";
57             reference
58                 "IEEE Std 802.3, 30.15.1.1.8 aPoDLPSEInvalidClassCounter";
59         }
60     }
61     leaf overload {
62         type yang:counter64;
63         description
64             "This counter is incremented when the PSE state diagram
65                 variable overload_held transitions from false to true (see
```



```

1         IEEE Std 802.3, 104.4.3.3).";
2     reference
3         "IEEE Std 802.3, 30.15.1.1.10 aPoDLPSEOverLoadCounter";
4     }
5     leaf fvs-absence {
6         type yang:counter64;
7         description
8             "Maintain Full Voltage Signature absent counter. This
9             counter is incremented when the PoDL PSE state diagram
10            variable mfvs_timeout transitions from false to true (see
11            IEEE Std 802.3, 104.4.3.3).";
12        reference
13            "IEEE Std 802.3, 30.15.1.1.11
14            aPoDLPSEMaintainFullVoltageSignatureAbsentCounter";
15    }
16    leaf cumulative-energy {
17        type yang:counter64;
18        units "millijoules";
19        description
20            "A count of the cumulative energy supplied by the PoDL PSE,
21            measured at the MDI, and expressed in units of millijoules.";
22        reference
23            "IEEE Std 802.3, 30.15.1.1.14 aPoDLPSECumulativeEnergy";
24    }
25    }
26    leaf actual-power {
27        type decimal64 {
28            fraction-digits "4";
29        }
30        units "milliwatts";
31        config false;
32        description
33            "An integer value indicating present (actual) power being
34            supplied by the PoDL PSE as measured at the MDI in
35            milliwatts.";
36        reference
37            "IEEE Std 802.3, 30.15.1.1.12 aPoDLPSEActualPower";
38    }
39    leaf power-accuracy {
40        type int64;
41        units "milliwatts";
42        config false;
43        description
44            "A signed integer value indicating the accuracy associated
45            with power-accuracy in milliwatts.";
46        reference
47            "IEEE Std 802.3, 30.15.1.1.13 aPoDLPSEPowerAccuracy";
48    }
49    }
50    }
51    }
52    }
53    }
54    }
55    }
56    }
57    }
58    }
59    }
60    }
61    }
62    }
63    }
64    }
65    }

```

1 **7. YANG module for Ethernet Passive Optical Network (EPON)**

2
3
4 **7.1 Introduction**

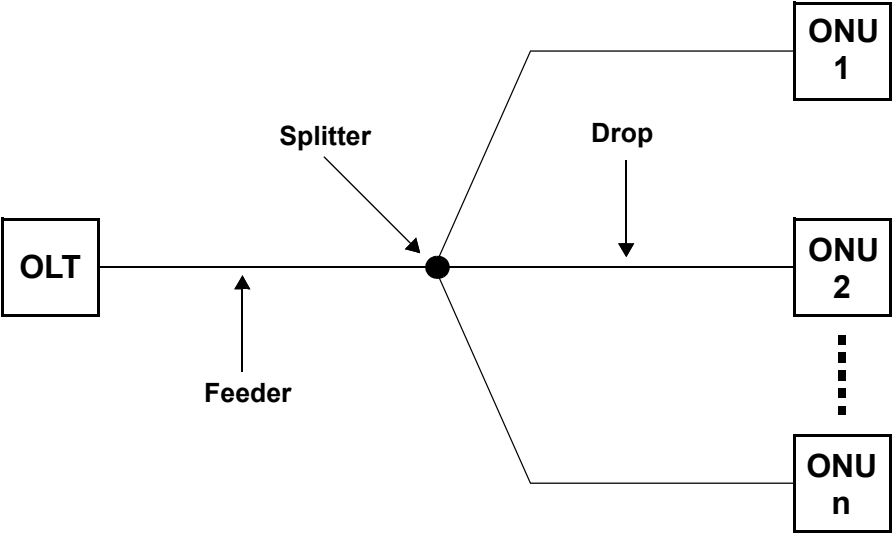
5
6
7 This clause defines a YANG module to manage Ethernet Passive Optical Network (EPON).

8
9
10 **7.2 YANG module structure**

11
12 The *ieee802-ethernet-pon* YANG module of this clause is focused on the configuration and monitoring of
13 EPON.

14
15
16 **7.2.1 Introduction**

17
18 EPON is defined in IEEE Std 802.3, covering Physical Layers and Media Access Control sublayers. The
19 Passive Optical Network (PON) is comprised of sections of single-mode fiber connected with passive opti-
20 cal splitter/coupler devices, forming a passive optical tree, as shown in Figure 7–1. Individual branches of
21 the PON are terminated with the Optical Line Terminal (OLT) in the Central Office or at remote optical
22 nodes, and Optical Network Units (ONUs) near the subscribers. ONUs can be located either in some remote
23 location (e.g., basement in a multi-dwelling unit) or directly at the subscriber premises. Various types of
24 Customer Premises Equipment (CPE) can be connected to ONUs or even integrated with such devices.
25 Figure 7–1 presents an example PON topology.



50
51
52 **Figure 7–1—PON topology example**

53
54 The following clauses in IEEE Std 802.3 define 1G-EPON:

- 55 — Clause 60: Physical Medium Dependent (PMD) sublayer for 1G-EPON
- 56 — Clause 64: MPCP (Multipoint Control Protocol) for 1G-EPON
- 57 — Clause 65: Reconciliation Sublayer (RS), Physical Coding Sublayer (PCS), and Physical Media
- 58 Attachment (PMA) sublayers for 1G-EPON

59
60
61 The following clauses in IEEE Std 802.3 define 10G-EPON:

- 62 — Clause 75: PMD sublayer for 10G-EPON
- 63 — Clause 76: RS, PCS, and PMA sublayers for 10G-EPON
- 64
65

— Clause 77: MPCP for 10G-EPON

Additionally, IEEE Std 802.3, Clause 30 and Clause 45 are also applicable to EPON.

7.2.2 Principles of operation

The EPON specification extended the specification of Gigabit Ethernet (in case of 1G-EPON) or 10 Gigabit Ethernet (in case of 10G-EPON) as described in IEEE Std 802.3. The Ethernet MAC operates at the data rate of 1 Gb/s (in 1G-EPON) or 10 Gb/s (in 10G-EPON) and it is connected to a media dependent interface through the GMII (in 1G-EPON) or XGMII (in 10G-EPON) interface. The EPON PCS layer extended the Ethernet PCS, adding burst-mode operation capabilities and EPON-specific forward error correction (FEC). The following new, EPON-specific layers were added:

- MPCP is placed in the MAC control layer, providing EPON media access, station discovery, and registration protocol.
- Functionality of the reconciliation sublayer (RS) was extended, creating logical links over shared passive optical medium, providing private transmission channels to each of the connected ONU.
- FEC functionality (optional in 1G-EPON, mandatory in 10G-EPON) located in the PCS was added, extending the Ethernet PCS layer, enhancing reach and split performance of the EPON optical link.

Figure 7–2 presents the EPON layering model.

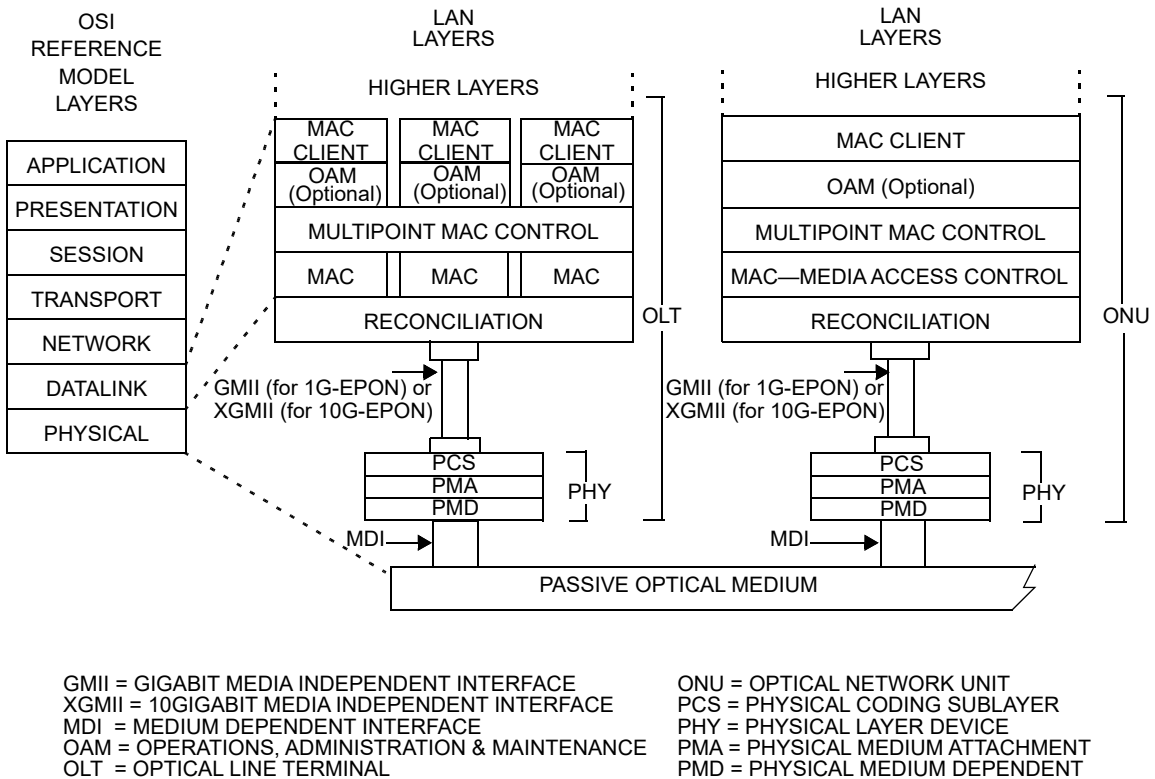


Figure 7–2—Relationship of Multipoint MAC Control and the OSI protocol stack

7.2.3 Physical media

The physical link in EPON comprises single-mode fiber. The OLT and ONUs are connected through a passive optical network comprising sections of single-mode fiber interconnected with passive splitter/coupler devices.

The term *downstream* denotes transmission from the OLT to all connected ONUs, while the term *upstream* denotes transmission from the connected ONUs (one at the time) to the OLT. Upstream and downstream transmissions are wavelength division multiplexed (WDM) into a single strand of single-mode fiber, sharing the same physical link.

The downstream transmission channel is continuously available to the OLT, thus Time Division Multiplexing (TDM) is used. Transmissions from the OLT arrive at all of the connected ONUs and the individual ONUs filter data from the OLT's transmission based on the logical link identifiers (LLID) assigned to them during the registration and discovery process.

The upstream transmission channel is shared among a number of connected and registered ONUs using time-division multiple access (TDMA). Access to the upstream channel is controlled via the Multipoint Control Protocol (MPCP), where the OLT plays the role of the master and ONUs play the role of slave devices. An ONU upon registration remains silent until registered and once registered, it transmits data towards OLT only when granted a transmission opportunity (slot).

7.2.4 PMD specifications

The EPON PMD specifications are based on a wavelength plan defined in IEEE Std 802.3, Clause 60 (1G-EPON) and Clause 75 (10G-EPON). The OLT and ONU optical parameters were derived in part from applicable Ethernet PMD specifications, with the addition of WDM capabilities, and burst mode operation for ONU transmitters and the OLT receiver.

The upstream burst mode operation capability corresponds directly to the TDMA operation in the upstream direction, where queued data is burst from individual ONUs at full data rate for the duration of the allocated transmission period. Once completed, the ONU goes silent and another ONU starts transmitting its data.

7.2.5 Principles of the MPCP

The EPON standard comprises a mechanism for media access control, referred to as Multipoint Control Protocol (MPCP). An access network architecture is different from a typical LAN environment, primarily in terms of network provisioning. An access network is an administrated environment, with an operator providing services and subscribers consuming it depending on service provisioning contracts. The operator controls the network, manages traffic and medium access, and enforces the service level agreements. For instance, the available bandwidth is controlled and subscribers may be billed for services. In this sense, the access network (and EPON specifically) requires a media access control protocol that provides a mechanism for station discovery and registration as well as bandwidth provisioning capabilities.

In the MPCP, the OLT is considered to be the master, controlling a series of connected ONUs (slave devices). The OLT manages the network and controls access to network resources from individual slave devices. The MPCP is also used for provisioning upstream channel access to individual slave devices via a MPCPDU pair i.e., GATE and REPORT. The MPCP is part of the MAC control layer and MPCPDUs are considered MAC control messages, carrying a specific Ethertype of 0x8808. These messages are not forwarded outside of the EPON domain and are used to manage the EPON link only.

A concept of time exists in the MPCP in order to schedule the upstream transmission. A timestamp, which is transmitted in the MPCPDUs downstream by the OLT and received by the connected ONUs, is used to synchronize slave devices to the master device clock. This coordinates upstream transmissions from individual

ONUs so that the transmissions arrive at the OLT at the precisely anticipated time, and thus data from different ONUs do not overlap.

The MPCP plane is also used to measure the round-trip time (RTT) for each connected ONU. Each MPCPDU carries a generalized timestamp field, which is filled in by the transmitting station with the current value of its MPCP clock at the time when the given MPCPDU is transmitted. The RTT is measured first during the discovery and registration process and then updated regularly upon each exchange of MPCPDUs between the OLT and one of the ONUs. RTT is used by the OLT bandwidth scheduler to schedule upstream transmission slots for individual ONUs in a non-overlapping manner. The IEEE 802.3 EPON standard provides support for the network diameter (distance between the OLT and the farthest ONU) of nominally up to 20 km, which corresponds to the RTT of approximately 200 μ s. However, nothing in the standard precludes support for larger network diameters.

The TDMA control is performed using a pair of MPDPUs, namely GATE generated by the OLT to indicate a future transmission opportunity to an ONU and REPORT generated by the ONU with information on the current queue status (bandwidth demand). Internal structure and possible encoding of GATE and REPORT MPCPDUs are defined in IEEE Std 802.3, Clause 64 (for 1G-EPON) and Clause 77 (for 10G-EPON).

A scheduling algorithm at the OLT, which is not defined in IEEE Std 802.3, is responsible for dividing the bandwidth and controlling the transmission delay of each ONU according to its service level agreement. The MPCP defines a closed loop operation in order for this algorithm to be efficient. The MPCP allows the ONUs to report on the amount of bandwidth they require for transmission using a special REPORT message. This allows allocating bandwidth to an ONU only when requested, relying on the statistical burst property of the traffic, and allowing different peak bandwidths for different ONUs at different times; hence, allowing oversubscription of the bandwidth. The REPORT message reports the amount of data waiting in the ONU queues.

In addition, the MPCP defines a protocol of auto-discovery and registration of ONUs.

The MPCP registration process is presented in Figure 7–3, while details are described in IEEE Std 802.3, Clause 64 (for 1G-EPON) and Clause 77 (for 10G-EPON). Note that MPCP for 10G-EPON supports the coexistence mode, i.e., simultaneous operation of 1G-EPON and 10G-EPON devices on the same fiber plant, through time sharing the upstream transmission channel.

A new ONU requests to register during a special upstream window (called Discovery Window), sending the REGISTER_REQ MPCPDU. More than one ONU may attempt registration during that window, which means that their REGISTER_REQ MPCPDUs can potentially collide at the OLT receiver, since the ONU-specific RTT is not yet known and transmissions from individual ONUs cannot be scheduled in a non-overlapping manner. A random backoff mechanism was therefore developed and is used to increase the registration success probability.

When the OLT receives a REGISTER_REQ MPCPDU from an ONU, a decision a non-overlapping on registration is taken and an LLID is assigned to that ONU. Next, the OLT sends a REGISTER MPCPDU to that ONU, informing the given slave device whether it is admitted to network or not. The registration process is completed with the ONU sending REGISTER_ACK MPCPDU to the OLT, confirming assigned parameters and registration in the network. From that point onward, the OLT can schedule transmissions from that ONU using its LLID and the measured RTT so that its transmissions do not collide with other ONUs.

Additional higher layer protocols may be employed to authenticate the ONU and allow it to participate in the network; however, their specification is outside the scope of IEEE Std 802.3.

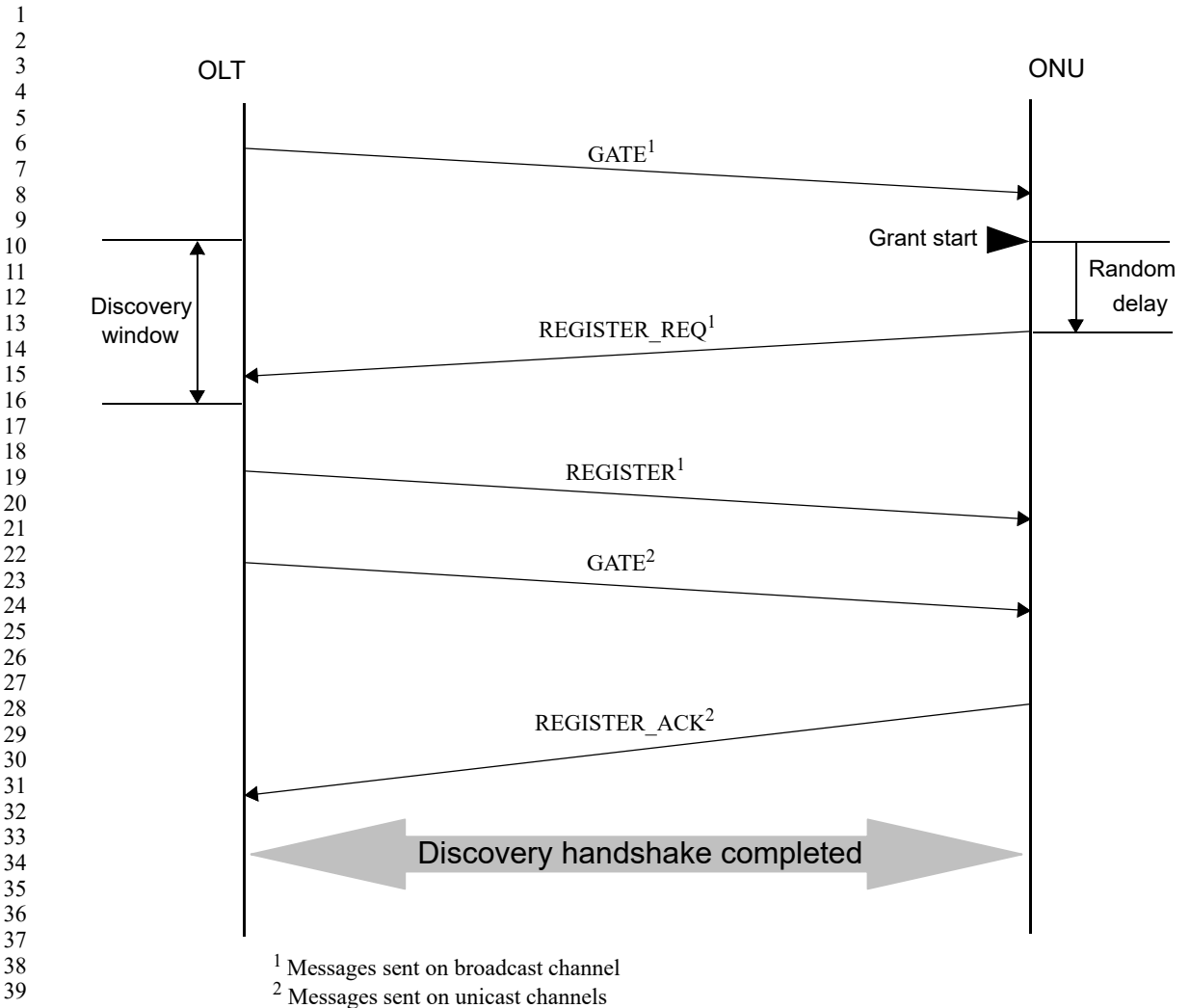


Figure 7–3—Discovery handshake message exchange

7.2.6 Forward error correction (FEC)

The FEC mechanism is optional for 1G-EPON and is defined to enhance the 1G-EPON link budget. All the passive components of the fiber plant attenuate the optical signal, thus the target distance (network diameter) and the number of supported splits is limited by the available link budget. The optional FEC mechanism increases the available link budget by improving the link BER from 10⁻⁴ to 10⁻¹² (the target BER at the MAC), effectively increasing the target network diameter and/or split ratio. The target use of the increased power budget remains at the sole discretion of the network architects and is out of the scope of IEEE Std 802.3.

The optional FEC used in 1G-EPON is frame-based, meaning that parity information is added at the end of each Ethernet packet. Extra space between individual Ethernet packets is provided by the MAC rate adaptation function, while extra idle symbols were replaced within the FEC function.

The start and end of packet codewords also define the FEC boundaries, and they are outside the FEC protection. They are replaced by a series of symbols to reduce their vulnerability to link errors.

Figure 7–4 presents the structure of an FEC-protected 1G-EPON frame.

The optional FEC function is added to the extended Gigabit Ethernet PCS per 65.2 in IEEE Std 802.3. The added, optional FEC function introduces a fixed delay in receive path and transmit path.

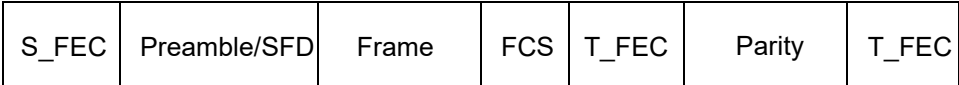


Figure 7–4—1G-EPON FEC-protected frame

The FEC mechanism is mandatory for 10G-EPON, and similarly to 1G-EPON – defined to enhance the EPON link budget. The mandatory FEC mechanism increases the available link budget by improving the link BER from 2×10^{-3} to 10^{-12} (the target BER at the MAC), effectively increasing the target network diameter and/or split ratio. The target use of the increased power budget remains at the sole discretion of the network architects and is out of the scope of IEEE Std 802.3. The mandatory FEC used in 10G-EPON is stream-based, meaning that 32 parity symbols are inserted into the bit stream at regular intervals (every 223 information symbols). Details of the FEC encoding process in 10G-EPON are described in IEEE Std 802.3, 76.3.2.4, including the structure of the resulting frame and the resulting bit ordering shown in IEEE Std 802.3, Figure 76-12.

7.2.7 Management architecture

All of the EPON layers are accompanied by a management interface that is controlled through mechanisms defined in Clause 30 of IEEE Std 802.3. Since IEEE Std 802.3 specifications may be used for different applications (and hence are extensible), and some of the clauses may be used separately, the management clause allocates a separate package for each independent layer. The structure of the modules follows this separation.

Figure 7–5 presents the relation of the module groups to the individual IEEE Std 802.3 layers.

The association is straightforward for the ONU interface. There is one logical and one physical interface, and a single copy of each layer can be remotely queried by the OLT.

The OLT has a single physical interface and N logical interfaces, one for each logical link connected to an ONU. There is also one logical interface for the single copy broadcast link. Per layering diagram in Figure 7–5, the MAC sublayer is virtually replicated. Therefore, in this clause it was elected that management of logical interfaces is performed in the manner identical to management of any physical interfaces—an interface index is allocated for each one of the logical links, and an additional interface index is allocated for the OLT.

Each row in the tables is indexed according to the ifIndex; specifically, there is a row for each logical link. There are some control objects that are shared and are the same for the logical interfaces (and they should have the same value for each ifIndex), but most of the objects have different values for N+1 logical interfaces at the OLT. This is done for each YANG group. It is different from the EPON layering diagram, which presents the P2MP layer as a single layer, while duplicating the MAC and MAC client layers (please see Figure 7–5). However, from a management perspective, it is more convenient to partition the management of the layers for the logical links, as the atomic managed entity is the logical link. It is also convenient to use the interface index of the logical link for that purpose, as it is already used to index the rows of the logical links at the Interface, MAU, and Ethernet-like interface YANG module.

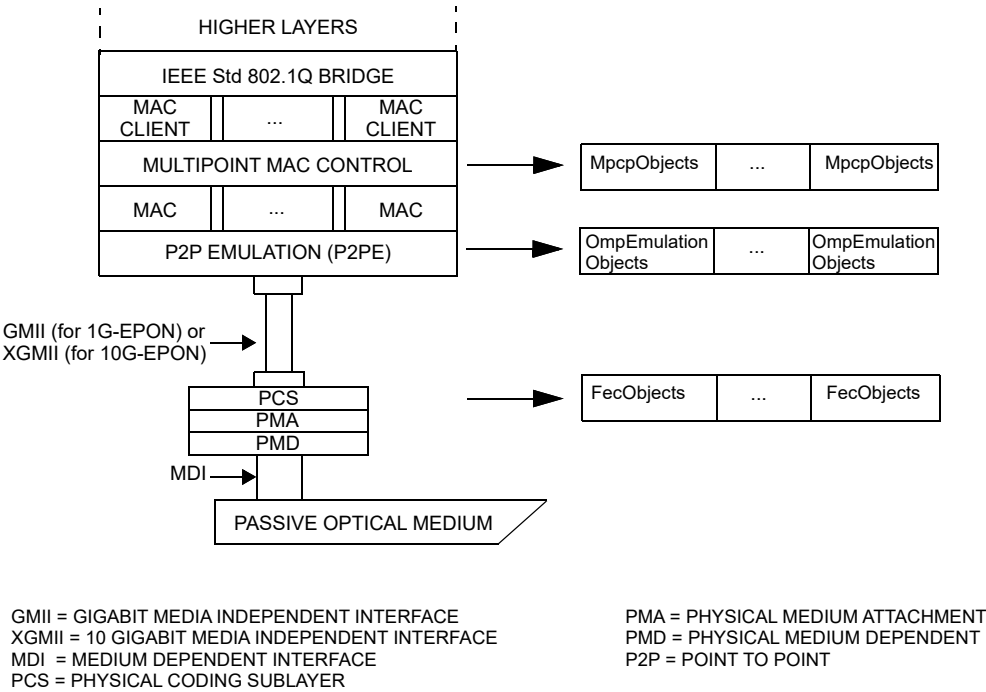


Figure 7–5—Relationship of the YANG module to the EPON sublayers

7.3 Mapping of IEEE Std 802.3, Clause 30 managed objects

This sub-clause contains the mapping between YANG data nodes included in *ieee802-ethernet-pon* (see Table 7–1) YANG module, managed objects, and attributes defined in IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB.

Table 7–1—Mapping between IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB managed objects and *ieee802-ethernet-pon* YANG data nodes

IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB		Corresponding <i>ieee802-ethernet-pon</i> YANG data nodes		
Managed object(s)	Attribute(s)	Container(s)	Data node(s)	R/W
dot3EponFecTable	dot3EponFecMode		fec-mode	R/W
	dot3EponFecPCSCodingViolation	statistics-pon-fec	fec-code-group-violations	R
	dot3EponFecAbility		fec-capability	R
	dot3EponFecCorrectedBlocks	statistics-pon-fec	fec-code-word-corrected-errors	R
	dot3EponFecUncorrectableBlocks	statistics-pon-fec	fec-code-word-uncorrected-errors	R
	dot3EponFecBufferHeadCodingViolation	statistics-pon-fec	fec-buffer-head-coding-violation	R
dot3MpcpControl Table	dot3MpcpAdminState		mpcp-admin-state	R/W
	dot3MpcpMode		mpcp-mode	R
	dot3MpcpLinkID		mpcp-logical-link-id	R
	dot3MpcpRemoteMACAddress		mpcp-remote-mac-address	R
	dot3MpcpRegistrationState		mpcp-logical-link-state	R
	dot3MpcpSyncTime		mpcp-sync-time	R
	dot3MpcpTransmitElapsed		mpcp-elapsed-time-out	R
	dot3MpcpReceiveElapsed		mpcp-elapsed-time-in	R
	dot3MpcpRoundTripTime		mpcp-round-trip-time	R
	dot3MpcpMaximumPendingGrants		mpcp-maximum-grant-count	R

Table 7–1—Mapping between IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB managed objects and *ieee802-ethernet-pon* YANG data nodes (continued)

IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB		Corresponding <i>ieee802-ethernet-pon</i> YANG data nodes		
Managed object(s)	Attribute(s)	Container(s)	Data node(s)	R/W
dot3ExtPkgQueueSets Table	dot3QueueSetIndex	mpcp-queue-thresholds	mpcp-queue-set-index	R/W
	dot3ExtPkgObjectReportThreshold		mpcp-queue-set-threshold	R/W
	dot3QueueIndex	mpcp-queues	mpcp-queue-index	R/W
	dot3ExtPkgObjectReportNumThreshold		mpcp-queue-threshold-count	R/W
	dot3ExtPkgObjectReportMaximumNumThreshold		mpcp-queue-threshold-count-max	R
	dot3ExtPkgStatTxFramesQueue		in-mpcp-queue-frames	R
	dot3ExtPkgStatRxFramesQueue		out-mpcp-queue-frames	R
	dot3ExtPkgStatDroppedFramesQueue		mpcp-queue-frames-drop	R
dot3ExtPkgControl Table	dot3ExtPkgObjectReset dot3MpcpOperStatus		mpcp-logical-link-admin-state	R/W
	dot3ExtPkgObjectNumberOfLLIDs		mpcp-logical-link-count	R
	dot3ExtPkgObjectReportMaximumNumQueues		mpcp-maximum-queue-count-per-report	R
dot3RecognizedMulticast-IDs Table	dot3RecognizedMulticastID	multicast-IDs	multicast-ID	R/W

Table 7–1—Mapping between IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB managed objects and *ieee802-ethernet-pon* YANG data nodes (continued)

IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB		Corresponding <i>ieee802-ethernet-pon</i> YANG data nodes		
Managed object(s)	Attribute(s)	Container(s)	Data node(s)	R/W
dot3OmpEmulation Table	dot3OmpEmulationType	statistics-ompe	ompe-mode	R
	dot3OmpEmulationSLDErrors		in-ompe-frames-errored-sld	R
	dot3OmpEmulationCRC8Errors		in-ompe-frames-errored-crc8	R
	dot3OmpEmulationBadLLID		in-ompe-frames-with-bad-llid	R
	dot3OmpEmulationGoodLLID		in-ompe-frames-with-good-llid	R
	dot3OmpEmulationBroadcastBitNotOnuLlid		in-ompe-frames-not-match-onu-llid-broadcast	R
	dot3OmpEmulationOnuLLIDNotBroadcast		in-ompe-frames-match-onu-llid-not-broadcast	R
	dot3OmpEmulationBroadcastBitPlusOnuLlid		in-ompe-frames-match-onu-llid-broadcast	R
	dot3OmpEmulationNotBroadcastBitNotOnuLlid		in-ompe-frames-not-match-onu-llid-not-broadcast	R
			in-ompe-frames	R
			ompe-onu-frames-with-good-llid-good-crc8	
			ompe-olt-frames-with-good-llid-good-crc8	

Table 7–1—Mapping between IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB managed objects and *ieee802-ethernet-pon* YANG data nodes (continued)

IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB		Corresponding <i>ieee802-ethernet-pon</i> YANG data nodes		
Managed object(s)	Attribute(s)	Container(s)	Data node(s)	R/W
dot3MpcpStat Table	dot3MpcpMACCtrlFramesTransmitted	statistics-mpcp	out-mpcp-mac-ctrl-frames	R
	dot3MpcpMACCtrlFramesReceived		in-mpcp-mac-ctrl-frames	R
	dot3MpcpDiscoveryWindowsSent		mpcp-discovery-window-count	R
	dot3MpcpDiscoveryTimeout		mpcp-discovery-timeout-count	R
	dot3MpcpTxRegRequest		out-mpcp-register-req	R
	dot3MpcpRxRegRequest		in-mpcp-register-req	R
	dot3MpcpTxRegAck		out-mpcp-register-ack	R
	dot3MpcpRxRegAck		in-mpcp-register-ack	R
	dot3MpcpTxReport		out-mpcp-report	R
	dot3MpcpRxReport		in-mpcp-report	R
	dot3MpcpTxGate		out-mpcp-gate	R
	dot3MpcpRxGate		in-mpcp-gate	R
	dot3MpcpTxRegister		out-mpcp-register	R
	dot3MpcpRxRegister		in-mpcp-register	R

Table 7–1—Mapping between IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB managed objects and *ieee802-ethernet-pon* YANG data nodes (continued)

IEEE Std 802.3.1, IEEE8023-DOT3-EPON-MIB		Corresponding <i>ieee802-ethernet-pon</i> YANG data nodes		
Managed object(s)	Attribute(s)	Container(s)	Data node(s)	R/W
dot3ExtPkgOptIf Table	dot3ExtPkgOptIfLowerInputPowerThreshold	thresholds-trx	in-trx-power-low-threshold	R/W
	dot3ExtPkgOptIfUpperInputPowerThreshold		in-trx-power-high-threshold	R/W
	dot3ExtPkgOptIfLowerOutputPowerThreshold		out-trx-power-low-threshold	R/W
	dot3ExtPkgOptIfUpperOutputPowerThreshold		out-trx-power-high-threshold	R/W
	dot3ExtPkgOptIfSignalDetect		in-trx-power-signal-detect	R
	dot3ExtPkgOptIfInputPower		in-trx-power	R
	dot3ExtPkgOptIfLowInputPower		in-trx-power-low-15-minutes-bin	R
	dot3ExtPkgOptIfHighInputPower		in-trx-power-high-15-minutes-bin	R
	dot3ExtPkgOptIfTransmitEnable		out-trx-power-signal-detect	R/W
	dot3ExtPkgOptIfOutputPower		out-trx-power	R
	dot3ExtPkgOptIfLowOutputPower		out-trx-power-low-15-minutes-bin	R
	dot3ExtPkgOptIfHighOutputPower		out-trx-power-high-15-minutes-bin	R
	dot3ExtPkgOptIfSuspectedFlag		trx-data-reliable	R

7.4 YANG module definitionⁿ

The YANG module tree hierarchy uses terms defined in IETF RFC 8407.

7.4.1 Tree hierarchy

```
module: ieee802-ethernet-pon

augment /if:interfaces/if:interface/ieee802-eth-if:ethernet:
  +---rw fec-mode?                                fec-mode
  |      {fec-supported}?
  +---rw mpcp-admin-state?                          mpcp-admin-state
  +---ro mpcp-logical-link-admin-state?
  |      mpcp-logical-link-admin-state
  +---rw trx-transmit-admin-state?                  trx-admin-state
  |      {trx-power-level-reporting-supported}?
  +---ro capabilities
  |  +---ro mpcp-supported?    mpcp-supported
  +---ro statistics-mpcp
  |  +---ro out-mpcp-mac-ctrl-frames?    yang:counter64
  |  +---ro in-mpcp-mac-ctrl-frames?    yang:counter64
  |  +---ro mpcp-discovery-window-count? yang:counter64
  |  +---ro mpcp-discovery-timeout-count? yang:counter64
  |  +---ro out-mpcp-register-req?      yang:counter64
  |  +---ro in-mpcp-register-req?      yang:counter64
  |  +---ro out-mpcp-register-ack?      yang:counter64
  |  +---ro in-mpcp-register-ack?      yang:counter64
  |  +---ro out-mpcp-report?            yang:counter64
  |  +---ro in-mpcp-report?            yang:counter64
  |  +---ro out-mpcp-gate?              yang:counter64
  |  +---ro in-mpcp-gate?              yang:counter64
  |  +---ro out-mpcp-register?         yang:counter64
  |  +---ro in-mpcp-register?         yang:counter64
```

ⁿCopyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.

```

+--rw statistics-ompe
|   +--ro in-ompe-frames-errored-sld?
|   |       yang:counter64
|   +--ro in-ompe-frames-errored-crc8?
|   |       yang:counter64
|   +--ro ompe-onu-frames-with-good-llid-good-crc8?
|   |       yang:counter64
|   +--ro ompe-olt-frames-with-good-llid-good-crc8?
|   |       yang:counter64
|   +--ro in-ompe-frames-with-bad-llid?
|   |       yang:counter64
|   +--ro in-ompe-frames-with-good-llid?
|   |       yang:counter64
|   +--ro in-ompe-frames?
|   |       yang:counter64
|   +--ro in-ompe-frames-not-match-onu-llid-broadcast?
|   |       yang:counter64
|   +--ro in-ompe-frames-match-onu-llid-not-broadcast?
|   |       yang:counter64
|   +--ro in-ompe-frames-match-onu-llid-broadcast?
|   |       yang:counter64
|   +--ro in-ompe-frames-not-match-onu-llid-not-broadcast?
|   |       yang:counter64
+--rw thresholds-trx {trx-power-level-reporting-supported}?
|   +--rw in-trx-power-low-threshold?    power-level
|   |       {trx-power-level-reporting-supported}?
|   +--rw in-trx-power-high-threshold?   power-level
|   |       {trx-power-level-reporting-supported}?
|   +--rw out-trx-power-low-threshold?   power-level
|   |       {trx-power-level-reporting-supported}?
|   +--rw out-trx-power-high-threshold?  power-level
|   |       {trx-power-level-reporting-supported}?
x--rw statistics-trx {trx-power-level-reporting-supported}?
|   +--ro in-trx-power-signal-detect?    boolean
|   +--ro in-trx-power?                  power-level
|   +--ro in-trx-power-low-15-minutes-bin? power-level

```

```

|   +---ro in-trx-power-high-15-minutes-bin?    power-level
|   +---ro out-trx-power-signal-detect?         boolean
|   +---ro out-trx-power?                       power-level
|   +---ro out-trx-power-low-15-minutes-bin?    power-level
|   +---ro out-trx-power-high-15-minutes-bin?   power-level
|   +---ro trx-data-reliable?                   boolean
|   {trx-power-level-reporting-supported}?
+--rw monitoring-trx {trx-power-level-reporting-supported}?
|   +---ro in-trx-power-signal-detect?         boolean
|   +---ro in-trx-power?                       power-level
|   +---ro in-trx-power-low-15-minutes-bin?    power-level
|   +---ro in-trx-power-high-15-minutes-bin?   power-level
|   +---ro out-trx-power-signal-detect?         boolean
|   +---ro out-trx-power?                       power-level
|   +---ro out-trx-power-low-15-minutes-bin?    power-level
|   +---ro out-trx-power-high-15-minutes-bin?   power-level
|   +---ro trx-data-reliable?                   boolean
|   {trx-power-level-reporting-supported}?
+--ro statistics-pon-fec {fec-supported}?
|   +---ro fec-code-group-violations?          yang:counter64
|   +---ro fec-buffer-head-coding-violations?  yang:counter64
|   +---ro fec-code-word-corrected-errors?     yang:counter64
|   +---ro fec-code-word-uncorrected-errors?    yang:counter64
+--rw mpcp-logical-link-admin-actions
|   +---x state-change-action-type
|   |   +---w input
|   |   +---w state-change-action-type?  identityref
|   +---x reset-action-type
|   |   +---w input
|   |   +---w reset-action-type?  identityref
|   +---x register-type
|   |   +---w input
|   |   +---w register-type?  identityref
+--rw mpcp-queues* [mpcp-queue-index]
|   +---rw mpcp-queue-index                uint8
|   +---rw mpcp-queue-threshold-count?     uint8

```



```

| +--ro mpcp-queue-threshold-count-max?  uint8
| +--rw mpcp-queue-thresholds* [mpcp-queue-set-index]
| |   +--rw mpcp-queue-set-index          uint8
| |   +--rw mpcp-queue-set-threshold?     uint64
| +--ro in-mpcp-queue-frames?             yang:counter64
| +--ro out-mpcp-queue-frames?            yang:counter64
| +--ro mpcp-queue-frames-drop?           yang:counter64
+--rw multicast-IDs* [multicast-ID]
|   +--rw multicast-ID                    uint32
+--ro fec-capability?                     fec-capability
+--ro mpcp-mode?                          mpcp-mode
+--ro mpcp-sync-time?                     uint64
+--ro mpcp-logical-link-id?               mpcp-supported

```

Editor's Note (to be removed prior to publication):

Leaf mpcp-remote-mac-address was modified per Maintenance Request 1380 (see https://www.ieee802.org/3/maint/requests/maint_1380.pdf)

```

+--ro mpcp-remote-mac-address?            ieee:mac-address
+--ro mpcp-logical-link-state?
|   mpcp-logical-link-state
+--ro mpcp-elapsed-time-out?              uint64
+--ro mpcp-elapsed-time-in?               uint64
+--ro mpcp-round-trip-time?               uint16
+--ro mpcp-maximum-grant-count?            uint8
+--ro mpcp-logical-link-count?            mpcp-llid-count
+--ro mpcp-maximum-queue-count-per-report?
|   mpcp-maximum-queue-count-per-report
+--ro ompe-mode?                          ompe-mode

```

7.4.2 YANG module

In the following YANG module definition, should any discrepancy between the text of the description for individual YANG nodes and the corresponding definition in 7.2 through 7.4 of this clause occur, the definitions and mappings in 7.4 shall take precedence.

Editor's Note (to be removed prior to publication):

Yang files contained in <https://github.com/YangModels/yang/tree/main/standard/ieee/published/802.3> are IEEE 802.3.1-2019 version and will be updated at the publication time.

An ASCII text version of the YANG module can be found at the following URL:^o <https://github.com/YangModels/yang/tree/master/standard/ieee/published/802.3>.

Editor's Note (to be removed prior to publication):

Pretty printing of ieee802-ethernet-pon.yang file may change the appearance by adding whitespace and reformatting lines

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 and IEEE Std 802.3.2 to be updated at the publication time

```
module ieee802-ethernet-pon {
  yang-version "1.1";
  namespace urn:ieee:std:802.3:yang:ieee802-ethernet-pon;
  prefix ieee802-eth-pon;
  import ieee802-types {
    prefix ieee;
    reference
      "IEEE 802 types";
  }
  import ietf-yang-types {
    prefix yang;
    reference
      "IETF RFC 6991";
  }
  import ietf-interfaces {
    prefix if;
    reference
      "IETF RFC 8343";
  }
  import ieee802-ethernet-interface {
    prefix ieee802-eth-if;
  }
  organization
    "IEEE 802.3 Ethernet Working Group
    Web URL: http://www.ieee802.org/3/";
  contact
    "Web URL: http://www.ieee802.org/3/";
  description
    "This module contains a collection of YANG definitions for managing
    the Multi Point Control Protocol for Ethernet PON (EPON), as defined
    in IEEE Std 802.3, Clause 64 and Clause 77.

    This YANG module augments the 'ethernet' module.";
  revision 2024-02-12 {
```

^oCopyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.

```
1      description
2      "Updates under IEEE Std 802.3.2-202x, Draft 1.1";
3      reference
4      "IEEE Std 802.3-2022, unless dated explicitly";
5  }
6  feature trx-power-level-reporting-supported {
7      description
8      "This object indicates the support for optical transceiver power
9      level monitoring and reporting capability. When 'true', the given
10     interface supports the optical power level monitoring and reporting
11     function. Otherwise, the value is 'false.'";
12  }
13  feature fec-supported {
14      description
15      "This object indicates the support of operation of the optional FEC
16      sublayer of the 1G-EPON PHY specified in IEEE Std 802.3, 65.2. The
17      value of 'unknown' is reported in the initialization, for non FEC
18      support state or type not yet known. The value of 'not supported'
19      is reported when the sublayer is not supported. The value of
20      'supported' is reported when the sublayer is supported. This object
21      is applicable for an OLT, with the same value for all logical
22      links, and for an ONU.";
23      reference
24      "IEEE Std 802.3, 30.5.1.1.15";
25  }
26  identity state-change-action-type {
27      description
28      "Type of interface state change requested.";
29  }
30  identity power-down {
31      base state-change-action-type;
32      description
33      "Power down the EPON logical interface. Power-down actions are
34      applicable for the OLT and ONU. A power down of a specific logical
35      interface affects only the logical interface (and not the physical
36      interface). the logical interface will be unavailable while the
37      power-down occurs and data may be lost. Other logical interface are
38      unaffected by power-down.
39
40      This action is relevant when the admin state is active.";
41  }
42  identity power-up {
43      base state-change-action-type;
44      description
45      "Exit EPON logical interface power-down state.";
46  }
47  identity reset-action-type {
48      description
49      "Type of reset action requested.";
50  }
51  identity reset-interface {
52      base reset-action-type;
53      description
54      "Reset the EPON logical interface. Resetting an interface can lead
55      an interruption of service for the users connected to the
56      respective EPON interface.
57
58      This object is applicable for an OLT and an ONU. At the OLT, it has
59      a distinct value for each logical interface. A reset for a specific
60      logical interface resets only this logical interface and not the
61      physical interface.
62
63      Thus, a logical link that is malfunctioning can be reset without
64      affecting the operation of other logical interfaces.
```

```

1
2     The reset can cause Discontinuities in the values of the counters
3     of the interface, similar to re-initialization of the management
4     system.";
5 }
6 identity register-type {
7     description
8         "Type of registration requested.";
9 }
10 identity register {
11     base register-type;
12     description
13         "Register indicates a request to register an LLID. This action
14         applies to an OLT or ONU logical interface.";
15 }
16 identity reregister {
17     base register-type;
18     description
19         "Re-register indicates an request to re-register an LLID. This
20         action applies to an OLT or ONU logical interface.";
21 }
22 identity deregister {
23     base register-type;
24     description
25         "De-register indicates an request to de-register an LLID. This
26         action applies to an OLT or ONU logical interface. Deregister may
27         result in an interruption of service to users connected to the
28         respective EPON interface.";
29 }
30 typedef mpcp-supported {
31     type boolean;
32     description
33         "This object indicates that the given interface supports MPCP,
34         i.e., it is an Ethernet PON (EPON) interface.";
35 }
36 typedef mpcp-llid {
37     type uint64 {
38         range "0 .. 32767";
39     }
40     description
41         "Logical Link Identifiers (LLIDs) are used to identify a single MAC
42         from a number of MACs which may be present in the EPON OLT or ONU.
43         LLIDs between the value of 0x07FFE and 0x7FFF are assigned for ONU
44         discovery and registration. Other LLIDs are dynamically assigned by
45         the OLT during the registration process. For a complete description
46         of how the LLID is used in an EPON device, see IEEE Std 802.3,
47         Clause 65 for 1G-EPON and Clause 76 for 10G-EPON.";
48     reference
49         "IEEE Std 802.3, 65.1.3.3 for 1G-EPON and 76.2.6.1.3 for 10G-EPON";
50 }
51 typedef mpcp-maximum-queue-count-per-report {
52     type uint8 {
53         range "0..7";
54     }
55     default "0";
56     description
57         "Defines the maximum number of queues (0-7) in the REPORT MPCPDU as
58         defined in IEEE Std 802.3, Clause 64 and Clause 77.";
59 }
60 typedef mpcp-llid-count {
61     type uint64 {
62         range "0 .. 32767";
63     }
64     description
65

```

```
1      "Indicates the number of registered LLIDs. The initialization value
2      is 0. This is applicable for an OLT with the same value for all
3      logical interfaces and for an ONU.";
4      reference
5      "IEEE Std 802.3, 65.1.3.3 for 1G-EPON and 76.2.6.1.3 for 10G-EPON";
6  }
7  typedef mpcp-admin-state {
8      type enumeration {
9          enum enabled {
10             description
11             "When selecting the value of 'enabled', the MultiPoint Control
12             Protocol sublayer on the OLT / ONU is enabled.";
13         }
14         enum disabled {
15             description
16             "When selecting the value of 'disabled', the MultiPoint Control
17             Protocol sublayer on the OLT / ONU is disabled.";
18         }
19     }
20     description
21     "Enumeration of valid administrative states for a MultiPoint MAC
22     Control sublayer on the OLT or ONU.";
23     reference
24     "IEEE Std 802.3, 30.3.5.2.1";
25 }
26 typedef mpcp-mode {
27     type enumeration {
28         enum olt {
29             description
30             "MPCP mode: olt";
31         }
32         enum onu {
33             description
34             "MPCP mode: onu";
35         }
36     }
37     description
38     "Enumeration of valid MPCP modes for EPON interfaces.";
39     reference
40     "IEEE Std 802.3, 30.3.5.1.3";
41 }
42 typedef mpcp-logical-link-state {
43     type enumeration {
44         enum unregistered {
45             description
46             "MPCP registration state: logical link is NOT registered.";
47         }
48         enum registering {
49             description
50             "MPCP registration state: logical link is currently in the
51             process of registering.";
52         }
53         enum registered {
54             description
55             "MPCP registration state: logical link is currently registered.";
56         }
57     }
58     description
59     "Enumeration of valid MPCP registration states for EPON interfaces.";
60     reference
61     "IEEE Std 802.3, 30.3.5.1.6";
62 }
63 typedef mpcp-logical-link-admin-state {
64     type enumeration {
```

```

1      enum reset {
2          description
3              "When read, the value of 'reset' indicates that the given
4              logical link on the OLT / ONU has been reset.";
5      }
6      enum operate {
7          description
8              "When read, the value of 'operate' indicates that the given
9              logical link on the OLT / ONU has moved into operating mode.";
10     }
11     enum unknown {
12         description
13             "When read, the value of 'unknown' indicates that the status of
14             the given logical link on the OLT / ONU is currently not known.";
15     }
16     enum registered {
17         description
18             "When read, the value of 'registered' indicates that the given
19             logical link on the OLT / ONU has been registered.";
20     }
21     enum deregistered {
22         description
23             "When read, the value of 'deregistered' indicates that the
24             given logical link on the OLT / ONU has been deregistered.";
25     }
26     enum reregistered {
27         description
28             "When read, the value of 'reregistered' indicates that the
29             given logical link on the OLT / ONU has been reregistered.";
30     }
31 }
32 description
33     "Enumeration of valid administrative states for a logical link on
34     the OLT or ONU.";
35 }
36 typedef ompe-mode {
37     type enumeration {
38         enum unknown {
39             description
40                 "omp-emulation mode: unknown = system is initializing";
41         }
42         enum olt {
43             description
44                 "omp-emulation mode: olt";
45         }
46         enum onu {
47             description
48                 "omp-emulation mode: onu";
49         }
50     }
51 }
52 description
53     "Enumeration of valid OMP-Emulation modes for EPON interfaces.";
54 reference
55     "IEEE Std 802.3, 30.3.7.1.2";
56 }
57 typedef fec-capability {
58     type enumeration {
59         enum unknown {
60             description
61                 "FEC capability: unknown = system is initializing.";
62         }
63         enum supported {
64             description
65                 "FEC capability: supported.";

```

```

1      }
2      enum not_supported {
3          description
4              "FEC capability: not supported.";
5      }
6  }
7  description
8      "Enumeration of valid FEC capability values for EPON interfaces
9      with enabled MPCP.";
10 reference
11     "IEEE Std 802.3, 30.5.1.1.15";
12 }
13 typedef fec-mode {
14     type enumeration {
15         enum unknown {
16             description
17                 "FEC mode: unknown = system is initializing.";
18         }
19         enum disabled {
20             description
21                 "FEC mode: disabled = FEC is disabled for the given logical
22                 link (both Tx and Rx directions).";
23         }
24         enum enabled-Tx-Rx {
25             description
26                 "FEC mode: enabled-Tx-Rx = FEC is enabled for the given logical
27                 link in both Tx and Rx directions.";
28         }
29         enum enabled-Tx-only {
30             description
31                 "FEC mode: enabled-Tx-only = FEC is enabled for the given
32                 logical link but only in Tx direction.";
33         }
34         enum enabled-Rx-only {
35             description
36                 "FEC mode: enabled-Rx-only = FEC is enabled for the given
37                 logical link but only in Rx direction.";
38         }
39     }
40 }
41 description
42     "Enumeration of valid FEC modes for EPON interfaces.";
43 reference
44     "IEEE Std 802.3, 30.5.1.1.16";
45 }
46 typedef power-level {
47     type int32;
48     units "0.1 dBm";
49     description
50         "Power level reflects the value of power, as measured at the
51         optical transceiver, expressed in units of 0.1 dBm.";
52 }
53 typedef trx-admin-state {
54     type enumeration {
55         enum enabled {
56             description
57                 "When read as 'enabled', the transmitter is enabled and
58                 operating under the control of the logical control protocol.
59                 When set to 'enabled', the transmitter is enabled to operate
60                 under the control of the logical control protocol.";
61         }
62         enum disabled {
63             description
64                 "When read as 'disabled', the transmitter is currently disabled
65                 (not transmitting). When set to 'disabled', the transmitter is

```

```
1         expected to be disabled (to stop transmitting).";
2     }
3 }
4 description
5     "Enumeration of valid administrative states for an optical
6     transceiver.";
7 reference
8     "IEEE Std 802.3.1, dot3ExtPkgOptIfTransmitEnable";
9 }
10 augment "/if:interfaces/if:interface/ieee802-eth-if:ethernet" {
11     description
12         "Augments the definition of Ethernet interface (/if:interfaces/
13         if:interface/ieee802-eth-if:ethernet) module with nodes specific to
14         Ethernet PON (EPON).";
15     leaf fec-mode {
16         if-feature "fec-supported";
17         type fec-mode;
18         description
19             "This object reflects the current administrative state of the FEC
20             function for the given logical link on an ONU or OLT.
21
22             When reading the value of 'disabled', the FEC function on the
23             given logical link is disabled.
24
25             When reading the value of 'enabled-Tx-Rx', the FEC function on
26             the given logical link is enabled in both Tx and Rx directions.
27
28             When reading the value of 'enabled-Tx-only', the FEC function on
29             the given logical link is enabled in Tx direction only.
30
31             When reading the value of 'enabled-Rx-only', the FEC function on
32             the given logical link is enabled in Rx direction only.
33
34             When reading the value of 'unknown', the state of the FEC
35             function on the given logical link is unknown or the FEC function
36             is currently initializing.
37
38             This object is applicable for an OLT and an ONU. This object has
39             the same value for each logical link.";
40         reference
41             "IEEE Std 802.3, 30.5.1.1.16";
42     }
43     leaf mpcp-admin-state {
44         type mpcp-admin-state;
45         description
46             "This object reflects the current administrative state of the
47             MultiPoint MAC Control sublayer, as defined in IEEE Std 802.3,
48             Clause 64 and Clause 77, for the OLT / ONU.
49
50             When reading the value of 'enabled', the MultiPoint Control
51             Protocol on the OLT / ONU is enabled.
52
53             When reading the value of 'disabled', the MultiPoint Control
54             Protocol on the OLT / ONU is disabled.
55
56             This object is applicable for an OLT and an ONU. It has the same
57             value for all logical links.";
58         reference
59             "IEEE Std 802.3, 30.3.5.1.2";
60     }
61     leaf mpcp-logical-link-admin-state {
62         type mpcp-logical-link-admin-state;
63         config false;
64         description
```



```
1      "This object reflects the current administrative state of a
2      logical link on an ONU or OLT.
3
4      When reading the value of 'reset', the given logical link is
5      undergoing a reset.
6
7      When reading the value of 'unknown', the current status of the
8      given logical link is unknown and the link might be undergoing
9      initialization.
10
11     When reading the value of 'operate', the given logical link is
12     operating normally.
13
14     When reading the value of 'registered', the given logical link
15     was requested to perform registration.
16
17     When reading the value of 'deregistered', the given logical link
18     was requested to perform deregistration.
19
20     When reading the value of 'reregistered', the given logical link
21     was requested to perform reregistration.
22
23     This object is applicable for an OLT and an ONU. It has a
24     distinct value for each logical link.";
25     reference
26     "IEEE Std 802.3.1, dot3ExtPkgObjectRegisterAction";
27 }
28 leaf trx-transmit-admin-state {
29     when
30     "../..//ieee802-eth-if:ethernet/ "+"
31     "ieee802-eth-pon:mpcp-admin-state = 'enabled'";
32     if-feature "trx-power-level-reporting-supported";
33     type trx-admin-state;
34     description
35     "This object reflects the current status of the transmitter in
36     the optical transceiver.
37
38     When read as 'enabled', the optical transmitter is enabled and
39     operating under the control of the logical control protocol.
40
41     When read as 'disabled', the optical transmitter is disabled.
42
43     This object is applicable for an OLT and an ONU. At the OLT, this
44     object has a distinct value for each logical link.
45
46     The value of this object is only reliable when
47     /if:interfaces-state/if:interface/ieee802-eth-if:ethernet/
48     'mpcp-admin-state' is equal to 'enabled'.";
49     reference
50     "IEEE Std 802.3.1, dot3ExtPkgOptIfTransmitEnable";
51 }
52 container capabilities {
53     config false;
54     description
55     "This container includes all EPON interface-specific
56     capabilities.";
57     leaf mpcp-supported {
58         type mpcp-supported;
59         default "true";
60         description
61         "This object indicates that the given interface supports MPCP,
62         i.e., it is an Ethernet PON (EPON) interface.";
63     }
64 }
65 }
```

```

1  container statistics-mpcp {
2      config false;
3      description
4          "This container defines a set of MPCP-related statistics counters
5           of an EPON interface, as defined in IEEE Std 802.3, Clause 64 and
6           Clause 77.
7
8           Discontinuities in the values of counters in this container can
9           occur at re-initialization of the management system, and at other
10          times as indicated by the value of the 'discontinuity-time' leaf
11          defined in the ietf-interfaces YANG module (IETF RFC 8343).";
12      leaf out-mpcp-mac-ctrl-frames {
13          type yang:counter64;
14          units "frames";
15          config false;
16          description
17              "A count of MPCP frames passed to the MAC sublayer for
18               transmission.
19
20               This counter is incremented when a MA_CONTROL.request service
21               primitive is generated within the MAC control sublayer with an
22               opcode indicating an MPCP frame.
23
24               This object is applicable for an OLT and an ONU. It has a
25               distinct value for each logical link.";
26          reference
27              "IEEE Std 802.3, 30.3.5.1.7";
28      }
29      leaf in-mpcp-mac-ctrl-frames {
30          type yang:counter64;
31          units "frames";
32          config false;
33          description
34              "A count of MPCP frames passed by the MAC sublayer to the MAC
35               Control sublayer.
36
37               This counter is incremented when a frame is received at the
38               interface which is an MPCP frame or has a Length/Type Ethernet
39               header field value equal to the Type assigned for
40               802.3_MAC_Control as specified in IEEE Std 802.3, 31.4.1.3.
41
42               This object is applicable for an OLT and an ONU. It has a
43               distinct value for each logical link.";
44          reference
45              "IEEE Std 802.3, 30.3.5.1.8";
46      }
47      leaf mpcp-discovery-window-count {
48          when
49              "../ompe-mode = 'olt'";
50          type yang:counter64;
51          units "discovery windows";
52          config false;
53          description
54              "A count of discovery windows generated by the OLT.
55
56               The counter is incremented by one for each generated discovery
57               window.
58
59               This object is applicable for an OLT and has the same value for
60               each logical link.";
61          reference
62              "IEEE Std 802.3, 30.3.5.1.22";
63      }
64      leaf mpcp-discovery-timeout-count {
65

```

```
1      when
2        "../ompe-mode = 'olt'";
3      type yang:counter64;
4      units "discovery timeouts";
5      config false;
6      description
7        "A count of the number of times a discovery timeout occurs.
8
9        This counter is incremented by one for each discovery
10       processing state-machine reset resulting from timeout waiting
11       for message arrival.
12
13       This object is applicable for an OLT and has the same value for
14       each logical link.";
15     reference
16       "IEEE Std 802.3, 30.3.5.1.23";
17   }
18   leaf out-mpcp-register-req {
19     when
20       "../ompe-mode = 'onu'";
21     type yang:counter64;
22     units "frames";
23     config false;
24     description
25       "A count of the number of times a REGISTER_REQ MPCP frame
26       transmission occurs.
27
28       This counter is incremented by one for each REGISTER_REQ MPCP
29       frame transmitted as defined in IEEE Std 802.3, Clause 64 and
30       Clause 77.
31
32       This object is applicable for an ONU and has the same value for
33       each logical link.";
34     reference
35       "IEEE Std 802.3, 30.3.5.1.12";
36   }
37   leaf in-mpcp-register-req {
38     when
39       "../ompe-mode = 'olt'";
40     type yang:counter64;
41     units "frames";
42     config false;
43     description
44       "A count of the number of times a REGISTER_REQ MPCP frame
45       reception occurs.
46
47       This counter is incremented by one for each REGISTER_REQ MPCP
48       frame received as defined in IEEE Std 802.3, Clause 64 and
49       Clause 77.
50
51       This object is applicable for an OLT and has the same value for
52       each logical link.";
53     reference
54       "IEEE Std 802.3, 30.3.5.1.17";
55   }
56   leaf out-mpcp-register-ack {
57     when
58       "../ompe-mode = 'onu'";
59     type yang:counter64;
60     units "frames";
61     config false;
62     description
63       "A count of the number of times a REGISTER_ACK MPCP frame
64       transmission occurs.
65
```

```
1      This counter is incremented by one for each REGISTER_ACK MPCP
2      frame transmitted as defined in IEEE Std 802.3, Clause 64 and
3      Clause 77.
4
5      This object is applicable for an ONU and has a distinct value
6      for each logical link.";
7
8      reference
9      "IEEE Std 802.3, 30.3.5.1.10";
10   }
11   leaf in-mpcp-register-ack {
12     when
13       "../ompe-mode = 'olt'";
14     type yang:counter64;
15     units "frames";
16     config false;
17     description
18       "A count of the number of times a REGISTER_ACK MPCP frame
19       reception occurs.
20
21       This counter is incremented by one for each REGISTER_ACK MPCP
22       frame received as defined in IEEE Std 802.3, Clause 64 and
23       Clause 77.
24
25       This object is applicable for an OLT and has a distinct value
26       for each logical link.";
27     reference
28       "IEEE Std 802.3, 30.3.5.1.15";
29   }
30   leaf out-mpcp-report {
31     when
32       "../ompe-mode = 'onu'";
33     type yang:counter64;
34     units "frames";
35     config false;
36     description
37       "A count of the number of times a REPORT MPCP frame
38       transmission occurs.
39
40       This counter is incremented by one for each REPORT MPCP frame
41       transmitted as defined in IEEE Std 802.3, Clause 64 and Clause
42       77.
43
44       This object is applicable for an ONU and has a distinct value
45       for each logical link.";
46     reference
47       "IEEE Std 802.3, 30.3.5.1.13";
48   }
49   leaf in-mpcp-report {
50     when
51       "../ompe-mode = 'olt'";
52     type yang:counter64;
53     units "frames";
54     config false;
55     description
56       "A count of the number of times a REPORT MPCP frame reception
57       occurs.
58
59       This counter is incremented by one for each REPORT MPCP frame
60       received as defined in IEEE Std 802.3, Clause 64 and Clause 77.
61
62       This object is applicable for an OLT and has a distinct value
63       for each logical link.";
64     reference
```

```
1         "IEEE Std 802.3, 30.3.5.1.18";
2     }
3     leaf out-mpcp-gate {
4         when
5             "../ompe-mode = 'olt'";
6         type yang:counter64;
7         units "frames";
8         config false;
9         description
10            "A count of the number of times a GATE MPCP frame transmission
11            occurs.
12
13            This counter is incremented by one for each GATE MPCP frame
14            transmitted as defined in IEEE Std 802.3, Clause 64 and Clause
15            77.
16
17            This object is applicable for an OLT and has a distinct value
18            for each logical link.";
19        reference
20            "IEEE Std 802.3, 30.3.5.1.9";
21    }
22    leaf in-mpcp-gate {
23        when
24            "../ompe-mode = 'onu'";
25        type yang:counter64;
26        units "frames";
27        config false;
28        description
29            "A count of the number of times a GATE MPCP frame reception
30            occurs.
31
32            This counter is incremented by one for each GATE MPCP frame
33            received as defined in IEEE Std 802.3, Clause 64 and Clause 77.
34
35            This object is applicable for an ONU and has a distinct value
36            for each logical link.";
37        reference
38            "IEEE Std 802.3, 30.3.5.1.14";
39    }
40    leaf out-mpcp-register {
41        when
42            "../ompe-mode = 'olt'";
43        type yang:counter64;
44        units "frames";
45        config false;
46        description
47            "A count of the number of times a REGISTER MPCP frame
48            transmission occurs.
49
50            This counter is incremented by one for each REGISTER MPCP frame
51            transmitted as defined in IEEE Std 802.3, Clause 64 and Clause
52            77.
53
54            This object is applicable for an OLT and has a distinct value
55            for each logical link.";
56        reference
57            "IEEE Std 802.3, 30.3.5.1.11";
58    }
59    leaf in-mpcp-register {
60        when
61            "../ompe-mode = 'onu'";
62        type yang:counter64;
63        units "frames";
64        config false;
```

```
1      description
2          "A count of the number of times a REGISTER MPCP frame reception
3          occurs.
4
5          This counter is incremented by one for each REGISTER MPCP frame
6          received as defined in IEEE Std 802.3, Clause 64 and Clause 77.
7
8          This object is applicable for an ONU and has a distinct value
9          for each logical link.";
10     reference
11         "IEEE Std 802.3, 30.3.5.1.16";
12 }
13 }
14 container statistics-ompe {
15     description
16         "This container defines a set of OMP-Emulation-related statistics
17         counters of an EPON interface, as defined in IEEE Std 802.3,
18         Clause 65 and Clause 76.
19
20         Discontinuities in the values of counters in this container can
21         occur at re-initialization of the management system, and at other
22         times as indicated by the value of the 'discontinuity-time' leaf
23         defined in the ietf-interfaces YANG module (IETF RFC 8343).";
24     reference
25         "IEEE Std 802.3.1, dot3OmpEmulationStatEntry";
26     leaf in-ompe-frames-errored-sld {
27         type yang:counter64;
28         units "frames";
29         config false;
30         description
31             "A count of frames received that do not contain a valid SLD
32             field as defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1,
33             as appropriate.
34
35             This object is applicable for an OLT and an ONU. It has a
36             distinct value for each logical link.";
37         reference
38             "IEEE Std 802.3, 30.3.7.1.3";
39     }
40     leaf in-ompe-frames-errored-crc8 {
41         type yang:counter64;
42         units "frames";
43         config false;
44         description
45             "A count of frames received that contain a valid SLD field, as
46             defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1 as
47             appropriate, but do not pass the CRC-8 check as defined in IEEE
48             Std 802.3, 65.1.3.3.3 or 76.2.6.1.3.3 as appropriate.
49
50             This object is applicable for an OLT and an ONU. It has a
51             distinct value for each logical link.";
52         reference
53             "IEEE Std 802.3, 30.3.7.1.4";
54     }
55 }
56 leaf ompe-onu-frames-with-good-llid-good-crc8 {
57     when
58         "../ompe-mode = 'onu'";
59     type yang:counter64;
60     units "frames";
61     config false;
62     description
63         "A count of frames received that 1) contain a valid SLD field
64         in an ONU, 2) meet the rule for frame acceptance, and
65         3) pass the CRC-8 check.
```

```
1
2     The SLD is defined in IEEE Std 802.3, 65.1.3.3.1 or
3     76.2.6.1.3.1, as appropriate.
4
5     The rules for LLID acceptance are defined in IEEE Std 802.3,
6     65.1.3.3.2 or 76.2.6.1.3.2, as appropriate.
7
8     The CRC-8 check is defined in IEEE Std 802.3, 65.1.3.3.3 or
9     76.2.6.1.3.3, as appropriate.
10
11     This object is applicable for an ONU and has a distinct value
12     for each logical link.";
13     reference
14         "IEEE Std 802.3, 30.3.7.1.6";
15 }
16 leaf ompe-olt-frames-with-good-llid-good-crc8 {
17     when
18         "../ompe-mode = 'olt'";
19     type yang:counter64;
20     units "frames";
21     config false;
22     description
23         "A count of frames received that 1) contain a valid SLD field
24         in an OLT, and 2) pass the CRC-8 check.
25
26         The SLD is defined in IEEE Std 802.3, 65.1.3.3.1 or
27         76.2.6.1.3.1, as appropriate.
28
29         The frame acceptance are defined in IEEE Std 802.3, 65.1.3.3.2
30         or 76.2.6.1.3.2, as appropriate.
31
32         The CRC-8 check is defined in IEEE Std 802.3, 65.1.3.3.3 or
33         76.2.6.1.3.3, as appropriate.
34
35         This object is applicable for an OLT and has a distinct value
36         for each logical link.";
37     reference
38         "IEEE Std 802.3, 30.3.7.1.6";
39 }
40 leaf in-ompe-frames-with-bad-llid {
41     when
42         "../ompe-mode = 'olt'";
43     type yang:counter64;
44     units "frames";
45     config false;
46     description
47         "A count of frames received that contain a valid SLD field, as
48         defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1, as
49         appropriate, and pass the CRC-8 check as defined in IEEE Std
50         802.3, 65.1.3.3.3 or 76.2.6.1.3.3, as appropriate, but are
51         discarded due to the LLID check.
52
53         This object is applicable for an OLT and has a distinct value
54         for each logical link.";
55     reference
56         "IEEE Std 802.3, 30.3.7.1.8";
57 }
58 leaf in-ompe-frames-with-good-llid {
59     type yang:counter64;
60     units "frames";
61     config false;
62     description
63         "A count of frames received that contain a valid SLD field, as
64         defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1 as
65
```

```
1         appropriate, but do not pass the CRC-8 check as defined in IEEE
2         Std 802.3, 65.1.3.3.3 or 76.2.6.1.3.3 as appropriate.
3
4         This object is applicable for an OLT and an ONU. It has a
5         distinct value for each logical link.";
6     reference
7         "IEEE Std 802.3, 30.3.7.1.4";
8 }
9 leaf in-ompe-frames {
10     type yang:counter64;
11     units "frames";
12     config false;
13     description
14         "A count of frames received that contain a valid SLD field, as
15         defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1, as
16         appropriate, and pass the CRC-8 check as defined in IEEE Std
17         802.3, 65.1.3.3.3 or 76.2.6.1.3.3, as appropriate.
18
19         This object is applicable for an OLT and an ONU. It has a
20         distinct value for each logical link.";
21     reference
22         "IEEE Std 802.3, 30.3.7.1.6 (ONU) and 30.3.7.1.7 (OLT)";
23 }
24 leaf in-ompe-frames-not-match-onu-llid-broadcast {
25     when
26         "../ompe-mode = 'onu'";
27     type yang:counter64;
28     units "frames";
29     config false;
30     description
31         "A count of frames received that contain a valid SLD field, as
32         defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1, as
33         appropriate, pass the CRC-8 check, as defined in IEEE Std
34         802.3, 65.1.3.3.3 or 76.2.6.1.3.3, as appropriate, and contain
35         the broadcast bit in the LLID and not the ONU's LLID (frame
36         accepted) as defined in IEEE Std 802.3, Clause 65 and Clause
37         76, as appropriate.
38
39         This object is applicable for an ONU only.";
40     reference
41         "IEEE Std 802.3.1, dot3OmpEmulationBroadcastBitNotOnuLlid";
42 }
43 leaf in-ompe-frames-match-onu-llid-not-broadcast {
44     when
45         "../ompe-mode = 'onu'";
46     type yang:counter64;
47     units "frames";
48     config false;
49     description
50         "A count of frames received that contain a valid SLD field, as
51         defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1, as
52         appropriate, pass the CRC-8 check, as defined in IEEE Std
53         802.3, 65.1.3.3.3 or 76.2.6.1.3.3, as appropriate, and contain
54         the ONU's LLID (frame accepted) as defined in IEEE Std 802.3,
55         Clause 65 and Clause 76, as appropriate.
56
57         This object is applicable for an ONU only.";
58     reference
59         "IEEE Std 802.3.1, dot3OmpEmulationOnuLLIDNotBroadcast";
60 }
61 leaf in-ompe-frames-match-onu-llid-broadcast {
62     when
63         "../ompe-mode = 'onu'";
64     type yang:counter64;
```



```

1      units "frames";
2      config false;
3      description
4          "A count of frames received that contain a valid SLD field, as
5          defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1, as
6          appropriate, pass the CRC-8 check, as defined in IEEE Std
7          802.3, 65.1.3.3.3 or 76.2.6.1.3.3, as appropriate, and contain
8          the broadcast bit in the LLID and the ONU's LLID (frame
9          accepted) as defined in IEEE Std 802.3, Clause 65 and Clause
10         76, as appropriate.
11
12         This object is applicable for an ONU only.";
13     reference
14         "IEEE Std 802.3.1, dot3OmpEmulationBroadcastBitPlusOnuLlid";
15 }
16 leaf in-ompe-frames-not-match-onu-llid-not-broadcast {
17     when
18         "../ompe-mode = 'onu'";
19     type yang:counter64;
20     units "frames";
21     config false;
22     description
23         "A count of frames received that contain a valid SLD field, as
24         defined in IEEE Std 802.3, 65.1.3.3.1 or 76.2.6.1.3.1, as
25         appropriate, pass the CRC-8 check, as defined in IEEE Std
26         802.3, 65.1.3.3.3 or 76.2.6.1.3.3, as appropriate, do not
27         contain the broadcast bit in the LLID and do not contain the
28         ONU's LLID (frame is NOT accepted) as defined in IEEE Std
29         802.3, Clause 65 and Clause 76, as appropriate.
30
31         This object is applicable for an ONU only.";
32     reference
33         "IEEE Std 802.3.1, dot3OmpEmulationNotBroadcastBitNotOnuLlid";
34 }
35 }
36 container thresholds-trx {
37     if-feature "trx-power-level-reporting-supported";
38     description
39         "This container defines a set of optical transceiver thresholds
40         of an EPON interface as defined in IEEE Std 802.3, Clause 60 and
41         Clause 75.";
42     reference
43         "IEEE Std 802.3.1, dot3ExtPkgOptIfEntry";
44     leaf in-trx-power-low-threshold {
45         if-feature "trx-power-level-reporting-supported";
46         type power-level;
47         description
48             "This object reflects the current setting of low alarm
49             threshold for the input power into the optical receiver. If the
50             value reported in 'in-trx-power' object drops below the value
51             set in 'in-trx-power-low-threshold', a
52             'in-trx-power-low-threshold-crossing' event is generated.
53
54             This object is applicable for an OLT and an ONU. It has a
55             distinct value for each logical link.";
56         reference
57             "IEEE Std 802.3.1, dot3ExtPkgOptIfLowerInputPowerThreshold";
58     }
59     leaf in-trx-power-high-threshold {
60         if-feature "trx-power-level-reporting-supported";
61         type power-level;
62         description
63             "This object reflects the current setting of high alarm
64             threshold for the input power into the optical receiver. If the
65             value reported in 'in-trx-power' object rises above the value
66             set in 'in-trx-power-high-threshold', a
67             'in-trx-power-high-threshold-crossing' event is generated.
68
69             This object is applicable for an OLT and an ONU. It has a
70             distinct value for each logical link."

```

```
1         value reported in 'in-trx-power' object exceeds the value set
2         in 'in-trx-power-high-threshold', a
3         'in-trx-power-high-threshold-crossing' event is generated.
4
5         This object is applicable for an OLT and an ONU. It has a
6         distinct value for each logical link.";
7     reference
8         "IEEE Std 802.3.1, dot3ExtPkgOptIfUpperInputPowerThreshold";
9 }
10 leaf out-trx-power-low-threshold {
11     if-feature "trx-power-level-reporting-supported";
12     type power-level;
13     description
14         "This object reflects the current setting of low alarm
15         threshold for the output power out of the optical transmitter.
16         If the value reported in 'out-trx-power' object drops below the
17         value set in 'out-trx-power-low-threshold', a
18         'out-trx-power-low-threshold-crossing' event is generated.
19
20         This object is applicable for an OLT and an ONU. It has a
21         distinct value for each logical link.";
22     reference
23         "IEEE Std 802.3.1, dot3ExtPkgOptIfLowerOutputPowerThreshold";
24 }
25 leaf out-trx-power-high-threshold {
26     if-feature "trx-power-level-reporting-supported";
27     type power-level;
28     description
29         "This object reflects the current setting of high alarm
30         threshold for the output power out of the optical transmitter.
31         If the value reported in 'out-trx-power' object exceeds the
32         value set in 'out-trx-power-high-threshold', a
33         'out-trx-power-high-threshold-crossing' event is generated.
34
35         This object is applicable for an OLT and an ONU. It has a
36         distinct value for each logical link.";
37     reference
38         "IEEE Std 802.3.1, dot3ExtPkgOptIfUpperOutputPowerThreshold";
39 }
40 }
41 container statistics-trx {
42     if-feature "trx-power-level-reporting-supported";
43     status "deprecated";
44     description
45         "This container defines a set of optical transceiver statistics
46         counters of an EPON interface as defined in IEEE Std 802.3,
47         Clause 60 and Clause 75.";
48     reference
49         "IEEE Std 802.3.1, dot3ExtPkgOptIfEntry";
50     leaf in-trx-power-signal-detect {
51         type boolean;
52         config false;
53         description
54             "This object indicates whether a valid optical signal was
55             detected (when read as 'true') or not (when read as 'false') at
56             the input to the optical transceiver.
57
58             This object is applicable for an OLT and an ONU. It has a
59             distinct value for each logical link.";
60         reference
61             "IEEE Std 802.3.1, dot3ExtPkgOptIfSignalDetect";
62     }
63     leaf in-trx-power {
64         type power-level;
```

```
1      config false;
2      description
3          "This object reflects the value of the input power, as measured
4          at the optical transceiver, expressed in units of 0.1 dBm.
5
6          At the ONU, the measurement is performed in a continuous
7          manner.
8
9          At the OLT, the measurement is performed in a burst-mode
10         manner, for each incoming data burst.
11
12         This object is applicable for an OLT and an ONU. It has a
13         distinct value for each logical link.";
14     reference
15         "IEEE Std 802.3.1, dot3ExtPkgOptIfInputPower";
16 }
17 leaf in-trx-power-low-15-minutes-bin {
18     type power-level;
19     config false;
20     description
21         "This object reflects the lowest value of the input power
22         during the period of the last 15 minutes, as measured at the
23         optical transceiver, and expressed in units of 0.1 dBm.
24
25         At the ONU, the measurement is performed in a continuous manner
26         and stored in a rolling 15-minutes' long observation bin.
27
28         At the OLT, the measurement is the average power for each
29         incoming data burst, and stored in a rolling 15-minutes' long
30         observation bin.
31
32         This object is applicable for an OLT and an ONU. It has a
33         distinct value for each logical link.";
34     reference
35         "IEEE Std 802.3.1, dot3ExtPkgOptIfLowInputPower";
36 }
37 leaf in-trx-power-high-15-minutes-bin {
38     type power-level;
39     config false;
40     description
41         "This object reflects the highest value of the input power
42         during the period of the last 15 minutes, as measured at the
43         optical transceiver, and expressed in units of 0.1 dBm.
44
45         At the ONU, the measurement is performed in a continuous manner
46         and stored in a rolling 15-minutes' long observation bin.
47
48         At the OLT, the measurement is the average power for each
49         incoming data burst, and stored in a rolling 15-minutes' long
50         observation bin.
51
52         This object is applicable for an OLT and an ONU. It has a
53         distinct value for each logical link.";
54     reference
55         "IEEE Std 802.3.1, dot3ExtPkgOptIfHighInputPower";
56 }
57 }
58 leaf out-trx-power-signal-detect {
59     type boolean;
60     config false;
61     description
62         "This object indicates whether a valid optical signal was
63         detected (when read as 'true') or not (when read as 'false') at
64         the output from the optical transceiver.
65
```

```
1         This object is applicable for an OLT and an ONU. It has a
2         distinct value for each logical link.";
3     reference
4         "IEEE Std 802.3.1, dot3ExtPkgOptIfTransmitAlarm";
5 }
6 leaf out-trx-power {
7     type power-level;
8     config false;
9     description
10        "This object reflects the value of the output power, as
11        measured at the optical transceiver, expressed in units of 0.1
12        dBm.
13
14        At the ONU, the measurement is performed in a burst-mode manner
15        for each outgoing data burst.
16
17        At the OLT, the measurement is performed in a continuous
18        manner.
19
20        This object is applicable for an OLT and an ONU. It has a
21        distinct value for each logical link.";
22    reference
23        "IEEE Std 802.3.1, dot3ExtPkgOptIfOutputPower";
24 }
25 leaf out-trx-power-low-15-minutes-bin {
26     type power-level;
27     config false;
28     description
29        "This object reflects the lowest value of the output power
30        during the period of the last 15 minutes, as measured at the
31        optical transceiver, and expressed in units of 0.1 dBm.
32
33        At the ONU, the measurement is performed in a burst-mode manner
34        and stored in a rolling 15-minutes' long observation bin.
35
36        At the OLT, the measurement is the average power for each
37        incoming data burst, and stored in a rolling 15-minutes' long
38        observation bin.
39
40        This object is applicable for an OLT and an ONU. It has a
41        distinct value for each logical link.";
42    reference
43        "IEEE Std 802.3.1, dot3ExtPkgOptIfLowOutputPower";
44 }
45 leaf out-trx-power-high-15-minutes-bin {
46     type power-level;
47     config false;
48     description
49        "This object reflects the highest value of the output power
50        during the period of the last 15 minutes, as measured at the
51        optical transceiver, and expressed in units of 0.1 dBm.
52
53        At the ONU, the measurement is performed in a burst-mode manner
54        and stored in a rolling 15-minutes' long observation bin.
55
56        At the OLT, the measurement is the average power for each
57        incoming data burst, and stored in a rolling 15-minutes' long
58        observation bin.
59
60        This object is applicable for an OLT and an ONU. It has a
61        distinct value for each logical link.";
62    reference
63        "IEEE Std 802.3.1, dot3ExtPkgOptIfHighOutputPower";
64 }
65 }
```

```
1     leaf trx-data-reliable {
2         if-feature "trx-power-level-reporting-supported";
3         type boolean;
4         config false;
5         description
6             "This object indicates whether data contained in individual
7             counters in 'statistics-trx' container are reliable (when read
8             as 'true') or not (when read as 'false')."
9
10            This object is applicable for an OLT and an ONU. It has a
11            distinct value for each logical link.";
12        reference
13            "IEEE Std 802.3.1, dot3ExtPkgOptIfSuspectedFlag";
14    }
15 }
16 container monitoring-trx {
17     if-feature "trx-power-level-reporting-supported";
18     description
19         "This container defines a set of optical transceiver statistics
20         counters of an EPON interface as defined in IEEE Std 802.3,
21         Clause 60 and Clause 75.";
22     reference
23         "IEEE Std 802.3.1, dot3ExtPkgOptIfEntry";
24     leaf in-trx-power-signal-detect {
25         type boolean;
26         config false;
27         description
28             "This object indicates whether a valid optical signal was
29             detected (when read as 'true') or not (when read as 'false') at
30             the input to the optical transceiver.
31
32             This object is applicable for an OLT and an ONU. It has a
33             distinct value for each logical link.";
34         reference
35             "IEEE Std 802.3.1, dot3ExtPkgOptIfSignalDetect";
36     }
37     leaf in-trx-power {
38         type power-level;
39         config false;
40         description
41             "This object reflects the value of the input power, as measured
42             at the optical transceiver, expressed in units of 0.1 dBm.
43
44             At the ONU, the measurement is performed in a continuous
45             manner.
46
47             At the OLT, the measurement is performed in a burst-mode
48             manner, for each incoming data burst.
49
50             This object is applicable for an OLT and an ONU. It has a
51             distinct value for each logical link.";
52         reference
53             "IEEE Std 802.3.1, dot3ExtPkgOptIfInputPower";
54     }
55     leaf in-trx-power-low-15-minutes-bin {
56         type power-level;
57         config false;
58         description
59             "This object reflects the lowest value of the input power
60             during the period of the last 15 minutes, as measured at the
61             optical transceiver, and expressed in units of 0.1 dBm.
62
63             At the ONU, the measurement is performed in a continuous manner
64             and stored in a rolling 15-minutes' long observation bin.
```

```
1
2     At the OLT, the measurement is the average power for each
3     incoming data burst, and stored in a rolling 15-minutes' long
4     observation bin.
5
6     This object is applicable for an OLT and an ONU. It has a
7     distinct value for each logical link.";
8     reference
9         "IEEE Std 802.3.1, dot3ExtPkgOptIfLowInputPower";
10 }
11 leaf in-trx-power-high-15-minutes-bin {
12     type power-level;
13     config false;
14     description
15         "This object reflects the highest value of the input power
16         during the period of the last 15 minutes, as measured at the
17         optical transceiver, and expressed in units of 0.1 dBm.
18
19         At the ONU, the measurement is performed in a continuous manner
20         and stored in a rolling 15-minutes' long observation bin.
21
22         At the OLT, the measurement is the average power for each
23         incoming data burst, and stored in a rolling 15-minutes' long
24         observation bin.
25
26         This object is applicable for an OLT and an ONU. It has a
27         distinct value for each logical link.";
28     reference
29         "IEEE Std 802.3.1, dot3ExtPkgOptIfHighInputPower";
30 }
31 leaf out-trx-power-signal-detect {
32     type boolean;
33     config false;
34     description
35         "This object indicates whether a valid optical signal was
36         detected (when read as 'true') or not (when read as 'false') at
37         the output from the optical transceiver.
38
39         This object is applicable for an OLT and an ONU. It has a
40         distinct value for each logical link.";
41     reference
42         "IEEE Std 802.3.1, dot3ExtPkgOptIfTransmitAlarm";
43 }
44 leaf out-trx-power {
45     type power-level;
46     config false;
47     description
48         "This object reflects the value of the output power, as
49         measured at the optical transceiver, expressed in units of 0.1
50         dBm.
51
52         At the ONU, the measurement is performed in a burst-mode manner
53         for each outgoing data burst.
54
55         At the OLT, the measurement is performed in a continuous
56         manner.
57
58         This object is applicable for an OLT and an ONU. It has a
59         distinct value for each logical link.";
60     reference
61         "IEEE Std 802.3.1, dot3ExtPkgOptIfOutputPower";
62 }
63 leaf out-trx-power-low-15-minutes-bin {
64     type power-level;
```

```
1      config false;
2      description
3          "This object reflects the lowest value of the output power
4          during the period of the last 15 minutes, as measured at the
5          optical transceiver, and expressed in units of 0.1 dBm.
6
7          At the ONU, the measurement is performed in a burst-mode manner
8          and stored in a rolling 15-minutes' long observation bin.
9
10         At the OLT, the measurement is the average power for each
11         incoming data burst, and stored in a rolling 15-minutes' long
12         observation bin.
13
14         This object is applicable for an OLT and an ONU. It has a
15         distinct value for each logical link.";
16      reference
17          "IEEE Std 802.3.1, dot3ExtPkgOptIfLowOutputPower";
18  }
19  leaf out-trx-power-high-15-minutes-bin {
20      type power-level;
21      config false;
22      description
23          "This object reflects the highest value of the output power
24          during the period of the last 15 minutes, as measured at the
25          optical transceiver, and expressed in units of 0.1 dBm.
26
27          At the ONU, the measurement is performed in a burst-mode manner
28          and stored in a rolling 15-minutes' long observation bin.
29
30          At the OLT, the measurement is the average power for each
31          incoming data burst, and stored in a rolling 15-minutes' long
32          observation bin.
33
34          This object is applicable for an OLT and an ONU. It has a
35          distinct value for each logical link.";
36      reference
37          "IEEE Std 802.3.1, dot3ExtPkgOptIfHighOutputPower";
38  }
39  leaf trx-data-reliable {
40      if-feature "trx-power-level-reporting-supported";
41      type boolean;
42      config false;
43      description
44          "This object indicates whether data contained in individual
45          counters in 'statistics-trx' container are reliable (when read
46          as 'true') or not (when read as 'false').
47
48          This object is applicable for an OLT and an ONU. It has a
49          distinct value for each logical link.";
50      reference
51          "IEEE Std 802.3.1, dot3ExtPkgOptIfSuspectedFlag";
52  }
53  }
54  }
55  container statistics-pon-fec {
56      when
57          "(../fec-capability = 'supported') and (../fec-mode = '+'
58          'enabled-Tx-Rx')";
59      if-feature "fec-supported";
60      config false;
61      description
62          "This container defines a set of FEC-related statistics counters
63          of an EPON interface, as defined in IEEE Std 802.3, Clause 65 and
64          Clause 76.
65  }
```

```

1      Discontinuities in the value of this counter can occur at
2      re-initialization of the management system, and at other times as
3      indicated by the value of the 'discontinuity-time' leaf defined
4      in the ietf-interfaces YANG module (IETF RFC 8343).";
5  reference
6      "IEEE Std 802.3.1, dot3OmpEmulationStatEntry";
7  leaf fec-code-group-violations {
8      type yang:counter64;
9      units "code-group";
10     config false;
11     description
12         "For 1G-EPON this is a count of the number of events that cause
13         the PHY to indicate 'Data reception error' or 'Carrier Extend
14         Error' on the GMII (see IEEE Std 802.3, Table 35-1). The
15         contents of this counter is undefined when FEC is operating.
16         For 10G-EPON this object is not applicable.
17
18         This object is applicable for an OLT and an ONU. At the OLT, it
19         has a distinct value for each logical link.";
20     reference
21         "IEEE Std 802.3, 30.5.1.1.14";
22 }
23 leaf fec-buffer-head-coding-violations {
24     type yang:counter64;
25     units "code-group";
26     config false;
27     description
28         "For 1G-EPON PHY, this object represents the count of the
29         number of invalid code-groups received directly from the link
30         when FEC is enabled. When FEC is disabled this counter stops
31         counting.
32
33         For 10G-EPON PHYs, this object is set to zero.
34
35         This object is applicable for an OLT and an ONU. It has a
36         distinct value for each logical link.";
37     reference
38         "IEEE Std 802.3.1, dot3EponFecBufferHeadCodingViolation";
39 }
40 leaf fec-code-word-corrected-errors {
41     type yang:counter64;
42     units "code-group";
43     config false;
44     description
45         "For 1G-EPON or 10G-EPON PHYs, this object represents a count
46         of corrected FEC blocks.
47
48         This counter increments by one for each received FEC block that
49         contained detected errors and was corrected by the FEC function
50         in the PHY.
51
52         This object is applicable for an OLT and an ONU. It has a
53         distinct value for each logical link.";
54     reference
55         "IEEE Std 802.3, 30.5.1.1.17";
56 }
57 leaf fec-code-word-uncorrected-errors {
58     type yang:counter64;
59     units "code-group";
60     config false;
61     description
62         "For 1G-EPON or 10G-EPON PHYs, this object represents a count
63         of uncorrectable FEC blocks.
64
65

```



```

1         This counter increments by one for each received FEC block that
2         contained detected errors and was not corrected by the FEC
3         function in the PHY.
4
5         This object is applicable for an OLT and an ONU. It has a
6         distinct value for each logical link.";
7     reference
8         "IEEE Std 802.3, 30.5.1.1.18";
9 }
10 }
11 container mpcp-logical-link-admin-actions {
12     description
13         "Container of actions.";
14     action state-change-action-type {
15         description
16             "Request a state change on the interface.";
17         input {
18             leaf state-change-action-type {
19                 type identityref {
20                     base state-change-action-type;
21                 }
22                 description
23                     "Type of interface state change requested.";
24             }
25         }
26     }
27     action reset-action-type {
28         description
29             "Request a reset-action of the interface.";
30         input {
31             leaf reset-action-type {
32                 type identityref {
33                     base reset-action-type;
34                 }
35                 description
36                     "Type of reset action requested of the interface.";
37             }
38         }
39     }
40 }
41 action register-type {
42     description
43         "Request a registration action.";
44     input {
45         leaf register-type {
46             type identityref {
47                 base register-type;
48             }
49             description
50                 "Type of registration action requested of the interface.";
51         }
52     }
53 }
54 }
55 list mpcp-queues {
56     key "mpcp-queue-index";
57     description
58         "An instance of this object for each value of 'mpcp-queue-index'
59         is created when a new logical link is registered and deleted when
60         the logical link is deregistered.
61
62         All instances of this object in the ONU associated with the given
63         logical link are then mapped to a REPORT MPCPDU, when generated.
64
65         +-----+ | Destination Address |

```

```

1      +-----+ | Source Address |
2      +-----+ | Length/Type |
3      +-----+ | OpCode |
4      +-----+ | TimeStamp |
5      +-----+ | Number of Queue Sets |
6      +-----+ -| | Report bitmap | |
7      +-----+ | | Queue 0 report | |
8      +-----+ | repeated | Queue 1 report
9      | | for every +-----+ | Queue Set |
10     Queue 2 report | | +-----+ | |
11     Queue 3 report | | +-----+ | |
12     Queue 4 report | | +-----+ | |
13     Queue 5 report | | +-----+ | |
14     Queue 6 report | | +-----+ | |
15     Queue 7 report | | +-----+ -| |
16     Pad/reserved | +-----+ | FCS |
17     +-----+

```

The 'Queue N report' field reports the current occupancy of each upstream transmission queue associated with the given logical link.

The 'Number of Queue Sets' field defines the number of reported 'Queue N report' sets.

For each Queue Set, the 'Report bitmap' field defines which upstream transmission queues are present in the REPORT MPCPDU. Although the REPORT MPCPDU can report current occupation for up to 8 upstream transmission queues in a single REPORT MPCPDU, the actual number is flexible. The 'mpcp-queue-group' grouping has a variable size that is limited by value of 'mpcp-maximum-queue-count-per-report' object, allowing ONUs report the occupancy of fewer upstream transmission queues, as needed.

This object is applicable for an OLT and an ONU. At the OLT, this object has a distinct value for each logical link and every queue. At the ONU, it has a distinct value for every queue.";

reference

"IEEE Std 802.3.1, dot3ExtPkgQueueEntry";

leaf mpcp-queue-index {

type uint8 {

range "0 .. 7" {

description

"This object indicates the identity (index) of a queue in the ONU. It can have a value between 0 and 7, limited by the value stored in the 'mpcp-maximum-queue-count-per-report' object.";

reference

"See 'mpcp-maximum-queue-count-per-report' object";

}

}

description

"An object represents the index of an upstream transmission queue storing subscriber packets. The size (occupancy) of the upstream transmission queue identified by this object is then reported within REPORT MPCPDU, defined in IEEE Std 802.3, Clause 64 and Clause 77.

This object indicates the identity (index) of a queue in the ONU. It can have a value between 0 and 7, limited by the value stored in the 'mpcp-maximum-queue-count-per-report' object.

This object is applicable for an OLT and an ONU. It has a

```
1         distinct value for each logical link and each queue. At the
2         ONU, it has a distinct value for each queue.";
3     reference
4         "IEEE Std 802.3.1, dot3QueueIndex";
5 }
6 leaf mpcp-queue-threshold-count {
7     type uint8 {
8         range "0 .. 7" {
9             description
10                "This object indicates the identity (index) of a queue in
11                the ONU. It can have a value between 0 and 7, limited by
12                the value stored in the
13                'mpcp-maximum-queue-count-per-report' object.";
14            reference
15                "See 'mpcp-queue-threshold-count-max' object";
16        }
17    }
18    description
19        "This object reflects the number of reporting thresholds for
20        the specific upstream transmission queue, reflected in the
21        REPORT MPCPDU, as defined in IEEE Std 802.3, Clause 64 and
22        Clause 77.
23
24        Each 'Queue set' provides information for the specific upstream
25        transmission queue occupancy of frames below the matching
26        reporting threshold.
27
28        A read of this object reflects the number of reporting
29        thresholds for the specific upstream transmission queue.
30
31        This object is applicable for an OLT and an ONU. It has a
32        distinct value for each logical link and each queue. At the
33        ONU, it has a distinct value for each queue.";
34    reference
35        "IEEE Std 802.3.1, dot3ExtPkgObjectReportNumThreshold";
36 }
37 leaf mpcp-queue-threshold-count-max {
38     type uint8 {
39         range "0 .. 7" {
40             description
41                "This object can have a value between 0 and 7.";
42        }
43    }
44    config false;
45    description
46        "This object reflects the maximum number of reporting
47        thresholds for the specific upstream transmission queue,
48        reflected in the REPORT MPCPDU, as defined in IEEE Std 802.3,
49        Clause 64 and Clause 77.
50
51        A read of this object reflects the maximum number of reporting
52        thresholds for the specific upstream transmission queue.
53
54        This object is applicable for an OLT and an ONU. It has a
55        distinct value for each logical link and each queue. At the
56        ONU, it has a distinct value for each queue.";
57    reference
58        "IEEE Std 802.3.1, dot3ExtPkgObjectReportMaximumNumThreshold";
59 }
60 list mpcp-queue-thresholds {
61     when
62         "../mpcp-queue-threshold-count > 0";
63     key "mpcp-queue-set-index";
64     max-elements 7;
```

description

"An instance of this object for each value of 'mpcp-queue-index' is created when a new logical link is registered and deleted when the logical link is deregistered.

All instances of this object in the ONU associated with the given logical link are then mapped to a REPORT MPCPDU, when generated.

```
+-----+ | Destination Address |
+-----+ | Source Address |
+-----+ | Length/Type |
+-----+ | OpCode |
+-----+ | TimeStamp |
+-----+ | Number of Queue Sets |
+-----+ -| | Report bitmap | |
+-----+ | | Queue 0 report | |
+-----+ | repeated for | Queue 1
report | | every +-----+ | Queue
Set | Queue 2 report | | +-----+
| | Queue 3 report | | +-----+ |
| Queue 4 report | | +-----+ | |
Queue 5 report | | +-----+ | |
Queue 6 report | | +-----+ | |
Queue 7 report | | +-----+ -| |
Pad/reserved | +-----+ | FCS |
+-----+
```

The 'Queue N report' field reports the current occupancy of each upstream transmission queue associated with the given logical link.

The 'Number of Queue Sets' field defines the number of reported 'Queue N report' sets.

For each Queue Set, the 'Report bitmap' field defines which upstream transmission queues are present in the REPORT MPCPDU. Although the REPORT MPCPDU can report current occupation for up to 8 upstream transmission queues in a single REPORT MPCPDU, the actual number is flexible.

The 'mpcp-queue-group' grouping has a variable size that is limited by value of 'mpcp-maximum-queue-count-per-report' object, allowing ONUs to report the occupancy of fewer upstream transmission queues, as needed.

This object is applicable for an OLT and an ONU. It has a distinct value for each logical link and every queue. At the ONU, it has a distinct value for every queue.";

reference

"IEEE Std 802.3.1, dot3ExtPkgQueueSetsEntry";

leaf mpcp-queue-set-index {

type uint8 {

range "0 .. 7" {

description

"This object indicates the identity (index) of a queue in the ONU. It can have a value between 0 and 7, limited by the value stored in the 'mpcp-maximum-queue-count-per-report' object.";

reference

"See 'mpcp-maximum-queue-count-per-report' object";

}

}

description

```

1      "This object represents the index of the Queue Set for the
2      'mpcp-queue-set-group' grouping. The size (occupancy) of the
3      upstream transmission queues belonging to the given Queue Set
4      is then reported within REPORT MPCPDU, defined in IEEE Std
5      802.3, Clause 64 and Clause 77.
6
7      This object can have a value between 0 and 7, limited by the
8      value stored in the 'mpcp-queue-threshold-count-max' object.";
9      reference
10     "IEEE Std 802.3.1, dot3QueueSetIndex";
11 }
12 leaf mpcp-queue-set-threshold {
13     type uint64;
14     units "TQ";
15     default "0";
16     description
17     "This object defines the value of a reporting threshold for
18     each Queue Set stored in REPORT MPCPDU defined in IEEE Std
19     802.3, Clause 64 and Clause 77.
20
21     The number of Queue Sets for each upstream transmission queue
22     is defined in the 'mpcp-queue-threshold-count' object.
23
24     Within REPORT MPCPDU, each Queue Set provides information on
25     the current upstream transmission queue occupancy for frames
26     below the matching threshold.
27
28     The value stored in this object is expressed in the units of
29     Time quanta (TQ), where 1 TQ = 16 ns.
30
31     A read of this object provides the current threshold value
32     for the specific upstream transmission queue.
33
34     This object is applicable for an OLT and an ONU. At the OLT,
35     it has a distinct value for each logical link, each queue,
36     and each Queue Set.
37
38     At the ONU, it has a distinct value for each queue and each
39     Queue Set.";
40     reference
41     "IEEE Std 802.3.1, dot3ExtPkgObjectReportThreshold";
42 }
43 }
44 leaf in-mpcp-queue-frames {
45     type yang:counter64;
46     config false;
47     description
48     "A count of the number of times a frame reception event results
49     in a frame being queued in (for ONUs) or received from (for
50     OLTs) the corresponding queue. This object is incremented by
51     one for each frame written to (in the case of the ONU) or
52     received for (in case of the OLT) the associated queue.
53
54     The queue index matches the queue number in REPORT MPCPDU, as
55     defined in IEEE Std 802.3, Clause 64 and Clause 77.
56
57     This object is applicable for an OLT and an ONU. At the OLT, it
58     has a distinct value for each logical link and each queue. At
59     the ONU, it has a distinct value for each queue.;
60     reference
61     "IEEE Std 802.3.1, dot3ExtPkgStatRxFramesQueue";
62 }
63 leaf out-mpcp-queue-frames {
64     when
65 
```

```
1         ".../...mpcp-mode = 'onu'";
2     type yang:counter64;
3     config false;
4     description
5         "This object reflects the number of frame transmission events
6         from the corresponding upstream transmission queue. This object
7         is incremented by one for each frame transmitted , when it is
8         output from the associated queue.
9
10        The queue index matches the queue number in REPORT MPCPDU, as
11        defined in IEEE Std 802.3, Clause 64 and Clause 77.
12
13        This object is applicable for an ONU only. At the ONU, it has a
14        distinct value for each queue.";
15    reference
16        "IEEE Std 802.3.1, dot3ExtPkgStatTxFramesQueue";
17    }
18    leaf mpcp-queue-frames-drop {
19        when
20            ".../...mpcp-mode = 'onu'";
21        type yang:counter64;
22        config false;
23        description
24            "This object reflects the number of frame drop events from the
25            corresponding upstream transmission queue. This object is
26            incremented by one for each frame dropped in the associated
27            queue.
28
29            The queue index matches the queue number in REPORT MPCPDU, as
30            defined in IEEE Std 802.3, Clause 64 and Clause 77.
31
32            This object is applicable for an ONU only. At the ONU, it has a
33            distinct value for each queue.";
34        reference
35            "IEEE Std 802.3.1, dot3ExtPkgStatDroppedFramesQueue";
36    }
37    }
38    list multicast-IDs {
39        key "multicast-ID";
40        description
41            "Multicast-IDs list of multicast IDs to be recognized by the
42            device.";
43        leaf multicast-ID {
44            type uint32;
45            description
46                "Multicast-IDs to be recognized by the device.";
47            reference
48                "IEEE Std 802.3, 30.3.5.1.25";
49        }
50    }
51    }
52    leaf fec-capability {
53        type fec-capability;
54        config false;
55        description
56            "This object is used to identify whether the given interface is
57            capable of supporting FEC or not.";
58    }
59    leaf mpcp-mode {
60        type mpcp-mode;
61        config false;
62        description
63            "This object is used to identify the operational state of the
64            MultiPoint MAC Control sublayer as defined in IEEE Std 802.3,
65            Clause 64 and Clause 77.
```

```
1      Reading 'olt' for an OLT (controller) mode and 'onu' for an ONU
2      (client) mode.
3
4      This object is used to identify the operational mode for the MPCP
5      objects.
6
7      This object is applicable for an OLT, with the same value for all
8      logical links, and for an ONU."
9
10     reference
11         "IEEE Std 802.3, 30.3.5.1.3";
12 }
13 leaf mpcp-sync-time {
14     type uint64;
15     units "TQ (16ns)";
16     config false;
17     description
18         "This object reports the 'sync lock time' of the OLT receiver in
19         units of Time Quanta (TQ; 1 TQ = 16 ns; see IEEE Std 802.3,
20         Clause 64 and Clause 77).
21
22         The value returned is equal to [sync lock time ns]/16, rounded up
23         to the nearest TQ. If this value exceeds 4,294,967,295 TQ, the
24         value 4,294,967,295 TQ is returned.
25
26         This object is applicable for an OLT, with distinct values for
27         all logical links, and for an ONU."
28     reference
29         "IEEE Std 802.3.1, dot3MpcpSyncTime";
30 }
31 leaf mpcp-logical-link-id {
32     type mpcp-supported;
33     config false;
34     description
35         "This object is used to identify the operational state of the
36         MultiPoint MAC Control sublayer as defined in IEEE Std 802.3,
37         Clause 64 and Clause 77.
38
39         Reading 'olt' for an OLT (controller) mode and 'onu' for an ONU
40         (client) mode.
41
42         This object is used to identify the operational mode for the MPCP
43         objects.
44
45         This object is applicable for an OLT, with the same value for all
46         logical links, and for an ONU."
47     reference
48         "IEEE Std 802.3, 30.3.5.1.3";
49 }
50 leaf mpcp-remote-mac-address {
51     type ieee:mac-address;
52     config false;
53     description
54         "This object identifies the source_address parameter of the last
55         MPCPDUs passed to the MAC Control. This value is updated on
56         reception of a valid frame with:
57
58         1) a destination Field equal to the multicast address assigned
59            for MAC Control as specified in IEEE Std 802.3, Annex 31A;
60
61         2) the lengthOrType field value equal to the Type assigned for
62            MAC Control as specified in IEEE Std 802.3, Annex 31A;
63
64         3) an MPCP Control opcode value equal to the subtype assigned
65
```

```
1         for MPCP as specified in IEEE Std 802.3, Annex 31A.
2
3         This object is applicable for an OLT and an ONU. It has a
4         distinct value for each logical link.
5
6         The value reflects the MAC address of the remote entity and
7         therefore the OLT holds a value for each LLID, which is the MAC
8         address of the ONU.
9
10        The ONU has a single value that is the OLT MAC address.";
11    reference
12        "IEEE Std 802.3, 30.3.5.1.5";
13    }
14    leaf mpcp-logical-link-state {
15        type mpcp-logical-link-state;
16        config false;
17        description
18            "This object identifies the registration state of the MultiPoint
19            MAC Control sublayer as defined in IEEE Std 802.3, Clause 64 and
20            Clause 77.
21
22            When this object has the enumeration 'unregistered', the
23            interface is unregistered and may be used for registering a link
24            partner.
25
26            When this object has the enumeration 'registering', the interface
27            is in the process of registering a link-partner.
28
29            When this object has the enumeration 'registered', the interface
30            has an established link-partner.
31
32            This object is applicable for an OLT and an ONU. It has a
33            distinct value for each logical link.";
34        reference
35            "IEEE Std 802.3, 30.3.5.1.6";
36    }
37    leaf mpcp-elapsed-time-out {
38        type uint64;
39        units "TQ (16ns)";
40        config false;
41        description
42            "This object reports the interval from the last MPCP frame
43            transmission in increments of Time Quanta (TQ; 1 TQ = 16 ns; see
44            IEEE Std 802.3, Clause 64 and Clause 77).
45
46            The value returned is equal to [interval from last MPCP frame
47            transmission on this EPON interface, expressed in ns]/16. If this
48            value exceeds 4,294,967,295 TQ, the value 4,294,967,295 TQ is
49            returned.
50
51            This object is applicable for an OLT and an ONU. It has a
52            distinct value for each logical link.";
53        reference
54            "IEEE Std 802.3, 30.3.5.1.19";
55    }
56    leaf mpcp-elapsed-time-in {
57        type uint64;
58        units "TQ (16ns)";
59        config false;
60        description
61            "This object reports the interval from the last MPCP frame
62            reception in increments of Time Quanta (TQ; 1 TQ = 16 ns; see
63            IEEE Std 802.3, Clause 64 and Clause 77).
64
65
```



```
1         The value returned is equal to [interval from last MPCP frame
2         reception on this EPON interface, expressed in ns]/16. If this
3         value exceeds 4,294,967,295 TQ, the value 4,294,967,295 TQ is
4         returned.
5
6         This object is applicable for an OLT and an ONU. It has a
7         distinct value for each logical link.";
8     reference
9         "IEEE Std 802.3, 30.3.5.1.20";
10 }
11 leaf mpcp-round-trip-time {
12     when
13         "../ompe-mode = 'olt'";
14     type uint16;
15     units "TQ (16ns)";
16     config false;
17     description
18         "This object reports the MPCP round trip time in increments of
19         Time Quanta (TQ; 1 TQ = 16 ns; see IEEE Std 802.3, Clause 64 and
20         Clause 77).
21
22         The value returned is equal to [round trip time in ns]/16. If
23         this value exceeds 65,535 TQ, the value 65,535 TQ is returned.
24
25         This object is applicable for an OLT. It has a distinct value for
26         each logical link.";
27     reference
28         "IEEE Std 802.3, 30.3.5.1.21";
29 }
30 leaf mpcp-maximum-grant-count {
31     when
32         "../ompe-mode = 'onu'";
33     type uint8;
34     config false;
35     description
36         "This object reports the maximum number of grants that an ONU can
37         store for handling. The maximum number of grants that an ONU can
38         store for handling has a range of 0 to 255.
39
40         This object is applicable for an ONU and has a distinct value for
41         each logical link.";
42     reference
43         "IEEE Std 802.3, 30.3.5.1.24";
44 }
45 leaf mpcp-logical-link-count {
46     type mpcp-llid-count;
47     units "LLID";
48     config false;
49     description
50         "This object reflects the number of logical links registered on
51         the OLT / ONU. The LLID field, as defined in the IEEE Std 802.3,
52         Clause 65 and Clause 76, is a 2-byte register (15-bit field and a
53         broadcast bit) limiting the number of logical links to 32,768.
54
55         This object is initialized to the value of 0 when the OLT / ONU
56         is powered up.
57
58         This object is applicable for an OLT and an ONU. It has the same
59         value for all logical links.";
60     reference
61         "IEEE Std 802.3.1, dot3ExtPkgObjectNumberOfLLIDs";
62 }
63 leaf mpcp-maximum-queue-count-per-report {
64     when
```

```
1      "../ompe-mode = 'olt'";
2      type mpcp-maximum-queue-count-per-report;
3      config false;
4      description
5          "This object reflects the maximum number of queues (0-7) that can
6          be accepted by the OLT in a single REPORT MPCPDU, as defined in
7          IEEE Std 802.3, Clause 64 and Clause 77.
8
9          This object is applicable for an OLT and has a distinct value for
10         each logical link.";
11     reference
12         "IEEE Std 802.3.1, dot3ExtPkgObjectReportMaximumNumQueues";
13 }
14 leaf ompe-mode {
15     type ompe-mode;
16     config false;
17     description
18         "This object indicates the mode of operation of the
19         Reconciliation Sublayer for Point-to-Point Emulation (see IEEE
20         Std 802.3, 65.1 or 76.2 as appropriate).
21
22         The value of 'unknown' is assigned in initialization; true state
23         or type is not yet known.
24
25         The value of 'olt' is assigned when the sublayer is operating in
26         OLT mode.
27
28         The value of 'onu' is assigned when the sublayer is operating in
29         ONU mode.
30
31         This object is applicable for an OLT and an ONU. It has the same
32         value for each logical link.";
33     reference
34         "IEEE Std 802.3, 30.3.7.1.2";
35 }
36 }
37 }
```

8. YANG module for Ethernet Link OAM (ELO)

8.1 Introduction

IEEE Std 802.3, Clause 57 includes management capabilities for Ethernet-like interfaces to provide some basic operations, administration and maintenance (OAM) functions. The defined functionality includes discovery, error signaling, loopback, and link monitoring. This clause defines a portion of the YANG module for use with NETCONF or RESTCONF to manage these Ethernet-like interface capabilities.

8.2 Overview

Ethernet OAM is composed of a core set of functions and a set of optional functional groups as described in Clause 57 of IEEE Std 802.3. The core functions include discovery operations (determining if the other end of the link is OAM capable and what OAM functions it supports), state machine implementation, and some critical event flows.

Ethernet OAM provides single-hop functionality in that it works only between two directly connected Ethernet stations. Ethernet OAM has three functional objectives, which are detailed in 8.2.1 through 8.2.3. The definition of a basic Ethernet OAM protocol data unit is given in 8.2.4.

8.2.1 Remote fault indication

Remote fault indication provides a mechanism for one end of an Ethernet link to signal the other end that the receive path is non-operational. Some Ethernet Physical Layers offer mechanisms to signal this condition at the Physical Layer. Ethernet OAM added a mechanism so that some Ethernet Physical Layers can operate in unidirectional mode, allowing frames to be transmitted in one direction even when the other direction is non-operational. Traditionally, Ethernet PHYs do not allow frame transmission in one direction if the other direction is not operational. Using this mode, Ethernet OAM allows frame-based signaling of remote fault conditions while still not allowing higher layer applications to be aware of the unidirectional capability. This clause includes mechanisms for capturing that fault information and reflecting such information in data nodes and notifications within the NETCONF management framework.

8.2.2 Link monitoring

Ethernet OAM includes event signaling capability so that one end of an Ethernet link can indicate the occurrence of certain important events to the other end of the link. This happens via layer 2 protocols. This clause defines methods for incorporating the occurrence of these events, at both the local end and the far end of the link, into the YANG-based management framework.

Ethernet OAM also includes mechanisms for one Ethernet station to query another directly connected Ethernet station about the status of its Ethernet interface variables and status. This clause does not include mechanisms for controlling how one Ethernet endpoint may use this functionality to query the status or statistics of a peer Ethernet entity.

8.2.3 Remote loopback

Remote loopback is a link state where the peer Ethernet entity echoes every received packet (without modifications) back onto the link. Remote loopback is intrusive in that the other end of the link is not forwarding traffic from higher layers out over the link. This clause defines data nodes controlling loopback operation and reading the status of the loopback state.

8.2.4 Ethernet OAM protocol data units

An Ethernet OAM protocol data unit (OAMPDU) is a valid Ethernet frame with a destination Media Access Control (MAC) address equal to the MAC address assigned for Slow Protocols (see IEEE Std 802.3, Annex 57A), a lengthOrType field equal to the Type assigned for Slow Protocols, and a Slow Protocols subtype equal to that of the subtype assigned for Ethernet OAM.

OAMPDU is used throughout this clause as an abbreviation for Ethernet OAM protocol data unit. OAMPDUs are the mechanism by which two directly connected Ethernet interfaces exchange OAM information.

8.3 Security considerations for Ethernet operations, administration, and maintenance (OAM) module

The readable data nodes in this module can provide information about network traffic, and therefore, they may be considered sensitive. In particular, OAM provides mechanisms for reading the Clause 30 IEEE 802.3 management attributes from a link partner via a layer 3 protocol. IEEE Std 802.3 OAM does not include encryption or authentication mechanisms. It should not be used in environments where this interface information is considered sensitive, and where the facility terminations are unprotected. By default, OAM is disabled on Ethernet-like interfaces and is therefore not a risk.

IEEE Std 802.3 OAM is designed to support deployment in access and enterprise networks. In access networks, one end of a link is the CO-side, and the other is the CPE-side, and the facilities are often protected in wiring cages or closets. In such deployments, it is often the case that the CO-side is protected from access from the CPE-side. Within IEEE Std 802.3 OAM, this protection from remote access is accomplished by configuring the CPE-side in passive mode using the mode leaf. This prevents the CPE from accessing functions and information at the CO-side of the connection. In enterprise networks, read-only interface information is often considered non-sensitive.

The frequency of OAM PDUs on an Ethernet interface does not adversely affect data traffic, as OAM is a slow protocol with very limited bandwidth potential, and it is not required for normal link operation. Although there are a number of objects in this module with read-write or read-create MAX-ACCESS, they have limited effects on user data.

The loopback capability of OAM can have potentially disruptive effects; when remote loopback is enabled, the remote station automatically transmits all received traffic back to the local station except for OAM traffic. This completely disrupts all higher layer protocols such as bridging, IP, and NETCONF/RESTCONF.

The administrative state and mode are also configuration nodes. Disabling OAM can interrupt management activities between peer devices, potentially causing serious problems. Setting the mode node to an undesired value can allow access to Ethernet monitoring, events, and functions that may not be acceptable in a particular deployment scenario. In addition to loopback functionality, Ethernet interface statistics and events can be accessed via the OAM protocol, which may not be desired in some circumstances.

OAM event configuration also contains configuration nodes. These nodes control whether events are sent, and at what thresholds. Note that the frequency of event communication is limited by the frequency limits of Slow Protocols on Ethernet interfaces. Also, the information available via OAM events is also available via OAM Variable Requests. Access to this information via either OAM events or Variable Requests is controlled by the admin and mode nodes. As mentioned previously, inadequate protection of these variables can result in access to link information and functions.

8.4 Mapping of IEEE 802.3 managed objects

This subclause contains the mapping between the YANG data nodes defined in this clause and the attributes defined in IEEE Std 802.3, Clause 30. Table 8–1 provides the mapping between the *ieee802-ethernet-link-oam* module data nodes and the OAM attributes of IEEE Std 802.3, Clause 30.

Table 8–1—Mapping between IEEE Std 802.3, Clause 30 managed objects and *ieee802-ethernet-link-oam* YANG data nodes

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-link-oam</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
oOAM	aOAMAdminState	30.3.6.1.2	interfaces/interface/ethernet/link-oam	admin	R/W
	dot3OamOperStatus aOAMDiscoveryState aOAMLocalFlagsField aOAMRemoteFlagsField	IEEE Std 802.3.1 30.3.6.1.4 30.3.6.1.10 30.3.6.1.11	interfaces/interface/ethernet/link-oam/ discovery-info/local	operational-status	R
	aOAMLocalState	30.3.6.1.14		loopback-mode	R
	aOAMMode	30.3.6.1.3		mode	RW
	aOAMLocalRevision	30.3.6.1.12		revision	R
	aOAMLocalPDUConfiguration	30.3.6.1.8		oammtu	R
	aOAMRemoteConfiguration	30.3.6.1.7	interfaces/interface/ethernet/link-oam/ discovery-info/remote/functions-sup- ported	uni-directional-link-fault	R/W
				loopback	R/W
				mib-retrieval	R/W
	aOAMLocalConfiguration	30.3.6.1.6	interfaces/interface/ethernet/link-oam/ discovery-info/local/functions-sup- ported/link-monitor	link-monitoring	R/W
	aOAMLocalErrSymPeriodConfig aOAMLocalErrFrameConfig aOAMLocalErrFramePeriodConfig aOAMLocalErrFrameSecsSummaryConfig aOAMLocalErrSymPeriodConfig	30.3.6.1.34 30.3.6.1.36 30.3.6.1.38 30.3.6.1.40 30.3.6.1.42	interfaces/interface/ethernet/link-oam/ link-monitor/event-type	threshold-type window threshold	R/W R/W R/W
	aOAMRemoteMACAddress	30.3.6.1.5	interfaces/interface/ethernet/link-oam/ discovery-info/remote	mac-address	R
	aOAMRemoteVendorOUI	30.3.6.1.16		vendor-oui	R

Table 8–1—Mapping between IEEE Std 802.3, Clause 30 managed objects
and *ieee802-ethernet-link-oam* YANG data nodes (continued)

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-link-oam</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aOAMRemoteVendorSpecificInfo	30.3.6.1.17		vendor-info	R
	aOAMRemoteState	30.3.6.1.15		loopback-mode	R
	aOAMMode	30.3.6.1.3		mode	R
	aOAMRemoteRevision	30.3.6.1.13		revision	R
	aOAMRemotePDUConfiguration	30.3.6.1.9		oammtu	R

**Table 8–1—Mapping between IEEE Std 802.3, Clause 30 managed objects
and *ieee802-ethernet-link-oam* YANG data nodes (continued)**

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-link-oam</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
OAM	aOAMLocalConfiguration	30.3.6.1.6	interfaces/interface/ethernet/link-oam/ discovery-info/local/functions-sup- ported	uni-directional-link-fault	R
				loopback	R
				link-monitoring	R
				mib-retrieval	R
	dot3OamEventLogEntry	IEEE Std 802.3.1	interfaces-state/ interface/ethernet/ link-oam/event-log/event-log-entry	index	R
				oui	R
				timestamp	R
				location	R
				event-type	R
				running-total	R
				event-total	R
	aOAMLocalErrSymPeriodEvent aOAMLocalErrFrameEvent aOAMLocalErrFramePeriodConfig aOAMLocalErrFrameSecsSummaryEvent aOAMRemoteErrSymPeriodEvent aOAMRemoteErrFrameEvent aOAMRemoteErrFramePeriodEvent aOAMRemoteErrFrameSecsSummaryEvent	30.3.6.1.35 30.3.6.1.37 30.3.6.1.38 30.3.6.1.41 30.3.6.1.42 30.3.6.1.43 30.3.6.1.44 30.3.6.1.45	interfaces/interface/ethernet/link-oam/ event-log/event-log-entry/threshold	threshold-event-type window threshold value	R R R R
	Dot3OamStatsEntry	RFC-4878	interfaces/interface/ethernet/link-oam/ statistics	out-information	R
	aOAMInformationTx	30.3.6.1.20			

Table 8–1—Mapping between IEEE Std 802.3, Clause 30 managed objects
and *ieee802-ethernet-link-oam* YANG data nodes (continued)

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-link-oam</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
	aOAMInformationRx	30.3.6.1.21		in-information	R
	aOAMUniqueEventNotificationTx	30.3.6.1.22		out-unique-event-notification	R
	aOAMUniqueEventNotificationRx	30.3.6.1.24		in-unique-event-notification	R
	aOAMDuplicateEventNotificationTx	30.3.6.1.23		out-duplicate-event-notification	R
	aOAMDuplicateEventNotificationRx	30.3.6.1.25		in-duplicate-event-notification	R
	aOAMLoopbackControlTx	30.3.6.1.26		out-loopback-control	R
	aOAMLoopbackControlRx	30.3.6.1.27		in-loopback-control	R
	aOAMVariableRequestTx	30.3.6.1.28		out-variable-request	R

**Table 8–1—Mapping between IEEE Std 802.3, Clause 30 managed objects
and *ieee802-ethernet-link-oam* YANG data nodes (continued)**

IEEE Std 802.3, Clause 30		Reference	Corresponding <i>ieee802-ethernet-link-oam</i> YANG data nodes		
Managed object(s)	Attribute(s)		Container(s)	Data node(s)	R/W
OAM	aOAMVariableRequestRx	30.3.6.1.29	interfaces/interface/ethernet/link-oam/ statistics	variable-requeste-rx	R
	aOAMVariableResponseTx	30.3.6.1.30		out-variable-response	R
	aOAMVariableResponseRx	30.3.6.1.31		in-variable-response	R
	aOAMOrganizationSpecificTx	30.3.6.1.32		out-org-specific	R
	aOAMOrganizationSpecificRx	30.3.6.1.33		in-org-specific	R
	aOAMUnsupportedCodesTx	30.3.6.1.18		unsupported-condes-tx	R
	aOAMUnsupportedCodesRx	30.3.6.1.19		in-unsupported-codes	R
	aFramesLostDueToOAMError	30.3.6.1.46		frames-lost-due-to-oam	R
	aOAMLocalErrSymPeriodEvent, Errored Symbols	30.3.6.1.35		local-error-symbol-period-log-entries	R
	aOAMLocalErrFrameEvent, Errored Frames	30.3.6.1.37		local-error-frame-log-entries	R
	aOAMLocalErrFramePeriodEvent, Errored Frames	30.3.6.1.39		local-error-frame-period-log-entries	R
	aOAMLocalErrFrameSecsSummaryEvent, Errored Frame Seconds Summary	30.3.6.1.41		local-error-frame-second-log-entries	R
	aOAMRemoteErrSymPeriodEvent, Errored Symbols	30.3.6.1.42		remote-error-symbol-period-log-entries	R
	aOAMRemoteErrFrameEven, Errored Frames	30.3.6.1.43		remote-error-frame-log-entries	R
	aOAMRemoteErrFramePeriodEvent, Errored Frames	30.3.6.1.44		remote-error-frame-period-log-entries	R
	aOAMRemoteErrFrameSecsSummaryEvent, Errored Frame Seconds Summary	30.3.6.1.45		remote-error-frame-second-log-entries	R

8.5 YANG module definition^P

The YANG module tree hierarchy uses terms defined in IETF RFC 8407.

8.5.1 Tree hierarchy

module: ieee802-ethernet-link-oam

```

augment /if:interfaces/if:interface:
  +--rw link-oam!
    +--rw admin?                               admin-state
    +--rw discovery-info
      | +--rw local
      | | +--ro operational-status             operational-state
      | | +--ro loopback-mode                 loopback-status
      | | | {remote-loopback-initiate or
remote-loopback-respond}?
      | | +--rw mode?                         mode
      | | +--rw functions-supported
      | | | +--rw uni-directional-link-fault?  boolean
      | | | | {uni-directional-link-fault}?
      | | | +--rw loopback?                   boolean
      | | | | {remote-loopback-initiate}?
      | | | +--rw link-monitor
      | | | | {link-monitoring-remote or
link-monitoring-local}?
      | | | | +--rw link-monitoring?          boolean
      | | | | +--rw event-type* [threshold-type]
      | | | | | {link-monitoring-local}?
      | | | | +--rw threshold-type            threshold-event-enum
      | | | | +--rw window?                   uint64
      | | | | +--rw threshold?                uint64
      | | | +--rw mib-retrieval?              boolean
      | | | | {remote-mib-retrieval-initiate or

```

^PCopyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.

```

remote-mib-retrieval-respond)?
| | +--ro revision?          uint64
| | +--ro oammtu?           uint16
| +--ro remote
|   +--ro mac-address?      ieee:mac-address
|   +--ro vendor-oui?       vendor-oui
|   +--ro vendor-info?      uint64
|   +--ro loopback-mode     loopback-status
|   +--ro mode?             mode
|   +--ro functions-supported
|     | +--ro uni-directional-link-fault?  boolean
|     | +--ro loopback?                    boolean
|     | +--ro link-monitoring?             boolean
|     | +--ro mib-retrieval?               boolean
|   +--ro revision?          uint64
|   +--ro oammtu?            uint16
+--ro event-log
|   +--ro event-log-entry* [index]
|     +--ro index            uint64
|     +--ro oui              vendor-oui
|     +--ro timestamp        uint64
|     +--ro location         event-location
|     +--ro event-type       identityref
|     +--ro running-total    yang:counter64
|     +--ro event-total      yang:counter64
|     +--ro threshold
|       {link-monitoring-local or
link-monitoring-remote}?
|   +--ro threshold-event-type  threshold-event-enum
|   +--ro window                uint64
|   +--ro threshold             uint64
|   +--ro value                 uint64
+--ro statistics
|   +--ro out-information
|     | yang:counter64
|   +--ro in-information

```

```
| | yang:counter64
| +--ro out-unique-event-notification
| | yang:counter64 {link-monitoring-local}?
| +--ro in-unique-event-notification
| | yang:counter64 {link-monitoring-remote}?
| +--ro out-duplicate-event-notification
| | yang:counter64 {link-monitoring-local}?
| +--ro in-duplicate-event-notification
| | yang:counter64 {link-monitoring-remote}?
| +--ro out-loopback-control
| | yang:counter64 {remote-loopback-initiate}?
| +--ro in-loopback-control
| | yang:counter64 {remote-loopback-respond}?
| +--ro out-variable-request
| | yang:counter64 {remote-mib-retrieval-initiate}?
| +--ro in-variable-request
| | yang:counter64 {remote-mib-retrieval-respond}?
| +--ro out-variable-response
| | yang:counter64 {remote-mib-retrieval-respond}?
| +--ro in-variable-response
| | yang:counter64 {remote-mib-retrieval-initiate}?
| +--ro out-org-specific
| | yang:counter64
| +--ro in-org-specific
| | yang:counter64
| +--ro out-unsupported-codes
| | yang:counter64
| +--ro in-unsupported-codes
| | yang:counter64
| +--ro frames-lost-due-to-oam
| | yang:counter64
| +--ro local-error-symbol-period-log-entries
| | yang:counter64
| +--ro local-error-frame-log-entries
| | yang:counter64
| +--ro local-error-frame-period-log-entries
```

```

| | yang:counter64
| +---ro local-error-frame-second-log-entries
| | yang:counter64
| +---ro remote-error-symbol-period-log-entries
| | yang:counter64 {link-monitoring-remote}?
| +---ro remote-error-frame-log-entries
| | yang:counter64 {link-monitoring-remote}?
| +---ro remote-error-frame-period-log-entries
| | yang:counter64 {link-monitoring-remote}?
| +---ro remote-error-frame-second-log-entries
| | yang:counter64 {link-monitoring-remote}?
+---x remote-loopback {remote-loopback-initiate}?
| +---w input
| | +---w enable boolean
| +---ro output
| | +---ro success boolean
| | +---ro error-message? string
+---x reset-stats
| +---ro output
| | +---ro success boolean
| | +---ro error-message? string
+---n non-threshold-event
| +-- oui vendor-oui
| +-- timestamp uint64
| +-- location event-location
| +-- event-type identityref
| +-- running-total yang:counter64
| +-- event-total yang:counter64
+---n threshold-event
| {link-monitoring-local or
link-monitoring-remote}?
| +-- oui vendor-oui
| +-- timestamp uint64
| +-- location event-location
| +-- event-type identityref
| +-- running-total yang:counter64

```

```
    +-- event-total      yang:counter64
    +-- threshold
        {link-monitoring-local or
link-monitoring-remote}?
        +-- threshold-event-type    threshold-event-enum
        +-- window                  uint64
        +-- threshold                uint64
        +-- value                    uint64
```

8.5.2 YANG module

In the following YANG module definition, should any discrepancy between the text of the description for individual YANG nodes and the corresponding definition in 8.2 through 8.5 of this clause occur, the definitions in 8.2 through 8.5 shall take precedence.

Editor's Note (to be removed prior to publication):

Yang files contained in <https://github.com/YangModels/yang/tree/main/standard/ieee/published/802.3> are IEEE 802.3.1-2019 version and will be updated at the publication time.

An ASCII text version of the YANG module can be found at the following URL:⁹ <https://github.com/YangModels/yang/tree/master/standard/ieee/published/802.3>.

Editor's Note (to be removed prior to publication):

Pretty printing of `ieee802-ethernet-link-oam.yang` file may change the appearance by adding whitespace and reformatting lines

Editor's Note (to be removed prior to publication):

IEEE Std 802.3.1 and IEEE Std 802.3.2 to be updated at the publication time

```
module ieee802-ethernet-link-oam {
  yang-version "1.1";
  namespace urn:ieee:std:802.3:yang:ieee802-ethernet-link-oam;
  prefix ieee802-link-oam;
  import ieee802-types {
    prefix ieee;
    reference
      "IEEE 802 types";
  }
  import ietf-yang-types {
    prefix yang;
    reference
      "IETF RFC 6991";
  }
  import iana-if-type {
    prefix ianaift;
    reference
      "http://www.iana.org/assignments/yang-parameters/
      iana-if-type@2023-01-26.yang";
  }
  import ietf-interfaces {
    prefix if;
    reference
      "IETF RFC 8343";
  }
  organization
    "IEEE 802.3 Ethernet Working Group
    Web URL: http://www.ieee802.org/3/";
  contact
    "Web URL: http://www.ieee802.org/3/";
  description
    "This module contains a collection of YANG definitions for managing
    the Ethernet Link OAM feature defined by IEEE 802.3. It provides
    functionality roughly equivalent to that of the DOT3-OAM-MIB defined
```

⁹Copyright release for YANG modules: Users of this standard may freely reproduce the YANG module contained in this subclause so that it can be used for its intended purpose.


```
1      in IETF RFC 4878.";
2  revision 2024-02-12 {
3      description
4          "Updates under IEEE Std 802.3.2-202x, Draft 1.1";
5      reference
6          "IEEE Std 802.3-2022, unless dated explicitly";
7  }
8  feature uni-directional-link-fault {
9      description
10         "This feature means the device supports Uni Directional Link Fault
11         detection.";
12      reference
13         "IEEE Std 802.3, 57.1.2:a, 30.3.6.1.6 aOAMLocalConfiguration and
14         30.3.6.1.7 aOAMRemoteConfiguration";
15  }
16  feature remote-loopback-initiate {
17      description
18         "This feature means the device supports being the initiator of
19         remote loopback.";
20      reference
21         "IEEE Std 802.3, 57.1.2:b, 30.3.6.1.6 aOAMLocalConfiguration";
22  }
23  feature remote-loopback-respond {
24      description
25         "This feature means the device supports responding to remote
26         loopback control OAMPDUs received from the peer";
27      reference
28         "IEEE Std 802.3, 57.1.2:b, 30.3.6.1.7 aOAMRemoteConfiguration";
29  }
30  feature link-monitoring-local {
31      description
32         "This feature means the device monitors the link at the local side
33         and can generate Link Event OAMPDUs to the peer device.";
34      reference
35         "IEEE Std 802.3, 57.1.2:c:1, 30.3.6.1.6 aOAMLocalConfiguration,
36         and 30.3.6.1.7 aOAMRemoteConfiguration";
37  }
38  feature link-monitoring-remote {
39      description
40         "This feature means the device can process Link Event OAMPDUs
41         received from the peer device and report itself about this event on
42         its own management interface.";
43      reference
44         "IEEE Std 802.3, 57.1.2:c:1, 30.3.6.1.6 aOAMLocalConfiguration,
45         and 30.3.6.1.7 aOAMRemoteConfiguration";
46  }
47  feature remote-mib-retrieval-initiate {
48      description
49         "This feature means the device supports data retrieval from the
50         peer device. I.e. the device can send Variable Requests OAMPDUs to
51         the peer side and process the received Variable Response OAMPDUs.";
52      reference
53         "IEEE Std 802.3, 57.1.2:c:2, 30.3.6.1.6 aOAMLocalConfiguration,
54         and 30.3.6.1.7 aOAMRemoteConfiguration";
55  }
56  feature remote-mib-retrieval-respond {
57      description
58         "This feature means the device allows the peer device to retrieve
59         data from the managed device. I.e. the device can process received
60         Variable Requests OAMPDUs and respond with Variable Response
61         OAMPDUs.";
62      reference
63         "IEEE Std 802.3, 57.1.2:c:2, 30.3.6.1.6 aOAMLocalConfiguration,
64         and 30.3.6.1.7 aOAMRemoteConfiguration";
65  }
```

```
1      }
2      identity event-type {
3          description
4              "Base identity for all Link OAM event types.";
5      }
6      identity threshold-event-type {
7          base event-type;
8          description
9              "Event type for a Link Monitoring threshold event.";
10     }
11     identity link-fault-event {
12         if-feature "uni-directional-link-fault";
13         base event-type;
14         description
15             "Event type for a uni-directional link fault event.";
16         reference
17             "IEEE Std 802.3, 57.2.10.1";
18     }
19     identity dying-gasp-event {
20         base event-type;
21         description
22             "Event type for a dying gasp event.";
23         reference
24             "IEEE Std 802.3, 57.2.10.1";
25     }
26     identity critical-event {
27         base event-type;
28         description
29             "Event type for a critical event.";
30         reference
31             "IEEE Std 802.3, 57.2.10.1";
32     }
33     typedef threshold-event-enum {
34         type enumeration {
35             enum symbol-period-event {
36                 value 1;
37                 description
38                     "Errored symbol period event.";
39             }
40             enum frame-period-event {
41                 value 2;
42                 description
43                     "Errored frame period event.";
44             }
45             enum frame-event {
46                 value 3;
47                 description
48                     "Errored frame event";
49             }
50             enum frame-seconds-event {
51                 value 4;
52                 description
53                     "Errored frame seconds event.";
54             }
55         }
56         description
57             "Enumeration of the valid threshold event types.";
58         reference
59             "IEEE Std 802.3, 57.5.3";
60     }
61     typedef mode {
62         type enumeration {
63             enum passive {
64                 value 0;
```

```
1      description
2      "Ethernet Link OAM Passive mode.";
3    }
4    enum active {
5      value 1;
6      description
7      "Ethernet Link OAM Active mode.";
8    }
9  }
10 description
11 "Enumeration of the valid modes in which Link OAM may run.";
12 reference
13 "IEEE Std 802.3, 57.2.9 and 30.3.6.1.3.";
14 }
15 typedef event-location {
16   type enumeration {
17     enum event-location-local {
18       value 1;
19       description
20       "A local event.";
21     }
22     enum event-location-remote {
23       value 2;
24       description
25       "A remote event.";
26     }
27   }
28   description
29   "The location of the event that caused a log entry.";
30 }
31 typedef loopback-status {
32   type enumeration {
33     enum none {
34       value 1;
35       description
36       "Loopback is not being performed.";
37     }
38     enum initiating {
39       value 2;
40       description
41       "Initiating master loopback.";
42     }
43     enum master-loopback {
44       value 3;
45       description
46       "In master loopback mode.";
47     }
48     enum terminating {
49       value 4;
50       description
51       "Terminating master loopback mode.";
52     }
53     enum local-loopback {
54       value 5;
55       description
56       "In slave loopback mode.";
57     }
58     enum unknown {
59       value 6;
60       description
61       "Parser and multiplexer combination unexpected.";
62     }
63   }
64 }
65 description
```

```
1      "The loopback mode of an OAM interface.";
2      reference
3      "IEEE Std 802.3, 57.2.11";
4  }
5  typedef operational-state {
6      type enumeration {
7          enum disabled {
8              value 1;
9              description
10             "IEEE Std 802.3 OAM is disabled.";
11         }
12         enum link-fault {
13             value 2;
14             description
15             "IEEE Std 802.3 OAM has encountered a link fault.";
16         }
17         enum passive-wait {
18             value 3;
19             description
20             "Passive OAM entity waiting to see if peer is OAM capable.";
21         }
22         enum active-send-local {
23             value 4;
24             description
25             "Active OAM entity trying to determine if peer is OAM capable.";
26         }
27         enum send-local-and-remote {
28             value 5;
29             description
30             "OAM discovered peer but still to accept or reject peer
31             configuration.";
32         }
33         enum send-local-and-remote-ok {
34             value 6;
35             description
36             "OAM peering is allowed by local device.";
37         }
38         enum peering-locally-rejected {
39             value 7;
40             description
41             "OAM peering rejected by local device.";
42         }
43         enum peering-remotely-rejected {
44             value 8;
45             description
46             "OAM peering rejected by remote device.";
47         }
48         enum operational {
49             value 9;
50             description
51             "IEEE Std 802.3 OAM is operational.";
52         }
53         enum operational-half-duplex {
54             value 10;
55             description
56             "IEEE Std 802.3 OAM is operating in half-duplex mode.";
57         }
58     }
59 }
60 description
61 "Operational state of an interface.";
62 reference
63 "IEEE Std 802.3, 30.3.6.1.4,
64 30.3.6.1.10, and 30.3.6.1.11";
65 }
```

```
1  typedef vendor-oui {
2      type string {
3          length "6";
4      }
5      description
6          "24-bit MAC addresses - large(MA-L). Previously know as
7          Organizationally Unique Identifier (OUI).";
8      reference
9          "IEEE Std 802-2014, Clause 8.2.2";
10 }
11 typedef admin-state {
12     type enumeration {
13         enum enabled {
14             value 1;
15             description
16                 "IEEE Std 802.3, Clause 57 OAM is in the enabled admin state.";
17         }
18         enum disabled {
19             value 2;
20             description
21                 "IEEE Std 802.3, Clause 57 OAM is in the disabled admin state.";
22         }
23     }
24     description
25         "Admin state of the OAM function on an interface.";
26     reference
27         "IEEE Std 802.3, 30.3.6.1.2 and 30.3.6.2";
28 }
29 grouping event-details {
30     description
31         "Nodes describing an event, used in the event log and in
32         notifications.";
33     reference
34         "IETF RFC 4878, Dot3OamEventLogEntry";
35     leaf oui {
36         type vendor-oui;
37         mandatory true;
38         description
39             "Organizationally Unique Identifier for the device that generated
40             the event.";
41     }
42     leaf timestamp {
43         type uint64;
44         units "milliseconds";
45         mandatory true;
46         description
47             "Timestamp in milliseconds since Unix epoch for when the event
48             occurred.";
49     }
50     leaf location {
51         type event-location;
52         mandatory true;
53         description
54             "Where the event occurred (local or remote).";
55     }
56     leaf event-type {
57         type identityref {
58             base event-type;
59         }
60         mandatory true;
61         description
62             "Type of event that occurred.";
63         reference
64             "IEEE Std 802.3, 30.3.6.1.10 and 30.3.6.11";
65     }
66 }
```

```

1      }
2      leaf running-total {
3          type yang:counter64;
4          mandatory true;
5          description
6              "The running total number of errors seen since OAM was enabled on
7              the interface. For threshold events, this is the total number of
8              times that particular type of error (e.g. symbol error) has
9              occurred, which may be greater than the number of
10             threshold-crossing event notifications of that type generated
11             during that time (which is conveyed by the event-total leaf).";
12     }
13     leaf event-total {
14         type yang:counter64;
15         mandatory true;
16         description
17             "Total number of times this event has occurred since OAM was
18             enabled on the interface. For threshold events this is the number
19             of events generated of this type (as opposed to the total number
20             of errors of that type, which may be greater, and is conveyed by
21             the running-total leaf.";
22     }
23 }
24 grouping threshold-event-details {
25     description
26         "Nodes describing a threshold event, used in the event log and in
27         notifications";
28     reference
29         "IETF RFC 4878, Dot3OamEventLogEntry";
30     container threshold {
31         when
32             "../event-type = 'threshold-event-type'" {
33                 description
34                     "These nodes only apply to threshold event types";
35             }
36         if-feature "link-monitoring-local or link-monitoring-remote";
37         description
38             "Nodes specific to threshold (link monitoring) events";
39         leaf threshold-event-type {
40             type threshold-event-enum;
41             mandatory true;
42             description
43                 "The type of threshold event";
44             reference
45                 "IEEE Std 802.3, 57.5.3";
46         }
47         leaf window {
48             type uint64;
49             mandatory true;
50             description
51                 "Size of the window in which the event was generated. Units are
52                 dependent on the threshold event type.";
53         }
54         leaf threshold {
55             type uint64;
56             mandatory true;
57             description
58                 "Size of the threshold that was breached during the window.
59                 Units are dependent on the threshold event type.";
60         }
61         leaf value {
62             type uint64;
63             mandatory true;
64             description
65 
```

```
1         "Breaching value. Units are dependent on the threshold event
2         type, and match that of the threshold.";
3     }
4 }
5 }
6 grouping statistics-common {
7     description
8         "Collection of Link OAM event/packet counters.";
9     reference
10        "IETF RFC 4878, Dot3OamStatsEntry";
11    leaf out-information {
12        type yang:counter64;
13        mandatory true;
14        description
15            "Number of information OAMPDUs transmitted.";
16        reference
17            "IEEE Std 802.3, 30.3.6.1.20";
18    }
19    leaf in-information {
20        type yang:counter64;
21        mandatory true;
22        description
23            "Number of information OAMPDUs received.";
24        reference
25            "IEEE Std 802.3, 30.3.6.1.21";
26    }
27    leaf out-unique-event-notification {
28        if-feature "link-monitoring-local";
29        type yang:counter64;
30        mandatory true;
31        description
32            "Number of unique event notification OAMPDUs transmitted.";
33        reference
34            "IEEE Std 802.3, 30.3.6.1.22";
35    }
36    leaf in-unique-event-notification {
37        if-feature "link-monitoring-remote";
38        type yang:counter64;
39        mandatory true;
40        description
41            "Number of unique event notification OAMPDUs received.";
42        reference
43            "IEEE Std 802.3, 30.3.6.1.24";
44    }
45    leaf out-duplicate-event-notification {
46        if-feature "link-monitoring-local";
47        type yang:counter64;
48        mandatory true;
49        description
50            "Number of duplicate event notification OAMPDUs transmitted.";
51        reference
52            "IEEE Std 802.3, 30.3.6.1.23";
53    }
54    leaf in-duplicate-event-notification {
55        if-feature "link-monitoring-remote";
56        type yang:counter64;
57        mandatory true;
58        description
59            "Number of duplicate event notification OAMPDUs received.";
60        reference
61            "IEEE Std 802.3, 30.3.6.1.25";
62    }
63    leaf out-loopback-control {
64        if-feature "remote-loopback-initiate";
```

```
1      type yang:counter64;
2      mandatory true;
3      description
4        "Number of loopback control OAMPDUs transmitted.";
5      reference
6        "IEEE Std 802.3, 30.3.6.1.26";
7    }
8    leaf in-loopback-control {
9      if-feature "remote-loopback-respond";
10     type yang:counter64;
11     mandatory true;
12     description
13       "Number of loopback control OAMPDUs received.";
14     reference
15       "IEEE Std 802.3, 30.3.6.1.27";
16   }
17   leaf out-variable-request {
18     if-feature "remote-mib-retrieval-initiate";
19     type yang:counter64;
20     mandatory true;
21     description
22       "Number of variable request OAMPDUs transmitted.";
23     reference
24       "IEEE Std 802.3, 30.3.6.1.28";
25   }
26   leaf in-variable-request {
27     if-feature "remote-mib-retrieval-respond";
28     type yang:counter64;
29     mandatory true;
30     description
31       "Number of variable request OAMPDUs received.";
32     reference
33       "IEEE Std 802.3, 30.3.6.1.29";
34   }
35   leaf out-variable-response {
36     if-feature "remote-mib-retrieval-respond";
37     type yang:counter64;
38     mandatory true;
39     description
40       "Number of variable response OAMPDUs transmitted.";
41     reference
42       "IEEE Std 802.3, 30.3.6.1.30";
43   }
44   leaf in-variable-response {
45     if-feature "remote-mib-retrieval-initiate";
46     type yang:counter64;
47     mandatory true;
48     description
49       "Number of variable response OAMPDUs received.";
50     reference
51       "IEEE Std 802.3, 30.3.6.1.31";
52   }
53   leaf out-org-specific {
54     type yang:counter64;
55     mandatory true;
56     description
57       "Number of organization specific OAMPDUs transmitted.";
58     reference
59       "IEEE Std 802.3, 30.3.6.1.32";
60   }
61   leaf in-org-specific {
62     type yang:counter64;
63     mandatory true;
64     description
65
```



```
1      "Number of organization specific OAMPDUs received.";
2      reference
3      "IEEE Std 802.3, 30.3.6.1.33";
4  }
5  leaf out-unsupported-codes {
6      type yang:counter64;
7      mandatory true;
8      description
9      "Number of OAMPDUs with unsupported codes transmitted.";
10     reference
11     "IEEE Std 802.3, 30.3.6.1.18";
12 }
13 leaf in-unsupported-codes {
14     type yang:counter64;
15     mandatory true;
16     description
17     "Number of OAMPDUs with unsupported codes received.";
18     reference
19     "IEEE Std 802.3, 30.3.6.1.19";
20 }
21 leaf frames-lost-due-to-oam {
22     type yang:counter64;
23     mandatory true;
24     description
25     "A count of the number of frames that were dropped by the OAM
26     multiplexer. Since the OAM multiplexer has multiple inputs and a
27     single output, there may be cases where frames are dropped due to
28     transmit resource contention. This counter is incremented
29     whenever a frame is dropped by the OAM layer.";
30     reference
31     "IEEE Std 802.3, 30.3.6.1.46";
32 }
33 }
34 grouping discovery-remote {
35     description
36     "Nodes describing the discovery process remote end of a link.";
37     leaf mode {
38         type mode;
39         description
40         "Mode (passive/active).";
41         reference
42         "IEEE Std 802.3, 30.3.6.1.3";
43     }
44     container functions-supported {
45         description
46         "The Link OAM functions supported by this interface.";
47         reference
48         "IEEE Std 802.3, 30.3.6.1.7";
49         leaf uni-directional-link-fault {
50             type boolean;
51             description
52             "Unidirectional link fault support.";
53         }
54         leaf loopback {
55             type boolean;
56             description
57             "Remote Loopback support.";
58         }
59         leaf link-monitoring {
60             type boolean;
61             description
62             "Link monitoring support.";
63         }
64     }
65     leaf mib-retrieval {
```

```

1         type boolean;
2         description
3             "MIB variable retrieval support.";
4     }
5 }
6 leaf revision {
7     type uint64;
8     config false;
9     description
10        "Configuration revision.";
11    reference
12        "IEEE Std 802.3, 30.3.6.1.12 and 30.3.6.1.13";
13 }
14 leaf oammtu {
15     type uint16;
16     units "octets";
17     config false;
18     description
19        "The maximum OAMPDU size for the remote node. The peer OAM
20        entities exchange the maximum size they can support and negotiate
21        to use the smaller of the two maximum OAMPDU sizes.";
22    reference
23        "IEEE Std 802.3, 30.3.6.1.8 and 30.3.6.1.9";
24 }
25 }
26 grouping discovery-local {
27     description
28        "Nodes describing the local end discovery process of a link.";
29     leaf mode {
30         type mode;
31         description
32            "This object configures the mode of OAM operation as active or
33            passive. Active mode provides capabilities to initiate monitoring
34            activities with the remote OAM peer entity, while passive mode
35            waits for the peer to initiate actions with it. Changing this
36            value results in incrementing the revision field of locally
37            generated OAMPDUs (see IEEE Std 802.3, 30.3.6.1.12) and triggers
38            the OAM discovery process if the operational state was already
39            'operational'. The default value is implementation-dependent.";
40         reference
41            "IEEE Std 802.3, 30.3.6.1.3";
42     }
43     container functions-supported {
44         description
45            "The Link OAM functions supported by this interface.";
46         reference
47            "IEEE Std 802.3, 30.3.6.1.7";
48         leaf uni-directional-link-fault {
49             if-feature "uni-directional-link-fault";
50             type boolean;
51             description
52                "Unidirectional link fault support. This affects the setting of
53                the 'Unidirectional Support' bit in the OAM configuration field
54                put in the Information OAMPDU. This bit indicates to the peer
55                device that it can send OAM PDUs on links that are operating in
56                unidirectional mode (traffic flowing in one direction only).";
57         }
58         leaf loopback {
59             if-feature "remote-loopback-initiate";
60             type boolean;
61             default "true";
62             description
63                "Remote Loopback support.";
64         }
65     }

```

```
1     container link-monitor {
2         if-feature "link-monitoring-remote or link-monitoring-local";
3         description
4             "Configure link monitor parameters.";
5         reference
6             "IEEE Std 802.3, 57.1.2:c";
7         leaf link-monitoring {
8             type boolean;
9             default "true";
10            description
11                "Enable or disable monitoring. This affects the setting of
12                 the 'Link Events' bit in the OAM configuration field put in
13                 the Information OAMPDU. This bit indicates to the peer device
14                 that the OAM entity can send and receive Event Notification
15                 OAMPDUs.";
16        }
17        list event-type {
18            if-feature "link-monitoring-local";
19            key "threshold-type";
20            description
21                "A list containing at most one entry for each of the
22                 threshold event types. If there is no entry for a particular
23                 event type, the default values are used for both window size
24                 and threshold.";
25            leaf threshold-type {
26                type threshold-event-enum;
27                description
28                    "The type of threshold event for which this list entry is
29                     specifying the configuration.";
30                reference
31                    "IEEE Std 802.3, 57.5.3";
32            }
33            leaf window {
34                type uint64;
35                description
36                    "The size of the window to use when monitoring for this
37                     threshold event. The units, default and upper and lower
38                     bounds depend on the threshold type as follows:
39
40                     Symbol Period: Units: number of symbols Default: number of
41                     symbols in one second for the underlying physical layer
42                     Min: number of symbols in one second for the underlying
43                     physical layer Max: number of symbols in one minute for the
44                     underlying physical layer
45
46                     Frame: Units: deciseconds Default: 1 second Min: 1 second
47                     Max: 1 minute
48
49                     Frame Period: Units: number of frames Default: number of
50                     minFrameSize frames in one second for the underlying
51                     physical layer Min: number of minFrameSize frames in one
52                     second for the underlying physical layer Max: number of
53                     minFrameSize frames in one minute for the underlying
54                     physical layer
55
56                     Frame Seconds: Units: deciseconds Default: 60 seconds Min:
57                     10 seconds Max: 900 seconds";
58                reference
59                    "IEEE Std 802.3, 30.3.6.1.34, 30.3.6.1.36, 30.3.6.1.38,
60                     and 30.3.6.1.40";
61            }
62        }
63        leaf threshold {
64            type uint64 {
65                range "1..max";
```

```

1      }
2      default "1";
3      description
4          "The threshold value to use when determining whether to
5          generate an event given the number of errors that occurred
6          in a given window. The units depend on the threshold type
7          as follows:
8
9          Symbol Period: number of errored symbols Frame: number of
10         errored frames Frame Period: number of errored frames Frame
11         Seconds: number of seconds containing at least 1 frame
12         error";
13     reference
14         "IEEE Std 802.3, 30.3.6.1.34, 30.3.6.1.36, 30.3.6.1.38,
15         and 30.3.6.1.40";
16     }
17 }
18 }
19 leaf mib-retrieval {
20     if-feature
21         "remote-mib-retrieval-initiate or"+
22         "remote-mib-retrieval-respond";
23
24     status deprecated;
25     type boolean;
26     description
27         "MIB variable retrieval support. This affects the setting of
28         the 'Variable Retrieval' bit in the OAM configuration field put
29         in the Information OAMPDU. This bit indicates to the peer
30         device that the OAM entity can send and receive Variable
31         Request and Response OAMPDUs.";
32 }
33 leaf data-retrieval {
34     if-feature
35         "remote-mib-retrieval-initiate or"+
36         "remote-mib-retrieval-respond";
37     type boolean;
38     description
39         "Variable retrieval support. This affects the setting of
40         the 'Variable Retrieval' bit in the OAM configuration field put
41         in the Information OAMPDU. This bit indicates to the peer
42         device that the OAM entity can send and receive Variable
43         Request and Response OAMPDUs.";
44 }
45 }
46 leaf revision {
47     type uint64;
48     config false;
49     description
50         "Configuration revision.";
51     reference
52         "IEEE Std 802.3, 30.3.6.1.12 and 30.3.6.1.13";
53 }
54 leaf oammtu {
55     type uint16;
56     units "octets";
57     config false;
58     description
59         "The maximum OAMPDU size for the local node. The peer OAM
60         entities exchange the maximum size they can support and negotiate
61         to use the smaller of the two maximum OAMPDU sizes.";
62     reference
63         "IEEE Std 802.3, 30.3.6.1.8 and 30.3.6.1.9";
64 }
65 }

```

```
1  grouping discovery-info {
2    description
3      "Information relating to the discovery process.";
4    container local {
5      description
6        "Properties of the local device.";
7      leaf operational-status {
8        type operational-state;
9        config false;
10       mandatory true;
11       description
12         "Operational status.";
13       reference
14         "IETF RFC 4878, dot3OamOperStatus; IEEE Std 802.3,
15         30.3.6.1.4, 30.3.6.1.10, and 30.3.6.1.11";
16     }
17     leaf loopback-mode {
18       if-feature "remote-loopback-initiate or remote-loopback-respond";
19       type loopback-status;
20       config false;
21       mandatory true;
22       description
23         "The loopback mode the interface is in.";
24       reference
25         "IEEE Std 802.3, 30.3.6.1.14";
26     }
27     uses discovery-local;
28   }
29   container remote {
30     config false;
31     description
32       "Properties of the remote (peer) device.";
33     leaf mac-address {
34       type ieee:mac-address;
35       description
36         "Remote MAC address.";
37       reference
38         "IEEE Std 802.3, 30.3.6.1.5";
39     }
40     leaf vendor-oui {
41       type vendor-oui;
42       description
43         "Remote vendor OUI.";
44       reference
45         "IEEE Std 802.3, 30.3.6.1.16";
46     }
47     leaf vendor-info {
48       type uint64;
49       description
50         "Remote vendor info. The semantics of this value are
51         proprietary and specific to the vendor.";
52       reference
53         "IEEE Std 802.3, 30.3.6.1.17";
54     }
55     leaf loopback-mode {
56       type loopback-status;
57       mandatory true;
58       description
59         "The loopback mode the interface is in.";
60       reference
61         "IEEE Std 802.3, 30.3.6.1.15";
62     }
63   }
64   uses discovery-remote;
65 }
```

```

1      }
2      augment "/if:interfaces/if:interface" {
3          when
4              "derived-from-or-self(if:type, 'ianaift:ethernetCsmacd') or "+
5              "derived-from-or-self(if:type, 'ianaift:ptm')";
6          description
7              "Augments the interface model with nodes specific to Ethernet
8              Link OAM.";
9      }
10     description
11         "Augments Ethernet interface model with nodes specific to Ethernet
12         Link OAM.";
13     container link-oam {
14         presence "Implies Link OAM is configured on the interface.";
15         description
16             "Interface operational state for Ethernet Link OAM.";
17         leaf admin {
18             type admin-state;
19             default "disabled";
20             description
21                 "This object is used to provision the default administrative
22                 OAM mode for this interface. This object represents the desired
23                 state of OAM for this interface. It starts in the disabled
24                 state until an explicit management action or configuration
25                 information retained by the system causes a transition to the
26                 enabled(1) state. When enabled(1), Ethernet OAM will attempt to
27                 operate over this interface. The default value is
28                 implementation-dependent.";
29         }
30         container discovery-info {
31             description
32                 "Information relating to the discovery process.";
33             uses discovery-info;
34         }
35         container event-log {
36             config false;
37             description
38                 "List of Ethernet Link OAM event log entries on the interface.";
39             list event-log-entry {
40                 key "index";
41                 description
42                     "Ethernet Link OAM event log entry.";
43                 leaf index {
44                     type uint64;
45                     description
46                         "Index of this event in the event log.";
47                 }
48                 uses event-details;
49                 uses threshold-event-details;
50             }
51         }
52     }
53     container statistics {
54         config false;
55         description
56             "Statistics for an 802.3 OAM interface.";
57         uses statistics-common;
58         leaf local-error-symbol-period-log-entries {
59             type yang:counter64;
60             mandatory true;
61             description
62                 "Number of local error symbol period log entries.";
63         }
64         leaf local-error-frame-log-entries {
65             type yang:counter64;

```

```

1      mandatory true;
2      description
3          "Number of local error frame log entries.";
4  }
5  leaf local-error-frame-period-log-entries {
6      type yang:counter64;
7      mandatory true;
8      description
9          "Number of local error frame period log entries.";
10 }
11 leaf local-error-frame-second-log-entries {
12     type yang:counter64;
13     mandatory true;
14     description
15         "Number of local error frame second log entries.";
16 }
17 leaf remote-error-symbol-period-log-entries {
18     if-feature "link-monitoring-remote";
19     type yang:counter64;
20     mandatory true;
21     description
22         "Number of remote error symbol period log entries.";
23 }
24 leaf remote-error-frame-log-entries {
25     if-feature "link-monitoring-remote";
26     type yang:counter64;
27     mandatory true;
28     description
29         "Number of remote error frame log entries.";
30 }
31 leaf remote-error-frame-period-log-entries {
32     if-feature "link-monitoring-remote";
33     type yang:counter64;
34     mandatory true;
35     description
36         "Number of remote error frame period log entries.";
37 }
38 leaf remote-error-frame-second-log-entries {
39     if-feature "link-monitoring-remote";
40     type yang:counter64;
41     mandatory true;
42     description
43         "Number of remote error frame second log entries.";
44 }
45 }
46 action remote-loopback {
47     if-feature "remote-loopback-initiate";
48     description
49         "Start/stop remote loopback on the specified interface.";
50     reference
51         "IEEE Std 802.3, 57.1.2:b";
52     input {
53         leaf enable {
54             type boolean;
55             mandatory true;
56             description
57                 "Whether to enable or disable remote loopback.";
58         }
59     }
60 }
61 output {
62     leaf success {
63         type boolean;
64         mandatory true;
65         description

```

```

1         "True if the operation was successful, false otherwise.";
2     }
3     leaf error-message {
4         type string;
5         description
6             "If the operation failed, optionally used to provide extra
7             details.";
8     }
9 }
10 }
11 action reset-stats {
12     description
13         "Reset Ethernet Link OAM statistics on this interface.";
14     output {
15         leaf success {
16             type boolean;
17             mandatory true;
18             description
19                 "True if the operation was successful, false otherwise.";
20         }
21         leaf error-message {
22             type string;
23             description
24                 "If the operation failed, optionally used to provide extra
25                 details.";
26         }
27     }
28 }
29 notification non-threshold-event {
30     description
31         "This notification is sent when a local or remote non-threshold
32         crossing event is detected.";
33     uses event-details {
34         refine "event-type" {
35             must
36                 ". != 'threshold-event-type'" {
37                 description
38                     "This leaf is not set to 'threshold-event-type'.";
39             }
40         }
41     }
42 }
43 notification threshold-event {
44     if-feature "link-monitoring-local or link-monitoring-remote";
45     description
46         "This notification is sent when a local or remote threshold
47         crossing event is detected.";
48     uses event-details {
49         refine "event-type" {
50             must
51                 ". = 'threshold-event-type'" {
52                 description
53                     "This leaf is set to 'threshold-event-type'.";
54             }
55         }
56     }
57     uses threshold-event-details;
58 }
59 }
60 }
61 }
62 }
63
64
65

```