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## Definitions of Managed Objects for the Ethernet-like Interface Types

### Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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### 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.

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## 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 IDENTIFIER ::= { 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 ifHCOctets	64-bit versions of counters. Required 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 ifHCInMulticastPkts ifHCInBroadcastPkts ifHCOctets ifHCOctets ifHCOctets	64-bit versions of packet counters. Support for these counters is not required for the interface types supported by this MIB. They are only required for interfaces capable of 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	
.aSQUETestErrors	dot3StatsSQUETestErrors
.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 &amp; 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
                  Transceiver."
```

```
 ::= { 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

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in BCP-11. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementors or users of this specification can be obtained from the IETF Secretariat.

The IETF invites any interested party to bring to its attention any 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@nnsa.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

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