                    Definitions of Managed Objects for
                    the Ethernet-like Interface Types

Status of this Memo

Copyright Notice

Abstract

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   This memo obsoletes RFC 1650 "Definitions of Managed Objects for the
   Ethernet-like Interface Types using SMIv2". This memo extends that
   specification by including management information useful for the
   management of 100 Mb/s Ethernet interfaces.

   Ethernet technology, as defined by the 802.3 Working Group of the
   IEEE, continues to evolve, with scalable increases in speed, new
   types of cabling and interfaces, and new features. This evolution
   may require changes in the managed objects in order to reflect this
   new functionality. This document, as with other documents issued by
   this working group, reflect a certain stage in the evolution of
   Ethernet technology. In the future, this document might be revised,
   or new documents might be issued by the Ethernet Interfaces and Hub
   MIB Working Group, in order to reflect the evolution of Ethernet
   technology.

Table of Contents

1. Introduction

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   In particular, it defines objects for managing ethernet-like
   interfaces.

   This memo also includes a MIB module. This MIB module extends the
   list of managed objects specified in the earlier version of this MIB:
   RFC1650 [11].

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
   document are to be interpreted as described in [13].

2. The SNMP Network Management Framework

   The SNMP Network Management Framework consists of several components.
   For the purpose of this specification, the applicable components of
   the Framework are the SMI and related documents [2, 3, 4], which
   define the mechanisms used for describing and naming objects for the
   purpose of management.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

2.1. Object Definitions

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) [1] defined in the SMI [2]. In particular, each object object type is named by an OBJECT IDENTIFIER, an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to refer to the object type.

3. Overview

Instances of these object types represent attributes of an interface to an ethernet-like communications medium. At present, ethernet-like media are identified by the following values of the ifType object in the Interfaces MIB [12]:

                        ethernetCsmacd(6)
                        iso88023Csmacd(7)
                          starLan(11)

The definitions presented here are based on the IEEE 802.3 Layer Management Specification [5], as originally interpreted by Frank Kastenholz then of Interlan in [7]. Implementors of these MIB objects should note that the IEEE document explicitly describes (in the form of Pascal pseudocode) when, where, and how various MAC attributes are measured. The IEEE document also describes the effects of MAC actions that may be invoked by manipulating instances of the MIB objects defined here.

To the extent that some of the attributes defined in [5] are represented by previously defined objects in MIB-2 [16] or in the Interfaces MIB [12], such attributes are not redundantly represented by objects defined in this memo. Among the attributes represented by objects defined in other memos are the number of octets transmitted or received on a particular interface, the number of frames transmitted or received on a particular interface, the promiscuous status of an interface, the MAC address of an interface, and multicast information associated with an interface.

3.1. Relation to MIB-2

This section applies only when this MIB is used in conjunction with
the "old" (RFC 1213) [16] interface group.

The relationship between an ethernet-like interface and an interface
in the context of the Internet-standard MIB is one-to-one. As such,
the value of an ifIndex object instance can be directly used to
identify corresponding instances of the objects defined herein.

For agents which implement the (now deprecated) ifSpecific object, an
instance of that object that is associated with an ethernet-like
interface has the OBJECT IDENTIFIER value:

```
        dot3     OBJECT IDENTIFER ::= { transmission 7 }
```

3.2. Relation to the Interfaces MIB

The Interface MIB [12] requires that any MIB which is an adjunct of
the Interface MIB clarify specific areas within the Interface MIB.
These areas were intentionally left vague in the Interface MIB to
avoid over constraining the MIB, thereby precluding management of
certain media-types.

Section 3.3 of [12] enumerates several areas which a media-specific
MIB must clarify. Each of these areas is addressed in a following
subsection. The implementor is referred to [12] in order to
understand the general intent of these areas.

3.2.1. Layering Model

This MIB does not provide for layering. There are no sublayers.

EDITOR'S NOTE:

One could foresee the development of an 802.2 and enet-transceiver
MIB. They could be higher and lower sublayers, respectively. All
that THIS document should do is allude to the possibilities and urge
the implementor to be aware of the possibility and that they may have
requirements which supersede the requirements in this document.

3.2.2. Virtual Circuits

This medium does not support virtual circuits and this area is not
applicable to this MIB.

3.2.3. ifTestTable

This MIB defines two tests for media which are instrumented with this
MIB; TDR and Loopback. Implementation of these tests is not
required. Many common interface chips do not support one or both of
these tests.

These two tests are provided as a convenience, allowing a common
method to invoke the test.

Standard MIBs do not include objects in which to return the results
of the TDR test. Any needed objects MUST be provided in the vendor
specific MIB.

Note that the ifTestTable is now deprecated. Work is underway to
define a replacement MIB for system and interface testing. It is
expected that the tests defined in this document will be usable in
this replacement MIB.

3.2.4. ifRcvAddressTable

This table contains all IEEE 802.3 addresses, unicast, multicast, and
broadcast, for which this interface will receive packets and forward
them up to a higher layer entity for local consumption. The format
of the address, contained in ifRcvAddressAddress, is the same as for
ifPhysAddress.

In the event that the interface is part of a MAC bridge, this table
does not include unicast addresses which are accepted for possible
forwarding out some other port. This table is explicitly not
intended to provide a bridge address filtering mechanism.

3.2.5. ifPhysAddress

This object contains the IEEE 802.3 address which is placed in the
source-address field of any Ethernet, Starlan, or IEEE 802.3 frames
that originate at this interface. Usually this will be kept in ROM
on the interface hardware. Some systems may set this address via
software.

In a system where there are several such addresses the designer has a
tougher choice. The address chosen should be the one most likely to
be of use to network management (e.g. the address placed in ARP
responses for systems which are primarily IP systems).

If the designer truly can not chose, use of the factory- provided ROM
address is suggested.

If the address can not be determined, an octet string of zero length
should be returned.

The address is stored in binary in this object. The address is
stored in "canonical" bit order, that is, the Group Bit is positioned
as the low-order bit of the first octet. Thus, the first byte of a
multicast address would have the bit 0x01 set.

3.2.6. ifType

This MIB applies to interfaces which have any of the following ifType
values:

                        ethernetCsmacd(6)
                        iso88023Csmacd(7)
                           starLan(11)

It is RECOMMENDED that all Ethernet-like interfaces use an ifType of
ethernetCsmacd(6) regardless of the speed that the interface is
running or the link-layer encapsulation in use. iso88023Csmacd(7)
and starLan(11) are supported for backwards compatability.

There are two other interface types defined in the IANAifType-MIB for
100 Mbit Ethernet. They are fastEther(62), and fastEtherFX(69).
This document takes the position that an Ethernet is an Ethernet, and
Ethernet interfaces SHOULD always have the same value of ifType.
Information on the particular flavor of Ethernet that an interface is
running is available from ifSpeed in the Interfaces MIB, and
ifMauType in the 802.3 MAU MIB. An Ethernet-like interface SHOULD
NOT use the fastEther(62) or fastEtherFX(69) ifTypes.

Interfaces with any of the supported ifType values map to the
EtherLike-MIB in the same manner. Which compliance statement an
interface should implement is dependent on the maximum speed
supported on the interface. The EtherLike-MIB etherCompliance
compliance statement applies to all Ethernet-like interfaces whose
maximum supported speed is 10 Mbit/sec or less. There are no
implementation differences. Similarly, the EtherLike-MIB
ether100MbsCompliance compliance statement applies to all Ethernet-
like interfaces whose maximum supported speed is 100Mbit/sec.

An interface that is capable of operating at 100Mbit/sec MUST
implement the ether100MbsCompliance compliance statement, even if it
is currently operating at a lower speed. Counters in the
ether100MbsCompliance compliance statement that only apply to 100
Mbit interfaces would simply not increment when the interface is
operating at a lower speed.

3.2.7. Specific Interface MIB Objects

   The following table provides specific implementation guidelines for
   applying the interface group objects to ethernet-like media.

      Object

      ifIndex   Each ethernet-like interface is
                               represented by an ifEntry. The
                               dot3StatsTable in this MIB module is
                               indexed by dot3StatsIndex. The interface
                               identified by a particular value of
                               dot3StatsIndex is the same interface as
                               identified by the same value of ifIndex.

      ifDescr   Refer to [12].

      ifType   Refer to section 3.2.6.

      ifMtu   1500 octets.

      ifSpeed   The current operational speed of the
                               interface in bits per second. For
                               current ethernet-like interfaces, this
                               will be equal to 1,000,000 (1 million),
                               10,000,000 (10 million), or 100,000,000
                               (100 million). If the interface
                               implements auto-negotiation,
                               auto-negotiation is enabled for this
                               interface, and the interface has not yet
                               negotiated to an operational speed, this
                               object SHOULD reflect the maximum speed
                               supported by the interface. Note that
                               this object MUST NOT indicate a doubled
                               value when operating in full-duplex
                               mode. It MUST indicate the correct
                               line speed regardless of the current
                               duplex mode. The correct object to use
                               to determine the duplex mode of the
                               interface is the ifMauType object in the
                               802.3 MAU MIB.

      ifPhysAddress   Refer to section 3.2.5.

      ifAdminStatus   Write access is not required. Support
                               for 'testing' is not required.

```
    ifOperStatus              The operational state of the interface.
                              Support for 'testing' is not required.
                              The value 'dormant' has no meaning for
                              an ethernet-like interface.

    ifLastChange              Refer to [12].

    ifInOctets                The number of octets in valid MAC frames
                              received on this interface, including
                              the MAC header and FCS.

    ifInUcastPkts             Refer to [12].

    ifInDiscards              Refer to [12].

    ifInErrors                The sum for this interface of
                              dot3StatsAlignmentErrors,
                              dot3StatsFCSErrors,
                              dot3StatsFrameTooLongs,
                              dot3StatsInternalMacReceiveErrors and
                              dot3StatsSymbolErrors.

    ifInUnknownProtos         Refer to [12].

    ifOutOctets               The number of octets transmitted in
                              valid MAC frames on this interface,
                              including the MAC header and FCS.

    ifOutUcastPkts            Refer to [12].

    ifOutDiscards             Refer to [12].

    ifOutErrors               The sum for this interface of:
                              dot3StatsSQETestErrors,
                              dot3StatsLateCollisions,
                              dot3StatsExcessiveCollisions,
                              dot3StatsInternalMacTransmitErrors and
                              dot3StatsCarrierSenseErrors.

    ifName                    Locally-significant textual name for the
                              interface (e.g. lan0).

    ifInMulticastPkts         Refer to [12].

    ifInBroadcastPkts         Refer to [12].

    ifOutMulticastPkts        Refer to [12].
```

```
ifOutBroadcastPkts           Refer to [12].

ifHCInOctets                 64-bit versions of counters.  Required
ifHCOutOctets                for ethernet-like interfaces that are
                             capable of operating at 20Mbit/sec or
                             faster, even if the interface is
                             currently operating at less than
                             20Mbit/sec.

ifHCInUcastPkts              64-bit versions of packet counters.
ifHCInMulticastPkts          Support for these counters is not
ifHCInBroadcastPkts          required for the interface types
ifHCOutUcastPkts             supported by this MIB.  They are only
ifHCOutMulticastPkts         required for interfaces capable of
ifHCOutBroadcastPkts         operating at 640Mbit/sec or faster.
                             Note that a future revision of this
                             document may support faster interfaces,
                             and therefore may require support for
                             these counters.

ifLinkUpDownTrapEnable       Refer to [12].  Default is 'enabled'

ifHighSpeed                  The current operational speed of the
                             interface in millions of bits per
                             second. For current ethernet-like
                             interfaces, this will be equal to 1, 10,
                             or 100.  If the interface implements
                             auto-negotiation, auto-negotiation is
                             enabled for this interface, and the
                             interface has not yet negotiated to an
                             operational speed, this object SHOULD
                             reflect the maximum speed supported by
                             the interface. Note that this object
                             MUST NOT indicate a doubled value when
                             operating in full-duplex mode.  It MUST
                             indicate the correct line speed
                             regardless of the current duplex mode.
                             The correct object to use to determine
                             the duplex mode of the interface is the
                             ifMauType object in the 802.3 MAU MIB.

ifPromiscuousMode            Refer to [12].

ifConnectorPresent           This will normally be 'true'.

ifAlias                      Refer to [12].

ifCounterDiscontinuityTime Refer to [12].
```

```
    ifStackHigherLayer          Refer to section 3.2.1.
    ifStackLowerLayer
    ifStackStatus

    ifRcvAddressAddress         Refer to section 3.2.4.
    ifRcvAddressStatus
    ifRcvAddressType
```

3.3. Relation to the 802.3 MAU MIB

Support for the mauModIfCompl compliance statement of the MAU-MIB
[14] is REQUIRED for Ethernet-like interfaces. This MIB is needed in
order to allow applications to determine the current MAU type in use
by the interface. The MAU type indicates not only the media type in
use, but also indicates whether the interface is operating in half-
duplex or full-duplex mode. Implementing this MIB module without
implementing the MAU-MIB would leave applications with no standard
way to determine the duplex mode of the interface.

3.4. Mapping of IEEE 802.3 Managed Objects

```
    IEEE 802.3 Managed Object           Corresponding SNMP Object

    oMacEntity
     .aMACID                            dot3StatsIndex or
                                        IF-MIB - ifIndex
     .aFramesTransmittedOK              IF-MIB - ifOutUCastPkts +
                                                 ifOutMulticastPkts +
                                                 ifOutBroadcastPkts
     .aSingleCollisionFrames            dot3StatsSingleCollisionFrames
     .aMultipleCollisionFrames          dot3StatsMultipleCollisionFrames
     .aFramesReceivedOK                 IF-MIB - ifInUcastPkts +
                                                 ifInMulticastPkts +
                                                 ifInBroadcastPkts
     .aFrameCheckSequenceErrors         dot3StatsFCSErrors
     .aAlignmentErrors                  dot3StatsAlignmentErrors
     .aOctetsTransmittedOK              IF-MIB - ifOutOctets
     .aFramesWithDeferredXmissions      dot3StatsDeferredTransmissions
     .aLateCollisions                   dot3StatsLateCollisions
     .aFramesAbortedDueToXSColls        dot3StatsExcessiveCollisions
     .aFramesLostDueToIntMACXmitError   dot3StatsInternalMacTransmitErrors
     .aCarrierSenseErrors               dot3StatsCarrierSenseErrors
     .aOctetsReceivedOK                 IF-MIB - ifInOctets
     .aFramesLostDueToIntMACRcvError    dot3StatsInternalMacReceiveErrors
     .aPromiscuousStatus                IF-MIB - ifPromiscuousMode
     .aReadMulticastAddressList         IF-MIB - ifRcvAddressTable
     .aMulticastFramesXmittedOK         IF-MIB - ifOutMulticastPkts
     .aBroadcastFramesXmittedOK         IF-MIB - ifOutBroadcastPkts
```

```
   .aMulticastFramesReceivedOK       IF-MIB - ifInMulticastPkts
   .aBroadcastFramesReceivedOK       IF-MIB - ifInBroadcastPkts
   .aFrameTooLongErrors              dot3StatsFrameTooLongs
   .aReadWriteMACAddress             IF-MIB - ifPhysAddress
   .aCollisionFrames                 dot3CollFrequencies
   .acAddGroupAddress                IF-MIB - ifRcvAddressTable
   .acDeleteGroupAddress             IF-MIB - ifRcvAddressTable
   .acExecuteSelfTest                dot3TestLoopBack

 oPHYEntity
   .aSQETestErrors                   dot3StatsSQETestErrors
   .aSymbolErrorDuringCarrier        dot3StatsSymbolErrors
```

The following IEEE 802.3 managed objects have been removed from this
MIB module as a result of implementation feedback:

```
 oMacEntity
   .aFramesWithExcessiveDeferral
   .aInRangeLengthErrors
   .aOutOfRangeLengthField
   .aMACEnableStatus
   .aTransmitEnableStatus
   .aMulticastReceiveStatus
   .acInitializeMAC
```

Please see [15] for the detailed reasoning on why these objects were
removed.

4. Definitions

```
   EtherLike-MIB DEFINITIONS ::= BEGIN

       IMPORTS
           MODULE-IDENTITY, OBJECT-TYPE, OBJECT-IDENTITY,
           Counter32, mib-2, transmission
               FROM SNMPv2-SMI
           MODULE-COMPLIANCE, OBJECT-GROUP
               FROM SNMPv2-CONF
           ifIndex, InterfaceIndex
               FROM IF-MIB;

       etherMIB MODULE-IDENTITY
           LAST-UPDATED "9806032150Z"  -- June 3, 1998
           ORGANIZATION "IETF 802.3 Hub MIB Working Group"
           CONTACT-INFO
               "WG E-mail: hubmib@hprnd.rose.hp.com
             To subscribe: hubmib-request@hprnd.rose.hp.com
```

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           DESCRIPTION "The MIB module to describe generic objects for
                        Ethernet-like network interfaces. This MIB is an
                        updated version of the Ethernet-like MIB in RFC
                        1650."

           REVISION   "9806032150Z"
           DESCRIPTION "Updated to include support for 100 Mb/sec
                        interfaces."

           REVISION   "9402030400Z"
           DESCRIPTION "Version published as RFC 1650."
           ::= { mib-2 35 }

      etherMIBObjects OBJECT IDENTIFIER ::= { etherMIB 1 }

      dot3   OBJECT IDENTIFIER ::= { transmission 7 }

      -- the Ethernet-like Statistics group

      dot3StatsTable OBJECT-TYPE
          SYNTAX   SEQUENCE OF Dot3StatsEntry
          MAX-ACCESS not-accessible

```
        STATUS      current
        DESCRIPTION "Statistics for a collection of ethernet-like
                     interfaces attached to a particular system."
        ::= { dot3 2 }

    dot3StatsEntry OBJECT-TYPE
        SYNTAX      Dot3StatsEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION "Statistics for a particular interface to an
                     ethernet-like medium."
        INDEX       { dot3StatsIndex }
        ::= { dot3StatsTable 1 }

    Dot3StatsEntry ::=
        SEQUENCE {
            dot3StatsIndex                    InterfaceIndex,
            dot3StatsAlignmentErrors          Counter32,
            dot3StatsFCSErrors                Counter32,
            dot3StatsSingleCollisionFrames    Counter32,
            dot3StatsMultipleCollisionFrames  Counter32,
            dot3StatsSQETestErrors            Counter32,
            dot3StatsDeferredTransmissions    Counter32,
            dot3StatsLateCollisions           Counter32,
            dot3StatsExcessiveCollisions      Counter32,
            dot3StatsInternalMacTransmitErrors Counter32,
            dot3StatsCarrierSenseErrors       Counter32,
            dot3StatsFrameTooLongs            Counter32,
            dot3StatsInternalMacReceiveErrors Counter32,
            dot3StatsEtherChipSet             OBJECT IDENTIFIER,
            dot3StatsSymbolErrors             Counter32
        }

    dot3StatsIndex OBJECT-TYPE
        SYNTAX      InterfaceIndex
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION "An index value that uniquely identifies an
                     interface to an ethernet-like medium.  The
                     interface identified by a particular value of
                     this index is the same interface as identified
                     by the same value of ifIndex."
        ::= { dot3StatsEntry 1 }

    dot3StatsAlignmentErrors OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
```

          DESCRIPTION "A count of frames received on a particular
                      interface that are not an integral number of
                      octets in length and do not pass the FCS check.

                      The count represented by an instance of this
                      object is incremented when the alignmentError
                      status is returned by the MAC service to the
                      LLC (or other MAC user). Received frames for
                      which multiple error conditions obtain are,
                      according to the conventions of IEEE 802.3
                      Layer Management, counted exclusively according
                      to the error status presented to the LLC."
          REFERENCE   "IEEE 802.3 Layer Management"
          ::= { dot3StatsEntry 2 }

      dot3StatsFCSErrors OBJECT-TYPE
          SYNTAX   Counter32
          MAX-ACCESS read-only
          STATUS   current
          DESCRIPTION "A count of frames received on a particular
                      interface that are an integral number of octets
                      in length but do not pass the FCS check.

                      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 obtain are,
                      according to the conventions of IEEE 802.3
                      Layer Management, counted exclusively according
                      to the error status presented to the LLC."
          REFERENCE   "IEEE 802.3 Layer Management"
          ::= { dot3StatsEntry 3 }

      dot3StatsSingleCollisionFrames OBJECT-TYPE
          SYNTAX   Counter32
          MAX-ACCESS read-only
          STATUS   current
          DESCRIPTION "A count of successfully transmitted frames on
                      a particular interface for which transmission
                      is inhibited by exactly one collision.

                      A frame that is counted by an instance of this
                      object is also counted by the corresponding
                      instance of either the ifOutUcastPkts,
                      ifOutMulticastPkts, or ifOutBroadcastPkts,
                      and is not counted by the corresponding
                      instance of the dot3StatsMultipleCollisionFrames

                               object."
           REFERENCE   "IEEE 802.3 Layer Management"
           ::= { dot3StatsEntry 4 }

       dot3StatsMultipleCollisionFrames OBJECT-TYPE
           SYNTAX   Counter32
           MAX-ACCESS   read-only
           STATUS   current
           DESCRIPTION   "A count of successfully transmitted frames on
                         a particular interface for which transmission
                         is inhibited by more than one collision.

                         A frame that is counted by an instance of this
                         object is also counted by the corresponding
                         instance of either the ifOutUcastPkts,
                         ifOutMulticastPkts, or ifOutBroadcastPkts,
                         and is not counted by the corresponding
                         instance of the dot3StatsSingleCollisionFrames
                         object."
           REFERENCE   "IEEE 802.3 Layer Management"
           ::= { dot3StatsEntry 5 }

       dot3StatsSQETestErrors OBJECT-TYPE
           SYNTAX   Counter32
           MAX-ACCESS   read-only
           STATUS   current
           DESCRIPTION   "A count of times that the SQE TEST ERROR
                         message is generated by the PLS sublayer for a
                         particular interface. The SQE TEST ERROR
                         message is defined in section 7.2.2.2.4 of
                         ANSI/IEEE 802.3-1985 and its generation is
                         described in section 7.2.4.6 of the same
                         document."
           REFERENCE   "ANSI/IEEE Std 802.3-1985 Carrier Sense
                         Multiple Access with Collision Detection Access
                         Method and Physical Layer Specifications"
           ::= { dot3StatsEntry 6 }

       dot3StatsDeferredTransmissions OBJECT-TYPE
           SYNTAX   Counter32
           MAX-ACCESS   read-only
           STATUS   current
           DESCRIPTION   "A count of frames for which the first
                         transmission attempt on a particular interface
                         is delayed because the medium is busy.

                        The count represented by an instance of this
                        object does not include frames involved in
                        collisions."
           REFERENCE   "IEEE 802.3 Layer Management"
           ::= { dot3StatsEntry 7 }

    dot3StatsLateCollisions OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION "The number of times that a collision is
                        detected on a particular interface later than
                        512 bit-times into the transmission of a
                        packet.

                        Five hundred and twelve bit-times corresponds
                        to 51.2 microseconds on a 10 Mbit/s system. A
                        (late) collision included in a count
                        represented by an instance of this object is
                        also considered as a (generic) collision for
                        purposes of other collision-related
                        statistics."
           REFERENCE   "IEEE 802.3 Layer Management"
           ::= { dot3StatsEntry 8 }

    dot3StatsExcessiveCollisions OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION "A count of frames for which transmission on a
                        particular interface fails due to excessive
                        collisions."
           REFERENCE   "IEEE 802.3 Layer Management"
           ::= { dot3StatsEntry 9 }

    dot3StatsInternalMacTransmitErrors OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION "A count of frames for which transmission on a
                        particular interface fails due to an internal
                        MAC sublayer transmit error. A frame is only
                        counted by an instance of this object if it is
                        not counted by the corresponding instance of
                        either the dot3StatsLateCollisions object, the
                        dot3StatsExcessiveCollisions object, or the
                        dot3StatsCarrierSenseErrors object.

                    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 interface that are not
                    otherwise counted."
        REFERENCE   "IEEE 802.3 Layer Management"
        ::= { dot3StatsEntry 10 }

    dot3StatsCarrierSenseErrors OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION "The number of times that the carrier sense
                    condition was lost or never asserted when
                    attempting to transmit a frame on a particular
                    interface.

                    The count represented by an instance of this
                    object is incremented at most once per
                    transmission attempt, even if the carrier sense
                    condition fluctuates during a transmission
                    attempt."
        REFERENCE   "IEEE 802.3 Layer Management"
        ::= { dot3StatsEntry 11 }

    -- { dot3StatsEntry 12 } is not assigned

    dot3StatsFrameTooLongs OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION "A count of frames received on a particular
                    interface that exceed the maximum permitted
                    frame size.

                    The count represented by an instance of this
                    object is incremented when the frameTooLong
                    status is returned by the MAC service to the
                    LLC (or other MAC user). Received frames for
                    which multiple error conditions obtain are,
                    according to the conventions of IEEE 802.3
                    Layer Management, counted exclusively according
                    to the error status presented to the LLC."
        REFERENCE   "IEEE 802.3 Layer Management"
        ::= { dot3StatsEntry 13 }

    -- { dot3StatsEntry 14 } is not assigned

```
     -- { dot3StatsEntry 15 } is not assigned

     dot3StatsInternalMacReceiveErrors OBJECT-TYPE
         SYNTAX        Counter32
         MAX-ACCESS    read-only
         STATUS        current
         DESCRIPTION   "A count of frames for which reception on a
                        particular 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 dot3StatsFrameTooLongs object, the
                        dot3StatsAlignmentErrors object, or the
                        dot3StatsFCSErrors object.
                        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 interface that are not
                        otherwise counted."
         REFERENCE     "IEEE 802.3 Layer Management"
         ::= { dot3StatsEntry 16 }

     dot3StatsEtherChipSet OBJECT-TYPE
         SYNTAX        OBJECT IDENTIFIER
         MAX-ACCESS    read-only
         STATUS        current
         DESCRIPTION   "This object contains an OBJECT IDENTIFIER
                        which identifies the chipset used to
                        realize the interface. Ethernet-like
                        interfaces are typically built out of
                        several different chips. The MIB implementor
                        is presented with a decision of which chip
                        to identify via this object. The implementor
                        should identify the chip which is usually
                        called the Medium Access Control chip.
                        If no such chip is easily identifiable,
                        the implementor should identify the chip
                        which actually gathers the transmit
                        and receive statistics and error
                        indications. This would allow a
                        manager station to correlate the
                        statistics and the chip generating
                        them, giving it the ability to take
                        into account any known anomalies
                        in the chip."
         ::= { dot3StatsEntry 17 }
```

```
        dot3StatsSymbolErrors OBJECT-TYPE
            SYNTAX        Counter32
            MAX-ACCESS    read-only
            STATUS        current
            DESCRIPTION "The number of times there was an invalid data
                        symbol when a valid carrier was present on a
                        particular interface.

                        The count represented by an instance of this
                        object is incremented at most once per carrier
                        event, even if multiple symbol errors occur
                        during the carrier event."
            REFERENCE    "IEEE 802.3u-1995 10 & 100 Mb/s Management"
            ::= { dot3StatsEntry 18 }

        -- the Ethernet-like Collision Statistics group

        -- Implementation of this group is optional; it is appropriate
        -- for all systems which have the necessary metering

        dot3CollTable OBJECT-TYPE
            SYNTAX        SEQUENCE OF Dot3CollEntry
            MAX-ACCESS    not-accessible
            STATUS        current
            DESCRIPTION "A collection of collision histograms for a
                        particular set of interfaces."
            ::= { dot3 5 }

        dot3CollEntry OBJECT-TYPE
            SYNTAX        Dot3CollEntry
            MAX-ACCESS    not-accessible
            STATUS        current
            DESCRIPTION "A cell in the histogram of per-frame
                        collisions for a particular interface.  An
                        instance of this object represents the
                        frequency of individual MAC frames for which
                        the transmission (successful or otherwise) on a
                        particular interface is accompanied by a
                        particular number of media collisions."
            INDEX         { ifIndex, dot3CollCount }
            ::= { dot3CollTable 1 }

        Dot3CollEntry ::=
            SEQUENCE {
                dot3CollCount        INTEGER,
                dot3CollFrequencies  Counter32
            }
```

```
        -- { dot3CollEntry 1 } is no longer in use

        dot3CollCount OBJECT-TYPE
            SYNTAX      INTEGER (1..16)
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION "The number of per-frame media collisions for
                        which a particular collision histogram cell
                        represents the frequency on a particular
                        interface."
            ::= { dot3CollEntry 2 }


        dot3CollFrequencies OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION "A count of individual MAC frames for which the
                        transmission (successful or otherwise) on a
                        particular interface occurs after the
                        frame has experienced exactly the number
                        of collisions in the associated
                        dot3CollCount object.

                        For example, a frame which is transmitted
                        on interface 77 after experiencing
                        exactly 4 collisions would be indicated
                        by incrementing only dot3CollFrequencies.77.4.
                        No other instance of dot3CollFrequencies would
                        be incremented in this example."
            ::= { dot3CollEntry 3 }

        -- 802.3 Tests

        dot3Tests   OBJECT IDENTIFIER ::= { dot3 6 }

        dot3Errors  OBJECT IDENTIFIER ::= { dot3 7 }


        -- TDR Test

        dot3TestTdr OBJECT-IDENTITY
            STATUS      current
            DESCRIPTION "The Time-Domain Reflectometry (TDR) test is
                        specific to ethernet-like interfaces of type
                        10Base5 and 10Base2.  The TDR value may be
                        useful in determining the approximate distance
                        to a cable fault.  It is advisable to repeat
```

                        this test to check for a consistent resulting
                        TDR value, to verify that there is a fault.

                        A TDR test returns as its result the time
                        interval, measured in 10 MHz ticks or 100 nsec
                        units, between the start of TDR test
                        transmission and the subsequent detection of a
                        collision or deassertion of carrier. On
                        successful completion of a TDR test, the result
                        is stored as the value of an appropriate
                        instance of an appropriate vendor specific MIB
                        object, and the OBJECT IDENTIFIER of that
                        instance is stored in the appropriate instance
                        of the appropriate test result code object
                        (thereby indicating where the result has been
                        stored)."
            ::= { dot3Tests 1 }

    -- Loopback Test

    dot3TestLoopBack OBJECT-IDENTITY
        STATUS   current
        DESCRIPTION "This test configures the MAC chip and executes
                        an internal loopback test of memory, data paths,
                        and the MAC chip logic. This loopback test can
                        only be executed if the interface is offline.
                        Once the test has completed, the MAC chip should
                        be reinitialized for network operation, but it
                        should remain offline.

                        If an error occurs during a test, the
                        appropriate test result object will be set
                        to indicate a failure. The two OBJECT
                        IDENTIFIER values dot3ErrorInitError and
                        dot3ErrorLoopbackError may be used to provided
                        more information as values for an appropriate
                        test result code object."
            ::= { dot3Tests 2 }

    dot3ErrorInitError OBJECT-IDENTITY
        STATUS   current
        DESCRIPTION "Couldn't initialize MAC chip for test."
            ::= { dot3Errors 1 }

    dot3ErrorLoopbackError OBJECT-IDENTITY
        STATUS   current
        DESCRIPTION "Expected data not received (or not received
                        correctly) in loopback test."

          ::= { dot3Errors 2 }

       -- 802.3 Hardware Chipsets

       -- The object dot3StatsEtherChipSet is provided to
       -- identify the MAC hardware used to communicate on an
       -- interface. The following hardware chipsets are
       -- registered:

       dot3ChipSets   OBJECT IDENTIFIER ::= { dot3 8 }

       dot3ChipSetAMD   OBJECT IDENTIFIER ::= { dot3ChipSets 1 }

       dot3ChipSetAMD7990 OBJECT-IDENTITY
           STATUS   current
           DESCRIPTION "The authoritative identifier for the Advanced
                       Micro Devices Am7990 Local Area Network
                       Controller for Ethernet (LANCE)."
           ::= { dot3ChipSetAMD 1 }

       dot3ChipSetAMD79900 OBJECT-IDENTITY
           STATUS   current
           DESCRIPTION "The authoritative identifier for the Advanced
                       Micro Devices Am79900 chip."
           ::= { dot3ChipSetAMD 2 }

       dot3ChipSetAMD79C940 OBJECT-IDENTITY

           STATUS   current
           DESCRIPTION "The authoritative identifier for the Advanced
                       Micro Devices Am79C940 Media Access Controller
                       for Ethernet (MACE)."
           ::= { dot3ChipSetAMD 3 }

       dot3ChipSetAMD79C90 OBJECT-IDENTITY
           STATUS   current
           DESCRIPTION "The authoritative identifier for the Advanced
                       Micro Devices Am79C90 CMOS Local Area Network
                       Controller for Ethernet (C-LANCE)."
           ::= { dot3ChipSetAMD 4 }

       dot3ChipSetAMD79C960 OBJECT-IDENTITY
           STATUS   current
           DESCRIPTION "The authoritative identifier for the Advanced
                       Micro Devices Am79C960 PCnet-ISA Single Chip
                       Ethernet Controller for ISA."
           ::= { dot3ChipSetAMD 5 }

```
     dot3ChipSetAMD79C961 OBJECT-IDENTITY
         STATUS        current
         DESCRIPTION "The authoritative identifier for the Advanced
                      Micro Devices Am79C961 PCnet-ISA+ Single Chip
                      Plug & Play Full-Duplex Ethernet Controller
                      for ISA."
         ::= { dot3ChipSetAMD 6 }

     dot3ChipSetAMD79C961A OBJECT-IDENTITY
         STATUS        current
         DESCRIPTION "The authoritative identifier for the Advanced
                      Micro Devices Am79C961A PCnet-ISA II Single Chip
                      Plug & Play Full-Duplex Ethernet Controller
                      for ISA."
         ::= { dot3ChipSetAMD 7 }

     dot3ChipSetAMD79C965 OBJECT-IDENTITY
         STATUS        current
         DESCRIPTION "The authoritative identifier for the Advanced
                      Micro Devices Am79C965 PCnet-32 Single Chip
                      Ethernet Controller for PCI."
         ::= { dot3ChipSetAMD 8 }

     dot3ChipSetAMD79C970 OBJECT-IDENTITY
         STATUS        current
         DESCRIPTION "The authoritative identifier for the Advanced
                      Micro Devices Am79C970 PCnet PCI Single Chip
                      Ethernet Controller for PCI Local Bus."

         ::= { dot3ChipSetAMD 9 }

     dot3ChipSetAMD79C970A OBJECT-IDENTITY
         STATUS        current
         DESCRIPTION "The authoritative identifier for the Advanced
                      Micro Devices AM79C970A PCnet PCI II Single Chip
                      Full-Duplex Ethernet Controller for PCI Local
                      Bus."
         ::= { dot3ChipSetAMD 10 }

     dot3ChipSetAMD79C971 OBJECT-IDENTITY
         STATUS        current
         DESCRIPTION "The authoritative identifier for the Advanced
                      Micro Devices Am79C971 PCnet-FAST Single Chip
                      Full-Duplex 10/100 Mbps Ethernet Controller for
                      PCI Local Bus."
         ::= { dot3ChipSetAMD 11 }

     dot3ChipSetAMD79C972 OBJECT-IDENTITY
```

            STATUS   current
            DESCRIPTION "The authoritative identifier for the Advanced
                         Micro Devices Am79C972 PCnet-FAST+ Enhanced
                         10/100 Mbps PCI Ethernet Controller with OnNow
                         Support."
            ::= { dot3ChipSetAMD 12 }

        dot3ChipSetIntel   OBJECT IDENTIFIER ::= { dot3ChipSets 2 }

        dot3ChipSetIntel82586 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Intel
                         82586 IEEE 802.3 Ethernet LAN Coprocessor."
            ::= { dot3ChipSetIntel 1 }

        dot3ChipSetIntel82596 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Intel
                         82596 High-Performance 32-Bit Local Area Network
                         Coprocessor."
            ::= { dot3ChipSetIntel 2 }

        dot3ChipSetIntel82595 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Intel
                         82595 High Integration Ethernet Controller."
            ::= { dot3ChipSetIntel 3 }

        dot3ChipSetIntel82557 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Intel
                         82557 Fast Ethernet PCI Bus Lan Controller."
            ::= { dot3ChipSetIntel 4 }

        dot3ChipSetIntel82558 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Intel
                         82558 Fast Ethernet PCI Bus LAN Controller with
                         Integrated PHY."
            ::= { dot3ChipSetIntel 5 }

        dot3ChipSetSeeq   OBJECT IDENTIFIER ::= { dot3ChipSets 3 }

        dot3ChipSetSeeq8003 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                         8003 chip set."
            ::= { dot3ChipSetSeeq 1 }

        dot3ChipSetSeeq80C03 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                        80C03 Full-Duplex CMOS Ethernet Data Link
                        Controller (MAC)."
            ::= { dot3ChipSetSeeq 2 }

        dot3ChipSetSeeq84C30 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                        4-Port 84C30 Full-Duplex CMOS Ethernet 10
                        MBit/Sec Data Link Controller (MAC)."
            ::= { dot3ChipSetSeeq 3 }

        dot3ChipSetSeeq8431 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                        4-Port 8431 Full-Duplex CMOS Ethernet 10
                        MBit/Sec Data Link Controller (MAC)."
            ::= { dot3ChipSetSeeq 4 }

        dot3ChipSetSeeq80C300 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                        80C300 Full-Duplex CMOS Ethernet 10/100
                        Mbit/Sec Data Link Controller (MAC)."
            ::= { dot3ChipSetSeeq 5 }

        dot3ChipSetSeeq84C300 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                        4-Port 84C300 Fast Ethernet Controller (MAC)."
            ::= { dot3ChipSetSeeq 6 }

        dot3ChipSetSeeq84301 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                        4-Port 84301 Fast Ethernet Controller (MAC)."
            ::= { dot3ChipSetSeeq 7 }

        dot3ChipSetSeeq84302 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the SEEQ
                        4-Port 84302 Fast Ethernet Controller (MAC)."
            ::= { dot3ChipSetSeeq 8 }

        dot3ChipSetSeeq8100 OBJECT-IDENTITY
            STATUS   current

```
        DESCRIPTION "The authoritative identifier for the SEEQ
                    8100 Gigabit Ethernet Controller (MAC & PCS)."
        ::= { dot3ChipSetSeeq 9 }

    dot3ChipSetNational   OBJECT IDENTIFIER ::= { dot3ChipSets 4 }

    dot3ChipSetNational8390 OBJECT-IDENTITY
        STATUS      current
        DESCRIPTION "The authoritative identifier for the National
                    Semiconductor DP8390 Network Interface
                    Controller."
        ::= { dot3ChipSetNational 1 }

    dot3ChipSetNationalSonic OBJECT-IDENTITY
        STATUS      current
        DESCRIPTION "The authoritative identifier for the National
                    Semiconductor DP83932 Systems-Oriented Network
                    Interface Controller (SONIC)."
        ::= { dot3ChipSetNational 2 }

    dot3ChipSetNational83901 OBJECT-IDENTITY
        STATUS      current
        DESCRIPTION "The authoritative identifier for the National
                    Semiconductor DP83901 Serial Network Interface
                    Controller (SNIC)."
        ::= { dot3ChipSetNational 3 }

    dot3ChipSetNational83902 OBJECT-IDENTITY
        STATUS      current
        DESCRIPTION "The authoritative identifier for the National
                    Semiconductor DP83902 Serial Network Interface
                    Controller for Twisted Pair (ST-NIC)."
        ::= { dot3ChipSetNational 4 }

    dot3ChipSetNational83905 OBJECT-IDENTITY
        STATUS      current
        DESCRIPTION "The authoritative identifier for the National
                    Semiconductor DP83905 AT Local Area Network
                    Twisted-Pair Interface (AT/LANTIC)."
        ::= { dot3ChipSetNational 5 }

    dot3ChipSetNational83907 OBJECT-IDENTITY
        STATUS      current
        DESCRIPTION "The authoritative identifier for the National
                    Semiconductor DP83907 AT Twisted-Pair Enhanced
                    Coaxial Network Interface Controller
                    (AT/LANTIC II)."
        ::= { dot3ChipSetNational 6 }
```

```
dot3ChipSetNational83916 OBJECT-IDENTITY
    STATUS        current
    DESCRIPTION "The authoritative identifier for the National
                Semiconductor DP83916 Systems-Oriented Network
                Interface Controller (SONIC-16)."
    ::= { dot3ChipSetNational 7 }

dot3ChipSetNational83934 OBJECT-IDENTITY
    STATUS        current
    DESCRIPTION "The authoritative identifier for the National
                Semiconductor DP83934 Systems-Oriented Network
                Interface Controller with Twisted Pair Interface
                (SONIC-T)."
    ::= { dot3ChipSetNational 8 }

dot3ChipSetNational83936 OBJECT-IDENTITY
    STATUS        current
    DESCRIPTION "The authoritative identifier for the National
                Semiconductor DP83936AVUL Full-Duplex Systems-
                Oriented Network Interface Controller with
                Twisted Pair Interface (SONIC-T)."
    ::= { dot3ChipSetNational 9 }

dot3ChipSetFujitsu    OBJECT IDENTIFIER ::= { dot3ChipSets 5 }

dot3ChipSetFujitsu86950 OBJECT-IDENTITY
    STATUS        current
    DESCRIPTION "The authoritative identifier for the Fujitsu
                86950 chip."
    ::= { dot3ChipSetFujitsu 1 }

dot3ChipSetFujitsu86960 OBJECT-IDENTITY
    STATUS        current
    DESCRIPTION "The authoritative identifier for the Fujitsu
                MB86960 Network Interface Controller with
                Encoder/Decoder (NICE)."
    ::= { dot3ChipSetFujitsu 2 }

dot3ChipSetFujitsu86964 OBJECT-IDENTITY
    STATUS        current
    DESCRIPTION "The authoritative identifier for the Fujitsu
                MB86964 Ethernet Controller with 10BASE-T
                Tranceiver."
    ::= { dot3ChipSetFujitsu 3 }

dot3ChipSetFujitsu86965A OBJECT-IDENTITY
    STATUS        current
    DESCRIPTION "The authoritative identifier for the Fujitsu
```

```
                       MB86965A EtherCoupler Single-Chip Ethernet
                       Controller."
            ::= { dot3ChipSetFujitsu 4 }

        dot3ChipSetFujitsu86965B OBJECT-IDENTITY
            STATUS      current
            DESCRIPTION "The authoritative identifier for the Fujitsu
                        MB86965B EtherCoupler Single-Chip Ethernet
                        Controller (supports full-duplex)."
            ::= { dot3ChipSetFujitsu 5 }

        dot3ChipSetDigital    OBJECT IDENTIFIER ::= { dot3ChipSets 6 }

        dot3ChipSetDigitalDC21040 OBJECT-IDENTITY
            STATUS      current
            DESCRIPTION "The authoritative identifier for the Digital
                        Semiconductor DC21040 chip."
            ::= { dot3ChipSetDigital 1 }

        dot3ChipSetDigital21041 OBJECT-IDENTITY
            STATUS      current
            DESCRIPTION "The authoritative identifier for the Digital
                        Semiconductor 21041 PCI Ethernet LAN
                        Controller."
            ::= { dot3ChipSetDigital 2 }

        dot3ChipSetDigital21140 OBJECT-IDENTITY
            STATUS      current
            DESCRIPTION "The authoritative identifier for the Digital
                        Semiconductor 21140 PCI Fast Ethernet LAN
                        Controller."
            ::= { dot3ChipSetDigital 3 }

        dot3ChipSetDigital21143 OBJECT-IDENTITY
            STATUS      current
            DESCRIPTION "The authoritative identifier for the Digital
                        Semiconductor 21143 PCI/CardBus 10/100-Mb/s
                        Ethernet LAN Controller."
            ::= { dot3ChipSetDigital 4 }

        dot3ChipSetDigital21340 OBJECT-IDENTITY
            STATUS      current
            DESCRIPTION "The authoritative identifier for the Digital
                        Semiconductor 21340 10/100-MB/s managed buffered
                        port switch."
            ::= { dot3ChipSetDigital 5 }

        dot3ChipSetDigital21440 OBJECT-IDENTITY
```

```
        STATUS       current
        DESCRIPTION "The authoritative identifier for the Digital
                     Semiconductor 21440 Multiport 10/100Mbps
                     Ethernet Controller."
        ::= { dot3ChipSetDigital 6 }

    dot3ChipSetDigital21540 OBJECT-IDENTITY
        STATUS       current
        DESCRIPTION "The authoritative identifier for the Digital
                     Semiconductor 21540 PCI/CardBus Ethernet LAN
                     Controller with Modem Interface."
        ::= { dot3ChipSetDigital 7 }

    dot3ChipSetTI          OBJECT IDENTIFIER ::= { dot3ChipSets 7 }

    dot3ChipSetTIE100 OBJECT-IDENTITY
        STATUS       current
        DESCRIPTION "The authoritative identifier for the Texas
                     Instruments TNETE100 ThunderLAN PCI Fast
                     Ethernet Controller."
        ::= { dot3ChipSetTI 1 }

    dot3ChipSetTIE110 OBJECT-IDENTITY
        STATUS       current
        DESCRIPTION "The authoritative identifier for the Texas
                     Instruments TNETE110 ThunderLAN PCI 10BASE-T
                     Ethernet Adapter."
        ::= { dot3ChipSetTI 2 }

    dot3ChipSetTIX3100 OBJECT-IDENTITY
        STATUS       current
        DESCRIPTION "The authoritative identifier for the Texas
                     Instruments TNETX3100 Desktop ThunderSWITCH
                     8/2."
        ::= { dot3ChipSetTI 3 }

    dot3ChipSetTIX3150 OBJECT-IDENTITY
        STATUS       current
        DESCRIPTION "The authoritative identifier for the Texas
                     Instruments TNETX3150 ThunderSWITCH 12/3."
        ::= { dot3ChipSetTI 4 }

    dot3ChipSetTIX3270 OBJECT-IDENTITY
        STATUS       current
        DESCRIPTION "The authoritative identifier for the Texas
                     Instruments TNETX3270 ThunderSWITCH 24/3."
        ::= { dot3ChipSetTI 5 }
```

        dot3ChipSetToshiba   OBJECT IDENTIFIER ::= { dot3ChipSets 8 }

        dot3ChipSetToshibaTC35815F OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Toshiba
                        TC35815F PCI-Based 100/10Mbps Ethernet
                        Controller."
            ::= { dot3ChipSetToshiba 1 }

        dot3ChipSetLucent   OBJECT IDENTIFIER ::= { dot3ChipSets 9 }

        dot3ChipSetLucentATT1MX10 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Lucent
                        Technologies ATT1MX10 (Spinnaker) Quad MAC and
                        Tranceiver for Ethernet Frame Switching."
            ::= { dot3ChipSetLucent 1 }

        dot3ChipSetLucentLUC3M08 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Lucent
                        Technologies LUC3M08 Eight Ethernet MACs for
                        10/100 Mbits/s Frame Switching."
            ::= { dot3ChipSetLucent 2 }

        dot3ChipSetGalileo   OBJECT IDENTIFIER ::= { dot3ChipSets 10 }

        dot3ChipSetGalileoGT48001 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Galileo
                        Technology GT-48001A Switched Ethernet
                        Controller."
            ::= { dot3ChipSetGalileo 1 }

        dot3ChipSetGalileoGT48002 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Galileo
                        Technology GT-48002A Switched Fast Ethernet
                        Controller."
            ::= { dot3ChipSetGalileo 2 }

        dot3ChipSetGalileoGT48004 OBJECT-IDENTITY
            STATUS   current
            DESCRIPTION "The authoritative identifier for the Galileo
                        Technology GT-48004A Four Port Fast Ethernet
                        Switch for Multiport 10/100BASE-X Systems."
            ::= { dot3ChipSetGalileo 3 }

```
        dot3ChipSetGalileoGT48207 OBJECT-IDENTITY
            STATUS        current
            DESCRIPTION "The authoritative identifier for the Galileo
                        Technology GT-48207 Low-Cost 10 Port Switched
                        Ethernet Controller for 10+10/100BASE-X."
            ::= { dot3ChipSetGalileo 4 }

        dot3ChipSetGalileoGT48208 OBJECT-IDENTITY
            STATUS        current
            DESCRIPTION "The authoritative identifier for the Galileo
                        Technology GT-48208 Advanced 10 Port Switched
                        Ethernet Controller for 10+10/100BASE-X."
            ::= { dot3ChipSetGalileo 5 }

        dot3ChipSetGalileoGT48212 OBJECT-IDENTITY
            STATUS        current
            DESCRIPTION "The authoritative identifier for the Galileo
                        Technology GT-48212 Advanced 14 Port Switched
                        Ethernet Controller for 10+10/100BASE-X."
            ::= { dot3ChipSetGalileo 6 }

        dot3ChipSetJato        OBJECT IDENTIFIER ::= { dot3ChipSets 11 }

        dot3ChipSetJatoJT1001 OBJECT-IDENTITY
            STATUS        current
            DESCRIPTION "The authoritative identifier for the Jato
                        Technologies JT1001 GigEMAC Server
                        10/100/1000Mbps Ethernet Controller with PCI
                        interface."
            ::= { dot3ChipSetJato 1 }

        dot3ChipSetXaQti        OBJECT IDENTIFIER ::= { dot3ChipSets 12 }

        dot3ChipSetXaQtiXQ11800FP OBJECT-IDENTITY
            STATUS        current
            DESCRIPTION "The authoritative identifier for the XaQTI
                        XQ11800FP XMAC II Gigabit Ethernet Media Access
                        Controller."
            ::= { dot3ChipSetXaQti 1 }

        dot3ChipSetXaQtiXQ18110FP OBJECT-IDENTITY
            STATUS        current
            DESCRIPTION "The authoritative identifier for the XaQTI
                        XQ18110FP GigaPower Protocol Accelerator."
            ::= { dot3ChipSetXaQti 2 }

        -- For those chipsets not represented above, OBJECT IDENTIFIER
        -- assignment is required in other documentation, e.g.,
```

```
          -- assignment within that part of the registration tree
          -- delegated to individual enterprises (see RFC 1155 and
          -- RFC 1902).
          --
          -- In the future, management of chipset registrations may be
          -- delegated to the Internet Assigned Numbers Authority (IANA).

          -- conformance information

          etherConformance OBJECT IDENTIFIER ::= { etherMIB 2 }

          etherGroups      OBJECT IDENTIFIER ::= { etherConformance 1 }
          etherCompliances OBJECT IDENTIFIER ::= { etherConformance 2 }


          -- compliance statements

          etherCompliance MODULE-COMPLIANCE
              STATUS      current
              DESCRIPTION "The compliance statement for managed network
                          entities which have ethernet-like network
                          interfaces."

              MODULE  -- this module
                  MANDATORY-GROUPS { etherStatsGroup }

                  GROUP       etherCollisionTableGroup
                  DESCRIPTION "This group is optional. It is appropriate
                              for all systems which have the necessary
                              metering. Implementation in such systems is
                              highly recommended."
              ::= { etherCompliances 1 }

          ether100MbsCompliance MODULE-COMPLIANCE
              STATUS      current
              DESCRIPTION "The compliance statement for managed network
                          entities which have 100 Mb/sec ethernet-like
                          network interfaces."

              MODULE  -- this module
                  MANDATORY-GROUPS { etherStats100MbsGroup }

                  GROUP       etherCollisionTableGroup
                  DESCRIPTION "This group is optional. It is appropriate
                              for all systems which have the necessary
                              metering. Implementation in such systems is
                              highly recommended."
              ::= { etherCompliances 2 }
```

        -- units of conformance

        etherStatsGroup OBJECT-GROUP
            OBJECTS   { dot3StatsIndex,
                           dot3StatsAlignmentErrors,
                           dot3StatsFCSErrors,
                           dot3StatsSingleCollisionFrames,
                           dot3StatsMultipleCollisionFrames,
                           dot3StatsSQETestErrors,
                           dot3StatsDeferredTransmissions,
                           dot3StatsLateCollisions,
                           dot3StatsExcessiveCollisions,
                           dot3StatsInternalMacTransmitErrors,
                           dot3StatsCarrierSenseErrors,
                           dot3StatsFrameTooLongs,
                           dot3StatsInternalMacReceiveErrors,
                           dot3StatsEtherChipSet
                         }
            STATUS   current
            DESCRIPTION "A collection of objects providing information
                         applicable to all ethernet-like network
                         interfaces."
            ::= { etherGroups 1 }

        etherCollisionTableGroup OBJECT-GROUP
            OBJECTS   { dot3CollFrequencies
                         }
            STATUS   current
            DESCRIPTION "A collection of objects providing a histogram
                         of packets successfully transmitted after
                         experiencing exactly N collisions."
            ::= { etherGroups 2 }

        etherStats100MbsGroup OBJECT-GROUP
            OBJECTS   { dot3StatsIndex,
                           dot3StatsAlignmentErrors,
                           dot3StatsFCSErrors,
                           dot3StatsSingleCollisionFrames,
                           dot3StatsMultipleCollisionFrames,
                           dot3StatsDeferredTransmissions,
                           dot3StatsLateCollisions,
                           dot3StatsExcessiveCollisions,
                           dot3StatsInternalMacTransmitErrors,
                           dot3StatsCarrierSenseErrors,
                           dot3StatsFrameTooLongs,
                           dot3StatsInternalMacReceiveErrors,

```
                            dot3StatsEtherChipSet,
                            dot3StatsSymbolErrors
                        }
            STATUS        current
            DESCRIPTION "A collection of objects providing information
                        applicable to 100 Mb/sec ethernet-like network
                        interfaces."
            ::= { etherGroups 3 }


        END
```

5. Intellectual Property

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   intellectual property or other rights that might be claimed to
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   copyrights, patents or patent applications, or other proprietary
   rights which may cover technology that may be required to practice
   this standard. Please address the information to the IETF Executive
   Director.

6. Acknowledgements

   This document was produced by the 802.3 Hub MIB Working Group.

   This document is almost completely based on both the Standard
   Ethernet MIB, RFC 1643 [10], and the Proposed Standard Ethernet MIB
   using the SNMPv2 SMI, RFC 1650 [11], both of which were edited by
   Frank Kastenholz of FTP Software and produced by the Ethernet MIB
   Working Group. This document extends those documents by providing
   support for 100 Mb/sec ethernet interfaces as outlined in [6].

   RFC 1643 and RFC 1650, in turn, are based on the Draft Standard
   Ethernet MIB, RFC 1398 [9], also edited by Frank Kastenholz and
   produced by the Ethernet MIB Working Group.

RFC 1398, in turn, is based on the Proposed Standard Ethernet MIB,
RFC 1284 [8], which was edited by John Cook of Chipcom and produced
by the Transmission MIB Working Group. The Ethernet MIB Working
Group gathered implementation experience of the variables specified
in RFC 1284 and used that information to develop this revised MIB.

RFC 1284, in turn, is based on a document written by Frank
Kastenholz, then of Interlan, entitled IEEE 802.3 Layer Management
Draft M compatible MIB for TCP/IP Networks [7]. This document has
been modestly reworked, initially by the SNMP Working Group, and then
by the Transmission Working Group, to reflect the current conventions
for defining objects for MIB interfaces. James Davin, of the MIT
Laboratory for Computer Science, and Keith McCloghrie of Hughes LAN
Systems, contributed to later drafts of this memo. Marshall Rose of
Performance Systems International, Inc. converted the document into
its current concise format. Anil Rijsinghani of DEC contributed text
that more adequately describes the TDR test. Thanks to Frank
Kastenholz of Interlan and Louis Steinberg of IBM for their
experimentation.

7. References

   [1] Information processing systems - Open Systems Interconnection -
       Specification of Abstract Syntax Notation One (ASN.1),
       International Organization for Standardization, International
       Standard 8824, December 1987.

   [2] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S.
       Waldbusser, "Structure of Management Information for Version 2 of
       the Simple Network Management Protocol (SNMPv2)", RFC 1902,
       January 1996.

   [3] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S.
       Waldbusser, "Textual Conventions for Version 2 of the Simple
       Network Management Protocol (SNMPv2)", RFC 1903, January 1996.

   [4] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S.
       Waldbusser, "Conformance Statements for Version 2 of the Simple
       Network Management Protocol (SNMPv2)", RFC 1904, January 1996.

   [5] IEEE, IEEE 802.3 Layer Management, November 1988.

   [6] IEEE, IEEE 802.3u-1995, "10 & 100 Mb/s Management," Section 30,
       Supplement to IEEE Std 802.3, October 26, 1995.

   [7] Kastenholz, F., "IEEE 802.3 Layer Management Draft compatible MIB
       for TCP/IP Networks", electronic mail message to mib-
       wg@nnsc.nsf.net, 9 June 1989.

   [8] Cook, J., "Definitions of Managed Objects for Ethernet-Like
        Interface Types", RFC 1284, December 1991.

    [9] Kastenholz, F., "Definitions of Managed Objects for the
        Ethernet-like Interface Types", RFC 1398, January 1993.

   [10] Kastenholz, F., "Definitions of Managed Objects for the
        Ethernet-like Interface Types", RFC 1643, July 1994.

   [11] Kastenholz, F., "Definitions of Managed Objects for the
        Ethernet-like Interface Types using SMIv2", RFC 1650, August
        1994.

   [12] McCloghrie, K., and F. Kastenholz, "The Interfaces Group MIB
        using SMIv2", RFC 2233, Cisco Systems, November 1997.

   [13] Bradner, S., "Key words for use in RFCs to Indicate Requirements
        Levels", BCP 14, RFC 2119, March 1997.

   [14] deGraaf, K., Romascanu, D., McMaster, D., McCloghrie, K., and S.
        Roberts, "Definitions of Managed Objects for IEEE 802.3 Medium
        Attachment Units (MAUs) using SMIv2", RFC 2239, November 1997.

   [15] Kastenholz, F., "Implementation Notes and Experience for The
        Internet Ethernet MIB", RFC 1369, October 1992.

   [16] McCloghrie, K., and M. Rose, Editors, "Management Information
        Base for Network Management of TCP/IP-based internets: MIB-II",
        STD 17, RFC 1213, March 1991.

   [17] Blumenthal, U., and B. Wijnen, "User-based Security Model (USM)
        for version 3 of the Simple Network Management Protocol
        (SNMPv3)", RFC 2274, January 1998.

   [18] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access
        Control Model for the Simple Network Management Protocol (SNMP)",
        RFC 2275, January 1998.

8. Security Considerations

   There are no management objects defined in this MIB that have a MAX-
   ACCESS clause of read-write and/or read-create. So, if this MIB is
   implemented correctly, then there is no risk that an intruder can
   alter or create any management objects of this MIB via direct SNMP
   SET operations.

There are a number of managed objects in this MIB that may be
considered to contain sensitive information. In particular, the
dot3StatsEtherChipSet object may be considered sensitive in many
environments, since it would allow an intruder to obtain information
about which vendor's equipment is in use on the network.

Therefore, it may be important in some environments to control read
access to these objects and possibly to even encrypt the values of
these object when sending them over the network via SNMP. Not all
versions of SNMP provide features for such a secure environment.

SNMPv1 by itself is such an insecure environment. Even if the
network itself is secure (for example by using IPSec), even then,
there is no control as to who on the secure network is allowed to
access and GET (read) the objects in this MIB.

It is recommended that the implementors consider the security
features as provided by the SNMPv3 framework. Specifically, the use
of the User-based Security Model RFC 2274 [17] and the View-based
Access Control Model RFC 2275 [18] is recommended.

It is then a customer/user responsibility to ensure that the SNMP
entity giving access to an instance of this MIB, is properly
configured to give access to those objects only to those principals
(users) that have legitimate rights to access them.

9. Authors' Addresses

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A. Change Log

   This section enumerates changes made to RFC 1650 to produce this
   document.

      (1)   The MODULE-IDENTITY has been updated to reflect the changes
             in the MIB.

      (2)   A new object, dot3StatsSymbolErrors, has been added.

      (3)   The definition of the object dot3StatsIndex has been
             converted to use the SMIv2 OBJECT-TYPE macro.

      (4)   A new conformance group, etherStats100MbsGroup, has been
             added.

      (5)   A new compliance statement, ether100MbsCompliance, has
             been added.

      (6)   The Acknowledgements were extended to provide a more
             complete history of the origin of this document.

      (7)   The discussion of ifType has been expanded.

      (8)   A section on mapping of Interfaces MIB objects has
             been added.

      (9)   A section defining the relationship of this MIB to
             the MAU MIB has been added.

      (10)   A section on the mapping of IEEE 802.3 managed objects
             to this MIB and the Interfaces MIB has been added.

      (11)   Converted the dot3Tests, dot3Errors, and dot3ChipSets
             OIDs to use the OBJECT-IDENTITY macro.

      (12)   Added to the list of registered dot3ChipSets.

      (13)   An intellectual property notice and copyright notice
             were added, as required by RFC 2026.

B. Full Copyright Statement