

Network Working Group
Request for Comments: 2668
Obsoletes: 2239
Category: Standards Track

A. Smith
Extreme Networks, Inc.
J. Flick
Hewlett-Packard Company
K. de Graaf
Argon Networks
D. Romascanu
Lucent Technologies
D. McMaster
Cisco Systems, Inc.
K. McCloghrie
Cisco Systems, Inc.
S. Roberts
Farallon Computing, Inc.
August 1999

Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)

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.

Copyright Notice

Copyright (C) The Internet Society (1999). All Rights Reserved.

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 2239, "Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs) using SMIV2". This memo extends that specification by including management information useful for the management of 1000 Mb/s MAUs.

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, reflects 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	2
2. The SNMP Management Framework	3
3. Overview	4
3.1. Relationship to RFC 2239	4
3.2. Relationship to RFC 1515	4
3.3. MAU Management	4
3.4. Relationship to Other MIBs	5
3.4.1. Relationship to the Interfaces MIB	5
3.4.2. Relationship to the 802.3 Repeater MIB	5
3.5. Management of Internal MAUs	5
4. Definitions	6
5. Intellectual Property	49
6. Acknowledgements	49
7. References	50
8. Security Considerations	52
9. Authors' Addresses	53
10. Appendix: Change Log	55
11. Full Copyright Statement	57

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 IEEE 802.3 Medium Attachment Units (MAUs).

This memo also includes a MIB module. This MIB module extends the list of managed objects specified in the earlier version of this MIB: RFC 2239 [21].

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 [20].

2. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in RFC 2571 [1].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIV2, is described in STD 58, RFC 2578 [5], STD 58, RFC 2579 [6] and STD 58, RFC 2580 [7].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].
- o A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

3. Overview

3.1. Relationship to RFC 2239

This MIB is intended to be a superset of that defined by RFC 2239 [21], which will go to historic status. This MIB includes all of the objects contained in that MIB, plus several new ones which provide additional capabilities. Implementors are encouraged to support all applicable conformance groups in order to make the best use of the new functionality provided by this MIB. The new objects provide management support for:

- o management of 1000 Mb/s devices
- o management of PAUSE negotiation
- o management of remote fault status

3.2. Relationship to RFC 1515

RFC 2239 was a replacement for RFC 1515 [22], which is now historic. RFC 2239 defined a superset of RFC 1515 which contained all of the objects defined in RFC 1515, plus several new ones which provided additional capabilities. The new objects in RFC 2239 provided management support for:

- o management of 100 Mb/s devices
- o auto-negotiation on interface MAUs
- o jack management

3.3. MAU Management

Instances of these object types represent attributes of an IEEE 802.3 MAU. Several types of MAUs are defined in the IEEE 802.3 CSMA/CD standard [16]. These MAUs may be connected to IEEE 802.3 repeaters or to 802.3 (Ethernet-like) interfaces. For convenience this document refers to these devices as "repeater MAUs" and "interface MAUs."

The definitions presented here are based on Section 30.5, "Layer Management for 10, 100 & 1000 Mb/s Medium Attachment Units (MAUs)", and Annex 30A, "GDMO Specifications for 802.3 managed object classes" of IEEE Std. 802.3, 1998 edition [16]. That specification includes definitions for 10Mb/s, 100Mb/s and 1000Mb/s devices. This specification is intended to serve the same purpose: to provide for management of all types of Ethernet/802.3 MAUs.

3.4. Relationship to Other MIBs

It is assumed that an agent implementing this MIB will also implement (at least) the 'system' group defined in MIB-II [18]. The following sections identify other MIBs that such an agent should implement.

3.4.1. Relationship to the Interfaces MIB.

The sections of this document that define interface MAU-related objects specify an extension to the Interfaces MIB [19]. An agent implementing these interface-MAU related objects MUST also implement the relevant groups of Interface MIB. The value of the object `ifMauIfIndex` is the same as the value of `'ifIndex'` used to instantiate the interface to which the given MAU is connected.

It is expected that an agent implementing the interface-MAU related objects in this MIB will also implement the Ethernet-like Interfaces MIB, [23].

(Note that repeater ports are not represented as interfaces in the Interface MIB.)

3.4.2. Relationship to the 802.3 Repeater MIB

The section of this document that defines repeater MAU-related objects specifies an extension to the 802.3 Repeater MIB defined in [17]. An agent implementing these repeater-MAU related objects MUST also implement the 802.3 Repeater MIB.

The values of `'rpMauGroupIndex'` and `'rpMauPortIndex'` used to instantiate a repeater MAU variable SHALL be the same as the values of `'rpPtrPortGroupIndex'` and `'rpPtrPortIndex'` used to instantiate the port to which the given MAU is connected.

3.5. Management of Internal MAUs

In some situations, a MAU can be "internal" -- i.e., its functionality is implemented entirely within a device. For example, a managed repeater may contain an internal repeater-MAU and/or an internal interface-MAU through which management communications originating on one of the repeater's external ports pass in order to reach the management agent associated with the repeater. Such internal MAUs may or may not be managed. If they are managed, objects describing their attributes should appear in the appropriate MIB subtree: `dot3RpMauBasicGroup` for internal repeater-MAUs and `dot3IfMauBasicGroup` for internal interface-MAUs.

4. Definitions

MAU-MIB DEFINITIONS ::= BEGIN

IMPORTS

Counter32, Integer32,
OBJECT-TYPE, MODULE-IDENTITY, NOTIFICATION-TYPE,
OBJECT-IDENTITY, mib-2
FROM SNMPv2-SMI
TruthValue, TEXTUAL-CONVENTION
FROM SNMPv2-TC
OBJECT-GROUP, MODULE-COMPLIANCE, NOTIFICATION-GROUP
FROM SNMPv2-CONF;

mauMod MODULE-IDENTITY

LAST-UPDATED "9908240400Z" -- August 24, 1999
ORGANIZATION "IETF Ethernet Interfaces and Hub MIB
Working Group"

CONTACT-INFO

"WG E-mail: hubmib@hprnd.rose.hp.com
To subscribe: hubmib-request@hprnd.rose.hp.com

Chair: Dan Romascanu
Postal: Lucent Technologies
Atidim Technology Park, Bldg. 3
Tel Aviv 61131
Israel
Tel: +972 3 645 8414, 6458458
Fax: +972 3 648 7146
E-mail: dromasca@lucent.com

Editors: Andrew Smith
Postal: Extreme Networks, Inc.
10460 Bandley Drive
Cupertino, CA 95014
USA
Tel: +1 408 579-2821
E-mail: andrew@extremenetworks.com

John Flick
Postal: Hewlett-Packard Company
8000 Foothills Blvd. M/S 5557
Roseville, CA 95747-5557
USA
Tel: +1 916 785 4018
Fax: +1 916 785 1199
E-mail: johnf@rose.hp.com

Kathryn de Graaf
 Postal: Argon Networks
 25 Porter Road
 Littleton, MA 01460
 USA

Tel: +1 978 486 0665 x163

Fax: +1 978 486 9379

E-mail: kdegtraaf@argon.com"

DESCRIPTION "Management information for 802.3 MAUs.

The following reference is used throughout
 this MIB module:

[IEEE 802.3 Std] refers to
 IEEE Std 802.3, 1998 Edition: 'Information
 technology - Telecommunications and
 information exchange between systems -
 Local and metropolitan area networks -
 Specific requirements - Part 3: Carrier
 sense multiple access with collision
 detection (CSMA/CD) access method and
 physical layer specifications',
 September 1998.

Of particular interest is Clause 30, '10Mb/s,
 100Mb/s and 1000Mb/s Management'."

REVISION "9908240400Z" -- August 24, 1999
 DESCRIPTION "This version published as RFC 2668. Updated
 to include support for 1000 Mb/sec
 MAUs and flow control negotiation."

REVISION "9710310000Z" -- October 31, 1997
 DESCRIPTION "This version published as RFC 2239."

REVISION "9309300000Z" -- September 30, 1993
 DESCRIPTION "Initial version, published as RFC 1515."

::= { snmpDot3MauMgt 6 }

snmpDot3MauMgt OBJECT IDENTIFIER ::= { mib-2 26 }

-- textual conventions

JackType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION "Common enumeration values for repeater
 and interface MAU jack types."

```

SYNTAX      INTEGER {
                other(1),
                rj45(2),
                rj45S(3), -- rj45 shielded
                db9(4),
                bnc(5),
                fAUI(6),  -- female aui
                mAUI(7),  -- male aui
                fiberSC(8),
                fiberMIC(9),
                fiberST(10),
                telco(11),
                mtrj(12), -- fiber MT-RJ
                hssdc(13) -- fiber channel style-2
            }

dot3RpMauBasicGroup
    OBJECT IDENTIFIER ::= { snmpDot3MauMgt 1 }
dot3IfMauBasicGroup
    OBJECT IDENTIFIER ::= { snmpDot3MauMgt 2 }
dot3BroadMauBasicGroup
    OBJECT IDENTIFIER ::= { snmpDot3MauMgt 3 }

dot3IfMauAutoNegGroup
    OBJECT IDENTIFIER ::= { snmpDot3MauMgt 5 }

-- object identities for MAU types
-- (see rpMauType and ifMauType for usage)

dot3MauType
    OBJECT IDENTIFIER ::= { snmpDot3MauMgt 4 }

dot3MauTypeAUI OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "no internal MAU, view from AUI"
    ::= { dot3MauType 1 }

dot3MauType10Base5 OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "thick coax MAU (per 802.3 section 8)"
    ::= { dot3MauType 2 }
dot3MauTypeFoir1 OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "FOIRL MAU (per 802.3 section 9.9)"
    ::= { dot3MauType 3 }

dot3MauType10Base2 OBJECT-IDENTITY
    STATUS      current

```

```
DESCRIPTION "thin coax MAU (per 802.3 section 10)"
 ::= { dot3MauType 4 }
```

```
dot3MauType10BaseT OBJECT-IDENTITY
```

```
STATUS      current
DESCRIPTION "UTP MAU (per 802.3 section 14).
Note that it is strongly recommended that
agents return either dot3MauType10BaseTHD or
dot3MauType10BaseTFD if the duplex mode is
known. However, management applications should
be prepared to receive this MAU type value from
older agent implementations."
 ::= { dot3MauType 5 }
```

```
dot3MauType10BaseFP OBJECT-IDENTITY
```

```
STATUS      current
DESCRIPTION "passive fiber MAU (per 802.3 section 16)"
 ::= { dot3MauType 6 }
```

```
dot3MauType10BaseFB OBJECT-IDENTITY
```

```
STATUS      current
DESCRIPTION "sync fiber MAU (per 802.3 section 17)"
 ::= { dot3MauType 7 }
```

```
dot3MauType10BaseFL OBJECT-IDENTITY
```

```
STATUS      current
DESCRIPTION "async fiber MAU (per 802.3 section 18)
Note that it is strongly recommended that
agents return either dot3MauType10BaseFLHD or
dot3MauType10BaseFLFD if the duplex mode is
known. However, management applications should
be prepared to receive this MAU type value from
older agent implementations."
 ::= { dot3MauType 8 }
```

```
dot3MauType10Broad36 OBJECT-IDENTITY
```

```
STATUS      current
DESCRIPTION "broadband DTE MAU (per 802.3 section 11).
Note that 10BROAD36 MAUs can be attached to
interfaces but not to repeaters."
 ::= { dot3MauType 9 }
```

```
----- new since RFC 1515:
```

```
dot3MauType10BaseTHD OBJECT-IDENTITY
```

```
STATUS      current
DESCRIPTION "UTP MAU (per 802.3 section 14), half duplex
mode"
 ::= { dot3MauType 10 }
```

```
dot3MauType10BaseTFD OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "UTP MAU (per 802.3 section 14), full duplex
                mode"
    ::= { dot3MauType 11 }

dot3MauType10BaseFLHD OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "async fiber MAU (per 802.3 section 18), half
                duplex mode"
    ::= { dot3MauType 12 }

dot3MauType10BaseFLFD OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "async fiber MAU (per 802.3 section 18), full
                duplex mode"
    ::= { dot3MauType 13 }

dot3MauType100BaseT4 OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "4 pair categ. 3 UTP (per 802.3 section 23)"
    ::= { dot3MauType 14 }

dot3MauType100BaseTXHD OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "2 pair categ. 5 UTP (per 802.3 section 25),
                half duplex mode"
    ::= { dot3MauType 15 }

dot3MauType100BaseTXFD OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "2 pair categ. 5 UTP (per 802.3 section 25),
                full duplex mode"
    ::= { dot3MauType 16 }

dot3MauType100BaseFXHD OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "X fiber over PMT (per 802.3 section 26), half
                duplex mode"
    ::= { dot3MauType 17 }
dot3MauType100BaseFXFD OBJECT-IDENTITY
    STATUS      current
    DESCRIPTION "X fiber over PMT (per 802.3 section 26), full
                duplex mode"
    ::= { dot3MauType 18 }

dot3MauType100BaseT2HD OBJECT-IDENTITY
    STATUS      current
```

```
DESCRIPTION "2 pair categ. 3 UTP (per 802.3 section 32),
             half duplex mode"
 ::= { dot3MauType 19 }

dot3MauType100BaseT2FD OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION "2 pair categ. 3 UTP (per 802.3 section 32),
             full duplex mode"
 ::= { dot3MauType 20 }

----- new since RFC 2239:

dot3MauType1000BaseXHD OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION "PCS/PMA (per 802.3 section 36), unknown PMD,
             half duplex mode"
 ::= { dot3MauType 21 }

dot3MauType1000BaseXFD OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION "PCS/PMA (per 802.3 section 36), unknown PMD,
             full duplex mode"
 ::= { dot3MauType 22 }

dot3MauType1000BaseLXHD OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION "Fiber over long-wavelength laser (per 802.3
             section 38), half duplex mode"
 ::= { dot3MauType 23 }

dot3MauType1000BaseLXFD OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION "Fiber over long-wavelength laser (per 802.3
             section 38), full duplex mode"
 ::= { dot3MauType 24 }

dot3MauType1000BaseSXHD OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION "Fiber over short-wavelength laser (per 802.3
             section 38), half duplex mode"
 ::= { dot3MauType 25 }

dot3MauType1000BaseSXFD OBJECT-IDENTITY
  STATUS      current
  DESCRIPTION "Fiber over short-wavelength laser (per 802.3
             section 38), full duplex mode"
 ::= { dot3MauType 26 }
```

```

dot3MauType1000BaseCXHD OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "Copper over 150-Ohm balanced cable (per 802.3
                    section 39), half duplex mode"
    ::= { dot3MauType 27 }

dot3MauType1000BaseCXFD OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "Copper over 150-Ohm balanced cable (per 802.3
                    section 39), full duplex mode"
    ::= { dot3MauType 28 }

dot3MauType1000BaseTHD OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "Four-pair Category 5 UTP (per 802.3 section
                    40), half duplex mode"
    ::= { dot3MauType 29 }

dot3MauType1000BaseTFD OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION     "Four-pair Category 5 UTP (per 802.3 section
                    40), full duplex mode"
    ::= { dot3MauType 30 }

--
-- The Basic Repeater MAU Table
--

rpMauTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF RpMauEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION     "Table of descriptive and status information
                    about the MAU(s) attached to the ports of a
                    repeater."
    ::= { dot3RpMauBasicGroup 1 }

rpMauEntry OBJECT-TYPE
    SYNTAX          RpMauEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION     "An entry in the table, containing information
                    about a single MAU."
    INDEX          { rpMauGroupIndex,
                    rpMauPortIndex,
                    rpMauIndex
                  }
    ::= { rpMauTable 1 }

```

```

RpMauEntry ::=
  SEQUENCE {
    rpMauGroupIndex      Integer32,
    rpMauPortIndex       Integer32,
    rpMauIndex           Integer32,
    rpMauType            OBJECT IDENTIFIER,
    rpMauStatus          INTEGER,
    rpMauMediaAvailable  INTEGER,
    rpMauMediaAvailableStateExits Counter32,
    rpMauJabberState     INTEGER,
    rpMauJabberingStateEnters Counter32,
    rpMauFalseCarriers   Counter32
  }

```

```

rpMauGroupIndex OBJECT-TYPE
  SYNTAX      Integer32 (1..2147483647)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION "This variable uniquely identifies the group
               containing the port to which the MAU described
               by this entry is connected.

```

Note: In practice, a group will generally be a field-replaceable unit (i.e., module, card, or board) that can fit in the physical system enclosure, and the group number will correspond to a number marked on the physical enclosure.

The group denoted by a particular value of this object is the same as the group denoted by the same value of rpMauGroupIndex."

```

  REFERENCE   "Reference RFC 2108, rpMauGroupIndex."
  ::= { rpMauEntry 1 }

```

```

rpMauPortIndex OBJECT-TYPE
  SYNTAX      Integer32 (1..2147483647)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION "This variable uniquely identifies the repeater
               port within group rpMauGroupIndex to which the
               MAU described by this entry is connected."
  REFERENCE   "Reference RFC 2108, rpMauPortIndex."
  ::= { rpMauEntry 2 }

```

```

rpMauIndex OBJECT-TYPE
  SYNTAX      Integer32 (1..2147483647)
  MAX-ACCESS  read-only
  STATUS      current

```

DESCRIPTION "This variable uniquely identifies the MAU described by this entry from among other MAUs connected to the same port (rpMauPortIndex)."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.1, aMAUID."
::= { rpMauEntry 3 }

rpMauType OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER

MAX-ACCESS read-only

STATUS current

DESCRIPTION "This object identifies the MAU type. An initial set of MAU types are defined above. The assignment of OBJECT IDENTIFIERS to new types of MAUs is managed by the IANA. If the MAU type is unknown, the object identifier

unknownMauType OBJECT IDENTIFIER ::= { 0 0 }

is returned. Note that unknownMauType is a syntactically valid object identifier, and any conformant implementation of ASN.1 and the BER must be able to generate and recognize this value."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.2, aMAUType."
::= { rpMauEntry 4 }

rpMauStatus OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 unknown(2),
 operational(3),
 standby(4),
 shutdown(5),
 reset(6)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION "The current state of the MAU. This object MAY be implemented as a read-only object by those agents and MAUs that do not implement software control of the MAU state. Some agents may not support setting the value of this object to some of the enumerated values.

The value other(1) is returned if the MAU is in a state other than one of the states 2 through 6.

The value unknown(2) is returned when the MAU's true state is unknown; for example, when it is being initialized.

A MAU in the operational(3) state is fully functional, operates, and passes signals to its attached DTE or repeater port in accordance to its specification.

A MAU in standby(4) state forces DI and CI to idle and the media transmitter to idle or fault, if supported. Standby(4) mode only applies to link type MAUs. The state of rpMauMediaAvailable is unaffected.

A MAU in shutdown(5) state assumes the same condition on DI, CI, and the media transmitter as though it were powered down or not connected. The MAU MAY return other(1) value for the rpMauJabberState and rpMauMediaAvailable objects when it is in this state. For an AUI, this state will remove power from the AUI.

Setting this variable to the value reset(6) resets the MAU in the same manner as a power-off, power-on cycle of at least one-half second would. The agent is not required to return the value reset (6).

Setting this variable to the value operational(3), standby(4), or shutdown(5) causes the MAU to assume the respective state except that setting a mixing-type MAU or an AUI to standby(4) will cause the MAU to enter the shutdown state."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.7, aMAUAdminState, 30.5.1.2.2, acMAUAdminControl, and 30.5.1.2.1, acResetMAU."
 ::= { rpMauEntry 5 }

rpMauMediaAvailable OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 unknown(2),
 available(3),
 notAvailable(4),
 remoteFault(5),
 invalidSignal(6),

```

        remoteJabber(7),
        remoteLinkLoss(8),
        remoteTest(9),
        offline(10),
        autoNegError(11)
    }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION     "If the MAU is a link or fiber type (FOIRL,
10BASE-T, 10BASE-F) then this is equivalent to
the link test fail state/low light function.
For an AUI or a coax (including broadband) MAU
this indicates whether or not loopback is
detected on the DI circuit. The value of this
attribute persists between packets for MAU types
AUI, 10BASE5, 10BASE2, 10BR0AD36, and 10BASE-FP.

```

The value other(1) is returned if the mediaAvailable state is not one of 2 through 11.

The value unknown(2) is returned when the MAU's true state is unknown; for example, when it is being initialized. At power-up or following a reset, the value of this attribute will be unknown for AUI, coax, and 10BASE-FP MAUs. For these MAUs loopback will be tested on each transmission during which no collision is detected. If DI is receiving input when DO returns to IDL after a transmission and there has been no collision during the transmission then loopback will be detected. The value of this attribute will only change during non-collided transmissions for AUI, coax, and 10BASE-FP MAUs.

For 100Mbps and 1000Mbps MAUs, the enumerations match the states within the respective link integrity state diagrams, fig 32-16, 23-12 and 24-15 of sections 32, 23 and 24 of [16]. Any MAU which implements management of auto-negotiation will map remote fault indication to remote fault.

The value available(3) indicates that the link, light, or loopback is normal. The value notAvailable(4) indicates link loss, low light, or no loopback.

The value remoteFault(5) indicates that a fault has been detected at the remote end of the link. This value applies to 10BASE-FB, 100BASE-T4 Far End Fault Indication and non-specified remote faults from a system running auto-negotiation. The values remoteJabber(7), remoteLinkLoss(8), and remoteTest(9) SHOULD be used instead of remoteFault(5) where the reason for remote fault is identified in the remote signaling protocol.

The value invalidSignal(6) indicates that an invalid signal has been received from the other end of the link. InvalidSignal(6) applies only to MAUs of type 10BASE-FB.

Where an IEEE Std 802.3u-1995 clause 22 MII is present, a logic one in the remote fault bit (reference section 22.2.4.2.8 of that document) maps to the value remoteFault(5), and a logic zero in the link status bit (reference section 22.2.4.2.10 of that document) maps to the value notAvailable(4). The value notAvailable(4) takes precedence over the value remoteFault(5).

Any MAU that implements management of clause 37 Auto-Negotiation will map the received Remote Fault (RF1 and RF2) bit values for Offline to offline(10), Link Failure to remoteFault(5) and Auto-Negotiation Error to autoNegError(11)."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.4, aMediaAvailable."
 ::= { rpMauEntry 6 }

rpMauMediaAvailableStateExits OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION "A count of the number of times that rpMauMediaAvailable for this MAU instance leaves the state available(3).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of rpMauMonitorPortLastChange."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.5,
 aLoseMediaCounter.
 RFC 2108, rpMauMonitorPortLastChange"

```
::= { rpMauEntry 7 }
```

```
rpMauJabberState OBJECT-TYPE
```

```
SYNTAX      INTEGER {
                other(1),
                unknown(2),
                noJabber(3),
                jabbering(4)
            }
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION "The value other(1) is returned if the jabber
state is not 2, 3, or 4. The agent MUST always
return other(1) for MAU type dot3MauTypeAUI.
```

The value unknown(2) is returned when the MAU's true state is unknown; for example, when it is being initialized.

If the MAU is not jabbering the agent returns noJabber(3). This is the 'normal' state.

If the MAU is in jabber state the agent returns the jabbering(4) value."

```
REFERENCE "[IEEE 802.3 Std], 30.5.1.1.6,
aJabber.jabberFlag."
```

```
::= { rpMauEntry 8 }
```

```
rpMauJabberingStateEnters OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION "A count of the number of times that
mauJabberState for this MAU instance enters the
state jabbering(4). For MAUs of type
dot3MauTypeAUI, dot3MauType100BaseT4,
dot3MauType100BaseTX, dot3MauType100BaseFX and
all 1000Mbps types, this counter will always
indicate zero.
```

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of
rpPtrMonitorPortLastChange."

```
REFERENCE "[IEEE 802.3 Std], 30.5.1.1.6,
aJabber.jabberCounter.
RFC 2108, rpPtrMonitorPortLastChange"
```

```
::= { rpMauEntry 9 }
```

rpMauFalseCarriers OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION "A count of the number of false carrier events during IDLE in 100BASE-X links. This counter does not increment at the symbol rate. It can increment after a valid carrier completion at a maximum rate of once per 100 ms until the next carrier event.

This counter increments only for MAUs of type dot3MauType100BaseT4, dot3MauType100BaseTX, and dot3MauType100BaseFX and all 1000Mbps types. For all other MAU types, this counter will always indicate zero.

The approximate minimum time for rollover of this counter is 7.4 hours.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of rpPtrMonitorPortLastChange."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.10, aFalseCarriers. RFC 2108, rpPtrMonitorPortLastChange"

```
::= { rpMauEntry 10 }
```

```
-- The rpJackTable applies to MAUs attached to repeaters
-- which have one or more external jacks (connectors).
```

rpJackTable OBJECT-TYPE

SYNTAX SEQUENCE OF RpJackEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION "Information about the external jacks attached to MAUs attached to the ports of a repeater."

```
::= { dot3RpMauBasicGroup 2 }
```

rpJackEntry OBJECT-TYPE

SYNTAX RpJackEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION "An entry in the table, containing information about a particular jack."

INDEX { rpMauGroupIndex,

```

        rpMauPortIndex,
        rpMauIndex,
        rpJackIndex
    }
    ::= { rpJackTable 1 }

RpJackEntry ::=
    SEQUENCE {
        rpJackIndex
        rpJackType
    }
    Integer32,
    JackType

rpJackIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "This variable uniquely identifies the jack
        described by this entry from among other jacks
        attached to the same MAU (rpMauIndex)."
    ::= { rpJackEntry 1 }

rpJackType OBJECT-TYPE
    SYNTAX      JackType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "The jack connector type, as it appears on the
        outside of the system."
    ::= { rpJackEntry 2 }

--
-- The Basic Interface MAU Table
--

ifMauTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF IfMauEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "Table of descriptive and status information
        about MAU(s) attached to an interface."
    ::= { dot3IfMauBasicGroup 1 }

ifMauEntry OBJECT-TYPE
    SYNTAX      IfMauEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "An entry in the table, containing information
        about a single MAU."
    INDEX      { ifMauIfIndex,

```

```

        ifMauIndex
    }
    ::= { ifMauTable 1 }

IfMauEntry ::=
    SEQUENCE {
        ifMauIfIndex          Integer32,
        ifMauIndex            Integer32,
        ifMauType             OBJECT IDENTIFIER,
        ifMauStatus           INTEGER,
        ifMauMediaAvailable   INTEGER,
        ifMauMediaAvailableStateExits Counter32,
        ifMauJabberState      INTEGER,
        ifMauJabberingStateEnters Counter32,
        ifMauFalseCarriers    Counter32,
        ifMauTypeList         Integer32,
        ifMauDefaultType      OBJECT IDENTIFIER,
        ifMauAutoNegSupported TruthValue,
        ifMauTypeListBits     BITS
    }

ifMauIfIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "This variable uniquely identifies the interface
                to which the MAU described by this entry is
                connected."
    REFERENCE   "RFC 1213, ifIndex"
    ::= { ifMauEntry 1 }

ifMauIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "This variable uniquely identifies the MAU
                described by this entry from among other MAUs
                connected to the same interface (ifMauIfIndex)."
    REFERENCE   "[IEEE 802.3 Std], 30.5.1.1.1, aMAUID."
    ::= { ifMauEntry 2 }

ifMauType OBJECT-TYPE
    SYNTAX      OBJECT IDENTIFIER
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "This object identifies the MAU type.  An
                initial set of MAU types are defined above.  The
                assignment of OBJECT IDENTIFIERS to new types of

```

MAUs is managed by the IANA. If the MAU type is unknown, the object identifier

unknownMauType OBJECT IDENTIFIER ::= { 0 0 }

is returned. Note that unknownMauType is a syntactically valid object identifier, and any conformant implementation of ASN.1 and the BER must be able to generate and recognize this value.

This object represents the operational type of the MAU, as determined by either (1) the result of the auto-negotiation function or (2) if auto-negotiation is not enabled or is not implemented for this MAU, by the value of the object ifMauDefaultType. In case (2), a set to the object ifMauDefaultType will force the MAU into the new operating mode."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.2, aMAUType."
::= { ifMauEntry 3 }

ifMauStatus OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 unknown(2),
 operational(3),
 standby(4),
 shutdown(5),
 reset(6)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION "The current state of the MAU. This object MAY be implemented as a read-only object by those agents and MAUs that do not implement software control of the MAU state. Some agents may not support setting the value of this object to some of the enumerated values.

The value other(1) is returned if the MAU is in a state other than one of the states 2 through 6.

The value unknown(2) is returned when the MAU's true state is unknown; for example, when it is being initialized.

A MAU in the operational(3) state is fully functional, operates, and passes signals to its attached DTE or repeater port in accordance to its specification.

A MAU in standby(4) state forces DI and CI to idle and the media transmitter to idle or fault, if supported. Standby(4) mode only applies to link type MAUs. The state of ifMauMediaAvailable is unaffected.

A MAU in shutdown(5) state assumes the same condition on DI, CI, and the media transmitter as though it were powered down or not connected. The MAU MAY return other(1) value for the ifMauJabberState and ifMauMediaAvailable objects when it is in this state. For an AUI, this state will remove power from the AUI.

Setting this variable to the value reset(6) resets the MAU in the same manner as a power-off, power-on cycle of at least one-half second would. The agent is not required to return the value reset (6).

Setting this variable to the value operational(3), standby(4), or shutdown(5) causes the MAU to assume the respective state except that setting a mixing-type MAU or an AUI to standby(4) will cause the MAU to enter the shutdown state."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.7, aMAUAdminState, 30.5.1.2.2, acMAUAdminControl, and 30.5.1.2.1, acResetMAU."

::= { ifMauEntry 4 }

ifMauMediaAvailable OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 unknown(2),
 available(3),
 notAvailable(4),
 remoteFault(5),
 invalidSignal(6),
 remoteJabber(7),
 remoteLinkLoss(8),
 remoteTest(9),
 offline(10),
 autoNegError(11)

```

    }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION     "If the MAU is a link or fiber type (FOIRL,
                10BASE-T, 10BASE-F) then this is equivalent to
                the link test fail state/low light function.
                For an AUI or a coax (including broadband) MAU
                this indicates whether or not loopback is
                detected on the DI circuit. The value of this
                attribute persists between packets for MAU types
                AUI, 10BASE5, 10BASE2, 10BROAD36, and 10BASE-FP.

```

The value other(1) is returned if the mediaAvailable state is not one of 2 through 11.

The value unknown(2) is returned when the MAU's true state is unknown; for example, when it is being initialized. At power-up or following a reset, the value of this attribute will be unknown for AUI, coax, and 10BASE-FP MAUs. For these MAUs loopback will be tested on each transmission during which no collision is detected. If DI is receiving input when DO returns to IDL after a transmission and there has been no collision during the transmission then loopback will be detected. The value of this attribute will only change during non-collided transmissions for AUI, coax, and 10BASE-FP MAUs.

For 100Mbps and 1000Mbps MAUs, the enumerations match the states within the respective link integrity state diagrams, fig 32-16, 23-12 and 24-15 of sections 32, 23 and 24 of [16]. Any MAU which implements management of auto-negotiation will map remote fault indication to remote fault.

The value available(3) indicates that the link, light, or loopback is normal. The value notAvailable(4) indicates link loss, low light, or no loopback.

The value remoteFault(5) indicates that a fault has been detected at the remote end of the link. This value applies to 10BASE-FB, 100BASE-T4 Far End Fault Indication and non-specified remote faults from a system running auto-negotiation.

The values remoteJabber(7), remoteLinkLoss(8), and remoteTest(9) SHOULD be used instead of remoteFault(5) where the reason for remote fault is identified in the remote signaling protocol.

The value invalidSignal(6) indicates that an invalid signal has been received from the other end of the link. InvalidSignal(6) applies only to MAUs of type 10BASE-FB.

Where an IEEE Std 802.3u-1995 clause 22 MII is present, a logic one in the remote fault bit (reference section 22.2.4.2.8 of that document) maps to the value remoteFault(5), and a logic zero in the link status bit (reference section 22.2.4.2.10 of that document) maps to the value notAvailable(4). The value notAvailable(4) takes precedence over the value remoteFault(5).

Any MAU that implements management of clause 37 Auto-Negotiation will map the received RF1 and RF2 bit values for Offline to offline(10), Link Failure to remoteFault(5) and Auto-Negotiation Error to autoNegError(11)."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.4, aMediaAvailable."
 ::= { ifMauEntry 5 }

ifMauMediaAvailableStateExits OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION "A count of the number of times that ifMauMediaAvailable for this MAU instance leaves the state available(3). Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.5, aLoseMediaCounter.
 RFC 2233, ifCounterDiscontinuityTime."

::= { ifMauEntry 6 }

ifMauJabberState OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 unknown(2),
 noJabber(3),

```

        jabbering(4)
    }
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The value other(1) is returned if the jabber
state is not 2, 3, or 4. The agent MUST always
return other(1) for MAU type dot3MauTypeAUI.

The value unknown(2) is returned when the MAU's
true state is unknown; for example, when it is
being initialized.

If the MAU is not jabbering the agent returns
noJabber(3). This is the 'normal' state.

If the MAU is in jabber state the agent returns
the jabbering(4) value."
REFERENCE "[IEEE 802.3 Std], 30.5.1.1.6,
aJabber.jabberFlag."
 ::= { ifMauEntry 7 }

ifMauJabberingStateEnters OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "A count of the number of times that
mauJabberState for this MAU instance enters the
state jabbering(4). This counter will always
indicate zero for MAUs of type dot1MauTypeAUI
and those of speeds above 10Mbps.

Discontinuities in the value of this counter can
occur at re-initialization of the management
system, and at other times as indicated by the
value of ifCounterDiscontinuityTime."
REFERENCE "[IEEE 802.3 Std], 30.5.1.1.6,
aJabber.jabberCounter.
RFC 2233, ifCounterDiscontinuityTime."
 ::= { ifMauEntry 8 }

ifMauFalseCarriers OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "A count of the number of false carrier events
during IDLE in 100BASE-X and 1000BASE-X links.

For all other MAU types, this counter will

```

always indicate zero. This counter does not increment at the symbol rate.

It can increment after a valid carrier completion at a maximum rate of once per 100 ms for 100BASE-X and once per 10us for 1000BASE-X until the next CarrierEvent.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.10, aFalseCarriers. RFC 2233, ifCounterDiscontinuityTime."

::= { ifMauEntry 9 }

ifMauTypeList OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****"

A value that uniquely identifies the set of possible IEEE 802.3 types that the MAU could be. The value is a sum which initially takes the value zero. Then, for each type capability of this MAU, 2 raised to the power noted below is added to the sum. For example, a MAU which has the capability to be only 10BASE-T would have a value of 512 (2^9). In contrast, a MAU which supports both 10Base-T (full duplex) and 100BASE-TX (full duplex) would have a value of $((2^{11}) + (2^{16}))$ or 67584.

The powers of 2 assigned to the capabilities are these:

Power	Capability
0	other or unknown
1	AUI
2	10BASE-5
3	FOIRL
4	10BASE-2
5	10BASE-T duplex mode unknown
6	10BASE-FP
7	10BASE-FB
8	10BASE-FL duplex mode unknown
9	10BROAD36

```

10      10BASE-T  half duplex mode
11      10BASE-T  full duplex mode
12      10BASE-FL half duplex mode
13      10BASE-FL full duplex mode
14      100BASE-T4
15      100BASE-TX half duplex mode
16      100BASE-TX full duplex mode
17      100BASE-FX half duplex mode
18      100BASE-FX full duplex mode
19      100BASE-T2 half duplex mode
20      100BASE-T2 full duplex mode

```

If auto-negotiation is present on this MAU, this object will map to ifMauAutoNegCapability.

This object has been deprecated in favour of ifMauTypeListBits."

```
::= { ifMauEntry 10 }
```

ifMauDefaultType OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER

MAX-ACCESS read-write

STATUS current

DESCRIPTION "This object identifies the default administrative baseband MAU type, to be used in conjunction with the operational MAU type denoted by ifMauType.

The set of possible values for this object is the same as the set defined for the ifMauType object.

This object represents the administratively-configured type of the MAU. If auto-negotiation is not enabled or is not implemented for this MAU, the value of this object determines the operational type of the MAU. In this case, a set to this object will force the MAU into the specified operating mode.

If auto-negotiation is implemented and enabled for this MAU, the operational type of the MAU is determined by auto-negotiation, and the value of this object denotes the type to which the MAU will automatically revert if/when auto-negotiation is later disabled.

NOTE TO IMPLEMENTORS: It may be necessary to

provide for underlying hardware implementations which do not follow the exact behavior specified above. In particular, when ifMauAutoNegAdminStatus transitions from enabled to disabled, the agent implementation MUST ensure that the operational type of the MAU (as reported by ifMauType) correctly transitions to the value specified by this object, rather than continuing to operate at the value earlier determined by the auto-negotiation function."

REFERENCE "[IEEE 802.3 Std], 30.5.1.1.1, aMAUID, and 22.2.4.1.4."

::= { ifMauEntry 11 }

ifMauAutoNegSupported OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION "This object indicates whether or not auto-negotiation is supported on this MAU."

::= { ifMauEntry 12 }

ifMauTypeListBits OBJECT-TYPE

SYNTAX BITS {

bOther(0), -- other or unknown

bAUI(1), -- AUI

b10base5(2), -- 10BASE-5

bFoirl(3), -- FOIRL

b10base2(4), -- 10BASE-2

b10baseT(5), -- 10BASE-T duplex mode unknown

b10baseFP(6), -- 10BASE-FP

b10baseFB(7), -- 10BASE-FB

b10baseFL(8), -- 10BASE-FL duplex mode unknown

b10broad36(9), -- 10BROAD36

b10baseTHD(10), -- 10BASE-T half duplex mode

b10baseTFD(11), -- 10BASE-T full duplex mode

b10baseFLHD(12), -- 10BASE-FL half duplex mode

b10baseFLFD(13), -- 10BASE-FL full duplex mode

b100baseT4(14), -- 100BASE-T4

b100baseTXHD(15), -- 100BASE-TX half duplex mode

b100baseTXFD(16), -- 100BASE-TX full duplex mode

b100baseFXHD(17), -- 100BASE-FX half duplex mode

b100baseFXFD(18), -- 100BASE-FX full duplex mode

b100baseT2HD(19), -- 100BASE-T2 half duplex mode

b100baseT2FD(20), -- 100BASE-T2 full duplex mode

```

    b1000baseXHD(21), -- 1000BASE-X half duplex mode
    b1000baseXFD(22), -- 1000BASE-X full duplex mode
    b1000baseLXHD(23), -- 1000BASE-LX half duplex mode
    b1000baseLXFD(24), -- 1000BASE-LX full duplex mode
    b1000baseSXHD(25), -- 1000BASE-SX half duplex mode
    b1000baseSXFD(26), -- 1000BASE-SX full duplex mode
    b1000baseCXHD(27), -- 1000BASE-CX half duplex mode
    b1000baseCXFD(28), -- 1000BASE-CX full duplex mode
    b1000baseTHD(29), -- 1000BASE-T half duplex mode
    b1000baseTFD(30)  -- 1000BASE-T full duplex mode
}
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "A value that uniquely identifies the set of
               possible IEEE 802.3 types that the MAU could be.
               If auto-negotiation is present on this MAU, this
               object will map to ifMauAutoNegCapability.

               Note that this MAU may be capable of operating
               as a MAU type that is beyond the scope of this
               MIB. This is indicated by returning the
               bit value bOther in addition to any bit values
               for capabilities that are listed above."
 ::= { ifMauEntry 13 }

-- The ifJackTable applies to MAUs attached to interfaces
-- which have one or more external jacks (connectors).

ifJackTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF IfJackEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "Information about the external jacks attached
               to MAUs attached to an interface."
    ::= { dot3IfMauBasicGroup 2 }

ifJackEntry OBJECT-TYPE
    SYNTAX      IfJackEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "An entry in the table, containing information
               about a particular jack."
    INDEX       { ifMauIfIndex,
                  ifMauIndex,
                  ifJackIndex
                }
    ::= { ifJackTable 1 }

```

```

IfJackEntry ::=
    SEQUENCE {
        ifJackIndex          Integer32,
        ifJackType           JackType
    }

ifJackIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "This variable uniquely identifies the jack
                 described by this entry from among other jacks
                 attached to the same MAU."
    ::= { ifJackEntry 1 }

ifJackType OBJECT-TYPE
    SYNTAX      JackType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "The jack connector type, as it appears on the
                 outside of the system."
    ::= { ifJackEntry 2 }

-- The ifMauAutoNegTable applies to systems in which
-- auto-negotiation is supported on one or more MAUs
-- attached to interfaces. Note that if auto-negotiation
-- is present and enabled, the ifMauType object reflects
-- the result of the auto-negotiation function.

ifMauAutoNegTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF IfMauAutoNegEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "Configuration and status objects for the
                 auto-negotiation function of MAUs attached to
                 interfaces."
    ::= { dot3IfMauAutoNegGroup 1 }

ifMauAutoNegEntry OBJECT-TYPE
    SYNTAX      IfMauAutoNegEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "An entry in the table, containing configuration
                 and status information for the auto-negotiation
                 function of a particular MAU."
    INDEX      { ifMauIfIndex,
                 ifMauIndex
               }

```

```
::= { ifMauAutoNegTable 1 }
```

```
IfMauAutoNegEntry ::=
```

```
SEQUENCE {
    ifMauAutoNegAdminStatus          INTEGER,
    ifMauAutoNegRemoteSignaling      INTEGER,
    ifMauAutoNegConfig               INTEGER,
    ifMauAutoNegCapability            Integer32,
    ifMauAutoNegCapAdvertised        Integer32,
    ifMauAutoNegCapReceived          Integer32,
    ifMauAutoNegRestart              INTEGER,
    ifMauAutoNegCapabilityBits       BITS,
    ifMauAutoNegCapAdvertisedBits   BITS,
    ifMauAutoNegCapReceivedBits     BITS,
    ifMauAutoNegRemoteFaultAdvertised INTEGER,
    ifMauAutoNegRemoteFaultReceived INTEGER
}
```

```
ifMauAutoNegAdminStatus OBJECT-TYPE
```

```
SYNTAX      INTEGER {
                enabled(1),
                disabled(2)
            }
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

```
DESCRIPTION "Setting this object to enabled(1) will cause
the interface which has the auto-negotiation
signaling ability to be enabled.
```

If the value of this object is disabled(2) then the interface will act as it would if it had no auto-negotiation signaling. Under these conditions, an IEEE 802.3 MAU will immediately be forced to the state indicated by the value of the object ifMauDefaultType.

NOTE TO IMPLEMENTORS: When ifMauAutoNegAdminStatus transitions from enabled to disabled, the agent implementation MUST ensure that the operational type of the MAU (as reported by ifMauType) correctly transitions to the value specified by the ifMauDefaultType object, rather than continuing to operate at the value earlier determined by the auto-negotiation function."

```
REFERENCE   "[IEEE 802.3 Std], 30.6.1.1.2,
aAutoNegAdminState and 30.6.1.2.2,
acAutoNegAdminControl."
```

```
 ::= { ifMauAutoNegEntry 1 }
```

```
ifMauAutoNegRemoteSignaling OBJECT-TYPE
```

```
SYNTAX      INTEGER {
                detected(1),
                notdetected(2)
            }
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION "A value indicating whether the remote end of
the link is using auto-negotiation signaling. It
takes the value detected(1) if and only if,
during the previous link negotiation, FLP Bursts
were received."
```

```
REFERENCE   "[IEEE 802.3 Std], 30.6.1.1.3,
aAutoNegRemoteSignaling."
```

```
 ::= { ifMauAutoNegEntry 2 }
```

```
ifMauAutoNegConfig OBJECT-TYPE
```

```
SYNTAX      INTEGER {
                other(1),
                configuring(2),
                complete(3),
                disabled(4),
                parallelDetectFail(5)
            }
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION "A value indicating the current status of the
auto-negotiation process. The enumeration
parallelDetectFail(5) maps to a failure in
parallel detection as defined in 28.2.3.1 of
[IEEE 802.3 Std]."
```

```
REFERENCE   "[IEEE 802.3 Std], 30.6.1.1.4,
aAutoNegAutoConfig."
```

```
 ::= { ifMauAutoNegEntry 4 }
```

```
ifMauAutoNegCapability OBJECT-TYPE
```

```
SYNTAX      Integer32
```

```
MAX-ACCESS  read-only
```

```
STATUS      deprecated
```

```
DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****"
```

A value that uniquely identifies the set of capabilities of the local auto-negotiation entity. The value is a sum which initially takes the value zero. Then, for each capability of this interface, 2 raised to the power noted

below is added to the sum. For example, an interface which has the capability to support only 100Base-TX half duplex would have a value of 32768 (2^{15}). In contrast, an interface which supports both 100Base-TX half duplex and 100Base-TX full duplex would have a value of 98304 ($(2^{15}) + (2^{16})$).

The powers of 2 assigned to the capabilities are these:

Power	Capability
0	other or unknown
(1-9)	(reserved)
10	10BASE-T half duplex mode
11	10BASE-T full duplex mode
12	(reserved)
13	(reserved)
14	100BASE-T4
15	100BASE-TX half duplex mode
16	100BASE-TX full duplex mode
17	(reserved)
18	(reserved)
19	100BASE-T2 half duplex mode
20	100BASE-T2 full duplex mode

Note that interfaces that support this MIB may have capabilities that extend beyond the scope of this MIB.

This object has been deprecated in favour of ifMauAutoNegCapabilityBits"

REFERENCE "[IEEE 802.3 Std], 30.6.1.1.5,
aAutoNegLocalTechnologyAbility."
::= { ifMauAutoNegEntry 5 }

ifMauAutoNegCapAdvertised OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-write

STATUS deprecated

DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****"

A value that uniquely identifies the set of capabilities advertised by the local auto-negotiation entity. Refer to ifMauAutoNegCapability for a description of the possible values of this object.

Capabilities in this object that are not

available in ifMauAutoNegCapability cannot be enabled.

This object has been deprecated in favour of ifMauAutoNegCapAdvertisedBits"

REFERENCE "[IEEE 802.3 Std], 30.6.1.1.6,
aAutoNegAdvertisedTechnologyAbility."
::= { ifMauAutoNegEntry 6 }

ifMauAutoNegCapReceived OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****"

A value that uniquely identifies the set of capabilities received from the remote auto-negotiation entity. Refer to ifMauAutoNegCapability for a description of the possible values of this object.

Note that interfaces that support this MIB may be attached to remote auto-negotiation entities which have capabilities beyond the scope of this MIB.

This object has been deprecated in favour of ifMauAutoNegCapReceivedBits"

REFERENCE "[IEEE 802.3 Std], 30.6.1.1.7,
aAutoNegReceivedTechnologyAbility."
::= { ifMauAutoNegEntry 7 }

ifMauAutoNegRestart OBJECT-TYPE

SYNTAX INTEGER {
 restart(1),
 norestart(2)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION "If the value of this object is set to restart(1) then this will force auto-negotiation to begin link renegotiation. If auto-negotiation signaling is disabled, a write to this object has no effect.

Setting the value of this object to norestart(2) has no effect."

REFERENCE "[IEEE 802.3 Std], 30.6.1.2.1,

```

        acAutoNegRestartAutoConfig."
 ::= { ifMauAutoNegEntry 8 }

ifMauAutoNegCapabilityBits OBJECT-TYPE
    SYNTAX      BITS {
        bOther(0),          -- other or unknown
        b10baseT(1),        -- 10BASE-T half duplex mode
        b10baseTFD(2),      -- 10BASE-T full duplex mode
        b100baseT4(3),      -- 100BASE-T4
        b100baseTX(4),      -- 100BASE-TX half duplex mode
        b100baseTXFD(5),    -- 100BASE-TX full duplex mode
        b100baseT2(6),      -- 100BASE-T2 half duplex mode
        b100baseT2FD(7),    -- 100BASE-T2 full duplex mode
        bfdxPause(8),       -- PAUSE for full-duplex links
        bfdxAPause(9),      -- Asymmetric PAUSE for full-duplex
                             -- links
        bfdxSPause(10),     -- Symmetric PAUSE for full-duplex
                             -- links
        bfdxBPause(11),     -- Asymmetric and Symmetric PAUSE for
                             -- full-duplex links
        b1000baseX(12),     -- 1000BASE-X, -LX, -SX, -CX half
                             -- duplex mode
        b1000baseXFD(13),  -- 1000BASE-X, -LX, -SX, -CX full
                             -- duplex mode
        b1000baseT(14),     -- 1000BASE-T half duplex mode
        b1000baseTFD(15)   -- 1000BASE-T full duplex mode
    }
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION   "A value that uniquely identifies the set of
                   capabilities of the local auto-negotiation
                   entity. Note that interfaces that support this
                   MIB may have capabilities that extend beyond the
                   scope of this MIB.

                   Note that the local auto-negotiation entity may
                   support some capabilities beyond the scope of
                   this MIB. This is indicated by returning the
                   bit value bOther in addition to any bit values
                   for capabilities that are listed above."
    REFERENCE    "[IEEE 802.3 Std], 30.6.1.1.5,
                   aAutoNegLocalTechnologyAbility."
 ::= { ifMauAutoNegEntry 9 }

ifMauAutoNegCapAdvertisedBits OBJECT-TYPE
    SYNTAX      BITS {
        bOther(0),          -- other or unknown
        b10baseT(1),        -- 10BASE-T half duplex mode

```

```

b10baseTFD(2),      -- 10BASE-T full duplex mode
b100baseT4(3),      -- 100BASE-T4
b100baseTX(4),      -- 100BASE-TX half duplex mode
b100baseTXFD(5),    -- 100BASE-TX full duplex mode
b100baseT2(6),      -- 100BASE-T2 half duplex mode
b100baseT2FD(7),    -- 100BASE-T2 full duplex mode
bFdxPause(8),       -- PAUSE for full-duplex links
bFdxAPause(9),      -- Asymmetric PAUSE for full-duplex
                    -- links
bFdxSPause(10),     -- Symmetric PAUSE for full-duplex
                    -- links
bFdxBPause(11),     -- Asymmetric and Symmetric PAUSE for
                    -- full-duplex links
b1000baseX(12),     -- 1000BASE-X, -LX, -SX, -CX half
                    -- duplex mode
b1000baseXFD(13),   -- 1000BASE-X, -LX, -SX, -CX full
                    -- duplex mode
b1000baseT(14),     -- 1000BASE-T half duplex mode
b1000baseTFD(15)    -- 1000BASE-T full duplex mode
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION "A value that uniquely identifies the set of
capabilities advertised by the local
auto-negotiation entity.

Capabilities in this object that are not
available in ifMauAutoNegCapabilityBits cannot
be enabled.
Note that the local auto-negotiation entity may
advertise some capabilities beyond the scope of
this MIB. This is indicated by returning the
bit value b0ther in addition to any bit values
for capabilities that are listed above."
REFERENCE "[IEEE 802.3 Std], 30.6.1.1.6,
aAutoNegAdvertisedTechnologyAbility."
 ::= { ifMauAutoNegEntry 10 }

```

ifMauAutoNegCapReceivedBits OBJECT-TYPE

```

SYNTAX BITS {
    b0ther(0),      -- other or unknown
    b10baseT(1),    -- 10BASE-T half duplex mode
    b10baseTFD(2),  -- 10BASE-T full duplex mode
    b100baseT4(3),  -- 100BASE-T4
    b100baseTX(4),  -- 100BASE-TX half duplex mode
    b100baseTXFD(5), -- 100BASE-TX full duplex mode
    b100baseT2(6),  -- 100BASE-T2 half duplex mode
    b100baseT2FD(7), -- 100BASE-T2 full duplex mode

```

```

    bFdxPause(8),      -- PAUSE for full-duplex links
    bFdxAPause(9),     -- Asymmetric PAUSE for full-duplex
                        -- links
    bFdxSPause(10),    -- Symmetric PAUSE for full-duplex
                        -- links
    bFdxBPause(11),    -- Asymmetric and Symmetric PAUSE for
                        -- full-duplex links
    b1000baseX(12),    -- 1000BASE-X, -LX, -SX, -CX half
                        -- duplex mode
    b1000baseXFD(13),  -- 1000BASE-X, -LX, -SX, -CX full
                        -- duplex mode
    b1000baseT(14),    -- 1000BASE-T half duplex mode
    b1000baseTFD(15)   -- 1000BASE-T full duplex mode
}
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "A value that uniquely identifies the set of
capabilities received from the remote
auto-negotiation entity.

Note that interfaces that support this MIB may
be attached to remote auto-negotiation entities
which have capabilities beyond the scope of this
MIB. This is indicated by returning the bit
value bOther in addition to any bit values for
capabilities that are listed above."
REFERENCE     "[IEEE 802.3 Std], 30.6.1.1.7,
aAutoNegReceivedTechnologyAbility."
 ::= { ifMauAutoNegEntry 11 }
ifMauAutoNegRemoteFaultAdvertised OBJECT-TYPE
SYNTAX        INTEGER {
                noError(1),
                offline(2),
                linkFailure(3),
                autoNegError(4)
            }
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION   "A value that identifies any local fault
indications that this MAU has detected and will
advertise at the next auto-negotiation
interaction for 1000Mbps MAUs."
REFERENCE     "[IEEE 802.3 Std], 30.6.1.1.6,
aAutoNegAdvertisedTechnologyAbility."
 ::= { ifMauAutoNegEntry 12 }

ifMauAutoNegRemoteFaultReceived OBJECT-TYPE
SYNTAX        INTEGER {

```

```

        noError(1),
        offline(2),
        linkFailure(3),
        autoNegError(4)
    }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION     "A value that identifies any fault indications
                received from the far end of a link by the
                local auto-negotiation entity for 1000Mbps
                MAUs."
REFERENCE       "[IEEE 802.3 Std], 30.6.1.1.7,
                aAutoNegReceivedTechnologyAbility."
 ::= { ifMauAutoNegEntry 13 }

--
-- The Basic Broadband MAU Table
--

broadMauBasicTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF BroadMauBasicEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION  "***** THIS OBJECT IS DEPRECATED *****

                Table of descriptive and status information
                about the broadband MAUs connected to
                interfaces."
 ::= { dot3BroadMauBasicGroup 1 }

broadMauBasicEntry OBJECT-TYPE
    SYNTAX      BroadMauBasicEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION  "***** THIS OBJECT IS DEPRECATED *****

                An entry in the table, containing information
                about a single broadband MAU."
    INDEX       { broadMauIfIndex,
                broadMauIndex
                }
 ::= { broadMauBasicTable 1 }

BroadMauBasicEntry ::=
    SEQUENCE {
        broadMauIfIndex      Integer32,
        broadMauIndex        Integer32,
        broadMauXmtRcvSplitType  INTEGER,

```

```

        broadMauXmtCarrierFreq      Integer32,
        broadMauTranslationFreq     Integer32
    }

broadMauIfIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****

                This variable uniquely identifies the interface
                to which the MAU described by this entry is
                connected."
    REFERENCE   "Reference RFC 1213, ifIndex."
    ::= { broadMauBasicEntry 1 }

broadMauIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****

                This variable uniquely identifies the MAU
                connected to interface broadMauIfIndex that is
                described by this entry."
    REFERENCE   "[IEEE 802.3 Std], 30.5.1.1.1, aMAUID."
    ::= { broadMauBasicEntry 2 }

broadMauXmtRcvSplitType OBJECT-TYPE
    SYNTAX      INTEGER {
                    other(1),
                    single(2),
                    dual(3)
                }
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****

                This object indicates the type of frequency
                multiplexing/cabling system used to separate the
                transmit and receive paths for the 10BROAD36
                MAU.

                The value other(1) is returned if the split type
                is not either single or dual.

                The value single(2) indicates a single cable
                system.  The value dual(3) indicates a dual
    
```

REFERENCE cable system, offset normally zero."
 "[IEEE 802.3 Std], 30.5.1.1.8,
 aBbMAUXmitRcvSplitType."
 ::= { broadMauBasicEntry 3 }

broadMauXmtCarrierFreq OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS deprecated
 DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****"

This variable indicates the transmit carrier frequency of the 10BROAD36 MAU in MHz/4; that is, in units of 250 kHz."
 REFERENCE "[IEEE 802.3 Std], 30.5.1.1.9,
 aBroadbandFrequencies.xmitCarrierFrequency."
 ::= { broadMauBasicEntry 4 }

broadMauTranslationFreq OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS deprecated
 DESCRIPTION "***** THIS OBJECT IS DEPRECATED *****"

This variable indicates the translation offset frequency of the 10BROAD36 MAU in MHz/4; that is, in units of 250 kHz."
 REFERENCE "[IEEE 802.3 Std], 30.5.1.1.9,
 aBroadbandFrequencies.translationFrequency."
 ::= { broadMauBasicEntry 5 }

-- Notifications for use by 802.3 MAUs

snmpDot3MauTraps OBJECT IDENTIFIER ::= { snmpDot3MauMgt 0 }

rpMauJabberTrap NOTIFICATION-TYPE

OBJECTS { rpMauJabberState }
 STATUS current
 DESCRIPTION "This trap is sent whenever a managed repeater MAU enters the jabber state."

The agent MUST throttle the generation of consecutive rpMauJabberTraps so that there is at least a five-second gap between them."
 REFERENCE "[IEEE 802.3 Mgt], 30.5.1.3.1, nJabber notification."
 ::= { snmpDot3MauTraps 1 }

```

ifMauJabberTrap NOTIFICATION-TYPE
  OBJECTS      { ifMauJabberState }
  STATUS       current
  DESCRIPTION   "This trap is sent whenever a managed interface
                  MAU enters the jabber state.

                  The agent MUST throttle the generation of
                  consecutive ifMauJabberTraps so that there is at
                  least a five-second gap between them."
  REFERENCE    "[IEEE 802.3 Mgt], 30.5.1.3.1, nJabber
                  notification."
  ::= { snmpDot3MauTraps 2 }

-- Conformance information

mauModConf
  OBJECT IDENTIFIER ::= { mauMod 1 }
mauModCompls
  OBJECT IDENTIFIER ::= { mauModConf 1 }
mauModObjGrps
  OBJECT IDENTIFIER ::= { mauModConf 2 }
mauModNotGrps
  OBJECT IDENTIFIER ::= { mauModConf 3 }
-- Object groups

mauRpGrpBasic OBJECT-GROUP
  OBJECTS      { rpMauGroupIndex,
                  rpMauPortIndex,
                  rpMauIndex,
                  rpMauType,
                  rpMauStatus,
                  rpMauMediaAvailable,
                  rpMauMediaAvailableStateExits,
                  rpMauJabberState,
                  rpMauJabberingStateEnters
                }
  STATUS       current
  DESCRIPTION   "Basic conformance group for MAUs attached to
                  repeater ports. This group is also the
                  conformance specification for RFC 1515
                  implementations."
  ::= { mauModObjGrps 1 }

mauRpGrp100Mbs OBJECT-GROUP
  OBJECTS      { rpMauFalseCarriers }
  STATUS       current
  DESCRIPTION   "Conformance group for MAUs attached to
                  repeater ports with 100 Mb/s or greater

```

```

        capability."
 ::= { mauModObjGrps 2 }

mauRpGrpJack OBJECT-GROUP
  OBJECTS      { rpJackType }
  STATUS       current
  DESCRIPTION   "Conformance group for MAUs attached to
                 repeater ports with managed jacks."
 ::= { mauModObjGrps 3 }

mauIfGrpBasic OBJECT-GROUP
  OBJECTS      { ifMauIfIndex,
                 ifMauIndex,
                 ifMauType,
                 ifMauStatus,
                 ifMauMediaAvailable,
                 ifMauMediaAvailableStateExits,
                 ifMauJabberState,
                 ifMauJabberingStateEnters
               }
  STATUS       current
  DESCRIPTION   "Basic conformance group for MAUs attached to
                 interfaces. This group also provides a
                 conformance specification for RFC 1515
                 implementations."
 ::= { mauModObjGrps 4 }

mauIfGrp100Mbps OBJECT-GROUP
  OBJECTS      { ifMauFalseCarriers,
                 ifMauTypeList,
                 ifMauDefaultType,
                 ifMauAutoNegSupported
               }
  STATUS       deprecated
  DESCRIPTION   "***** THIS GROUP IS DEPRECATED *****

                 Conformance group for MAUs attached to
                 interfaces with 100 Mb/s capability.

                 This object group has been deprecated in favor
                 of mauIfGrpHighCapacity."
 ::= { mauModObjGrps 5 }

mauIfGrpJack OBJECT-GROUP
  OBJECTS      { ifJackType }
  STATUS       current
  DESCRIPTION   "Conformance group for MAUs attached to
                 interfaces with managed jacks."

```

```
::= { mauModObjGrps 6 }
```

```
mauIfGrpAutoNeg OBJECT-GROUP
```

```
OBJECTS      { ifMauAutoNegAdminStatus,
                ifMauAutoNegRemoteSignaling,
                ifMauAutoNegConfig,
                ifMauAutoNegCapability,
                ifMauAutoNegCapAdvertised,
                ifMauAutoNegCapReceived,
                ifMauAutoNegRestart
              }
```

```
STATUS      deprecated
```

```
DESCRIPTION "***** THIS GROUP IS DEPRECATED *****"
```

Conformance group for MAUs attached to interfaces with managed auto-negotiation.

This object group has been deprecated in favor of mauIfGrpAutoNeg2."

```
::= { mauModObjGrps 7 }
```

```
mauBroadBasic OBJECT-GROUP
```

```
OBJECTS      { broadMauIfIndex,
                broadMauIndex,
                broadMauXmtRcvSplitType,
                broadMauXmtCarrierFreq,
                broadMauTranslationFreq
              }
```

```
STATUS      deprecated
```

```
DESCRIPTION "***** THIS GROUP IS DEPRECATED *****"
```

Conformance group for broadband MAUs attached to interfaces.

This object group is deprecated. There have been no reported implementations of this group, and it was felt to be unlikely that there will be any future implementations."

```
::= { mauModObjGrps 8 }
```

```
mauIfGrpHighCapacity OBJECT-GROUP
```

```
OBJECTS      { ifMauFalseCarriers,
                ifMauTypeListBits,
                ifMauDefaultType,
                ifMauAutoNegSupported
              }
```

```
STATUS      current
```

```
DESCRIPTION "Conformance group for MAUs attached to
```

```

        interfaces with 100 Mb/s or greater capability."
 ::= { mauModObjGrps 9 }

mauIfGrpAutoNeg2 OBJECT-GROUP
  OBJECTS      { ifMauAutoNegAdminStatus,
                  ifMauAutoNegRemoteSignaling,
                  ifMauAutoNegConfig,
                  ifMauAutoNegCapabilityBits,
                  ifMauAutoNegCapAdvertisedBits,
                  ifMauAutoNegCapReceivedBits,
                  ifMauAutoNegRestart
                }
  STATUS        current
  DESCRIPTION   "Conformance group for MAUs attached to
                  interfaces with managed auto-negotiation."
 ::= { mauModObjGrps 10 }

mauIfGrpAutoNeg1000Mbps OBJECT-GROUP
  OBJECTS      { ifMauAutoNegRemoteFaultAdvertised,
                  ifMauAutoNegRemoteFaultReceived
                }
  STATUS        current
  DESCRIPTION   "Conformance group for 1000Mbps MAUs attached to
                  interfaces with managed auto-negotiation."
 ::= { mauModObjGrps 11 }

-- Notification groups

rpMauNotifications NOTIFICATION-GROUP
  NOTIFICATIONS { rpMauJabberTrap }
  STATUS        current
  DESCRIPTION   "Notifications for repeater MAUs."
 ::= { mauModNotGrps 1 }

ifMauNotifications NOTIFICATION-GROUP
  NOTIFICATIONS { ifMauJabberTrap }
  STATUS        current
  DESCRIPTION   "Notifications for interface MAUs."
 ::= { mauModNotGrps 2 }

-- Compliances

mauModRpComp1 MODULE-COMPLIANCE
  STATUS        deprecated
  DESCRIPTION   "***** THIS COMPLIANCE IS DEPRECATED *****

                  Compliance for MAUs attached to repeater
                  ports.

```

This compliance is deprecated and replaced by mauModRpCompl2, which corrects an oversight by allowing rpMauStatus to be implemented read-only."

```
MODULE -- this module
    MANDATORY-GROUPS { mauRpGrpBasic }

    GROUP          mauRpGrp100Mbps
    DESCRIPTION    "Implementation of this optional group is
                    recommended for MAUs which have 100Mb/s or
                    greater capability."

    GROUP          mauRpGrpJack
    DESCRIPTION    "Implementation of this optional group is
                    recommended for MAUs which have one or more
                    external jacks."

    GROUP          rpMauNotifications
    DESCRIPTION    "Implementation of this group is recommended
                    for MAUs attached to repeater ports."
::= { mauModCompls 1 }
```

```
mauModIfCompl MODULE-COMPLIANCE
    STATUS          deprecated
    DESCRIPTION     "***** THIS COMPLIANCE IS DEPRECATED *****

                    Compliance for MAUs attached to interfaces.

                    This compliance is deprecated and replaced by
                    mauModIfCompl2."
```

```
MODULE -- this module
    MANDATORY-GROUPS { mauIfGrpBasic }

    GROUP          mauIfGrp100Mbps
    DESCRIPTION    "Implementation of this optional group is
                    recommended for MAUs which have 100Mb/s
                    capability."

    GROUP          mauIfGrpJack
    DESCRIPTION    "Implementation of this optional group is
                    recommended for MAUs which have one or more
                    external jacks."

    GROUP          mauIfGrpAutoNeg
    DESCRIPTION    "Implementation of this group is mandatory
                    for MAUs which support managed
```

auto-negotiation."

GROUP mauBroadBasic
DESCRIPTION "Implementation of this group is mandatory
for broadband MAUs."

GROUP ifMauNotifications
DESCRIPTION "Implementation of this group is recommended
for MAUs attached to interfaces."

::= { mauModCompls 2 }

mauModIfCompl2 MODULE-COMPLIANCE

STATUS current
DESCRIPTION "Compliance for MAUs attached to interfaces."

MODULE -- this module

MANDATORY-GROUPS { mauIfGrpBasic }

GROUP mauIfGrpHighCapacity
DESCRIPTION "Implementation of this optional group is
recommended for MAUs which have 100Mb/s
or greater capability."

GROUP mauIfGrpJack
DESCRIPTION "Implementation of this optional group is
recommended for MAUs which have one or more
external jacks."

GROUP mauIfGrpAutoNeg2
DESCRIPTION "Implementation of this group is mandatory
for MAUs which support managed
auto-negotiation."

GROUP mauIfGrpAutoNeg1000Mbps
DESCRIPTION "Implementation of this group is mandatory
for MAUs which have 1000Mb/s or greater
capability and support managed
auto-negotiation."

GROUP ifMauNotifications
DESCRIPTION "Implementation of this group is recommended
for MAUs attached to interfaces."

OBJECT ifMauStatus
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."
::= { mauModCompls 3 }

```

mauModRpCompl2 MODULE-COMPLIANCE
    STATUS          current
    DESCRIPTION      "Compliance for MAUs attached to repeater
                      ports."

    MODULE -- this module
        MANDATORY-GROUPS { mauRpGrpBasic }

        GROUP        mauRpGrp100Mbps
        DESCRIPTION   "Implementation of this optional group is
                      recommended for MAUs which have 100Mb/s or
                      greater capability."

        GROUP        mauRpGrpJack
        DESCRIPTION   "Implementation of this optional group is
                      recommended for MAUs which have one or more
                      external jacks."

        GROUP        rpMauNotifications
        DESCRIPTION   "Implementation of this group is recommended
                      for MAUs attached to repeater ports."

        OBJECT        rpMauStatus
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required."
    ::= { mauModCompls 4 }

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 IETF Ethernet Interfaces and Hub MIB Working Group, whose efforts were greatly advanced by the contributions of the following people:

Chuck Black
John Flick
Jeff Johnson
Leon Leong
Mike Lui
Dave Perkins
Geoff Thompson
Maurice Turcotte
Paul Woodruff

Special thanks as well to Dave Perkins for his excellent work on the SMICng compiler, which made it easy to take advantage of the latest SNMPv2 constructs in this MIB.

7. References

- [1] Harrington, D., Presuhn, R. and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2571, May 1999.
- [2] Rose, M. and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", STD 16, RFC 1155, May 1990.
- [3] Rose, M. and K. McCloghrie, "Concise MIB Definitions", STD 16, RFC 1212, March 1991.
- [4] Rose, M., "A Convention for Defining Traps for use with the SNMP", RFC 1215, March 1991.
- [5] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [6] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.

- [7] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMiv2", STD 58, RFC 2580, April 1999.
- [8] Case, J., Fedor, M., Schoffstall, M. and J. Davin, "Simple Network Management Protocol", STD 15, RFC 1157, May 1990.
- [9] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Introduction to Community-based SNMPv2", RFC 1901, January 1996.
- [10] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1906, January 1996.
- [11] Case, J., Harrington, D., Presuhn, R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2572, May 1999.
- [12] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2574, May 1999.
- [13] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.
- [14] Levi, D., Meyer, P. and B. Stewart, "SNMPv3 Applications", RFC 2573, May 1999.
- [15] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2575, May 1999.
- [16] IEEE, IEEE Std 802.3, 1998 Edition: "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications" (incorporating ANSI/IEEE Std. 802.3, 1996 Edition, IEEE Std. 802.3r-1996, 802.3u-1995, 802.3x&y-1997, 802.3z-1998, and 802.3aa-1998), September 1998.
- [17] de Graaf, K., Romascanu, D., McMaster, D. and K. McCloghrie, "Definitions of Managed Objects for IEEE 802.3 Repeater Devices using SMiv2", RFC 2108, February 1997.

- [18] 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.
- [19] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB using SMIV2", RFC 2233, November 1997.
- [20] Bradner, S., "Key words for use in RFCs to Indicate Requirements Levels", BCP 14, RFC 2119, March 1997.
- [21] de Graaf, 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.
- [22] McMaster, D., McCloghrie, K. and S. Roberts, "Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)", RFC 1515, September 1993.
- [23] Flick, J. and J. Johnson, "Definitions of Managed Objects for the Ethernet-like Interface Types", RFC 2665, August 1999.

8. Security Considerations

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write. Setting these objects can have a serious effect on the operation of the network, including:

- enabling or disabling a MAU
- changing a MAU's default type
- enabling, disabling or restarting autonegotiation
- modifying the capabilities that a MAU advertizes during autonegotiation.

Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

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/SET (read/change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2574 [12] and the View-based Access Control Model RFC 2575 [15] 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

Andrew Smith
Extreme Networks, Inc.
3585 Monroe St.
Santa Clara, CA 95051 USA

Phone: +1 408 579-2821
Email: andrew@extremenetworks.com

John Flick
Hewlett-Packard Company
8000 Foothills Blvd. M/S 5557
Roseville, CA 95747-5557

Phone: +1 916 785 4018
Email: johnf@rose.hp.com

Kathryn de Graaf
Argon Networks
25 Porter Road
Littleton, MA 01460 USA

Phone: +1 978 486 0665 x163
Fax: +1 978 486 9379
Email: kdegraaf@argon.com

Dan Romascanu
Lucent Technologies
Atidim Technology Park, Bldg. 3
Tel Aviv 61131
Israel

Phone: 972 3 645 8414, 6458458
Fax: 972 3 648 7146
Email: dromasca@lucent.com

Donna McMaster
Cisco Systems Inc.
170 West Tasman Drive
San Jose, CA 95134

Phone: +1 408 526 5260
EMail: mcmaster@cisco.com

Keith McCloghrie
Cisco Systems Inc.
170 West Tasman Drive
San Jose, CA 95134

Phone: +1 408 526 5260
EMail: kzm@cisco.com

Sam Roberts
Farallon Computing, Inc.
2470 Mariner Square Loop
Alameda, CA 94501-1010

Phone: +1 510 814 5215
EMail: sroberts@farallon.com

Appendix

Change Log

This section enumerates the changes made to RFC 2239 to produce this document.

- (1) The MODULE-IDENTITY has been updated to reflect the changes in the MIB.
- (2) OBJECT-IDENTITY definitions have been added for gigabit MAU types.
- (3) The ifMauTypeList, ifMauAutoNegCapability, ifMauAutoNegCapAdvertised and ifMauAutoNegCapReceived objects have been deprecated and replaced by ifMauTypeListBits, ifMauAutoNegCapabilityBits, ifMauAutoNegCapAdvertisedBits and ifMauAutoNegCapReceivedBits.
- (4) Two new objects, ifMauAutoNegRemoteFaultAdvertised and ifMauAutoNegRemoteFaultReceived have been added.
- (5) Enumerations for 'offline' and 'autoNegError' have been added for the rpMauMediaAvailable and ifMauMediaAvailable objects.
- (6) The broadMauBasicTable and mauBroadBasic object group have been deprecated.
- (7) The mauIfGrp100Mbs and mauIfGrpAutoNeg object groups have been deprecated and replaced by mauIfGrpHighCapacity and mauIfGrpAutoNeg2.
- (8) A new object group, mauIfGrpAutoNeg1000Mbps, has been added.
- (9) The mauModIfCompl1 and mauModRpCompl1 compliances have been deprecated and replaced by mauModIfCompl2 and mauModRpCompl2.
- (10) Added section on relationship to RFC 2239.
- (11) Updated the SNMP Network Management Framework boilerplate.

- (12) Refer to the Interfaces MIB, rather than the interfaces group of MIB-II.
- (13) Updated references to refer to latest edition of IEEE 802.3.
- (14) An intellectual property notice was added, as required by RFC 2026.

11. Full Copyright Statement

Copyright (C) The Internet Society (1999). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.

