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

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

  prefix eth-if;

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

  import ietf-interfaces {
    prefix if;
    reference "IETF RFC 7223";
  }

  import iana-if-type {
    prefix ianaift;
    reference "IETF RFC 7224";
  }

  organization
    "IEEE Std 802.3 Ethernet Working Group
     Web URL: http://www.ieee802.org/3/";

  contact
    "Web URL: http://www.ieee802.org/3/cf/";

  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
     interfaces'.";


  reference "IEEE Std 802.3-2018, unless dated explicitly";

  typedef eth-if-speed-type {
    type decimal64 {
      fraction-digits 3;
    }
    units "Gb/s";
    description
      "Used to represent the configured, negotiated, or actual speed
       of an Ethernet interface in Gigabits per second (Gb/s),
       accurate to 3 decimal places (i.e., accurate to 1 Mb/s).";
  }

  typedef duplex-type {
    type enumeration {
      enum full {
        description
          "Full duplex.";
```

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      }
      enum half {
        description
          "Half duplex.";
      }
      enum unknown {
        description
          "Link is currently disconnected or initializing.";
      }
    }
    default full;
    description
      "The current duplex mode of operation of an Ethernet
       interface.";
    reference "IEEE Std 802.3, 30.3.1.1.32, aDuplexStatus";
  }

  typedef pause-fc-direction-type {
    type enumeration {
      enum "disabled" {
        description
          "Flow-control disabled in both ingress and egress
           directions, i.e., PAUSE frames are not transmitted and
           PAUSE frames received in the ingress direction are
           discarded without processing.";
      }
      enum "ingress-only" {
        description
          "PAUSE frame based flow control is enabled in the ingress
           direction only, i.e., PAUSE frames may be transmitted to
           reduce the ingress traffic flow, but PAUSE frames received
           in the ingress direction are discarded without reducing
           the egress traffic rate.";
      }
      enum "egress-only" {
        description
          "PAUSE frame based flow control is enabled in the egress
           direction only, i.e., PAUSE frames are not transmitted,
           but PAUSE frames received in the ingress direction are
           processed to reduce the egress traffic rate.";
      }
      enum "bi-directional" {
        description
          "PAUSE frame based flow control is enabled in both ingress
           and egress directions, i.e., PAUSE frames may be
           transmitted to reduce the ingress traffic flow, and PAUSE
           frames received on ingress are processed to reduce the
           egress traffic rate.";
      }
      enum "undefined" {
        description
          "Link is currently disconnected or initializing.";
      }
    }
    description
      "Enumerates the possible PAUSE frame based flow
       control settings that can be used in explicit configuration,
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        or when reporting the operational state.";

      reference
        "IEEE Std 802.3.1, dot3PauseAdminMode and dot3PauseOperMode";
    }

    feature ethernet-pfc {
      description
        "This device supports Ethernet priority flow-control.";
    }

    feature ethernet-pause {
      description
        "This device supports Ethernet PAUSE.";
    }

    augment "/if:interfaces/if:interface" {
      when "derived-from-or-self(if:type, 'ianaift:ethernetCsmacd')" {
        description
          "Applies to all P2P Ethernet interfaces";
      }
      description
        "Augment interface model with IEEE Std 802.3 Ethernet interface
         specific configuration nodes.";

      container ethernet {
        description
          "Contains all Ethernet interface related configuration.";

        container auto-negotiation {
          description
            "Contains auto-negotiation transmission parameters.

             This leaf allows the advertised duplex value in the
             negotiation to be restricted.

             If not specified then the default behavior is to
             negotiate all available values for the particular type of
             Ethernet PHY associated with the interface.

             If auto-negotiation is enabled, and PAUSE frame based flow
             control has not been explicitly configured, then the
             default PAUSE frame based flow control capabilities that
             are negotiated allows for bi-directional or egress-only
             PAUSE frame based flow control to be negotiated (depending
             on the peer device capabilities/configuration).

             If auto-negotiation is enabled, and PAUSE frame based flow
             control has been explicitly configured, then the
             configuration settings restrict the values that may be
             negotiated.  However, it should be noted that the protocol
             does not allow only egress PAUSE frame based flow control
             to be negotiated without also allowing bi-directional
             PAUSE frame based flow control.";
          reference "IEEE Std 802.3, Clause 28 and Annexes 28A-D";

          leaf enable {
```

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```
        type boolean;
        default true;

        description
          "Controls whether auto-negotiation is enabled or
           disabled.

           For interface types that support auto-negotiation then
           it defaults to being enabled.";
      }
      leaf negotiation-status {
        when "../enable = 'true'";
        type enumeration {
          enum in-progress {
            description
              "The auto-negotiation protocol is running and
               negotiation is currently in-progress";
          }
          enum complete {
            description
              "The auto-negotation protocol has completed
               successfully";
          }
          enum failed {
            description
              "The auto-negotiation protocol has failed.";
          }
          enum unknown {
            description
              "The auto-negotiation status is not currently known,
               this could be because it is still negotiating or the
               protocol cannot run (e.g., if no medium is
               present).";
          }
        }
        config false;
        description
          "The status of the auto-negotiation protocol.";
        reference "IEEE 802.3, 30.6.1.1.4, aAutoNegAutoConfig";
      }

    }

    leaf duplex {
      type duplex-type;
      description
        "Operational duplex mode of the Ethernet interface.
         The default value is implementation-dependent.";
      reference "IEEE Std 802.3, 30.3.1.1.32 aDuplexStatus";
    }

    leaf speed {
      type eth-if-speed-type;
      units "Gb/s";
      description
        "Operational speed of the Ethernet interface.
         The default value is implementation-dependent.";
```

```
      }

      container flow-control {
        description
          "Holds the different types of Ethernet PAUSE frame based
           flow control that can be enabled.";
        container pause {
          if-feature "ethernet-pause";
          description
            "IEEE Std 802.3 PAUSE frame based PAUSE frame based flow
             Control.";
          reference "IEEE Std 802.3, Annex 31B";
          leaf direction {
            type pause-fc-direction-type;
            description
              "Indicates which direction PAUSE frame based flow
               control is enabled in, or whether it is disabled.  The
               default flow-control settings are vendor specific.
               If auto-negotiation is enabled, then PAUSE based
               flow-control is negotiated by default.
               The default value is implementation-dependent.";
          }

          container statistics {
            config false;
            description
              "Contains the number of PAUSE frames received or
               Transmitted.";
            leaf in-pkts-pause {
              type yang:counter64;
              units frames;
              description
                "A count of PAUSE MAC Control frames transmitted on
                 this Ethernet interface.

                 Discontinuities in the values of counters in
                 this 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
                 (RFC 7223).";
              reference
                "IEEE Std 802.3, 30.3.4.3
aPAUSEMACCtrlFramesReceived";
            }
            leaf out-pkts-pause {
              type yang:counter64;
              units frames;
              description
                "A count of PAUSE MAC Control frames transmitted on
                 this Ethernet interface.

                 Discontinuities in the values of counters in
                 this 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
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                (RFC 7223).";
            reference
              "IEEE Std 802.3, 30.3.4.2
               aPAUSEMACCtrlFramesTransmitted";
          }
        }
      }

      container pfc {
        if-feature "ethernet-pfc";
        description
          "IEEE Std 802.3 Priority-based PAUSE frame based flow
           Control.";
        reference "IEEE Std 802.3, Annex 31D";

        leaf enable {
          type boolean;

          description
            "True indicates that IEEE Std 802.3 priority-based
             PAUSE frame based flow control is enabled, false
             indicates that IEEE Std 802.3 priority-based PAUSE
             frame based flow control is disabled.
             For interfaces that have auto-negotiation, then
             priority-based PAUSE frame based flow control is
             negotiated by default.
             If explicitly configured, when auto-negotiated is
             enabled, then the configuration will restrict the
             priority PAUSE frame based flow control settings that
             can be negotiated.
             The default value is implementation-dependent.";
        }

        container statistics {
          config false;
          description
            "This container collects all statistics for IEEE
             Std 802.3 Ethernet interfaces.";

          leaf in-pkts-pfc {
            type yang:counter64;
            units frames;
            description
              "A count of PFC MAC Control frames received on this
               Ethernet interface.

               Discontinuities in the values of counters in
               this 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
               (RFC 7223).";
            reference "IEEE Std 802.3.1, dot3HCInPFCFrames";
          }

          leaf out-pkts-pfc {
            type yang:counter64;
```

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```
          units frames;
          description
            "A count of PFC MAC Control frames transmitted on
             this interface.

             Discontinuities in the values of counters in
             this 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
             (RFC 7223).";
          reference "IEEE Std 802.3.1, dot3HCInPFCFrames";
        }
      }
    }

    leaf force-flow-control {
      type boolean;
      default false;
      description
        "Explicitly forces the local PAUSE frame based flow
         control settings regardless of what has been negotiated.

         Since the auto-negotiation of flow-control settings
         does not allow all sane combinations to be negotiated
         (e.g., consider a device that is only capable of sending
         PAUSE frames connected to a peer device that is only
         capable of receiving and acting on PAUSE frames) and
         failing to agree on the flow-control settings does not
         cause the auto-negotiation to fail completely, then it is
         sometimes useful to be able to explicitly enable
         particular PAUSE frame based flow control settings on
         the local device regardless of what is being advertised
         or negotiated.
         The default value is implementation-dependent.";
      reference
        "IEEE Std 802.3, Table 28B-3";
    }
  }

  leaf max-frame-length {
    type uint16;
    units octets;
    config false;
    description
      "This indicates the MAC frame length (including FCS bytes)
       at which frames are dropped for being too long.";
    reference "IEEE Std 802.3, 30.3.1.1.37 aMaxFrameLength";
  }

  leaf mac-control-extension-control {
    type boolean;
    config false;
    description
      "A value that identifies the current EXTENSION MAC Control
       function, as specified in IEEE Std 802.3, Annex 31C.";
    reference
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      "IEEE Std 802.3, 30.3.8.3 aEXTENSIONMACCtrlStatus
       IEEE Std 802.3.1, dot3ExtensionMacCtrlStatus ";
  }

  leaf frame-limit-slow-protocol {
    type uint64;
    units fps;
    default 10;
    config false;
    description
      "The maximum number of Slow Protocol frames of a given
       subtype that can be transmitted in a one second interval.
       The default value is 10.";
    reference
      "IEEE Std 802.3, 30.3.1.1.38 aSlowProtocolFrameLimit";
  }

  container capabilities {
    config false;
    description
      "Container all Ethernet interface specific capabilities.";

    leaf auto-negotiation {
      type boolean;
      default false;
      description
        "Indicates whether auto-negotiation may be configured on
         this interface.";
    }

  }

  container statistics {
    config false;
    description
      "Contains statistics specific to Ethernet interfaces.

       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 7223).";

    container frame {
      description
        "Contains frame statistics specific to Ethernet
         Interfaces.

         All octet frame lengths include the 4 byte FCS.

         Error counters are only reported once. . The count
         represented by an instance of this object is incremented
         when the frameCheckError status is returned by the MAC
         service to the LLC (or other MAC user). 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
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   status presented to the LLC.

   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 7223).

   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 7223).";

leaf in-total-pkts {
  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

     Also see the 'description' statement associated with
     the parent 'statistics' container for additional
     common semantics related to this counter.";

  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 byte FCS.

     Also see the 'description' statement associated with
     the parent 'statistics' container for additional
     common semantics related to this counter.";

  reference
    "IETF RFC 2819, etherStatsOctets";
}

leaf in-pkts {
  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.

               Also see the 'description' statement associated with
               the parent 'statistics' container for additional
               common semantics related to this counter.";

            reference
              "IEEE Std 802.3, 30.3.1.1.5 aFramesReceivedOK";
          }

          leaf in-multicast-pkts {
            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-pkts.

               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.

               Also see the 'description' statement associated with
               the parent 'statistics' container for additional
               common semantics related to this counter.";

            reference
              "IEEE Std 802.3, 30.3.1.1.21
aMulticastFramesReceivedOK";
          }

          leaf in-broadcast-pkts {
            type yang:counter64;
            units frames;
            description
              "A count of broadcast frames that have been
               successfully received on the Ethernet interface.

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

               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.

               Also see the 'description' statement associated with
               the parent 'statistics' container for additional
               common semantics related to this counter.";
```

```
            reference
              "IEEE Std 802.3, 30.3.1.1.22
aBroadcastFramesReceivedOK";
          }

          leaf in-error-fcs-pkts {
            type yang:counter64;
            units frames;
            description
              "A count of receive frames that are of valid length,
               but do not pass the FCS check, regardless of whether
               or not the frames are an integral number of octets in
               length.

               This count effectively comprises
               aFrameCheckSequenceErrors and aAlignmentErrors added
               together.

               Also see the 'description' statement associated with
               the parent 'statistics' container for additional
               common semantics related to this counter.";

            reference
              "IEEE Std 802.3, 30.3.1.1.6 aFrameCheckSequenceErrors;
               IEEE Std 802.3, 30.3.1.1.7 aAlignmentErrors";
          }

          leaf in-error-undersize-pkts {
            type yang:counter64;
            units frames;
            description
              "A count of frames received on a particular Ethernet
               interface that are less than 64 bytes in length, and
               are discarded.

               This counter is incremented regardless of whether the
               frame passes the FCS check.

               Also see the 'description' statement associated with
               the parent 'statistics' container for additional
               common semantics related to this counter.";

            reference
              "IETF RFC 2819, etherStatsUndersizePkts and
               etherStatsFragments";
          }

          leaf in-error-oversize-pkts {
            type yang:counter64;
            units frames;
            description
              "A count of frames received on a particular Ethernet
               interface that exceed the maximum permitted frame
               size, that is specified in max-frame-length, and are
               discarded.
```

```
              This counter is incremented regardless of whether the
              frame passes the FCS check.

              Also see the 'description' statement associated with
              the parent 'statistics' container for additional
              common semantics related to this counter.";

            reference "IEEE Std 802.3, 30.3.1.1.25
aFrameTooLongErrors";
          }

          leaf in-error-mac-internal-pkts {
            type yang:counter64;
            units frames;
            description
              "A count of frames for which reception on a particular
               Ethernet interface fails due to an internal MAC
               sublayer receive error.

               A frame is only counted by an instance of this object
               if it is not counted by the corresponding instance of
               either the in-error-fcs-pkts, in-error-undersize-pkts,
               or in-error-oversize-pkts.  The precise meaning of the
               count represented by an instance of this object is
               implementation-specific.

               In particular, an instance of this object may
               represent a count of receive errors on a particular
               Ethernet interface that are not otherwise counted.

               Also see the 'description' statement associated with
               the parent 'statistics' container for additional
               common semantics related to this counter.";

            reference
              "IEEE Std 802.3, 30.3.1.1.15
               aFramesLostDueToIntMACRcvError";
          }

          leaf out-pkts {
            type yang:counter64;
            units frames;
            description
              "A count of frames (including unicast, multicast and
               broadcast) that have been successfully transmitted on
               the Ethernet interface.

               Also see the 'description' statement associated with
               the parent 'statistics' container for additional
               common semantics related to this counter.";

            reference
              "IEEE Std 802.3, 30.3.1.1.2 aFramesTransmittedOK";
          }

          leaf out-multicast-pkts {
            type yang:counter64;
```

```
    units frames;
    description
      "A count of multicast frames that have been
       successfully transmitted on the Ethernet interface.

       This counter represents a subset of the frames counted
       by out-pkts.

       Also see the 'description' statement associated with
       the parent 'statistics' container for additional
       common semantics related to this counter.";

    reference
      "IEEE Std 802.3, 30.3.1.1.18 aMulticastFramesXmittedOK";
  }

  leaf out-broadcast-pkts {
    type yang:counter64;
    units frames;
    description
      "A count of broadcast frames that have been
       successfully transmitted on the Ethernet interface.

       This counter represents a subset of the frames counted
       by out-pkts.

       Also see the 'description' statement associated with
       the parent 'statistics' container for additional
       common semantics related to this counter.";

    reference
      "IEEE Std 802.3, 30.3.1.1.19 aBroadcastFramesXmittedOK";
  }

  leaf out-error-mac-internal-pkts {
    type yang:counter64;
    units frames;
    description
      "A count of frames for which transmission on a
       particular Ethernet interface fails due to an internal
       MAC sublayer transmit error.

       The precise meaning of the count represented by an
       instance of this object is implementation-specific. In
       particular, an instance of this object may represent a
       count of transmission errors on a particular Ethernet
       interface that are not otherwise counted.

       Also see the 'description' statement associated with
       the parent 'statistics' container for additional
       common semantics related to this counter.";

    reference
      "IEEE Std 802.3, 30.3.1.1.12
       aFramesLostDueToIntMACXmitError";
  }
}
```

```
container phy {
  description
    "Ethernet statistics related to the PHY layer.

     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 7223).";

  leaf in-error-symbol {
    type yang:counter64;
    units errors;
    description
      "A count of the number of symbol errors that have
       occurred.

       For the precise definition of when the symbol error
       counter is incremented, please see the 'description'
       text associated with aSymbolErrorDuringCarrier,
       specified in IEEE Std 802.3, 30.3.2.1.5.

       Also see the 'description' statement associated with
       the parent 'phy-statistics' container for additional
       common semantics related to this counter.";
    reference
      "IEEE Std 802.3, 30.3.2.1.5 aSymbolErrorDuringCarrier";
  }

  container lpi {
    description
      "Physical Ethernet statistics for the energy efficiency
       related low power idle indications.";

    leaf in-lpi-transitions {
      type yang:counter64;
      units transitions;
      description
        "A count of occurrences of the transition from
         DEASSERT to ASSERT of the LPI_INDICATE
         parameter. The indication reflects the state of the
         PHY according to the requirements of the RS (see
         IEEE Std 802.3, 22.7, 35.4, and 46.4).

         Also see the 'description' statement associated with
         the parent 'phy-statistics' container for additional
         common semantics related to this counter.";

      reference
        "IEEE Std 802.3, 30.3.2.1.11 aReceiveLPITransitions";
    }

    leaf in-lpi-time {
      type decimal64 {
        fraction-digits 6;
      }
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```
      units seconds;
      description
        "A count reflecting the total amount of time (in
         seconds) that the LPI_REQUEST parameter has the
         value ASSERT.  The request is indicated to the PHY
         according to the requirements of the RS (see IEEE Std
         802.3, 22.7, 35.4, and 46.4).

         Also see the 'description' statement associated with
         the parent 'phy-statistics' container for additional
         common semantics related to this counter.";

      reference
        "IEEE Std 802.3, 30.3.2.1.9 aReceiveLPIMicroseconds";
    }

    leaf out-lpi-transitions {
      type yang:counter64;
      units transitions;
      description
        "A count of occurrences of the transition from state
         LPI_DEASSERTED to state LPI_ASSERTED of the LPI
         transmit state diagram is the RS. The state
         transition corresponds to the assertion of the
         LPI_REQUEST parameter. The request is indicated to
         the PHY according to the requirements of the RS (see
         IEEE Std 802.3, 22.7, 35.4, 46.4.)

         Also see the 'description' statement associated with
         the parent 'phy-statistics' container for additional
         common semantics related to this counter.";

      reference
        "IEEE Std 802.3, 30.3.2.1.10 aTransmitLPITransitions";
    }

    leaf out-lpi-time {
      type decimal64 {
        fraction-digits 6;
      }
      units seconds;
      description
        "A count reflecting the total amount of time (in
         seconds) that the LPI_INDICATION parameter has the
         value ASSERT.  The request is indicated to the PHY
         according to the requirements of the RS (see IEEE
         802.3, 22.7, 35.4, and 46.4).

         Also see the 'description' statement associated with
         the parent 'phy-statistics' container for additional
         common semantics related to this counter.";

      reference
        "IEEE Std 802.3, 30.3.2.1.8 aTransmitLPIMicroseconds";
    }
  }
}
```

```
container mac-control {
  description
    "A group of statistics specific to MAC Control operation
     of selected Ethernet interfaces.

     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 7223).";

  reference
    "IEEE Std 802.3.1, dot3ExtensionTable";

  leaf in-pkts-mac-control-unknown {
    type yang:counter64;
    units frames;
    description
      "A count of MAC Control frames with an unsupported
       opcode received on this Ethernet interface.

       Frames counted against this counter are also counted
       against in-discards defined in the ietf-interfaces
       YANG module (IETF RFC 7223).

       Also see the 'description' statement associated with
       the parent 'mac-control-statistics' container for
       additional semantics.";
    reference
      "IEEE Std 802.3, 30.3.3.5 aUnsupportedOpcodesReceived";
  }

  leaf in-pkts-mac-control-extension {
    type yang:counter64;
    units frames;
    description
      "The count of Extension MAC Control frames received on
       this Ethernet interface.

       Also see the 'description' statement associated with
       the parent 'mac-control-statistics' container for
       additional semantics.";
    reference
      "IEEE Std 802.3, 30.3.8.2
       aEXTENSIONMACCtrlFramesReceived";
  }

  leaf out-pkts-mac-control-extension {
    type yang:counter64;
    units frames;
    description
      "The count of Extension MAC Control frames transmitted
       on this Ethernet interface.

       Also see the 'description' statement associated with
       the parent 'mac-control-statistics' container for
```

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```
              additional semantics.";
            reference
              "IEEE Std 802.3, 30.3.8.1
               aEXTENSIONMACCtrlFramesTransmitted";
          }
        }
      }
    }
  }
}
```