

## 5. Ethernet YANG Module

### 5.1 YANG module structure

Two modules defined in this clause are focused on the configuration and monitoring of IEEE Std 802.3 Ethernet interfaces. The *ieee802-ethernet-interface* YANG module contains definitions of current attributes used widely in the industry in current products, while the *ieee802-ethernet-interface-half-duplex* YANG module contains definitions of half-duplex attributes. [The \*ieee802-ethernet-lldp\* YANG module contains definitions for configuring LLDP for IEEE Std 802.3 compliant interfaces.](#)

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), ~~and~~ *ieee802-ethernet-interface-half-duplex* (see Table 5-4) [and \*ieee802-ethernet-lldp\* \(see Table 5-5\)](#) -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	dot3HCOutPFCFrames				
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 <sup>a</sup>	interfaces/interface/ethernet/statistics/frame	in-total-frames	R
etherStatsOctets		in-total-octets	R
etherStatsUndersizePkts + etherStatsFragments		in-error-undersize-frames	R

<sup>a</sup> 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, Clause 30 managed objects and *ieee802-ethernet-interface-half-duplex* YANG data nodes**

IEEE Std 802.3, Clause 30			Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)	Reference	Container(s)	Data node(s)	R/W
<a href="#">oLldpXdot3-Config</a>	<a href="#">aLldpXdot3PortConfigTLVsTx-Enable</a>	<a href="#">30.12.1.1.1</a>	<a href="#">lldp/port</a>	<a href="#">tlvs-port-config-enable</a>	R/W
<a href="#">oLldpXdot3LocSystemsGroup</a>	<a href="#">aLldpXdot3LocPortAutoNeg-Supported</a>	<a href="#">30.12.2.1.1</a>		<a href="#">auto-negotiation-supported</a>	R
	<a href="#">aLldpXdot3LocPortAutoNegEnabled</a>	<a href="#">30.12.2.1.2</a>		<a href="#">auto-negotiation-enabled</a>	R
	<a href="#">aLldpXdot3LocPortAutoNegAdvertisedCap</a>	<a href="#">30.12.2.1.3</a>		<a href="#">auto-negotiation-cap</a>	R
	<a href="#">aLldpXdot3LocPortOperMau-Type</a>	<a href="#">30.12.2.1.4</a>		<a href="#">operational-mau-type</a>	R
	<a href="#">aLldpXdot3LocPowerPortClass</a>	<a href="#">30.12.2.1.5</a>		<a href="#">power-port-class</a>	R
	<a href="#">aLldpXdot3LocPowerMDISupported</a>	<a href="#">30.12.2.1.6</a>		<a href="#">mdi-power-supported</a>	R
	<a href="#">aLldpXdot3LocPowerMDIEnabled</a>	<a href="#">30.12.2.1.7</a>		<a href="#">mdi-power-enabled</a>	R
	<a href="#">aLldpXdot3LocPowerPairControllable</a>	<a href="#">30.12.2.1.8</a>		<a href="#">power-pair-controllable</a>	R

Copyright © 2023 IEEE. All rights reserved. This is an unapproved IEEE Standards draft, subject to change.

IEEE Std 802.3, Clause 30			Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes		
Managed object(s)	Attribute(s)	Reference	Container(s)	Data node(s)	R/W
	aLldpXdot3LocPowerPairs	<a href="#">30.12.2.1.9</a>		power-pairs	R
	aLldpXdot3LocPowerClass	<a href="#">30.12.2.1.10</a>		local-power-class	R
	aLldpXdot3LocLinkAggStatus	<a href="#">30.12.2.1.11</a>		link-aggregation-status	R
	aLldpXdot3LocLinkAggPortId	<a href="#">30.12.2.1.12</a>		aggregation-port-id	R
	aLldpXdot3LocMaxFrameSize	<a href="#">30.12.2.1.13</a>		local-max-frame-size	R
	aLldpXdot3LocPowerType	<a href="#">30.12.2.1.14</a>		power-type	R
	aLldpXdot3LocPowerSource	<a href="#">30.12.2.1.15</a>		power-source	R
	aLldpXdot3LocPowerPriority	<a href="#">30.12.2.1.16</a>		local-power-priority	R/W
	aLldpXdot3LocPDRrequested-PowerValue	<a href="#">30.12.2.1.17</a>		pd-requested-power-value	R
					Continue when YANG has been updated from supporting 802.3-2015 to 802.3-2022
oLldpX-dot3RemSystemsGroup	aLldpXdot3RemPortAutoNeg-Supported	<a href="#">30.12.3.1.1</a>	lldp/port/remote-systems-data	auto-negotiation-supported	R
	aLldpXdot3RemPortAutoNeg-Enabled	<a href="#">30.12.3.1.2</a>		auto-negotiation-enabled	R
	aLldpXdot3RemPortAutoNeg-AdvertisedCap	<a href="#">30.12.3.1.3</a>		auto-negotiation-cap	R
	aLldpXdot3RemPortOperMau-Type	<a href="#">30.12.3.1.4</a>		operational-mau-type	R
	aLldpXdot3RemPowerPortClass	<a href="#">30.12.3.1.5</a>		power-port-class	R
	aLldpXdot3RemPowerMDISupported	<a href="#">30.12.3.1.6</a>		mdi-power-supported	R

<u>IEEE Std 802.3, Clause 30</u>			<u>Corresponding <i>ieee802-ethernet-lldp</i> YANG data nodes</u>		
<u>Managed object(s)</u>	<u>Attribute(s)</u>	<u>Reference</u>	<u>Container(s)</u>	<u>Data node(s)</u>	<u>R/W</u>
	<a href="#">aLldpXdot3RemPowerMDIEnabled</a>	<a href="#">30.12.3.1.7</a>		<a href="#">mdi-power-enabled</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemPowerPairControllable</a>	<a href="#">30.12.3.1.8</a>		<a href="#">power-pair-controllable</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemPowerPairs</a>	<a href="#">30.12.3.1.9</a>		<a href="#">power-pairs</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemPowerClass</a>	<a href="#">30.12.3.1.10</a>		<a href="#">power-class</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemLinkAggStatus</a>	<a href="#">30.12.3.1.11</a>		<a href="#">link-aggregation-status</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemLinkAggPortId</a>	<a href="#">30.12.3.1.12</a>		<a href="#">aggregation-port-id</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemMaxFrameSize</a>	<a href="#">30.12.3.1.13</a>		<a href="#">local-max-frame-size</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemPowerType</a>	<a href="#">30.12.3.1.14</a>		<a href="#">power-type</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemPowerSource</a>	<a href="#">30.12.3.1.15</a>		<a href="#">power-source</a>	<a href="#">R</a>
	<a href="#">aLldpXdot3RemPowerPriority</a>	<a href="#">30.12.3.1.16</a>		<a href="#">power-priority</a>	<a href="#">RW</a>
	<a href="#">aLldpXdot3RemPDRrequested-PowerValue</a>	<a href="#">30.12.3.1.17</a>		<a href="#">pd-requested-power-value</a>	<a href="#">R</a>
			<a href="#">Continue when YANG has been updated from supporting 802.3-2015 to 802.3-2022</a>		



## 5.3 YANG module definition<sup>j</sup>

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
          | +--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
```

<sup>j</sup>Copyright 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         |     +---ro out-lpi-transitions?   yang:counter64
2         |
3         |     +---ro out-lpi-time?      decimal64
4
5         +---ro mac-control
6             +---ro in-frames-mac-control-unknown?   yang:counter64
7             +---ro in-frames-mac-control-extension? yang:counter64
8             +---ro out-frames-mac-control-extension? yang:counter64
9
10
11
12 module: ieee802-ethernet-interface-half-duplex
13     augment /if:interfaces/if:interface/ieee802-eth-if:ethernet:
14         +---rw dynamic-rate-control?   dynamic-rate-control-type {dynamic-
15         rate-control}?
16
17         augment /if:interfaces/if:interface/ieee802-eth-if:ethernet/ieee802-
18         eth-if:capabilities:
19
20             +---ro dynamic-rate-control-supported?   boolean {dynamic-rate-con-
21             trol}?
22
23             augment /if:interfaces/if:interface/ieee802-eth-if:ethernet/ieee802-
24             eth-if:statistics/ieee802-eth-if:frame:
25
26                 +---ro csma-cd {csma-cd}?
27
28                     +---ro in-errors-sqe-test?      yang:counter64
29
30                     +---ro out-frames-collision-single?   yang:counter64
31
32                     +---ro out-frames-collision-multiple? yang:counter64
33
34                     +---ro out-frames-deferred?         yang:counter64
35
36                     +---ro out-frames-collisions-excessive? yang:counter64
37
38                     +---ro out-collisions-late?        yang:counter64
39
40                     +---ro out-errors-carrier-sense?   yang:counter64
41
42                     +---ro collision-histogram* [collision-count]
43
44                         +---ro collision-count         yang:counter64
45
46                         +---ro collision-count-frames? yang:counter64
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
```

## 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.

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

### 5.3.2.1 Ethernet interface module

```
module ieee802-ethernet-interface {
  yang-version 1.1;

  namespace
    "urn:ieee:std:802.3:yang:ieee802-ethernet-interface";

  prefix ieee802-eth-if;

  revision 2019-06-21 {
    description "Initial revision.";
  }

  import ietf-yang-types {
    prefix yang;
    reference "IETF RFC 6991";
  }

  import ietf-interfaces {
    prefix if;
    reference "IETF RFC 8343";
  }

  import iana-if-type {
    prefix ianaift;
    reference "http://www.iana.org/assignments/yang-parameters/
      iana-if-type@2018-07-03.yang";
  }

  organization
    "IEEE Std 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 IEEE Std
    802.3 Ethernet Interfaces.
    In this YANG module, 'Ethernet interface' can be interpreted
    as referring to 'IEEE Std 802.3 compliant Ethernet
```

<sup>k</sup>Copyright 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     interfaces'. ";
2
3 reference "IEEE Std 802.3-2018, unless dated explicitly";
4
5
6 typedef eth-if-speed-type {
7     type decimal64 {
8         fraction-digits 3;
9     }
10    units "Gb/s";
11    description
12        "Used to represent the configured, negotiated, or actual speed
13        of an Ethernet interface in Gigabits per second (Gb/s),
14        accurate to 3 decimal places (i.e., accurate to 1 Mb/s).";
15    }
16
17
18
19 typedef duplex-type {
20     type enumeration {
21         enum full {
22             description
23                 "Full duplex.";
24         }
25         enum half {
26             description
27                 "Half duplex.";
28         }
29         enum unknown {
30             description
31                 "Link is currently disconnected or initializing.";
32         }
33     }
34     default full;
35     description
36         "Used to represent the configured, negotiated, or actual
37         duplex mode of an Ethernet interface.";
38     reference "IEEE Std 802.3, 30.3.1.1.32, aDuplexStatus";
39 }
40
41
42 typedef pause-fc-direction-type {
43     type enumeration {
44         enum "disabled" {
45             description
46                 "Flow-control disabled in both ingress and egress
47                 directions, i.e., PAUSE frames are not transmitted and
48                 PAUSE frames received in the ingress direction are
49                 discarded without processing.";
50         }
51         enum "ingress-only" {
52             description
53                 "PAUSE frame based flow control is enabled in the ingress
54                 direction only, i.e., PAUSE frames may be transmitted to
55                 reduce the ingress traffic flow, but PAUSE frames received
56                 in the ingress direction are discarded without reducing
57                 the egress traffic rate.";
58         }
59     }
60 }
61
62
63
64
65
```

```
1     enum "egress-only" {
2         description
3             "PAUSE frame based flow control is enabled in the egress
4             direction only, i.e., PAUSE frames are not transmitted,
5             but PAUSE frames received in the ingress direction are
6             processed to reduce the egress traffic rate.";
7     }
8     enum "bi-directional" {
9         description
10            "PAUSE frame based flow control is enabled in both ingress
11            and egress directions, i.e., PAUSE frames may be
12            transmitted to reduce the ingress traffic flow, and
13            PAUSE frames received on ingress are processed to reduce
14            the egress traffic rate.";
15        }
16        enum "undefined" {
17            description
18                "Link is currently disconnected or initializing.";
19        }
20    }
21    description
22        "Used to represent the configured, negotiated, or actual
23        PAUSE frame-based flow control setting.";
24
25    reference
26        "IEEE Std 802.3.1, dot3PauseAdminMode and dot3PauseOperMode";
27 }
28
29 feature ethernet-pfc {
30     description
31         "This device supports Ethernet priority flow-control.";
32 }
33
34 feature ethernet-pause {
35     description
36         "This device supports Ethernet PAUSE.";
37 }
38
39
40
41 augment "/if:interfaces/if:interface" {
42     when "derived-from-or-self(if:type, 'ianaift:ethernetCsmacd')" {
43         description
44             "Applies to all P2P Ethernet interfaces.";
45     }
46     description
47         "Augment interface model with Ethernet interface
48         specific configuration nodes.";
49
50     container ethernet {
51         description
52             "Contains all Ethernet interface related configuration.";
53
54         container auto-negotiation {
55             presence
56                 "The presence of this container indicates that
```

```
1         auto-negotiation is supported on this Ethernet
2         interface.";
3
4     description
5         "Contains auto-negotiation transmission parameters
6
7         This container contains a data node that allows the
8         advertised duplex value in the negotiation to be
9         restricted.
10
11        If not specified then the default behavior for the duplex
12        data node is to negotiate all available values for the
13        particular type of Ethernet PHY associated with the
14        interface.
15
16        If auto-negotiation is enabled, and PAUSE frame based flow
17        control has not been explicitly configured, then the
18        default PAUSE frame based flow control capabilities that
19        are negotiated allow for bi-directional or egress-only
20        PAUSE frame based flow control.
21
22        If auto-negotiation is enabled, and PAUSE frame based flow
23        control has been explicitly configured, then the
24        configuration settings restrict the values that may be
25        negotiated. However, it should be noted that the protocol
26        does not allow only egress PAUSE frame based flow control
27        to be negotiated without also allowing bi-directional
28        PAUSE frame based flow control.";
29
30     reference
31         "IEEE Std 802.3, Clause 28 and Annexes 28A-D";
32
33     leaf enable {
34         type boolean;
35         default true;
36
37         description
38             "Controls whether auto-negotiation is enabled or
39             disabled.
40             For interface types that support auto-negotiation then
41             it defaults to being enabled.
42
43             For interface types that do not support auto-negotiation,
44             the related configuration data is ignored.";
45     }
46
47     leaf negotiation-status {
48         when "../enable = 'true'";
49         type enumeration {
50             enum in-progress {
51                 description
52                     "The auto-negotiation protocol is running and
53                     negotiation is currently in-progress.";
54             }
55             enum complete {
56                 description
57                     "The auto-negotiation protocol has completed
```

```
1         successfully.";  
2     }  
3     enum failed {  
4         description  
5             "The auto-negotiation protocol has failed.";  
6     }  
7     enum unknown {  
8         description  
9             "The auto-negotiation status is not currently known,  
10            this could be because it is still negotiating or the  
11            protocol cannot run (e.g., if no medium is present).";  
12     }  
13     enum no-negotiation {  
14         description  
15             "No auto-negotiation is executed.  
16             The auto-negotiation function is either not supported  
17             on this interface or has not been enabled.";  
18     }  
19     }  
20     config false;  
21     description  
22         "The status of the auto-negotiation protocol.";  
23     reference  
24         "IEEE 802.3, 30.6.1.1.4, aAutoNegAutoConfig";  
25 }  
26 }  
27 }  
28 }  
29 }  
30 }  
31 }  
32 }  
33 }  
34 }  
35 leaf duplex {  
36     type duplex-type;  
37     description  
38         "Operational duplex mode of the Ethernet interface.";  
39     reference  
40         "IEEE Std 802.3, 30.3.1.1.32 aDuplexStatus";  
41 }  
42 }  
43 }  
44 }  
45 leaf speed {  
46     type eth-if-speed-type;  
47     units "Gb/s";  
48     description  
49         "Operational speed (data rate) of the Ethernet interface.  
50         The default value is implementation-dependent.";  
51 }  
52 }  
53 }  
54 container flow-control {  
55     description  
56         "Holds the different types of Ethernet PAUSE frame based  
57         flow control that can be enabled.";  
58     container pause {  
59         if-feature "ethernet-pause";  
60         description  
61             "IEEE Std 802.3 PAUSE frame based PAUSE frame based flow  
62             control.";  
63         reference  
64     }  
65 }
```

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



```
1         if-feature "ethernet-pfc";
2     description
3         "IEEE Std 802.3 Priority-based flow control.";
4     reference
5         "IEEE Std 802.3, Annex 31D";
6
7
8     leaf enable {
9         type boolean;
10
11         description
12             "True indicates that IEEE Std 802.3 priority-based
13             flow control is enabled, false indicates that
14             IEEE Std 802.3 priority-based flow control is disabled.
15             For interfaces that have auto-negotiation,
16             the priority-based flow control is enabled by default.";
17     }
18
19
20
21     container statistics {
22         config false;
23         description
24             "This container collects all statistics for
25             Ethernet interfaces.";
26
27
28         leaf in-frames-pfc {
29             type yang:counter64;
30             units frames;
31             description
32                 "A count of PFC MAC Control frames received on this
33                 Ethernet interface.
34
35                 Discontinuities in the values of counters in
36                 this container can occur at re-initialization of the
37                 management system, and at other times as indicated
38                 by the value of the 'discontinuity-time' leaf
39                 defined in the ietf-interfaces YANG module
40                 (IETF RFC 8343).";
41             reference
42                 "IEEE Std 802.3.1, dot3HCInPFCFrames";
43         }
44
45         leaf out-frames-pfc {
46             type yang:counter64;
47             units frames;
48             description
49                 "A count of PFC MAC Control frames transmitted on
50                 this interface.
51
52                 Discontinuities in the values of counters in
53                 this container can occur at re-initialization of the
54                 management system, and at other times as indicated
55                 by the value of the 'discontinuity-time' leaf
56                 defined in the ietf-interfaces YANG module
57                 (IETF RFC 8343).";
58             reference
59                 "IEEE Std 802.3.1, dot3HCOutPFCFrames";
60         }
61     }
62
63     reference
64         "IEEE Std 802.3.1, dot3HCInPFCFrames";
65
```

```
1           "IEEE Std 802.3.1, dot3HCInPFCFrames";
2       }
3   }
4 }
5 }
6
7 leaf force-flow-control {
8     type boolean;
9     default false;
10    description
11        "Explicitly forces the local PAUSE frame based flow control
12        settings regardless of what has been negotiated.
13
14        Since the auto-negotiation of flow-control settings
15        does not allow all sane combinations to be negotiated
16        (e.g., consider a device that is only capable of sending
17        PAUSE frames connected to a peer device that is only
18        capable of receiving and acting on PAUSE frames) and
19        failing to agree on the flow-control settings does not
20        cause the auto-negotiation to fail completely, then it is
21        sometimes useful to be able to explicitly enable
22        particular PAUSE frame based flow control settings on
23        the local device regardless of what is being advertised
24        or negotiated.";
25    reference
26        "IEEE Std 802.3, Table 28B-3";
27 }
28 }
29
30 leaf max-frame-length {
31     type uint16;
32     units octets;
33     config false;
34     description
35         "This indicates the MAC frame length (including FCS bytes)
36         at which frames are dropped for being too long.";
37     reference
38         "IEEE Std 802.3, 30.3.1.1.37 aMaxFrameLength";
39 }
40
41 leaf mac-control-extension-control {
42     type boolean;
43     config false;
44     description
45         "A value that identifies the current EXTENSION MAC Control
46         function, as specified in IEEE Std 802.3, Annex 31C.";
47     reference
48         "IEEE Std 802.3, 30.3.8.3 aEXTENSIONMACCtrlStatus
49         IEEE Std 802.3.1, dot3ExtensionMacCtrlStatus ";
50 }
51
52 leaf frame-limit-slow-protocol {
53     type uint64;
54     units f/s;
55     default 10;
```

```
1         config false;
2         description
3             "The maximum number of Slow Protocol frames of a given
4             subtype that can be transmitted in a one second interval.
5             The default value is 10.";
6         reference
7             "IEEE Std 802.3, 30.3.1.1.38 aSlowProtocolFrameLimit";
8     }
9
10
11 container capabilities {
12     config false;
13     description
14         "Container all Ethernet interface specific capabilities.";
15
16     leaf auto-negotiation {
17         type boolean;
18         description
19             "Indicates whether auto-negotiation may be configured on
20             this interface.";
21     }
22 }
23
24
25
26
27
28 container statistics {
29     config false;
30     description
31         "Contains statistics specific to Ethernet interfaces.
32
33         Discontinuities in the values of counters in the
34         container can occur at re-initialization of the management
35         system, and at other times as indicated by the value of
36         the 'discontinuity-time' leaf defined in the
37         ietf-interfaces YANG module (IETF RFC 8343).";
38 }
39
40
41
42 container frame {
43     description
44         "Contains frame statistics specific to Ethernet
45         interfaces.
46
47         All octet frame lengths include the 4 byte FCS.
48
49         Error counters are only reported once ... The count
50         represented by an instance of this object is incremented
51         when the frameCheckError status is returned by the MAC
52         service to the LLC (or other MAC user). Received frames
53         for which multiple error conditions pertain are,
54         according to the conventions of IEEE Std 802.3 Layer
55         Management, counted exclusively according to the error
56         status presented to the LLC.
57
58         A frame that is counted by an instance of this object is
59         also counted by the corresponding instance of 'in-errors'
60         leaf defined in the ietf-interfaces YANG module
61         (IETF RFC 8343).
62
63
64
65
```

```
1
2       Discontinuities in the values of counters in the
3       container can occur at re-initialization of the
4       management system, and at other times as indicated by
5       the value of the 'discontinuity-time' leaf defined in
6       the ietf-interfaces YANG module (IETF RFC 8343).";
7
8
9
10      leaf in-total-frames {
11          type yang:counter64;
12          units frames;
13          description
14              "The total number of frames (including bad frames)
15              received on the Ethernet interface.
16
17              This counter is calculated by summing the following
18              IEEE Std 802.3, Clause 30 counters:
19              aFramesReceivedOK +
20              aFrameCheckSequenceErrors +
21              aAlignmentErrors +
22              aFrameTooLongErrors +
23              aFramesLostDueToIntMACRcvError
24
25              Also see the 'description' statement associated with
26              the parent 'statistics' container for additional
27              common semantics related to this counter.";
28
29          reference
30              "IEEE Std 802.3, Clause 30 counters, as specified
31              in the description above.";
32      }
33
34      leaf in-total-octets {
35          type yang:counter64;
36          units octets;
37          description
38              "The total number of octets of data (including those in
39              bad frames) received on the Ethernet interface.
40
41              Includes the 4-octet FCS.
42
43              Also see the 'description' statement associated with
44              the parent 'statistics' container for additional
45              common semantics related to this counter.";
46
47          reference
48              "IETF RFC 2819, etherStatsOctets";
49      }
50
51      leaf in-frames {
52          type yang:counter64;
53          units frames;
54          description
55              "A count of frames (including unicast, multicast and
56              broadcast) that have been successfully received on the
57
58
59
60
61
62
63
64
65
```

```
1           Ethernet interface.
2
3           This count does not include frames received with
4           frame-too-long, FCS, length or alignment errors, or
5           frames lost due to internal MAC sublayer error.
6
7
8           Also see the 'description' statement associated with
9           the parent 'statistics' container for additional
10          common semantics related to this counter.";
11
12
13          reference
14            "IEEE Std 802.3, 30.3.1.1.5 aFramesReceivedOK";
15        }
16
17
18        leaf in-multicast-frames {
19            type yang:counter64;
20            units frames;
21            description
22              "A count of multicast frames that have been
23              successfully received on the Ethernet interface.
24
25              This counter represents a subset of the frames counted
26              by in-frames.
27
28              This count does not include frames received with
29              frame-too-long, FCS, length or alignment errors, or
30              frames lost due to internal MAC sublayer error.
31
32              Also see the 'description' statement associated with
33              the parent 'statistics' container for additional
34              common semantics related to this counter.";
35
36            reference
37              "IEEE Std 802.3, 30.3.1.1.21 aMulticastFramesReceivedOK";
38        }
39
40
41        leaf in-broadcast-frames {
42            type yang:counter64;
43            units frames;
44            description
45              "A count of broadcast frames that have been
46              successfully received on the Ethernet interface.
47
48              This counter represents a subset of the frames counted
49              by in-frames.
50
51              This count does not include frames received with
52              frame-too-long, FCS, length or alignment errors, or
53              frames lost due to internal MAC sublayer error.
54
55              Also see the 'description' statement associated with
56              the parent 'statistics' container for additional
57              common semantics related to this counter.";
58
59
60
61
62
63
64
65
```

```
1         reference
2           "IEEE Std 802.3, 30.3.1.1.22 aBroadcastFramesReceivedOK";
3     }
4
5     leaf in-error-fcs-frames {
6         type yang:counter64;
7         units frames;
8         description
9           "A count of receive frames that are of valid length,
10          but do not pass the FCS check, regardless of whether
11          or not the frames are an integral number of octets in
12          length.
13
14          This count effectively comprises
15          aFrameCheckSequenceErrors and aAlignmentErrors added
16          together.
17
18          Also see the 'description' statement associated with
19          the parent 'statistics' container for additional
20          common semantics related to this counter.";
21
22         reference
23           "IEEE Std 802.3, 30.3.1.1.6 aFrameCheckSequenceErrors;
24           IEEE Std 802.3, 30.3.1.1.7 aAlignmentErrors";
25     }
26
27     leaf in-error-undersize-frames {
28         type yang:counter64;
29         units frames;
30         description
31           "A count of frames received on a particular Ethernet
32          interface that are less than 64 bytes in length, and
33          are discarded.
34
35          This counter is incremented regardless of whether the
36          frame passes the FCS check.
37
38          Also see the 'description' statement associated with
39          the parent 'statistics' container for additional
40          common semantics related to this counter.";
41
42         reference
43           "IETF RFC 2819, etherStatsUndersizePkts and
44           etherStatsFragments";
45     }
46
47     leaf in-error-oversize-frames {
48         type yang:counter64;
49         units frames;
50         description
51           "A count of frames received on a particular Ethernet
52          interface that exceed the maximum permitted frame
53          size, that is specified in max-frame-length, and are
54          discarded.
55
56          This counter is incremented regardless of whether the
57          frame passes the FCS check.
58
59          Also see the 'description' statement associated with
60          the parent 'statistics' container for additional
61          common semantics related to this counter.";
62
63         reference
64           "IETF RFC 2819, etherStatsOversizePkts and
65           etherStatsFragments";
66     }
```

```
1
2           This counter is incremented regardless of whether the
3           frame passes the FCS check.
4
5           Also see the 'description' statement associated with
6           the parent 'statistics' container for additional
7           common semantics related to this counter.";
8
9
10          reference "IEEE Std 802.3, 30.3.1.1.25 aFrameTooLongErrors";
11        }
12
13
14    leaf in-error-mac-internal-frames {
15        type yang:counter64;
16        units frames;
17        description
18            "A count of frames for which reception on a particular
19            Ethernet interface fails due to an internal MAC
20            sublayer receive error.
21
22            A frame is only counted by an instance of this object
23            if it is not counted by the corresponding instance of
24            either the in-error-fcs-frames, in-error-undersize-frames,
25            or in-error-oversize-frames. The precise meaning of the
26            count represented by an instance of this object is
27            implementation-specific.
28
29            In particular, an instance of this object may
30            represent a count of receive errors on a particular
31            Ethernet interface that are not otherwise counted.
32
33            Also see the 'description' statement associated with
34            the parent 'statistics' container for additional
35            common semantics related to this counter.";
36
37          reference
38              "IEEE Std 802.3, 30.3.1.1.15
39              aFramesLostDueToIntMACRcvError";
40        }
41
42    leaf out-frames {
43        type yang:counter64;
44        units frames;
45        description
46            "A count of frames (including unicast, multicast and
47            broadcast) that have been successfully transmitted on
48            the Ethernet interface.
49
50            Also see the 'description' statement associated with
51            the parent 'statistics' container for additional
52            common semantics related to this counter.";
53
54          reference
55              "IEEE Std 802.3, 30.3.1.1.2 aFramesTransmittedOK";
56        }
57    }
58
59
60
61
62
63
64
65
```

```
1
2     leaf out-multicast-frames {
3         type yang:counter64;
4         units frames;
5         description
6             "A count of multicast frames that have been
7             successfully transmitted on the Ethernet interface.
8
9             This counter represents a subset of the frames counted
10            by out-frames.
11
12            Also see the 'description' statement associated with
13            the parent 'statistics' container for additional
14            common semantics related to this counter.";
15
16            reference
17                "IEEE Std 802.3, 30.3.1.1.18 aMulticastFramesXmittedOK";
18        }
19
20     leaf out-broadcast-frames {
21         type yang:counter64;
22         units frames;
23         description
24             "A count of broadcast frames that have been
25             successfully transmitted on the Ethernet interface.
26
27            This counter represents a subset of the frames counted
28            by out-frames.
29
30            Also see the 'description' statement associated with
31            the parent 'statistics' container for additional
32            common semantics related to this counter.";
33
34            reference
35                "IEEE Std 802.3, 30.3.1.1.19 aBroadcastFramesXmittedOK";
36        }
37
38     leaf out-error-mac-internal-frames {
39         type yang:counter64;
40         units frames;
41         description
42             "A count of frames for which transmission on a
43             particular Ethernet interface fails due to an internal
44             MAC sublayer transmit error.
45
46            The precise meaning of the count represented by an
47            instance of this object is implementation-specific. In
48            particular, an instance of this object may represent a
49            count of transmission errors on a particular Ethernet
50            interface that are not otherwise counted.
51
52            Also see the 'description' statement associated with
53            the parent 'statistics' container for additional
54            common semantics related to this counter.";
```



```
1
2     reference
3         "IEEE Std 802.3, 30.3.1.1.12
4         aFramesLostDueToIntMACXmitError";
5     }
6 }
7
8
9 container phy {
10     description
11         "Ethernet statistics related to the PHY layer.
12
13         Discontinuities in the values of counters in the
14         container can occur at re-initialization of the
15         management system, and at other times as indicated by
16         the value of the 'discontinuity-time' leaf defined in
17         the ietf-interfaces YANG module (IETF RFC 8343).";
18
19     leaf in-error-symbol {
20
21         type yang:counter64;
22         units errors;
23         description
24             "A count of the number of symbol errors that have
25             occurred.
26
27             For the precise definition of when the symbol error
28             counter is incremented, please see the 'description'
29             text associated with aSymbolErrorDuringCarrier,
30             specified in IEEE Std 802.3, 30.3.2.1.5.
31
32             Also see the 'description' statement associated with
33             the parent 'phy-statistics' container for additional
34             common semantics related to this counter.";
35         reference
36             "IEEE Std 802.3, 30.3.2.1.5 aSymbolErrorDuringCarrier";
37     }
38 }
39
40 container lpi {
41     description
42         "Physical Ethernet statistics for the energy efficiency
43         related low power idle indications.";
44
45     leaf in-lpi-transitions {
46
47         type yang:counter64;
48         units transitions;
49         description
50             "A count of occurrences of the transition from
51             DEASSERT to ASSERT of the LPI_INDICATE
52             parameter. The indication reflects the state of the
53             PHY according to the requirements of the RS (see
54             IEEE Std 802.3, 22.7, 35.4, and 46.4).
55
56             Also see the 'description' statement associated with
57             the parent 'phy-statistics' container for additional
58             common semantics related to this counter.";
```

```
1
2     reference
3     "IEEE Std 802.3, 30.3.2.1.11 aReceiveLPITransitions";
4 }
5
6
7 leaf in-lpi-time {
8     type decimal64 {
9         fraction-digits 6;
10    }
11    units seconds;
12    description
13        "A count reflecting the total amount of time (in
14        seconds) that the LPI_REQUEST parameter has the
15        value ASSERT. The request is indicated to the PHY
16        according to the requirements of the RS (see IEEE Std
17        802.3, 22.7, 35.4, and 46.4).
18
19        Also see the 'description' statement associated with
20        the parent 'phy-statistics' container for additional
21        common semantics related to this counter.";
22
23    reference
24    "IEEE Std 802.3, 30.3.2.1.9 aReceiveLPIMicroseconds";
25 }
26
27 leaf out-lpi-transitions {
28     type yang:counter64;
29     units transitions;
30     description
31         "A count of occurrences of the transition from state
32         LPI_DEASSERTED to state LPI_ASSERTED in the LPI
33         transmit state diagram of the RS. The state
34         transition corresponds to the assertion of the
35         LPI_REQUEST parameter. The request is indicated to
36         the PHY according to the requirements of the RS (see
37         IEEE Std 802.3, 22.7, 35.4, 46.4.)
38
39         Also see the 'description' statement associated with
40         the parent 'phy-statistics' container for additional
41         common semantics related to this counter.";
42
43    reference
44    "IEEE Std 802.3, 30.3.2.1.10 aTransmitLPITransitions";
45 }
46
47 leaf out-lpi-time {
48     type decimal64 {
49         fraction-digits 6;
50    }
51    units seconds;
52    description
53        "A count reflecting the total amount of time (in
54        seconds) that the LPI_INDICATION parameter has the
55        value ASSERT. The request is indicated to the PHY
```

```
1         according to the requirements of the RS (see IEEE
2         802.3, 22.7, 35.4, and 46.4).
3
4         Also see the 'description' statement associated with
5         the parent 'phy-statistics' container for additional
6         common semantics related to this counter.";
7
8
9         reference
10        "IEEE Std 802.3, 30.3.2.1.8 aTransmitLPIMicroseconds";
11    }
12 }
13 }
14 }
15
16 container mac-control {
17     description
18         "A group of statistics specific to MAC Control operation
19         of selected Ethernet interfaces.
20
21         Discontinuities in the values of counters in the
22         container can occur at re-initialization of the
23         management system, and at other times as indicated by
24         the value of the 'discontinuity-time' leaf defined in
25         the ietf-interfaces YANG module (IETF RFC 8343).";
26
27     reference
28         "IEEE Std 802.3.1, dot3ExtensionTable";
29
30     leaf in-frames-mac-control-unknown {
31         type yang:counter64;
32         units frames;
33         description
34             "A count of MAC Control frames with an unsupported
35             opcode received on this Ethernet interface.
36
37             Frames counted against this counter are also counted
38             against in-discards defined in the ietf-interfaces
39             YANG module (IETF RFC 8343).
40
41             Also see the 'description' statement associated with
42             the parent 'mac-control-statistics' container for
43             additional semantics.";
44         reference
45             "IEEE Std 802.3, 30.3.3.5 aUnsupportedOpCodesReceived";
46     }
47
48     leaf in-frames-mac-control-extension {
49         type yang:counter64;
50         units frames;
51         description
52             "The count of Extension MAC Control frames received on
53             this Ethernet interface.
54
55             Also see the 'description' statement associated with
56             the parent 'mac-control-statistics' container for
57             additional semantics.";
```

```
1         additional semantics.";
2     reference
3         "IEEE Std 802.3, 30.3.8.2
4         aEXTENSIONMACCtrlFramesReceived";
5     }
6
7
8     leaf out-frames-mac-control-extension {
9         type yang:counter64;
10        units frames;
11        description
12            "The count of Extension MAC Control frames transmitted
13            on this Ethernet interface.
14
15            Also see the 'description' statement associated with
16            the parent 'mac-control-statistics' container for
17            additional semantics.";
18        reference
19            "IEEE Std 802.3, 30.3.8.1
20            aEXTENSIONMACCtrlFramesTransmitted";
21    }
22
23
24
25
26
27
28
29
30
31 }
```

### 5.3.2.2 Ethernet interface module (half-duplex)

```
32
33
34 module ieee802-ethernet-interface-half-duplex {
35
36     yang-version 1.1;
37
38     namespace
39         "urn:ieee:std:802.3:yang:ieee802-ethernet-interface-half-duplex";
40
41     prefix ieee802-eth-half-duplex;
42
43     revision 2019-06-21 {
44         description "Initial revision.";
45     }
46
47     import ietf-yang-types {
48         prefix yang;
49         reference "IETF RFC 6991";
50     }
51
52     import ietf-interfaces {
53         prefix if;
54         reference "IETF RFC 8343";
55     }
56
57     import iana-if-type {
58         prefix ianaift;
59         reference "http://www.iana.org/assignments/yang-parameters/
60         iana-if-type@2018-07-03.yang";
61     }
62
63
64
65 }
```

```
1
2 import ieee802-ethernet-interface {
3     prefix ieee802-eth-if;
4 }
5
6 organization
7     "IEEE Std 802.3 Ethernet Working Group
8     Web URL: http://www.ieee802.org/3/";
9
10
11 contact
12     "Web URL: http://www.ieee802.org/3/";
13
14 description
15     "This module contains YANG definitions for configuring Ethernet
16     interfaces that are deprecated, and are no longer
17     widely used in the industry. The definitions are maintained for
18     backwards compatibility purposes, but the general expectation is
19     that this module is not anticipated to be widely implemented.";
20
21 reference
22     "IEEE Std 802.3-2018, unless dated explicitly";
23
24 feature dynamic-rate-control {
25     description
26         "This feature indicates that the device supports Ethernet
27         interfaces lowering the average data rate of the MAC sublayer,
28         with frame granularity, by using Rate Control to dynamically
29         increase the inter-packet gap for some types of Ethernet
30         interface.
31         Only valid for Ethernet interfaces operating at speeds (data rates)
32         above 1000 Mb/s.";
33     reference "IEEE Std 802.3, 30.3.1.1.33 aRateControlAbility";
34 }
35
36
37 feature csma-cd {
38     description
39         "This feature indicates that the device supports Ethernet
40         interfaces running at half-duplex using CSMA/CD.";
41 }
42
43
44 typedef dynamic-rate-control-type {
45     type enumeration {
46         enum disabled {
47             description
48                 "Dynamic rate control is disabled";
49         }
50
51         enum "sonet-oc192" {
52             value 2;
53             description
54                 "Dynamic rate control is enabled for a 10 Gb/s Ethernet
55                 interface to SONET/SDH OC192/STM64.";
56         }
57     }
58 }
59
60 default disabled;
61 description
62     "Allowed values for dynamic-rate-control.";
63 reference
64     "IEEE Std 802.3, 4.4.2 ipgStretchRatio and 30.3.1.1.34
65     aRateControlStatus";
```

```
1   }
2
3   augment "/if:interfaces/if:interface/ieee802-eth-if:ethernet" {
4     when "derived-from-or-self(..if:type, 'ianaift:ethernetCsmacd')
5       and ieee802-eth-if:duplex = 'half'" {
6       description
7         "Applies to half-duplex Ethernet interfaces.";
8     }
9
10    description
11      "Augment with Ethernet interface configuration parameters
12        for half-duplex operation.";
13
14    leaf dynamic-rate-control {
15      if-feature "dynamic-rate-control";
16      type dynamic-rate-control-type;
17      description
18        "Enables dynamic rate control and specifies what speed (data rate)
19          the dynamic rate control is operating at. The value of this attribute
20          is constrained by the MAC data rate and hardware support.
21          The default value is implementation-dependent.";
22      reference
23        "IEEE Std 802.3, 30.3.1.1.34 aRateControlStatus";
24    }
25  }
26
27  }
28
29  augment "/if:interfaces/if:interface/ieee802-eth-if:ethernet/" +
30    "ieee802-eth-if:capabilities"{
31    when "derived-from-or-self(..if:type,
32      'ianaift:ethernetCsmacd') and ../ieee802-eth-if:duplex = 'half'" {
33      description "Applies to half-duplex Ethernet interfaces";
34    }
35  }
36
37  description
38    "Augment with configuration capabilities for half-duplex
39    Ethernet interface.";
40
41  leaf dynamic-rate-control-supported {
42    if-feature "dynamic-rate-control";
43    type boolean;
44    default false;
45    description
46      "Indicates whether the Ethernet interface supports lowering
47        the average data rate of the MAC sublayer, with frame
48        granularity, by using Rate Control to dynamically increase
49        the inter-packet gap.
50        Only valid for Ethernet interfaces operating at speeds (data rates)
51        above 1000 Mb/s.";
52    reference
53      "IEEE Std 802.3, 30.3.1.1.33 aRateControlAbility";
54  }
55  }
56
57  }
58
59  augment "/if:interfaces/if:interface/ieee802-eth-if:ethernet/" +
60    "ieee802-eth-if:statistics/ieee802-eth-if:frame" {
61    when "derived-from-or-self(..if:type,
62      'ianaift:ethernetCsmacd') and ../ieee802-eth-if:duplex = 'half'" {
63      description
64        "Applies to half-duplex Ethernet interfaces.";
65    }
```

```
1     }
2     description
3         "Augment with statistics for half-duplex Ethernet interface.";
4
5     container "csma-cd" {
6         if-feature "csma-cd";
7         description
8             "Holds counters that are specific to CDMA/CD half-duplex
9             operation of Ethernet interfaces.
10            Discontinuities in the values of the counters in this
11            container can occur at re-initialization of the management
12            system, and at other times as indicated by the value of the
13            'discontinuity-time' leaf defined in the ietf-interfaces
14            YANG module (IETF RFC 8343).";
15
16
17     leaf in-errors-sqe-test {
18         type yang:counter64;
19         units errors;
20         description
21             "A count of times that the SQE TEST ERROR is received on a
22             particular interface. The SQE TEST ERROR is set in
23             accordance with the rules for verification of the SQE
24             detection mechanism in the PLS Carrier Sense Function as
25             described in IEEE Std 802.3, 7.2.4.6.
26             This counter does not increment on Ethernet interfaces
27             operating at speeds (data rates) greater than 10 Mb/s, or on
28             Ethernet interfaces operating in full-duplex mode.
29             Discontinuities in the value of this counter can occur at
30             re-initialization of the management system, and at other
31             times as indicated by the value of the
32             'discontinuity-time' leaf defined in the ietf-interfaces
33             YANG module (IETF RFC 8343).";
34         reference
35             "IEEE Std 802.3, 7.2.4.6, and 30.3.2.1.4 aSQETestErrors";
36     }
37
38
39
40     leaf out-frames-collision-single {
41         type yang:counter64;
42         units frames;
43         description
44             "A count of frames that are involved in a single collision,
45             and are subsequently transmitted successfully. A frame
46             that is counted by an instance of this object is also
47             counted by the corresponding instance of either
48             'out-unicast-frames', 'out-broadcast-frames', or
49             'out-multicast-frames', and is not counted by the
50             corresponding instance of the
51             'out-frames-collision-multiple'.
52
53             This counter does not increment when the Ethernet
54             interface is operating in full-duplex mode.
55             Discontinuities in the value of this counter can occur at
56             re-initialization of the management system, and at other
57             times as indicated by the value of the
58             'discontinuity-time' leaf defined in the ietf-interfaces
59             YANG module (IETF RFC 8343).";
60         reference
61             "IEEE Std 802.3, 30.3.1.1.3 aSingleCollisionFrames";
62     }
63
64
65 }
```

```
1
2     leaf out-frames-collision-multiple {
3         type yang:counter64;
4         units frames;
5         description
6             "A count of frames that are involved in multiple
7             collisions, and are subsequently transmitted
8             successfully. A frame that is counted by an instance of
9             this object is also counted by the corresponding instance
10            of either 'out-unicast-frames', 'out-broadcast-frames', or
11            'out-multicast-frames', and is not counted by the
12            corresponding instance of the 'out-frames-collision-single'.
13            This counter does not increment when the Ethernet
14            interface is operating in full-duplex mode.
15            Discontinuities in the value of this counter can occur at
16            re-initialization of the management system, and at other
17            times as indicated by the value of the
18            'discontinuity-time' leaf defined in the ietf-interfaces
19            YANG module (IETF RFC 8343).";
20        reference
21            "IEEE Std 802.3, 30.3.1.1.4 aMultipleCollisionFrames";
22    }
23
24
25
26     leaf out-frames-deferred {
27         type yang:counter64;
28         units frames;
29         description
30             "A count of frames for which the first transmission attempt
31             on a particular Ethernet interface is delayed because the
32             medium is busy.
33             A deferred frame that is not subject to any number of
34             collisions is not counted by an instance of
35             'out-frames-collision-single' or
36             'out-frames-collision-multiple' objects.
37             This counter does not increment when the Ethernet
38             interface is operating in full-duplex mode.
39             Discontinuities in the value of this counter can occur at
40             re-initialization of the management system, and at other
41             times as indicated by the value of the
42             'discontinuity-time' leaf defined in the ietf-interfaces
43             YANG module (IETF RFC 8343).";
44        reference
45            "IEEE Std 802.3, 30.3.1.1.9 aFramesWithDeferredXmissions";
46    }
47
48
49
50     leaf out-frames-collisions-excessive {
51         type yang:counter64;
52         units frames;
53         description
54             "A count of frames for which transmission on a particular
55             Ethernet interface fails due to excessive collisions.
56
57
58             This counter does not increment when the Ethernet
59             interface is operating in full-duplex mode.
60             Discontinuities in the value of this counter can occur at
61             re-initialization of the management system, and at other
62             times as indicated by the value of the
63             'discontinuity-time' leaf defined in the ietf-interfaces
64             YANG module (IETF RFC 8343).";
65    }
```



```
1         reference
2           "IEEE Std 802.3, 30.3.1.1.11 aFramesAbortedDueToXSColls";
3     }
4
5     leaf out-collisions-late {
6         type yang:counter64;
7         units collisions;
8         description
9           "The number of times that a collision is detected on a
10            particular Ethernet interface later than one slotTime into
11            the transmission of a packet.
12            A (late) collision included in a count represented by an
13            instance of this object is also considered as a (generic)
14            collision for purposes of other collision-related
15            statistics.
16            This counter does not increment when the Ethernet
17            interface is operating in full-duplex mode.
18            Discontinuities in the value of this counter can occur at
19            re-initialization of the management system, and at other
20            times as indicated by the value of the
21            'discontinuity-time' leaf defined in the ietf-interfaces
22            YANG module (IETF RFC 8343).";
23         reference
24           "IEEE Std 802.3, 30.3.1.1.10 aLateCollisions";
25     }
26
27     leaf out-errors-carrier-sense {
28         type yang:counter64;
29         units errors;
30         description
31           "The number of times that the carrier sense condition was
32            lost or never asserted when attempting to transmit a frame
33            on a particular Ethernet interface.
34            The count represented by an instance of this object is
35            incremented at most once per transmission attempt, even if
36            the carrier sense condition fluctuates during a
37            transmission attempt.
38            This counter does not increment when the Ethernet
39            interface is operating in full-duplex mode.
40            Discontinuities in the value of this counter can occur at
41            re-initialization of the management system, and at other
42            times as indicated by the value of the
43            'discontinuity-time' leaf defined in the ietf-interfaces
44            YANG module (IETF RFC 8343).";
45         reference
46           "IEEE Std 802.3, 30.3.1.1.13 aCarrierSenseErrors";
47     }
48
49     list collision-histogram {
50         key collision-count;
51         description
52           "A collection of collision histograms for a particular
53            interface.";
54         reference
55           "IEEE Std 802.3, 30.3.1.1.30 aCollisionFrames";
56         leaf collision-count {
57             type yang:counter64;
58             units collisions;
59             description
```

```
1           "The number of per-frame media collisions for which a
2           particular collision histogram cell represents the
3           frequency on a particular interface.";
4
5       }
6   leaf collision-count-frames {
7       type yang:counter64;
8       units frames;
9       description
10          "A count of individual MAC frames for which the
11          transmission (successful or otherwise) on a particular
12          interface occurs after the frame has experienced exactly
13          the number of collisions in the associated dot3CollCount
14          object.
15          For example, a frame which is transmitted on an
16          interface after experiencing exactly 4 collisions would
17          be indicated by incrementing only collision-count-frames
18          object associated with the collision-count value of
19          4. No other instance of collision-count-frames would be
20          incremented in this example.
21          This counter does not increment when the interface is
22          operating in full-duplex mode.
23          Discontinuities in the value of this counter can occur
24          at re-initialization of the management system, and at
25          other times as indicated by the value of the
26          'discontinuity-time' leaf defined in the ietf-interfaces
27          YANG module (IETF RFC 8343).";
28
29     }
30 }
31 }
32 }
33 }
34 }
35 }
36 }
37 }
38 }
39 }
40 }
41 }
42 }
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
```