



**IEEE Standard for
Local and metropolitan area networks**

Part 16: Air Interface for Fixed Broadband Wireless Access Systems—

Amendment 1: Management Information Base

**IEEE Computer Society
and the
IEEE Microwave Theory and Techniques Society**

Sponsored by the
LAN/MAN Standards Committee

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IEEE Standard for Local and Metropolitan Area Networks

Part 16: Air Interface for Fixed Broadband Wireless Access Systems

Amendment 1: Management Information Base

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LAN/MAN Standards Committee
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Abstract: This document amends IEEE Std 802.16-2004 by defining a management information base (MIB) for the MAC and PHY and associated management procedures.

Keywords: fixed broadband wireless access network, management information base (MIB), metropolitan area network(MAN), microwave, millimeter wave, WirelessMAN® standards

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Introduction

This introduction is not part of IEEE Std 802.16f-2005, IEEE Standard for Local and Metropolitan Area Networks—Part 16: Air Interface for Fixed Broadband Wireless Access Systems—Amendment 1: Management Information Base.

IEEE Std 802.16 is an evolving standard. This specification is the first amendment to IEEE Std 802.16-2004, defining a management information base (MIB) for the MAC and PHY and associated management procedures. With its approval, the active version of IEEE Std 802.16 changes to be IEEE Std 802.16-2004 as modified by IEEE Std 802.16f-2005. At this stage, the standard addresses fixed and nomadic broadband wireless access, in which the base station and subscriber station are stationary during operation.

IEEE Std 802.16 was first approved in 2001, and published in 2002, as IEEE Std 802.16-2001. This standard addresses only the frequencies 10–66 GHz. Subsequently, it was modified by IEEE Std 802.16c™-2002 and IEEE Std 802.16a™-2003; the latter expanded the specification to include lower frequencies. The consolidation of these documents, along with additional material, led to IEEE Std 802.16-2004.

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IEEE Standard for Local and Metropolitan Area Networks

Part 16: Air Interface for Fixed Broadband Wireless Access Systems

Amendment 1: Management Information Base

NOTE—The editing instructions contained in this amendment define how to merge the material contained herein into the existing base standard IEEE Std 802.16™-2004.

The editing instructions are shown ***bold italic***. Four editing instructions are used: ***change***, ***delete***, ***insert***, and ***replace***. ***Change*** is used to make small corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strike through~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make large changes in existing text, subclauses, tables, or figures by removing existing material and replacing it with new material. Editorial notes will not be carried over into future editions because the changes will be incorporated into the base standard.

1. Overview

1.1 Scope

This document provides enhancements to IEEE Std 802.16-2004 to define a management information base (MIB) for the MAC and PHY and associated management procedures.

1.2 Purpose

The purpose of this project is to provide a definition of managed objects to enable standards-based management of IEEE 802.16 device.

1.3 Reference models

[Insert new subclause to subclause 1.4]

1.3.1 Management reference model

Figure 1 shows a management reference model of fixed Broadband Wireless Access (BWA) networks. It consists of a Network Management System (NMS), managed nodes, and service flow database. Base station (BS) and subscriber station (SS) managed nodes collect and store the managed objects in the format of WiressMan Interface MIB (wmanIfMib) and wmanDevMib that are made available to NMSs via management protocols, such as Simple Network Management Protocol (SNMP). Service Flow Database contains the service flow and the associated quality of service (QoS) information that have to be populated to BS and SS when a SS enters into a BS network.

The management information between SS and BS will be carried over the secondary management connection for managed SS. If the secondary management connection does not exist, the SNMP messages shall go through another interface in the customer premise.

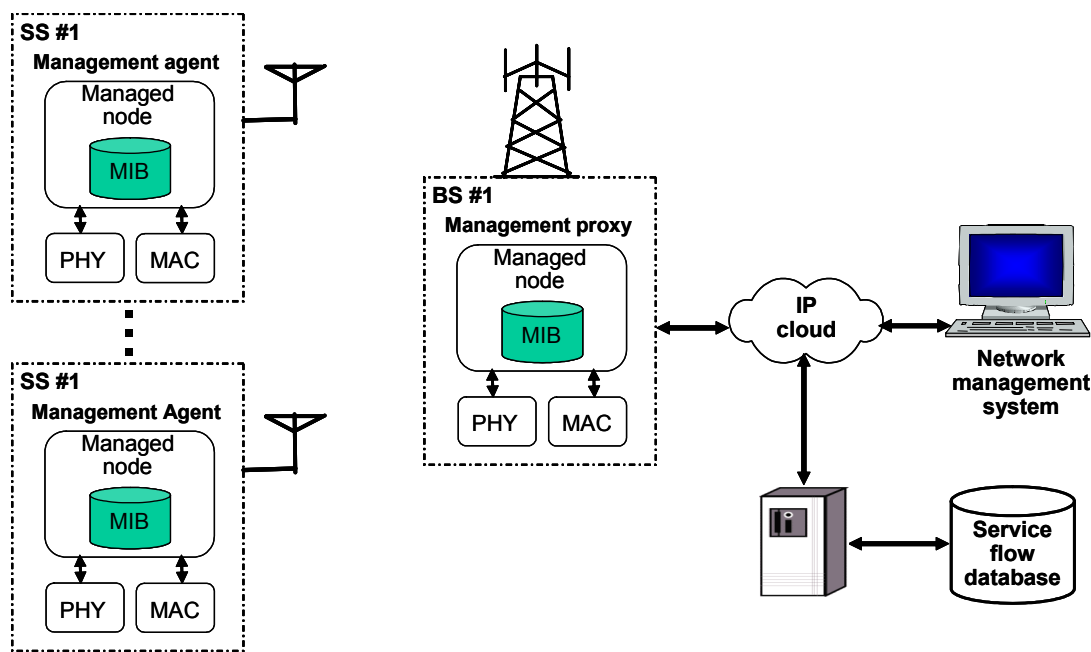


Figure 1—Fixed BWA network management reference model

1.4 Managed objects

[Add a new subclause 1.5]

The definition of managed objects in this standard are expressed in SMIV2. It supports a management protocol agnostic approach, including SNMP.

[Change Clause 2 as follows:]

2. Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

[Add the following references to Clause 2]

IETF RFC1213, “Management Information Base for Network Management of TCP/IP-based internets: MIB-II”, March 1991.¹

IETF RFC1902, “Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)”, January 1996.

IETF RFC1903, “Textual Convention for Version 2 of the Simple Network Management Protocol (SNMPv2)”, January 1996.

IETF RFC2576, “Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework”, March 2000.

IETF RFC2863, “The Interfaces Group MIB”, June, 2000.

IETF RFC3410, “Introduction and Applicability Statements for Internet-Standard Management Framework”, December 2002.

IETF RFC3411, “An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks”, December 2002.

IETF RFC3412, “Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)”, December 2002.

IETF RFC3413, “Simple Network Management Protocol (SNMP) Applications”, December 2002.

IETF RFC3414, “User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)”, December 2002.

IETF RFC3415, “View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)”, December 2002.

IETF RFC3418, “Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)”, December 2002.

¹IETF publications are available from the Internet Engineering Task Force at <http://www.ietf.org/>.

9. Configuration

[Add a new subclause 9.3]

9.3 Management information base

The management information base for BS and SS is defined as two ASN.1 MIB modules: wmanIfMib and wmanDevMib. The implementation of both MIB modules is mandatory for all BSs. The implementation of both MIB modules is mandatory for SSs, that are managed using SNMP protocol.

The wmanIfMib MIB module defines management objects relevant to the IEEE 802.16 broadband wireless interface as defined in this standard.

The wmanDevMib MIB module defines management objects relevant to the device implementing the IEEE 802.16 interface. The objects of this MIB module may refer explicitly to terms defined in the standard (e.g. configuration file encodings) but mainly provide the mandatory support required to implement, manage and test the equipment implementing the IEEE 802.16 interface.

This document also provides an informative Annex (see Annex D) to define vendor specific managed objects, such as temperature, fan and power alarms, for IEEE Std 802.16-2004 based Base Station.

9.3.1 Simple network management protocol

SNMP is a protocol to access the managed objects in the BS and SS. The support of SNMP is optional for the SS.

The support of SNMP in this standard is compliant to SNMPv2, but is backward compatible to SNMPv1 through appropriate translation. The SNMP agent support for SNMPv3 is optional. An agent that implements SNMPv3, is required to implement at least all the mandatory groups of the standard MIBs required for SNMPv3: RFC3410, RFC3411, RFC3412, RFC3413, RFC3414 and RFC3415 as well as the MIB defining coexistence between SNMPv1, v2 and v3 in RFC 2576. The SNMPv3 framework may be considered as a mechanism to flexibly control access to this MIB module, and mitigate security vulnerability.

The SNMP agent shall support RFC3418.

9.3.2 Relationship with interface MIB

This subclause describes the integration with MIB-II under Interface Group MIB defined in IETF RFC2863, as wmanIfMib will need to be integrated in the MIB tree. It describes where wmanIfMib is located in the MIB-II subtree, and how it can be accessed by NMS.

9.3.2.1 MIB-2 integration

The Internet Assigned Numbers Authority (IANA) has assigned the following ifType to point-to-multipoint broadband wireless access:

```
IANAIfType ::= TEXTUAL-CONVENTION
    SYNTAX INTEGER {
        propBWAp2Mp (184)    -- prop broadband wireless access point to multipoint
    }
```

WirelessMAN interface table is located under transmission subtree, as follows.

wmanIfMib ::= {transmission 184}-- WMAN interface table²

9.3.2.2 Usage of MIB-II tables

The “Interfaces” group of MIB-II, in RFC2863, has been designed to manage various sub-layers (e.g. MAC and PHY) beneath the internetwork-layer for numerous media-specific interfaces. The implementation of ifTable in SNMP managed BS and SS is mandatory.

The implementation of the ifTable for the BS shall create one row for each BS sector. The following recommendations shall be applied to each row defining a BS sector:

- ifIndex value is implementation specific
- ifType shall be set to propBWApm2Mp (value of 184 as defined in 9.3.2.1)
- ifSpeed shall be null
- ifPhysAddress shall be set to the MAC Address of the BS sector
- All other columnar objects shall be initialized as specified in RFC2863.

Table 1 provides an example.

Table 1—Example of the usage of ifTable objects for base station

ifTable	ifIndex	ifType (IANA)	ifSpeed	ifPhysAddress	ifAdminStatus	ifOperStatus
BS Sector 1	1	propBWApm2Mp	Null	MAC address of BS sector	Administration Status	Operational Status
BS Sector 2	2	propBWApm2Mp	Null	MAC address of BS sector	Administration Status	Operational Status
BS Sector 3	3	propBWApm2Mp	Null	MAC address of BS sector	Administration Status	Operational Status
Ethernet			Null	MAC address	Administration Status	Operational Status

The implementation of the ifTable for SS must create one row for each SS WirelessMAN interface. Additional rows may be necessary to support other network interfaces, such as Ethernet. The following recommendations must be applied to each row:

- ifIndex value is implementation specific
- ifType shall be set to propBWApm2Mp (value of 184 as defined in 9.3.2.1)
- ifSpeed shall be null
- ifPhys Address shall be set to the SS MAC Address (of the WirelessMAN interface)
- All other columnar objects shall be initialized as specified in RFC2863

²The wmanIfMib is approved by the IETF, this MIB can be accessed through the following :
iso.org.dod.internet.mgmt.mib-2.transmission.ifType (1.3.6.1.2.1.10.184).

Table 2 provides an example.

Table 2—Example of the usage of ifTable objects for subscriber station

ifTable	ifIndex	ifType (IANA)	ifSpeed	ifPhysAddress	ifAdminStatus	ifOperStatus
SS	1	propBWAp2Mp	Null	MAC address of SS	Administration Status	Operational Status
Ethernet			Null	MAC address	Administration Status	Operational Status

9.3.2.3 Events and traps

The wmanIfMib defines objects for reporting events through mechanisms, such as traps and non-volatile logging. However, the definition and coding of events is vendor-specific. In order to assist the network operators who must troubleshoot multi-vendor equipment, the circumstances and meaning of each event should be reported as human-readable text. Therefore, the trap definitions should include the event reason encoded as display String, and is shown in the following example.

```

trapName NOTIFICATION-TYPE
    OBJECTS      { ifIndex,
                  eventReason,
                  other useful objects
                }
    MAX-Access   read-only
    STATUS       current
    DESCRIPTION
        "trap description"
    ::= { Object Id }.

```

9.3.3 wmanDevMib MIB Subtree

This subclause specifies that wmanDevMib shall be accessed through the following MIB tree:

```
iso(1).std(0).iso8802(8802).wman(16).wmanDev(1) { 1 0 8802 16 1 }
```

11.TLV encodings

[Add a new subclause 11.2.8].

11.2.8 MIB object write-access control

SS support of MIB object write-access control is recommended. This object makes it possible for an operator to disable SNMP “Set” access to individual Management Information Base (MIB) objects, while a subscriber station is connected to that operator network. This behavior is not persistent and terminates when the SS de-registers or loses connection to the BS. Each instance of this object controls access to all of the writable MIB objects whose Object ID (OID) prefix matches. The object may be repeated to disable access to any number of MIB objects, where, n is the size of the ASN.1 Basic Encoding Rules [ISO 8825] encoding of the OID prefix plus one byte for the control flag.

Type	Length	Value
10	n	OID prefix plus control flag

The control flag may take the following values:

Value	Description
0	allow write-access
1	disallow write-access

Any OID prefix may be used. The Null OID 0.0 may be used to control access to all MIB objects with MAX-ACCESS as writable.

When multiple instances of this object are present and overlap, the longest (most specific) prefix has precedence. Thus, one example might be as follows:

someTable	disallow write-access
someTable.1.3	allow write-access

This example disallows MAX-ACCESS write-access to all writable objects in someTable except for someTable.1.3.

An attempt to set the MAX-ACCESS write-access of an unsupported MIB element or prefix shall be silently discarded.

11.2.9 Set MIB Object

This object allows arbitrary MIB objects to be Set via the TFTP configuration file, where the value is an ASN.1 VarBind as defined in IETF RFC 1157. The VarBind is encoded in ASN.1 Basic Encoding Rules (just as it would be if part of an SNMP Set request, for example).

Type	Length	Value
11	n	variable binding

SS support of Set MIB Object is recommended, but is not required. The SS shall treat this object as if it were part of an “Set” Request for the applicable MIB variable with the following caveats:

- 1) It shall treat the request as fully authorized (it shall not refuse the request for lack of privilege).
- 2) Attempt to write to MAX-ACCESS read-only MIB variables will be disallowed and silently discarded. Temporary MAX-ACCESS write restriction due to application of MIB object write-access control 11.2.8 shall not be considered when evaluating attempt to write to MIB objects for this purpose.
- 3) Writes to persistent MIB variables shall only update the “working” copy. A MIB value that supports persistence shall not update its non-volatile store for the indicated MIB object; such updates are only supported when the subscriber station is connected and registered to the BS.

This object may be repeated with different VarBinds to “Set” a number of MIB objects. All such Sets shall be treated as if simultaneous.

Each VarBind shall be limited to 255 bytes.

13. IEEE 802.16 MIB structure for SNMP

[Add a new Clause 13]

The IEEE 802.16 MIB consists of wmanIfMib and wmanDevMib.

The wmanIfMib is composed of three groups:

- wmanIfBsObjects: contains managed objects to be implemented in the SNMP agent in BS.
- wmanIfSsObjects: contains managed objects to be implemented in the SNMP agent in SS.
- wmanIfCommonObjects: contains common managed objects to be implemented in the SNMP agent in BS and SS.

The wmanDevMib is composed of three groups:

- wmanDevBsObjects: contains managed objects to be implemented in the SNMP agent in BS.
- wmanDevSsObjects: contains managed objects to be implemented in the SNMP agent in SS.
- wmanDevCommonObjects: contains managed objects to be implemented in the SNMP agent in BS/SS.

13.1 wmanIfMib

Figure 2 shows the high level MIB structure of wmanIfMib for IEEE 802.16. The MIB structure is organized based on the the reference model as defined in this standard.

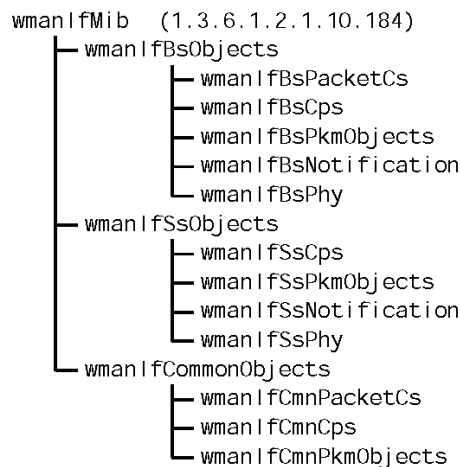
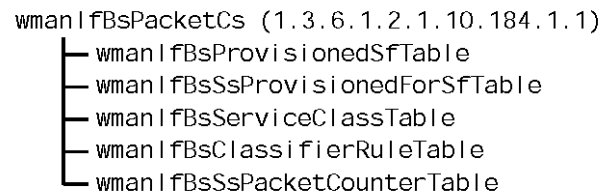


Figure 2—wmanIfMib structure

13.1.1 wmanIfBsObjects

13.1.1.1 wmanIfBsPacketCs

Figure 3 shows the structure of the wmanIfBsPacketCs subtree that contains BS managed objects related to the Packet CS management entity layer.

**Figure 3—wmanIfBsPacketCs structure****13.1.1.1.1 wmanIfBsProvisionedSfTable**

wmanIfBsProvisionedSfTable contains provisioned service flow profiles for SSs, and pointers to wmanIfBsServiceClassTable and wmanIfBsClassifierRuleTable for QoS parameters and classifier rules, respectively.

13.1.1.1.2 wmanIfBsProvisionedForSfTable

wmanIfBsProvisionedForSfTable maps the MAC addresses of SSs to the service flows provisioned in wmanIfBsProvisionedSfTable. It enables downlink multicast services where MAC addresses of multiple SSs can be mapped to the same service flow.

13.1.1.1.3 wmanIfBsServiceClassTable

Each entry of the wmanIfBsServiceClassTable contains QoS parameter set, as defined in subclause 6.3.14 and 11.13.

13.1.1.1.4 wmanIfBsClassifierRuleTable

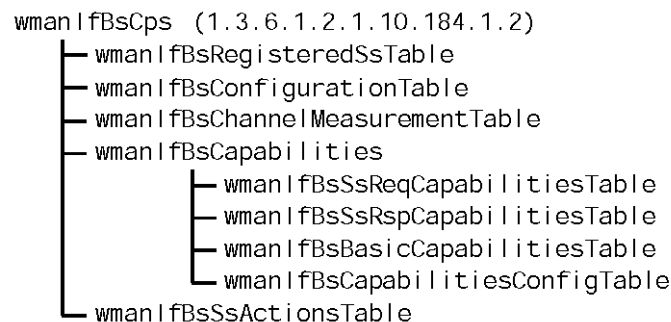
wmanIfBsClassifierRuleTable contains the packet classifier rules associated with service flows.

13.1.1.1.5 wmanIfBsSsPacketCounterTable

wmanIfBsSsPacketCounterTable contains counters to keep track of the number of packets and octets that have been received or transmitted on the per service flow basis.

13.1.1.2 wmanIfBsCps

Figure 4 shows the structure of wmanIfBsCps subtree that contains BS managed objects related to the MAC CPS management entity layer

**Figure 4—wmanIfBsCps structure**

13.1.1.2.1 wmanIfBsRegisteredSsTable

Each entry in the wmanIfBsRegisteredSsTable contains the information of SS that has been registered through REG-REQ and REG-RSP messages.

13.1.1.2.2 wmanIfBsConfigurationTable

wmanIfBsConfigurationTable contains objects for BS system parameters and constants as defined in subclause 10.1. The wmanIfBsConfigurationTable also contains objects that define the default behaviour of the BS for secondary Management Channel scheduling and SFID allocation as well as configuration parameters of the CPS scheduler and AAS system.

13.1.1.2.3 wmanIfBsChannelMeasurementTable

wmanIfBsChannelMeasurementTable contains channel measurement information on the uplink signal from the SS as received at the BS, and on the downlink signal from the BS as received at the SS and reported from SS to BS using REP-REQ/RSP messages.

13.1.1.2.4 wmanIfBsCapabilities

13.1.1.2.4.1 wmanIfBsSsReqCapabilitiesTable

wmanIfBsSsReqCapabilitiesTable contains the basic capability information of SSs as reported by SSs to BS using RNG-REQ, SBC-REQ and REG-REQ messages.

13.1.1.2.4.2 wmanIfBsSsRspCapabilitiesTable

wmanIfBsSsRspCapabilitiesTable contains the basic capability information of SSs as negotiated and agreed between BS and SS via RNG-REQ/RSP, SBC-REQ/RSP and REG-REQ/RSP messages.

13.1.1.2.4.3 wmanIfBsBasicCapabilitiesTable

wmanIfBsBasicCapabilitiesTable contains the basic capabilities of the BS as implemented in BS hardware and software. These capabilities, along with the configuration for them (wmanIfBsCapabilitiesConfigTable), are used for negotiation of basic capabilities with SS using RNG-RSP, SBC-RSP, and REG-RSP messages.

13.1.1.2.4.4 wmanIfBsCapabilitiesConfigTable

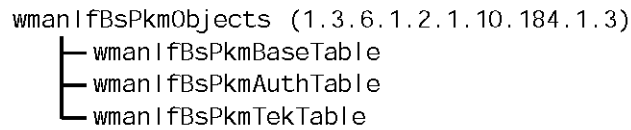
wmanIfBsCapabilitiesConfigTable contains the configuration for basic capabilities of the BS. The table is intended to be used to restrict the capabilities implemented by the BS, for example, in order to comply with local regulatory requirements. The BS should use the configuration along with the implemented capabilities (wmanIfBsBasicCapabilitiesTable) for negotiation of basic capabilities with the SS using RNG-RSP, SBC-RSP, and REG-RSP messages.

13.1.1.2.5 wmanIfBsSsActionsTable

wmanIfBsSsActionsTable contains all the actions specified for SSs in the standard. The actions are routed down to the SS using unsolicited MAC messages: REG-RSP, DREG-REQ and RES-CMD. The table also contains the parameters of the actions when specified by the standard.

13.1.1.3 wmanIfBsPkmObjects

Figure 5 shows the structure of wmanIfBsPkmObjects subtree that contains BS managed objects related to the MAC privacy management entity.

**Figure 5—wmanIfBsPkmObjects structure****13.1.1.3.1 wmanIfBsPkmBaseTable**

wmanIfBsPkmBaseTable contains base station PKM operational parameters described in subclause 10.2 of IEEE Std 802.16-2004.

13.1.1.3.2 wmanIfBsSsPkmAuthTable

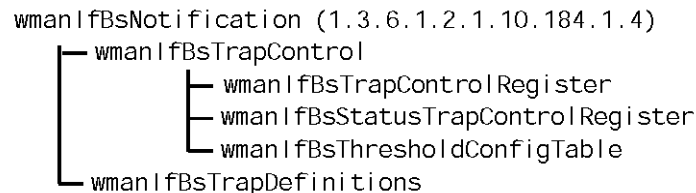
wmanIfBsSsPkmAuthTable contains runtime subscriber station authentication and authorization parameters for each base station.

13.1.1.3.3 wmanIfBsPkmTekTable

wmanIfBsPkmTekTable is double indexed by ifIndex and wmanIfBsPkmTekSAId and contains runtime Security Association parameters for each base station.

13.1.1.4 wmanIfBsNotification

Figure 6 shows the structure of wmanIfBsNotification subtree that contains BS traps to report fault events and exceptions, such as RSSI threshold crossing.

**Figure 6—wmanIfBsNotification structure****13.1.1.4.1 wmanIfBsTrapControl****13.1.1.4.1.1 wmanIfBsTrapControlRegister**

wmanIfBsTrapControlRegister is used to enable or disable BS traps independently.

13.1.1.4.1.2 wmanIfBsStatusTrapControlRegister

wmanIfBsStatusTrapControlRegister is used to enable or disable Base Station status notification traps.

13.1.1.4.1.3 wmanIfBsThresholdConfigTable

wmanIfBsThresholdConfigTable contains threshold objects that can be set to detect the threshold crossing events.

13.1.1.4.2 wmanIfBsTrapDefinitions

wmanIfBsTrapDefinitions object group defines all the traps reported by the BS.

13.1.1.5 wmanIfBsPhy

Figure 7 shows the structure of wmanIfBsPhy subtree that contains BS managed objects related to the Physical layer.

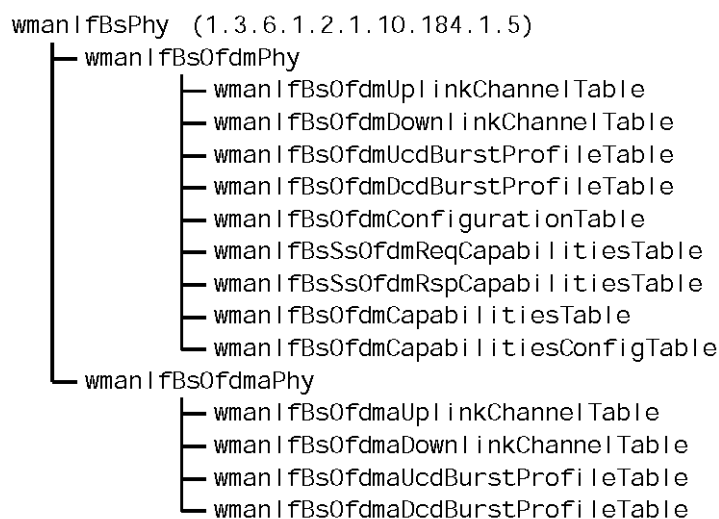


Figure 7—wmanIfBsPhy structure

13.1.1.5.1 wmanIfBsOfdmPhy

wmanIfBsOfdmPhy is a group containing objects specific to the WirelessMAN-OFDM physical layer specification.

13.1.1.5.1.1 wmanIfBsOfdmUplinkChannelTable

wmanIfBsOfdmUplinkChannelTable contains OFDM UCD (Uplink Channel Descriptor) channel attributes, defining the transmission characteristics of uplink channels.

13.1.1.5.1.2 wmanIfBsOfdmDownlinkChannelTable

wmanIfBsOfdmDownlinkChannelTable contains OFDM DCD (Downlink Channel Descriptor) channel attributes, defining the transmission characteristics of downlink channels.

13.1.1.5.1.3 wmanIfBsOfdmUcdBurstProfileTable

wmanIfBsOfdmUcdBurstProfileTable contains OFDM UCD burst profiles for each uplink channel.

13.1.1.5.1.4 wmanIfBsOfdmDcdBurstProfileTable

wmanIfBsOfdmDcdBurstProfileTable provides one row for each OFDM DCD burst profile.

13.1.1.5.1.5 wmanIfBsOfdmConfigurationTable

wmanIfBsOfdmConfigurationTable contains BS configuration objects, specific to the WirelessMAN-OFDM physical layer specification.

13.1.1.5.1.6 wmanIfBsSsOfdmReqCapabilitiesTable

wmanIfBsSsOfdmReqCapabilitiesTable contains the basic capability information, specific to the WirelessMAN-OFDM physical layer specification, of SSs as reported by SSs to BS using RNG-REQ, SBC-REQ and REG-REQ messages. Entries in this table should be created when an SS registers with a BS.

13.1.1.5.1.7 wmanIfBsSsOfdmRspCapabilitiesTable

wmanIfBsSsOfdmRspCapabilitiesTable contains the basic capability information, specific to the WirelessMAN-OFDM physical layer specification, of SSs as negotiated and agreed between BS and SS via RNG-REQ/RSP, SBC-REQ/RSP and REG-REQ/RSP messages. This table augments the wmanIfBsRegisteredSsTable.

13.1.1.5.1.8 wmanIfBsOfdmCapabilitiesTable

wmanIfBsOfdmCapabilitiesTable contains the basic capabilities, specific to the WirelessMAN-OFDM physical layer specification, of the BS as implemented in BS hardware and software.

13.1.1.5.1.9 wmanIfBsOfdmCapabilitiesConfigTable

wmanIfBsOfdmCapabilitiesConfigTable contains the configuration for basic capabilities of the BS, specific to the WirelessMAN-OFDM physical layer specification. The table is intended to be used to restrict the capabilities implemented by the BS.

13.1.1.5.2 wmanIfBsOfdmaPhy

wmanIfBsOfdmaPhy is a group containing objects specific to the WirelessMAN-OFDM physical layer specification.

13.1.1.5.2.1 wmanIfBsOfdmaUplinkChannelTable

wmanIfBsOfdmaUplinkChannelTable contains OFDMA UCD channel attributes, defining the transmission characteristics of uplink channels.

13.1.1.5.2.2 wmanIfBsOfdmaDownlinkChannelTable

wmanIfBsOfdmaDownlinkChannelTable contains OFDMA DCD channel attributes, defining the transmission characteristics of downlink channels.

13.1.1.5.2.3 wmanIfBsOfdmaUcdBurstProfileTable

wmanIfBsOfdmaUcdBurstProfileTable contains OFDMA UCD burst profiles for each uplink channel.

13.1.1.5.2.4 wmanIfBsOfdmaDcdBurstProfileTable

wmanIfBsOfdmaDcdBurstProfileTable provides one row for each OFDMA DCD burst profile.

13.1.2 wmanIfSsObjects

13.1.2.1 wmanIfSsCps

Figure 8 shows the structure of wmanIfSsCps subtree that contains SS managed objects related to the MAC CPS management entity layer.

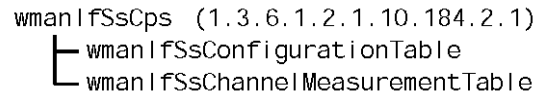


Figure 8—wmanIfSsCps structure

13.1.2.1.1 wmanIfSsConfigurationTable

wmanIfSsConfigurationTable contains objects for SS system parameters and constants as defined in subclause 10.1.

13.1.2.1.2 wmanIfSsChannelMeasurementTable

wmanIfSsChannelMeasurementTable contains downlink channel measurement information for each SS.

13.1.2.2 wmanIfSsPkmObjects

Figure 9 shows the structure of wmanIfSsPkmObjects subtree that contains subscriber station manageable objects related to the privacy management entity.

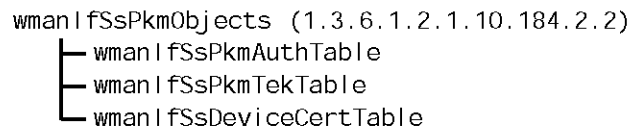


Figure 9—wmanIfSsPkm structure

13.1.2.2.1 wmanIfSsPkmAuthTable

wmanIfSsPkmAuthTable contains subscriber station authentication and authorization parameters including those described in subclause 10.2.

13.1.2.2.2 wmanIfSsPkmTekTable

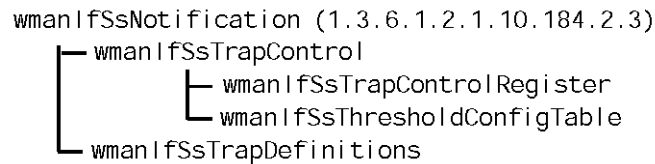
wmanIfSsPkmTekTable contains subscriber station runtime parameters for each active security association.

13.1.2.2.3 wmanIfSsDeviceCertTable

wmanIfSsDeviceCertTable describes the PKM device certificates for each SS wireless interface.

13.1.2.3 wmanIfSsNotification

Figure 10 shows the structure of wmanIfSsNotification subtree that contains SS traps to report fault events and exceptions, such as RSSI threshold crossing.

**Figure 10—wmanIfSsNotification structure****13.1.2.3.1 wmanIfSsTrapControl****13.1.2.3.1.1 wmanIfSsTrapControlRegister**

wmanIfSsTrapControlRegister is used to enable or disable Subscriber Station traps.

13.1.2.3.1.2 wmanIfSsThresholdConfigTable

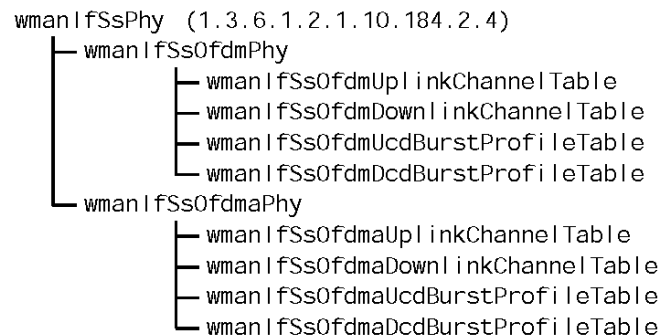
wmanIfSsThresholdConfigTable contains threshold objects that can be set to detect the threshold crossing events.

13.1.2.3.2 wmanIfSsTrapDefinitions

wmanIfSsTrapDefinitions group defines all the traps reported by the SS.

13.1.2.4 wmanIfSsPhy

Figure 11 shows the structure of wmanIfSsPhy subtree that contains SS managed objects related to the Physical layer.

**Figure 11—wmanIfSsPhy structure****13.1.2.4.1 wmanIfSsOfdmPhy**

wmanIfSsOfdmPhy is a group containing objects specific to the WirelessMAN-OFDM physical layer specification.

13.1.2.4.1.1 wmanIfSsOfdmUplinkChannelTable

wmanIfSsOfdmUplinkChannelTable contains OFDM UCD channel attributes defining the transmission characteristics of uplink channels.

13.1.2.4.1.2 wmanIfSsOfdmDownlinkChannelTable

wmanIfSsOfdmUplinkChannelTable contains OFDM DCD channel attributes, defining the transmission characteristics of downlink channels.

13.1.2.4.1.3 wmanIfSsOfdmUcdBurstProfileTable

wmanIfSsOfdmUcdBurstProfileTable contains OFDM UCD burst profiles for each uplink channel.

13.1.2.4.1.4 wmanIfSsOfdmDcdBurstProfileTable

wmanIfSsOfdmDcdBurstProfileTable provides one row for each OFDM DCD burst profile.

13.1.2.4.2 wmanIfSsOfdmaPhy

wmanIfSsOfdmaPhy is a group containing objects specific to the WirelessMAN-OFDM physical layer specification.

13.1.2.4.2.1 wmanIfSsOfdmaUplinkChannelTable

wmanIfSsOfdmaUplinkChannelTable contains OFDMA UCD channel attributes, defining the transmission characteristics of uplink channels.

13.1.2.4.2.2 wmanIfSsOfdmaDownlinkChannelTable

wmanIfSsOfdmaDownlinkChannelTable contains OFDMA DCD channel attributes, defining the transmission characteristics of downlink channels.

13.1.2.4.2.3 wmanIfSsOfdmaUcdBurstProfileTable

wmanIfSsOfdmaUcdBurstProfileTable contains OFDMA UCD burst profiles for each uplink channel.

13.1.2.4.2.4 wmanIfSsOfdmaDcdBurstProfileTable

wmanIfSsOfdmaDcdBurstProfileTable provides one row for each OFDMA DCD burst profile.

13.1.3 wmanIfCommonObjects

13.1.3.1 wmanIfCmnPacketCs

Figure 12 shows the structure of wmanIfCmnPacketCs subtree that contains common managed objects related to the Packet CS management entity layer.

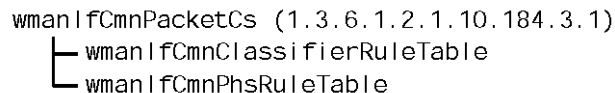


Figure 12—wmanIfCmnPacketCs structure

13.1.3.1.1 wmanIfCmnClassifierRuleTable

wmanIfCmnClassifierRuleTable contains runtime classifier rules screening criteria for each service flow.

13.1.3.1.2 wmanIfCmnPhsRuleTable

wmanIfCmnPhsRuleTable contains PHS rule dictionary entries. Each entry contains the data of the header to be suppressed along with its PHSI identification.

13.1.3.2 wmanIfCmnCps

Figure 13 shows the structure of wmanIfCmnCps subtree that contains common managed objects related to the MAC CPS management entity.

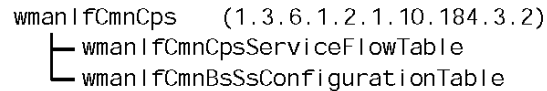


Figure 13—wmanIfCmnCps structure

13.1.3.2.1 wmanIfCmnCpsServiceFlowTable

wmanIfCmnCpsServiceFlowTable contains Service Flow managed objects that are common in BS and SS.

13.1.3.2.2 wmanIfCmnBsSsConfigurationTable

wmanIfCmnBsSsConfigurationTable provides one row for each BS sector that contains the system parameters common in both SS and BS. All SSs shall have the same parameters as the BS to which the SSs are associated.

13.1.3.3 wmanIfCmnPkmObjects

Figure 14 shows the structure of wmanIfCmnPkmObjects subtree that contains common PKM objects.

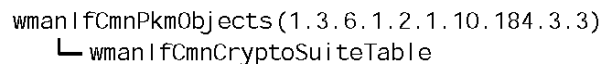


Figure 14—wmanIfCmnPkmObjects structure

13.1.3.3.1 wmanIfCmnCryptoSuiteTable

wmanIfCmnCryptoSuiteTable contains supported cryptographic suites for the particular SS and other cryptographic parameters such as key lifetimes.

13.2 wmanDevMib

Figure 15 shows the high level MIB structure of wmanDevMib for IEEE 802.16.

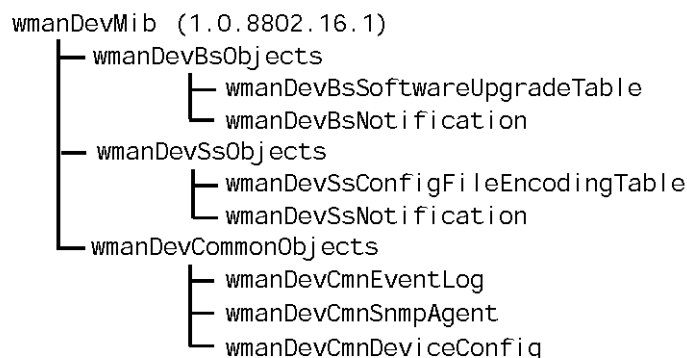


Figure 15—wmanDevMib structure

13.2.1 wmanDevBsObjects

13.2.1.1 wmanDevBsSoftwareUpgradeTable

wmanDevBsSoftwareUpgradeTable contains objects associated with BS software upgrade.

13.2.1.2 wmanDevBsNotification

Figure 16 shows the structure of wmanDevBsNotification subtree that contains managed objects related to the traps.

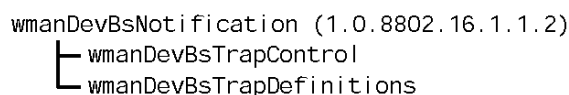


Figure 16—wmanDevBsNotification structure

13.2.1.2.1 wmanDevBsTrapControl

wmanDevBsTrapControl is used to enable or disable BS traps.

13.2.1.2.2 wmanDevBsTrapDefinitions

wmanDevBsTrapDefinitions group defines all the traps reported by BS.

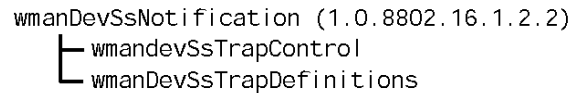
13.2.2 wmanDevSsObjects

13.2.2.1 wmanDevSsConfigFileEncodingTable

wmanDevSsConfigFileEncodingTable contains configuration file information about the subscriber station such as manufacturer, hardware model, serial number, and software or firmware revision.

13.2.2.2 wmanDevSsNotification

Figure 17 shows the structure of wmanDevSsNotification subtree that contains managed objects related to the traps.

**Figure 17—wmanDevSsNotification structure****13.2.2.2.1 wmanDevSsTrapControl**

wmanDevSsTrapControlRegister is used to enable or disable SS traps.

13.2.2.2.2 wmanDevBsTrapDefinitions

wmanDevSsTrapDefinitions group defines all the traps reported by SS.

13.2.3 wmanDevCommonObjects**13.2.3.1 wmanDevCmnEventLog**

Figure 18 shows the structure of wmanDevCmnEventLog subtree that contains common managed objects related to the Event Log.

**Figure 18—wmanDevCmnEventLog structure****13.2.3.1.1 wmanDevCmnEventLogConfigTable**

wmanDevCmnEventLogConfigTable defines the configurable parameters that are required for the Event Log operation.

13.2.3.1.2 wmanDevCmnEventTable

wmanDevCmnEventTable provides the events that are supported by SS.

13.2.3.1.3 wmanDevCmnEventLogTable

wmanDevCmnEventLogTable is used to store local events, that should reside in the non-volatile memory. The Event Log consists of the following features:

- Event Log uses the wrap-around buffer to store events. When the buffer is almost full, a TRAP may be sent to the NMS. When the buffer is full, the oldest entry will be removed to make room for the new entry. The wrap-around can be disabled by NMS to prevent faulty events from flooding the log buffer quickly.
- The sizes of the buffers is configurable.
- Events in the log have a lifespan that may be configurable.
- The threshold of the residual buffer which triggers the TRAP may be configurable.

- NMS can set the minimum severity of the events that should be logged into the buffer.
- Certain events can trigger notifications that shall be sent to NMS.
- A pointer is provided to enable the access to the latest event.

The content of each entry should be retained after the power reset.

13.2.3.2 wmanDevCmnSnmpAgent

Figure 19 shows the structure of wmanDevCmnSnmpAgent subtree that contains common managed objects related to SNMP agent configuration.

```
wmanDevCmnSnmpAgent (1.0.8802.16.1.3.2)
└─ wmanDevCmnSnmpV1V2TrapDestTable
```

Figure 19—wmanDevCmnSnmpAgent structure

13.2.3.2.1 wmanDevCmnSnmpAgentConfigTable

wmanDevCmnSnmpAgentConfigTable contains the configuration objects for the BS controller entity implementing SNMP agent.

13.2.3.3 wmanDevCmnDeviceConfig

wmanDevCmnDeviceConfig contains common managed object related to device configuration.

13.3 ASN.1 Definitions of 802.16 MIB for SNMP

13.3.1 wmanIfMib

```
WMAN-IF-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY,
    OBJECT-TYPE,
    NOTIFICATION-TYPE,
    Unsigned32, Integer32, Counter32,
    Counter64, transmission
        FROM SNMPv2-SMI
    SnmpAdminString
        FROM SNMP-FRAMEWORK-MIB
    TEXTUAL-CONVENTION,
    MacAddress, RowStatus, TruthValue,
    TimeStamp, DateAndTime
        FROM SNMPv2-TC
    InetAddressType, InetAddress
        FROM INET-ADDRESS-MIB
    OBJECT-GROUP,
    MODULE-COMPLIANCE,
    NOTIFICATION-GROUP
        FROM SNMPv2-CONF
    ifIndex
        FROM IF-MIB;
```

```
wmanIfMib MODULE-IDENTITY
```

```
    LAST-UPDATED      "200508020000Z" -- August 02, 2005
    ORGANIZATION      "IEEE 802.16"
    CONTACT-INFO
```

```
        "WG E-mail: stds-802-16@ieee.org
        WG Chair: Roger B. Marks
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```
DESCRIPTION
```

```
    "This material is from IEEE Std 802.16f
    Copyright (c) 2005 IEEE.
    This MIB Module defines managed objects for
    IEEE 802.16-2004 based Subscriber Station
    and Base Station."
```

```
REVISION      "200508020000Z"
```

DESCRIPTION

"The first approved version of WMAN-IF-MIB module."
::= { transmission 184 }

wmanIfMibObjects OBJECT IDENTIFIER ::= { wmanIfMib 1 }
wmanIfBsObjects OBJECT IDENTIFIER ::= { wmanIfMibObjects 1 }
wmanIfSsObjects OBJECT IDENTIFIER ::= { wmanIfMibObjects 2 }
wmanIfCommonObjects OBJECT IDENTIFIER ::= { wmanIfMibObjects 3 }

-- Textual Conventions

WmanIfSfSchedulingType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The scheduling service provided by a SC for an upstream service flow. If the parameter is omitted from an upstream QOS Parameter Set, this object takes the value of bestEffort (2). This parameter must be reported as undefined (1) for downstream QOS Parameter Sets."

SYNTAX INTEGER {undefined(1),
bestEffort(2),
nonRealTimePollingService(3),
realTimePollingService(4),
reserved(5),
unsolicitedGrantService(6)}

WmanIfPhsRuleVerify ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The value of this field indicates to the sending entity whether or not the packet header contents are to be verified prior to performing suppression. If PHSV is enabled, the sender shall compare the bytes in the packet header with the bytes in the PHSF that are to be suppressed as indicated by the PHSM."

REFERENCE

"Subclause 11.13.19.3.7.5 in IEEE Std 802.16-2004"

SYNTAX INTEGER {phsVerifyEnable(0),
phsVerifyDisable(1)}

WmanIfClassifierBitMap ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A bit of of this object is set to 1 if the parameter indicated by the comment was present in the classifier encoding, and 0 otherwise.
Note: that BITS are encoded most significant bit first, so that if e.g. bits 6 and 7 are set, this object is encoded as the octet string '030000'H."

REFERENCE

"Subclause 11.13.19.3.4 in IEEE Std 802.16-2004"

SYNTAX BITS {priority(0),
ipTos(1),
ipProtocol(2),

```
ipMaskedSrcAddr(3),  
ipMaskedDestAddr(4),  
srcPort(5),  
destPort(6),  
destMacAddr(7),  
srcMacAddr(8),  
ethernetProtocol(9),  
userPriority(10),  
vlanId(11),  
ipv6FlowLabel(12)}
```

WmanIfSfState ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"WmanIfSfState defines the state of a service flow."

SYNTAX INTEGER {authorized(1),
admitted(2),
active(3)}

WmanIfServClassName ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"WmanIfServClassName defines the type of service
class name."

SYNTAX OCTET STRING (SIZE(2..128))

WmanIfCsSpecification ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"WmanIfCsSpecification defines the types of convergence
sublayer."

SYNTAX INTEGER {noCs(0),
packetIPv4(1),
packetIPv6(2),
packet802dot3Ethernet(3),
packet802dot1QVlan(4),
packetIPv4Over802dot3(5),
packetIPv6Over802dot3(6),
packetIPv4Over802dot1Q(7),
packetIPv6Over802dot1Q(8),
atm(9)}

WmanIfMacVersion ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Version number of IEEE 802.16."

SYNTAX INTEGER {ieee802Dot16Of2001(1),
ieee802Dot16cOf2002(2),
ieee802Dot16aOf2003(3),
ieee802Dot16Of2004(4)}

WmanIfCidType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

```
        "Type of CID."
SYNTAX      INTEGER (0 .. 65535)

WmanIfDataEncryptAlgId ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "Data encryption algorithm identifiers."
    REFERENCE
        "Table 375 in IEEE Std 802.16-2004"
    SYNTAX      INTEGER {none(0),
                        des56BitCbcMode(1),
                        aesCcmMode(2)}

WmanIfDataAuthAlgId ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "Data authentication algorithm identifiers."
    REFERENCE
        "Table 376 in IEEE Std 802.16-2004"
    SYNTAX      INTEGER {noDataAuthentication(0),
                        reserved(1)}

WmanIfTekEncryptAlgId ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "TEK encryption algorithm identifiers."
    REFERENCE
        "Table 377 in IEEE Std 802.16-2004"
    SYNTAX      INTEGER {tripleDes128BitKey(1),
                        rsa1024BitKey(2),
                        aes128BitKey(3)}

WmanIfChannelNumber ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "Physical channel number"
    SYNTAX      INTEGER (0 .. 199)

WmanIfOfdmFecCodeType ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "FEC code type and modulation type"
    REFERENCE
        "Table 356 and Table 362 in IEEE Std 802.16-2004"
    SYNTAX      INTEGER {bpskCc1Over2(0),
                        qpskRsCcCc1Over2(1),
                        qpskRsCcCc3Over4(2),
                        sixteenQamRsCcCc1Over2(3),
                        sixteenQamRsCcCc3Over4(4),
                        sixtyFourQamRsCcCc2Over3(5),
                        sixtyFourQamRsCcCc3Over4(6),
                        qpskBtc1Over2(7),
                        qpskBtc3Over4(8),
                        sixteenQamBtc3Over4(9),
```

```
sixteenQamBtc4Over5(10),
sixtyFourQamBtc2Over3(11),
sixtyFourQamBtc5Over6(12),
qpskCtc1Over2(13),
qpskCtc2Over3(14),
qpskCtc3Over4(15),
sixteenQamCtc1Over2(16),
sixteenQamCtc3Over4(17),
sixtyFourQamCtc2Over3(18),
sixtyFourQamCtc3Over4(19) }
```

```
WmanIfOfdmaFecCodeType ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "FEC code type and modulation type"
    REFERENCE
        "Table 356 and Table 362 in IEEE Std 802.16-2004"
    SYNTAX          INTEGER {qpskCc1Over2(0),
                             qpskCc3Over4(1),
                             sixteenQamCc1Over2(2),
                             sixteenQamCc3Over4(3),
                             sixtyFourQamCc2Over3(4),
                             sixtyFourQamCc3Over4(5),
                             qpskBtc1Over2(6),
                             qpskBtc2Over3(7),
                             sixteenQamBtc3Over5(8),
                             sixteenQamBtc4Over5(9),
                             sixtyFourQamBtc5Over8(10),
                             sixtyFourQamBtc4Over5(11),
                             qpskCtc1Over2(12),
                             qpskCtc2Over3(13),
                             qpskCtc3Over4(14),
                             sixteenQamCtc1Over2(15),
                             sixteenQamCtc3Over4(16),
                             sixtyFourQamCtc2Over3(17),
                             sixtyFourQamCtc3Over4(18),
                             sixtyFourQamCtc5Over6(19),
                             qpskZtCc1Over2(20),
                             qpskZtCc3Over4(21),
                             sixteenQamZtCc1Over2(22),
                             sixteenQamZtCc3Over4(23),
                             sixtyFourQamZtCc2Over3(24),
                             sixtyFourQamZtCc3Over4(25) }
```

```
-- Textual convention for capabilities encodings
WmanIfNumOfUplinkCid ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "The object of this type shows the number of Uplink CIDs
         the SS can support."
    REFERENCE
        "Subclause 11.7.4 in IEEE Std 802.16-2004"
    SYNTAX          INTEGER (2..65535)
```

WmanIfArqSupportType ::= TEXTUAL-CONVENTION
 STATUS current
 DESCRIPTION
 "The object of this type indicates whether the SS support
 ARQ."
 REFERENCE
 "Subclause 11.7.8.1 in IEEE Std 802.16-2004"
 SYNTAX INTEGER {arqNotSupported(0),
 arqSupported(1)}

WmanIfMaxDsxFowType ::= TEXTUAL-CONVENTION
 STATUS current
 DESCRIPTION
 "The object of this type specifies the maximum number of
 concurrent DSA, DSC, or DSD transactions that may be
 outstanding."
 REFERENCE
 "Subclause 11.7.8.2 in IEEE Std 802.16-2004"
 SYNTAX INTEGER (0..255)

WmanIfMacCrcSupport ::= TEXTUAL-CONVENTION
 STATUS current
 DESCRIPTION
 "The object of this type indicates whether or not the SS
 supports MAC level CRC."
 REFERENCE
 "Subclause 11.7.8.3 in IEEE Std 802.16-2004"
 SYNTAX INTEGER {noMacCrcSupport(0),
 macCrcSupport(1)}

WmanIfMaxMcaFlowType ::= TEXTUAL-CONVENTION
 STATUS current
 DESCRIPTION
 "The object of this type specifies the maximum number of
 concurrent MCA transactions that may be outstanding."
 REFERENCE
 "Subclause 11.7.8.4 in IEEE Std 802.16-2004"
 SYNTAX INTEGER (0..255)

WmanIfMaxMcpGroupCid ::= TEXTUAL-CONVENTION
 STATUS current
 DESCRIPTION
 "The object of this type indicates the maximum number of
 simultaneous Multicast Polling Groups the SS is
 capable of belonging to."
 REFERENCE
 "Subclause 11.7.8.5 in IEEE Std 802.16-2004"
 SYNTAX INTEGER (0..255)

WmanIfMaxPkmFlowType ::= TEXTUAL-CONVENTION
 STATUS current
 DESCRIPTION
 "The object of this type specifies the maximum number of
 concurrent PKM transactions that may be outstanding."

REFERENCE

"Subclause 11.7.8.6 in IEEE Std 802.16-2004"

SYNTAX INTEGER (0..255)

WmanIfAuthPolicyType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The object of this type specifies authorization policy that both SS and BS need to negotiate and synchronize. A bit value of 0 = not supported, 1 = supported. If this field is omitted, then both SS and BS shall use the IEEE 802.16 security, constituting X.509 digital certificates and the RSA public key encryption algorithm, as authorization policy."

REFERENCE

"Subclause 11.7.8.7 in IEEE Std 802.16-2004"

SYNTAX BITS {ieee802Dot16PrivacySupported(0),
 reserved1(1),
 reserved2(2),
 reserved3(3),
 reserved4(4),
 reserved5(5),
 reserved6(6),
 reserved7(7)}

WmanIfMaxNumOfSaType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field specifies maximum number of supported security association of the SS."

REFERENCE

"Subclause 11.7.8.8 in IEEE Std 802.16-2004"

SYNTAX INTEGER (0..255)

WmanIfIpVersionType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The object of this type indicates the version of IP used on the Secondary Management Connection. The value should be undefined if the 2nd management CID doesn't exist."

REFERENCE

"Subclause 11.7.4 in IEEE Std 802.16-2004"

SYNTAX INTEGER {undefined(0),
 ipv4(1),
 ipv6(2)}

WmanIfMacCsBitMap ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The object of this type indicates the set of MAC convergence sublayer support. When a bit is set, it indicates the corresponding CS feature is supported."

REFERENCE

"Subclause 11.7.7.1 in IEEE Std 802.16-2004"

SYNTAX BITS {atm(0),
 packetIpv4(1),
 packetIpv6(2),
 packet802Dot3(3),
 packet802Dot1Q(4),
 packetIpv4Over802Dot3(5),
 packetIpv6Over802Dot3(6),
 packetIpv4Over802Dot1Q(7),
 packetIpv6Over802Dot1Q(8)}

WmanIfMaxClassifiers ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The object of this type indicates the maximum number of
admitted Classifiers that the SS is allowed to have."

REFERENCE

"Subclause 11.7.7.2 in IEEE Std 802.16-2004"

SYNTAX INTEGER (0..65535)

WmanIfPhsSupportType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The object of this type indicates the level
of PHS support."

REFERENCE

"Subclause 11.7.7.3 in IEEE Std 802.16-2004"

SYNTAX INTEGER {noPhsSupport(0),
 atmPhsSupport(1),
 packetPhsSupport(2)}

WmanIfBwAllocSupport ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field indicates properties of the SS that the BS
needs to know for bandwidth allocation purposes. When
a bit is set, it indicates the corresponding feature
is supported. All unspecified and reserved bits should
be set to zero."

REFERENCE

"Subclause 11.8.1 in IEEE Std 802.16-2004"

SYNTAX BITS {reserved(0),
 halfDuplexFdd(1),
 fullDuplexFdd(2)}

WmanIfPduConstruction ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Specifies capabilities for construction and transmission
of MAC PDUs. When piggybackedRequests bit is set, it
indicates that the piggybacked requests are supported. The
fsnValuesSize bit is coded as follows:

0 - only 3-bit FSN values are supported

1 - only 11-bit FSN values are supported

All unspecified and reserved bits should be set to zero."

REFERENCE

"Subclause 11.8.2 in IEEE Std 802.16-2004"

SYNTAX BITS {piggybackedRequests(0),
 fsnValuesSize(1)}

WmanIfSsTransitionGap ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field indicates the transition speed SSTTG and SSRTG for TDD and H-FDD SSs. Allowed values are:

OFDM mode: TDD and H-FDD 0..100

Other modes: TDD: 0..50; H-FDD: 0..100"

REFERENCE

"Subclause 11.8.3.1 in IEEE Std 802.16-2004"

SYNTAX INTEGER (0..100)

WmanIfMaxTxPowerType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This type is used to define maximum available power for BPSK, QPSK, 16-QAM and 64-QAM constellations. The maximum power parameters are reported in dBm and quantized in 0.5 dBm steps ranging from -64 dBm (encoded 0x00) to 63.5 dBm (encoded 0xFF). Values outside this range shall be assigned the closest extreme. SSs that do not support QAM64 shall report the value of 0x00 in the maximum QAM64 power field."

REFERENCE

"Subclause 11.8.3.2 in IEEE Std 802.16-2004"

SYNTAX INTEGER (0..255)

WmanIfOfdmFftSizes ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field indicates the FFT sizes supported by the SS. For each FFT size, a bit value of 0 indicates 'not supported' while 1 indicates 'supported'."

REFERENCE

"Subclause 11.8.3.6.1 in IEEE Std 802.16-2004"

SYNTAX BITS {fft256(0),
 fft2048(1)}

WmanIfOfdmSsDeModType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field indicates the different demodulator options supported by a WirelessMAN-OFDM PHY SS for downlink. This field is not used for other PHY specifications. A bit value of 0 indicates 'not supported' while 1 indicates 'supported'."

REFERENCE

"Subclause 11.8.3.6.2 in IEEE Std 802.16-2004"

SYNTAX BITS {qam64(0),
 btc(1),

```
ctc(2),  
stc(3),  
aac(4)}
```

WmanIfOfdmSsModType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field indicates the different modulator options supported by a WirelessMAN-OFDM PHY SS for uplink. This field is not used for other PHY specifications. A bit value of 0 indicates 'not supported' while 1 indicates 'supported'."

REFERENCE

"Subclause 11.8.3.6.3 in IEEE Std 802.16-2004"

SYNTAX BITS {gam64(0),
btc(1),
ctc(2),
subchannellization(3),
focusedCtBwReq(4)}

WmanIfOfdmFocusedCt ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field indicates whether the SS supports Focused Contention (see 8.3.7.3.3). A bit value of 0 indicates 'not supported' while 1 indicates 'supported'."

REFERENCE

"Subclause 11.8.3.6.4 in IEEE Std 802.16-2004"

SYNTAX BITS {focusedCtSupport(0)}

WmanIfOfdmTcSublayer ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This field indicates whether or not the SS supports the TC sublayer (see 8.3.4). A bit value of 0 indicates 'not supported' while 1 indicates 'supported'."

REFERENCE

"Subclause 11.8.3.6.5 in IEEE Std 802.16-2004"

SYNTAX BITS {tcSublayerSupport(0)}

WmanIfBsIdType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Defines the encoding of BSID. The BSID is a 6 byte number and follows the encoding rules of MacAddress textual convention, i.e. as if it were transmitted least-significant bit first. The value should be displayed with 2 parts clearly separated by a colon e.g: 001DFF:00003A. The most significant part is representing the Operator ID. "

SYNTAX OCTET STRING (SIZE(6))

WmanIfIpv6FlowLabel ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The value of this field specifies the matching values for the IPv6 Flow label field. As the flow label field has a length of 20 bits, the first 4 bits of the most significant byte shall be set to 0x0 and disregarded."

SYNTAX OCTET STRING (SIZE(3))

--

-- BS object group - containing tables and objects to be implemented in
-- the Base station

--

-- wmanIfBsPacketCs contain the Base Station Packet Convergence
-- Sublayer objects

--

wmanIfBsPacketCs OBJECT IDENTIFIER ::= { wmanIfBsObjects 1 }

wmanIfBsProvisionedSfTable OBJECT-TYPE

SYNTAX SEQUENCE OF WmanIfBsProvisionedSfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains service flow profiles provisioned by NMS. The service flow should be created with SS(s) following instruction given by wmanIfBsSfState object.

1. The QoS parameters of the service flow are provisioned in wmanIfBsServiceClassTable and referenced by wmanIfBsServiceClassIndex.
2. The classifier rules of the service flow are provisioned in wmanIfBsClassifierRuleTable, where they refer to SF via wmanIfBsSfId.

The MAC addresses of SSs the service flow is created with are provisioned in wmanIfBsSsProvisionedForSfTable, where they refer to SF via wmanIfBsSfId."

REFERENCE

"Subclause 6.3.13 and 6.3.14 in IEEE Std 802.16-2004"

::= { wmanIfBsPacketCs 1 }

wmanIfBsProvisionedSfEntry OBJECT-TYPE

SYNTAX WmanIfBsProvisionedSfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table provides one row for each service flow provisioned by NMS. The table is indexed by ifIndex and wmanIfBsSfId. ifIndex is associated with the BS sector."

INDEX { ifIndex, wmanIfBsSfId }

::= { wmanIfBsProvisionedSfTable 1 }

WmanIfBsProvisionedSfEntry ::= SEQUENCE {

wmanIfBsSfId	Unsigned32,
wmanIfBsSfDirection	INTEGER,
wmanIfBsServiceClassIndex	INTEGER,
wmanIfBsSfState	WmanIfSfState,

wmanIfBsSfProvisionedTime	TimeStamp,
wmanIfBsSfCsSpecification	WmanIfCsSpecification,
wmanIfBsProvisionedSfRowStatus	RowStatus}

wmanIfBsSfId OBJECT-TYPE

SYNTAX Unsigned32 (1 .. 4294967295)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A 32 bit quantity that uniquely identifies a service flow
to both the subscriber station and base station (BS)."
::= { wmanIfBsProvisionedSfEntry 1 }

wmanIfBsSfDirection OBJECT-TYPE

SYNTAX INTEGER {downstream(1),
upstream(2)}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"An attribute indicating the service flow is downstream or
upstream."
::= { wmanIfBsProvisionedSfEntry 2 }

wmanIfBsServiceClassIndex OBJECT-TYPE

SYNTAX INTEGER (1..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The index in wmanIfBsServiceClassTable describing the
service class or QoS parameters for such service flow.
If no associated entry in wmanIfBsServiceClassTable
exists, this object returns a value of zero."
::= { wmanIfBsProvisionedSfEntry 3 }

wmanIfBsSfState OBJECT-TYPE

SYNTAX WmanIfSfState
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"wmanIfBsSfState determines the requested state of a service
flow.
- authorized state: A service flow is provisioned but
not resource is reserved yet
- admitted state: service flow has resources reserved.
- active state: has resources committed by the BS (e.g., is
actively sending maps containing unsolicited grants for a
UGS-based service flow),"
REFERENCE
"Subclause 6.3.14.6, in IEEE Std 802.16-2004"
::= { wmanIfBsProvisionedSfEntry 4 }

wmanIfBsSfProvisionedTime OBJECT-TYPE

SYNTAX TimeStamp
MAX-ACCESS read-create

STATUS current
 DESCRIPTION
 "Indicates the date and time when the service flow is provisioned."
 ::= { wmanIfBsProvisionedSfEntry 5 }

wmanIfBsSfCsSpecification OBJECT-TYPE
 SYNTAX WmanIfCsSpecification
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "This parameter specifies the convergence sublayer encapsulation mode."
 REFERENCE
 "Subclause 11.13.19.1 in IEEE Std 802.16-2004"
 ::= { wmanIfBsProvisionedSfEntry 6 }

wmanIfBsProvisionedSfRowStatus OBJECT-TYPE
 SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "This object is used to create a new row or modify or delete an existing row in this table.

 If the implementator of this MIB has choosen not to implement 'dynamic assignment' of profiles, this object is not useful and should return noSuchName upon SNMP request."
 ::= { wmanIfBsProvisionedSfEntry 7 }

wmanIfBsSsProvisionedForSfTable OBJECT-TYPE
 SYNTAX SEQUENCE OF WmanIfBsSsProvisionedForSfEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table maps the MAC addresses of SSs to the service flows provisioned in wmanIfBsProvisionedSfTable."
 REFERENCE
 "Subclause 6.3.14 in IEEE Std 802.16-2004"
 ::= { wmanIfBsPacketCs 2 }

wmanIfBsSsProvisionedForSfEntry OBJECT-TYPE
 SYNTAX WmanIfBsSsProvisionedForSfEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table is indexed by wmanIfBsSsProvMacAddress and wmanIfBsProvSfId."
 INDEX { wmanIfBsSsProvMacAddress, wmanIfBsProvSfId }
 ::= { wmanIfBsSsProvisionedForSfTable 1 }

WmanIfBsSsProvisionedForSfEntry ::= SEQUENCE {
 wmanIfBsSsProvMacAddress MacAddress,

wmanIfBsProvSfId	Unsigned32,
wmanIfBsSsProvisionedForSfRowStatus	RowStatus}

wmanIfBsSsProvMacAddress OBJECT-TYPE

SYNTAX MacAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The MAC address of the SS, the service flow is created with."
 ::= { wmanIfBsSsProvisionedForSfEntry 1 }

wmanIfBsProvSfId OBJECT-TYPE

SYNTAX Unsigned32 (1 .. 4294967295)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "A 32 bit quantity that uniquely identifies a service flow. The value of this object can be used by BS to index the wmanBsProvisionedSfTable."
 ::= { wmanIfBsSsProvisionedForSfEntry 2 }

wmanIfBsSsProvisionedForSfRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This object is used to ensure that the write, create, delete operation to multiple columns is guaranteed to be treated as atomic operation by agent."
 ::= { wmanIfBsSsProvisionedForSfEntry 3 }

wmanIfBsServiceClassTable OBJECT-TYPE

SYNTAX SEQUENCE OF WmanIfBsServiceClassEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "This table is provisioned and is indexed by wmanIfBsQoSProfileIndex. Each entry of the table contains corresponding service flow characteristic attributes (e.g. QoS parameter set). The value of wmanIfBsQoSProfileIndex is obtained from wmanIfBsServiceClassIndex in wmanIfBsProvisionedSfTable"
REFERENCE
 "Subclause 6.3.14.4 in IEEE Std 802.16-2004"
 ::= { wmanIfBsPacketCs 3 }

wmanIfBsServiceClassEntry OBJECT-TYPE

SYNTAX WmanIfBsServiceClassEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "This table provides one row for each service class"
INDEX { ifIndex, wmanIfBsQoSProfileIndex }

```
::= { wmanIfBsServiceClassTable 1 }
```

```
WmanIfBsServiceClassEntry ::= SEQUENCE {
    wmanIfBsQoSProfileIndex          INTEGER,
    wmanIfBsQoSServiceClassName      WmanIfServClassName,
    wmanIfBsQOSTrafficPriority        INTEGER,
    wmanIfBsQoSMaxSustainedRate      Unsigned32,
    wmanIfBsQoSMaxTrafficBurst       Unsigned32,
    wmanIfBsQoSMinReservedRate       Unsigned32,
    wmanIfBsQOSToleratedJitter       Unsigned32,
    wmanIfBsQoSMaxLatency            Unsigned32,
    wmanIfBsQoSFixedVsVariableSduInd INTEGER,
    wmanIfBsQOSSduSize               Unsigned32,
    wmanIfBsQoSScSchedulingType      WmanIfSfSchedulingType,
    wmanIfBsQoSScArqEnable           TruthValue,
    wmanIfBsQoSScArqWindowSize       INTEGER,
    wmanIfBsQoSScArqBlockLifetime    INTEGER,
    wmanIfBsQoSScArqSyncLossTimeout  INTEGER,
    wmanIfBsQoSScArqDeliverInOrder   TruthValue,
    wmanIfBsQoSScArqRxPurgeTimeout   INTEGER,
    wmanIfBsQoSScArqBlockSize        INTEGER,
    wmanIfBsQoSSCMinRsvdTolerableRate Unsigned32,
    wmanIfBsQoSReqTxPolicy           BITS,
    wmanIfBsQOSServiceClassRowStatus RowStatus}
```

```
wmanIfBsQoSProfileIndex OBJECT-TYPE
    SYNTAX      INTEGER (1 .. 65535)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The index value which uniquely identifies an entry
         in the wmanIfBsServiceClassTable"
    ::= { wmanIfBsServiceClassEntry 1 }
```

```
wmanIfBsQoSServiceClassName OBJECT-TYPE
    SYNTAX      WmanIfServClassName
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Refers to the Service Class Name"
    REFERENCE
        "Subclause 11.13.3 in IEEE Std 802.16-2004"
    ::= { wmanIfBsServiceClassEntry 2 }
```

```
wmanIfBsQOSTrafficPriority OBJECT-TYPE
    SYNTAX      INTEGER (0..7)
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The value of this parameter specifies the priority
         assigned to a service flow. For uplink service flows,
         the BS should use this parameter when determining
         precedence in request service and grant generation,
         and the SS shall preferentially select contention
```

Request opportunities for Priority Request CIDs based on this priority. Higher numbers indicate higher priority"

REFERENCE

"Subclause 11.13.5 in IEEE Std 802.16-2004"

::= { wmanIfBsServiceClassEntry 3 }

wmanIfBsQoSMaxSustainedRate OBJECT-TYPE

SYNTAX Unsigned32

UNITS "b/s"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This parameter defines the peak information rate of the service. The rate is expressed in bits per second and pertains to the SDUs at the input to the system."

REFERENCE

"Subclause 11.13.6 in IEEE Std 802.16-2004"

::= { wmanIfBsServiceClassEntry 4 }

wmanIfBsQoSMaxTrafficBurst OBJECT-TYPE

SYNTAX Unsigned32

UNITS "byte"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This parameter defines the maximum burst size that must be accommodated for the service."

REFERENCE

"Subclause 11.13.7 in IEEE Std 802.16-2004"

::= { wmanIfBsServiceClassEntry 5 }

wmanIfBsQoSMinReservedRate OBJECT-TYPE

SYNTAX Unsigned32

UNITS "b/s"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This parameter specifies the minimum rate reserved for this service flow."

REFERENCE

"Subclause 11.13.8 in IEEE Std 802.16-2004"

::= { wmanIfBsServiceClassEntry 6 }

wmanIfBsQoSMaxToleratedJitter OBJECT-TYPE

SYNTAX Unsigned32

UNITS "millisecond"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This parameter defines the Maximum delay variation (jitter) for the connection."

REFERENCE