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Definitions of Managed Objects for ATM Management

Status of this Memo

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

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1. Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes objects used for managing ATM-based interfaces, devices, networks and services.

This memo replaces RFC 1695 [24]. Changes relative to RFC 1695 are summarized in the MIB module's REVISION clause.

Textual Conventions used in this MIB are defined in [6] and [19].

2. The SNMP Network Management Framework

The SNMP Management Framework presently consists of five major components:

- 0 An overall architecture, described in RFC 2271 [1].
- 0 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 RFC 1902 [5], RFC 1903 [6] and RFC 1904 [7].
- 0 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 2272 [11] and RFC 2274 [12].

- 0 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].
- 0 A set of fundamental applications described in RFC 2273 [14] and the view-based access control mechanism described in RFC 2275 [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 (e.g., 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. ATM Terminology

Some basic ATM terminologies are described in this section to facilitate defining the ATM managed objects.

3.1. VCL/VPL and VCC/VPC

There are two distinct types of ATM virtual connections: Virtual Channel Connections (VCCs) and Virtual Path Connection (VPCs). As shown in Figures 1 and 2, ATM virtual connections consist of concatenated series of virtual links which forms a path between two end points, with each concatenation occurring at an ATM switch. Virtual links of VCCs are called Virtual Channel Links (VCLs). Virtual links of VPCs are called Virtual Path Links (VPLs). The VCI and VPI fields in the ATM cell header associate each cell of a VCC with a particular VCL over a given physical link. The VPI field in the ATM cell header associates each cell of a VPC with a particular VPL over a given physical link. Switches route cells between VCLs (or VPLs) via a cross-connect function according to the cells' VCI/VPI (or VPI) values.

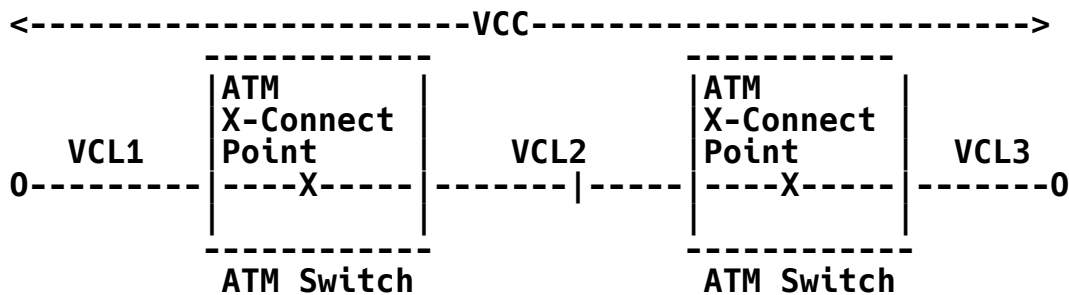


Figure 1: Virtual Channel Links and Virtual Channel Connection

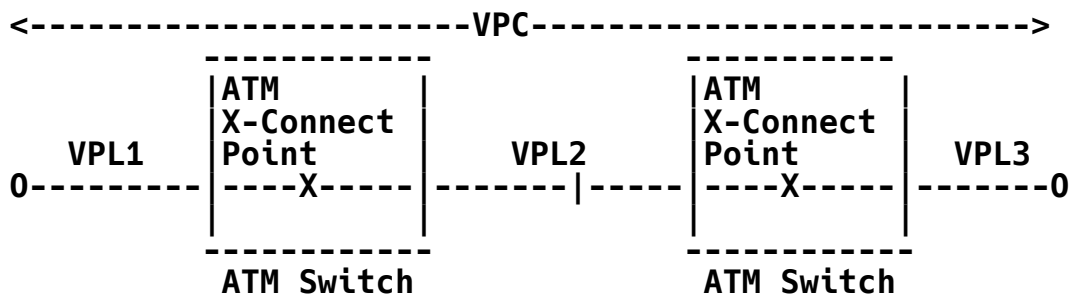


Figure 2: Virtual Path Links and Virtual Path Connection

A single ATM end-system or switch does not support the whole end-to-end span of a VCC (or VPC). Rather, multiple ATM end-systems and/or switches each support one piece of the VCC (or VPC). That is, each ATM end-system (or ATM switch) at one end of the VCC/VPC supports its end of the VCC/VPC plus the VCL or VPL on its external interface, and each switch through which the VCC/VPC passes supports the pair of VCLs/VPLs on its external interfaces as well as the cross-connection of those VCLs/VPLs. Thus, the end-to-end management of a VCC or VPC is achieved only by appropriate management of its individual pieces in combination.

Note that for management purposes, an ATM network may be viewed as a large distributed switch by hiding all the network's internal connectivity as being internal to the distributed switch (as shown in Figure 2a). This model may for example be used for Customer Network Management (CNM) purposes.

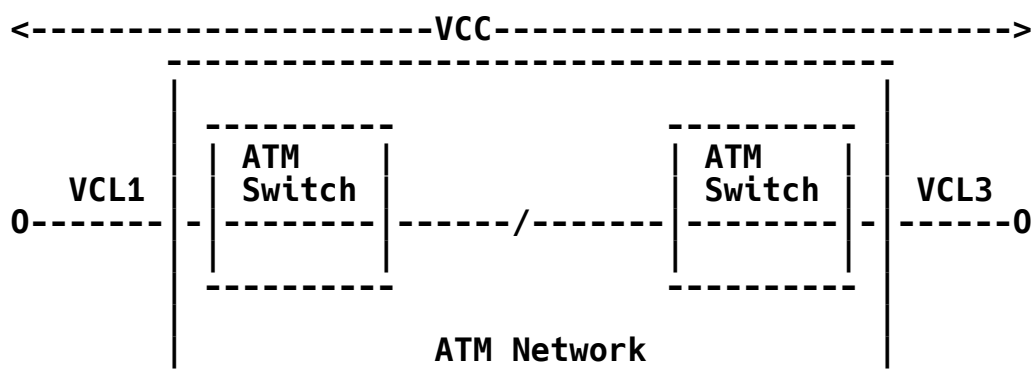


Figure 2a: ATM Network modeled as a large distributed switch

A VCC has a set of traffic characteristics (i.e., bandwidth parameters, service category parameters, etc.). VCLs inherit their traffic characteristics from the VCC of which they are a part. VCCs are bi-directional by definition. However, the traffic parameters in the two directions of a connection can be symmetric or asymmetric, i.e., the two directions can have the same or different traffic flows. A uni-directional traffic flow across a VCC is achieved by assigning a zero bandwidth in one direction. Note that in addition to the bandwidth required by the user traffic flow, bandwidth is also required for OAM cell flows, even for the zero-bandwidth direction of a uni-directional connection. These same principles apply to VPCs.

3.2. PVC, SVC and Soft PVC

A Permanent Virtual Connection (PVC) is a provisioned VCC or VPC. A Switched Virtual Connection (SVC) is a switched VCC or VPC that is set up in real-time via call set-up signaling procedures. A PVC (or an SVC) can be a point-to-point, point-to-multipoint, or multipoint-to-multipoint VCC or VPC. A Soft PVC is a connection of which portions are switched, while other portions are permanent (see Figure 3 and [22]).



Figure 3: An example of a Soft PVC

3.3. Traffic Management Parameters

3.3.1. Traffic Policing and Traffic Shaping Parameters

In order to allocate resources fairly among different users, some networks police traffic at resource access points. The traffic enforcement or policing taken at a UNI is called Usage Parameter Control (UPC) and is conceptually activated on an incoming VCL or VPL as shown in Figure 4. The use of the traffic enforcer at the ingress of the connection is to make sure that the user traffic does not exceed the negotiated traffic parameters such as the peak cell rate associated with a specific traffic descriptor type.

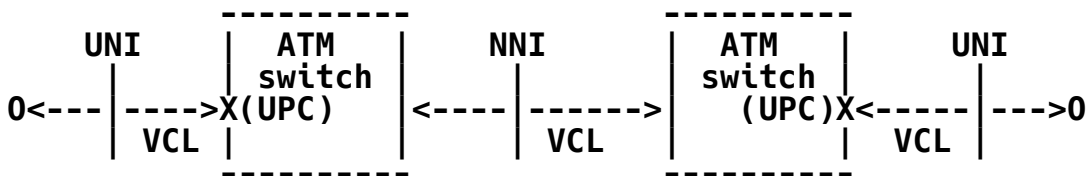


Figure 4: An Example of a UPC

In addition, traffic shaping may be performed on an outgoing VPL or VCL at a given ATM interface. The function of the ATM traffic shaper, conceptually either at the source or an egress point of the connection, is to smooth the outgoing cell traffic inter-arrival time. If policing or shaping is not performed then the policing or shaping algorithm is not activated.

3.3.2. Cell Loss Priority

To prioritize traffic during resource congestion, ATM cells are assigned one of the two types of Cell Loss Priority (CLP), CLP=0 and CLP=1. ATM cells with CLP=0 have a higher priority in regard to cell loss than ATM cells with CLP=1. Therefore, during resource congestions, CLP=1 cells are dropped before any CLP=0 cell is dropped.

3.3.3. QoS Class

RFC1695 specified that one of a number of Quality of Service (QoS) classes is assigned to a VCC or VPC by associating the object `atmTrafficQoSClass` with each VCL or VPL. However, new insights in ATM traffic management have caused this object to be deprecated.

3.3.4. Service Category

Replacing QoS Class, VPLs and VCLs are qualified in terms of their service category (`atmServiceCategory`). When properly configured, VCLs (or VPLs) concatenated to form a VCC (or VPC) will all have the same service category class as that of the VCC (or VPC).

3.4. Max Active and Max Current VPI and VCI Bits

A manager may wish to configure the maximum number of VPI and VCI bits that can be used to identify VPIs and VCIs on a given ATM interface. This value can be less than or equal to the maximum number of bits supported by the interface hardware, and is referred to in the MIB as the Max Active VPI Bits and Max Active VCI Bits.

However, a manager may not be able to configure the Max Active Bits on both ends of an ATM link. For example, the manager may not be allowed write access to the peer's MIB, or there may be hardware limitations on the peer device. Therefore, the two ATM devices may use ILMI to negotiate "Max Current" VPI and VCI bits, which is the maximum number of bits that both interfaces are willing to support. This is illustrated in Figure 5. The relationship between the different parameters is illustrated in Figure 6. Note that if ILMI negotiation is not supported, then the devices have no choice but to use the configured Max Active bits, and assume that it has been configured to the same value on both ends of the link.



IF a: Max Active VPI Bits = 6 (configured)
Max Current VPI Bits = 6 (negotiated)

IF b: Max Active VPI Bits = 8 (configured)
Max Current VPI Bits = 6 (negotiated)

IF c: Max Active VPI Bits = 8 (configured)
Max Current VPI Bits = 8 (negotiated)

IF d: Max Active VPI Bits = 8 (configured)
Max Current VPI Bits = 8 (negotiated)

(between IF a and IF b, the minimum of the two configured "Max Active VPI Bits" is 6, so both interfaces set their "Max Current VPI Bits" to 6. Since IF c and IF d both are configured with "Max Active VPI Bits" of 8, they set their "Max Current VPI Bits" to 8.)

Figure 5

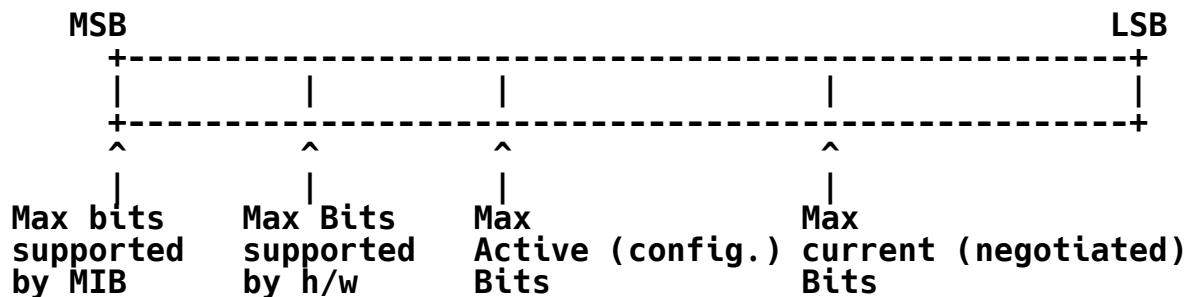


Figure 6

4. Overview

ATM management objects are used to manage ATM interfaces, ATM virtual links, ATM cross-connects, AAL5 entities and AAL5 connections supported by ATM hosts, ATM switches and ATM networks. This section provides an overview and background of how to use this MIB and other potential MIBs for this purpose.

The purpose of this memo is primarily to manage ATM PVCs. ATM SVCs are also represented by the management information in this MIB. However, full management of SVCs may require additional capabilities which are beyond the scope of this memo.

4.1. Background

In addition to the MIB module defined in this memo, other MIB modules are necessary to manage ATM interfaces, links and cross-connects. Examples include MIB II for general system and interface management [16][17], the DS3 or SONET MIBs for management of physical interfaces, and, as appropriate, MIB modules for applications that make use of ATM, such as SMDS. These MIB modules are outside the scope of this specification.

The current specification of this ATM MIB is based on SNMPv2-SMI.

4.2. Structure of the MIB

The managed ATM objects are arranged into the following tables:

- (1) ATM interface configuration table
- (2) ATM interface DS3 PLCP and TC sublayer tables
- (3) ATM traffic parameter table
- (4) ATM interface virtual link (VPL/VCL) configuration tables
- (5) ATM VP/VC cross-connect tables
- (6) AAL5 connection performance statistics table

Note that, managed objects for activation/deactivation of OAM cell flows and ATM traps notifying virtual connection or virtual link failures are outside the scope of this memo.

4.3. ATM Interface Configuration Table

This table contains information on ATM cell layer configuration of local ATM interfaces on an ATM device in addition to the information on such interfaces contained in the ifTable.

4.4. ATM Interface DS3 PLCP and TC Layer Tables

These tables provide performance statistics of the DS3 PLCP and TC sublayer of local ATM interfaces on a managed ATM device. DS3 PLCP and TC sublayer are currently used to carry ATM cells respectively over DS3 and SONET transmission paths.

4.5. ATM Virtual Link and Cross-Connect Tables

ATM virtual link and cross-connect tables model bi-directional ATM virtual links and ATM cross-connects. The ATM VP/VC link tables are implemented in an ATM host, ATM switch and ATM network. The ATM switch and ATM network also implement the ATM VP/VC cross-connect tables. Both link and cross-connect tables are implemented in a carrier's network for Customer Network Management (CNM) purposes.

The ATM virtual link tables are used to create, delete or modify ATM virtual links in an ATM host, ATM switch and ATM network. ATM virtual link tables along with the cross-connect tables are used to create, delete or modify ATM cross-connects in an ATM switch or ATM network (e.g., for CNM purposes).

For a PVC, the cross-connect between two VPLs is represented in the atmVpCrossConnectTable of the ATM-MIB, indexed by the atmVplCrossConnectIdentifier values for the two VPLs, and the cross-

rconnect between two VCLs is represented in the atmVcCrossConnectTable of the ATM-MIB, indexed by the atmVclCrossConnectIdentifier values for the two VCLs.

For an SVC or Soft PVC the VPL and VCL tables defined in this memo are used. However, for an SVC or Soft PVC the cross-connect between two VPLs is represented in the atmSvcVpCrossConnectTable of the ATM2-MIB, indexed by the atmVplCrossConnectIdentifier values for the two VPLs, and the cross-connect between two VCLs is represented in the atmSvcVcCrossConnectTable of the ATM2-MIB, indexed by the atmVclCrossConnectIdentifier values for the two VCLs.

Note: The ATM2-MIB module was being defined in a separate memo at the time of this publication. Please consult the RFC directory for an exact reference.

5. Application of MIB II to ATM

5.1. The System Group

For the purposes of the sysServices object in the System Group of MIB II [16], ATM is a data link layer protocol. Thus, for ATM switches and ATM networks, sysServices will have the value "2".

5.2. The Interface Group

The Interfaces Group of MIB II defines generic managed objects for managing interfaces. This memo contains the media-specific extensions to the Interfaces Group for managing ATM interfaces.

This memo assumes the interpretation of the Interfaces Group to be in accordance with [17] which states that the interfaces table (ifTable) contains information on the managed resource's interfaces and that each sub-layer below the internetwork layer of a network interface is considered an interface. Thus, the ATM cell layer interface is represented as an entry in the ifTable. This entry is concerned with the ATM cell layer as a whole, and not with individual virtual connections which are managed via the ATM-specific managed objects specified in this memo. The inter-relation of entries in the ifTable is defined by Interfaces Stack Group defined in [17].

5.2.1. Support of the ATM Cell Layer by ifTable

Some specific interpretations of ifTable for the ATM cell layer follow.

Object =====	Use for the generic ATM layer =====
ifIndex	Each ATM port is represented by an ifEntry.
ifDescr	Description of the ATM interface.
ifType	The value that is allocated for ATM is 37.
ifSpeed	The total bandwidth in bits per second for use by the ATM layer.
ifPhysAddress	<p>The interface's address at the ATM protocol sublayer; the ATM address which would be used as the value of the Called Party Address Information Element (IE) of a signalling message for a connection which either:</p> <ul style="list-style-type: none">- would terminate at this interface, or- for which the Called Party Address IE would need to be replaced by the Called Party SubAddress IE before the message was forwarded to any other interface. <p>For an interface on which signalling is not supported, then the interface does not necessarily have an address, but if it does, then ifPhysAddress is the address which would be used as above in the event that signalling were supported. If the interface has multiple such addresses, then ifPhysAddress is its primary address. If the interface has no addresses, then ifPhysAddress is an octet string of zero length. Address encoding is as per [20]. Note that addresses assigned for purposes other than those listed above (e.g., an address associated with the service provider side of a public network UNI) may be represented through atmInterfaceSubscrAddress.</p>
ifAdminStatus	See [17].
ifOperStatus	Assumes the value down(2) if the ATM cell layer is down.
ifLastChange	See [17].
ifInOctets	The number of received octets over the interface, i.e., the number of received, assigned cells multiplied by 53.
ifOutOctets	The number of transmitted octets over the interface, i.e., the number of transmitted, assigned cells multiplied by 53.

ifInErrors The number of cells dropped due to uncorrectable HEC errors.

ifInUnknownProtos The number of received cells discarded during cell header validation, including cells with unrecognized VPI/VCI values, and cells with invalid cell header patterns. If cells with undefined PTI values are discarded, they are also counted here.

ifOutErrors See [17].

ifName Textual name (unique on this system) of the interface or an octet string of zero length.

ifLinkUpDownTrapEnable Default is disabled (2).

ifConnectorPresent Set to false (2).

ifHighSpeed See [17].

ifHCInOctets The 64-bit version of ifInOctets; supported if required by the compliance statements in [17].

ifHCOctets The 64-bit version of ifOutOctets; supported if required by the compliance statements in [17].

ifAlias The non-volatile 'alias' name for the interface as specified by a network manager.

6. Support of the AAL3/4 Based Interfaces

For the management of AAL3/4 CPCS layer, see [18].

7. Support of the AAL5 Managed Objects

Support of AAL5 managed objects in an ATM switch and ATM host are described below.

7.1. Managing AAL5 in a Switch

Managing AAL5 in a switch involves:

- (1) performance management of an AAL5 entity as an internal resource in a switch
- (2) performance management of AAL5 per virtual connection

AAL5 in a switch is modeled as shown in Figure 7 and 8. AAL5 will be managed in a switch for only those virtual connections that carry AAL5 and are terminated at the AAL5 entity in the switch. Note that, the virtual channels within the ATM UNIs carrying AAL5 will be switched by the ATM switching fabric (termed as ATM Entity in the figure) to the virtual channels on a proprietary internal interface associated with the AAL5 process (termed as AAL5 Entity in the figure). Therefore, performance management of the AAL5 resource in the switch will be modeled using the ifTable through an internal (pseudo-ATM) virtual interface and the AAL5 performance management per virtual connection will be supported using an additional AAL5 connection table in the ATM MIB. The association between the AAL5 virtual link at the proprietary virtual, internal interface and the ATM virtual link at the ATM interface will be derived from the virtual channel cross-connect table and the virtual channel link table in the ATM MIB. Note that for the proprietary virtual interface the traffic transmit and receive conventions in the virtual channel link table are as follows:

Transmitting traffic:	ATM Entity	--->	AAL5 Entity
Receiving traffic:	ATM Entity	<---	AAL5 Entity

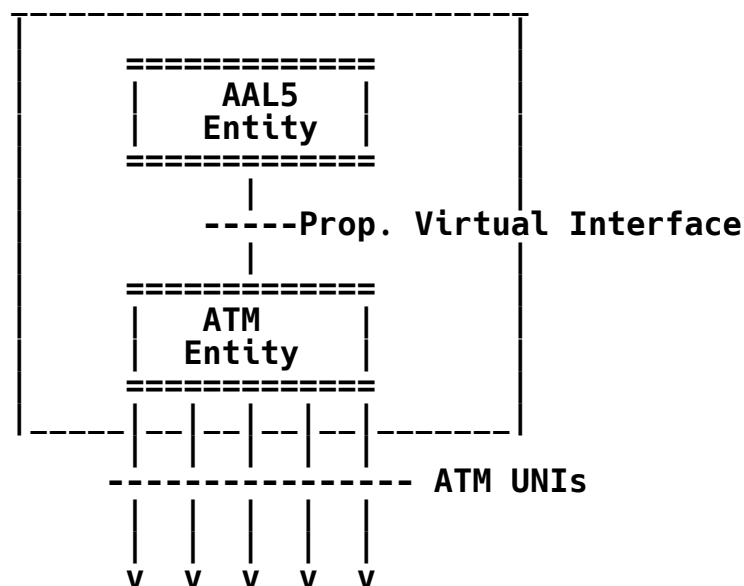


Figure 7: Model of an AAL5 Entity in a Switch

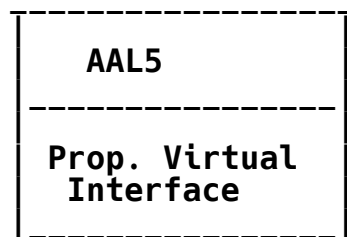


Figure 8: AAL5 Entity's Interface Stack in a Switch

7.2. Managing AAL5 in a Host

Managing AAL5 in a host involves managing the AAL5 sublayer interface as shown in Figure 9 and 10. The AAL5 sublayer is stacked directly over the ATM sublayer. The ifTable is applied to the AAL5 sublayer as defined in Section 10.3.

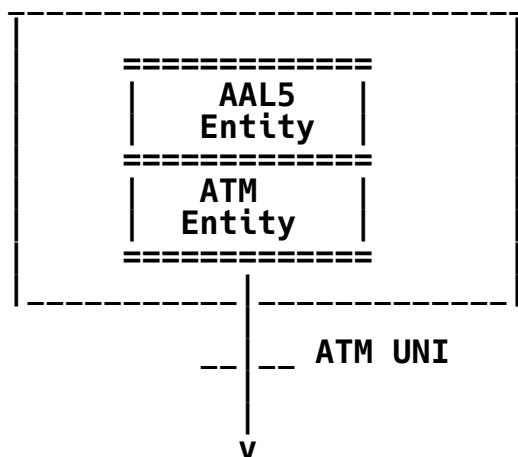


Figure 9: Model of an AAL5 Entity in a Host

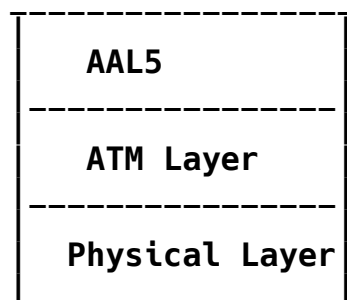


Figure 10: AAL5 Entity's Interface Stack in a Host

7.3. Support of AAL5 by ifTable

The AAL5 entity in an ATM device (e.g., switch or host) is managed using the ifTable. There are additional counters specified for AAL5 than those specified in the ATM B-ICI document [21]. Specific interpretations of ifTable for the AAL5 CPCS layer are as follows.

Object	Use for AAL5 CPCS layer entity
=====	=====
ifIndex	Each AAL5 entity is represented by an ifEntry.
ifDescr	Description of the AAL5 entity.
ifType	The value that is allocated for AAL5 is 49.
ifMtu	Set to the largest PDU size for the AAL5 CPCS layer that can be processed by the AAL5 entity.
ifSpeed	Set to 0.
ifPhysAddress	An octet string of zero length.
ifAdminStatus	See [17].
ifOperStatus	Assumes the value down(2) if the AAL5 layer is down.
ifLastChange	See [17].
ifInOctets	The number of received AAL5 CPCS PDU octets.
ifOutOctets	The number of AAL5 CPCS PDU octets transmitted.
ifInUcastPkts	The number of received AAL5 CPCS PDUs passed to a higher-layer.
ifOutUcastPkts	The number of AAL5 CPCS PDUs received from a higher-layer for transmission. [Note: The number of AAL5 PDUs actually transmitted is the number received from a higher-layer for transmission minus any which are counted by ifOutErrors and ifOutDiscards.]

ifInErrors Number of errored AAL5 CPCS PDUs received.
 The types of errors counted include CRC-32 errors,
 SAR time-out errors, and oversized SDU errors.

ifInUnknownProtos Set to 0.

ifInDiscards Number of received AAL5 CPCS PDUs discarded.
 Possible reason may be input buffer overflow.

ifOutErrors Number of AAL5 CPCS PDUs that could not
 be transmitted due to errors.

ifOutDiscards Number of AAL5 CPCS PDUs received for
 transmission that are discarded.
 Possible reason may be output buffer
 overflow.

ifInMulticastPkts Set to 0.

ifInBroadcastPkts Set to 0.

ifOutMulticastPkts Set to 0.

ifOutBroadcastPkts Set to 0.

ifName Textual name (unique on this system) of the
 AAL5 entity or an octet string of zero length.

ifHighSpeed Set to 0.

ifConnectorPresent Set to false (2).

ifPromiscuousMode Set to false(2).

ifLinkUpDownTrapEnable Default is disabled (2).

ifAlias The non-volatile 'alias' name for the interface
 as specified by a network manager.

7.4. Support of Proprietary Virtual Interface by ifTable

Specific interpretations of ifTable for the proprietary virtual,
internal interface associated with an AAL5 entity in an ATM switch
are as follows.

Object	Use for proprietary virtual, internal interface associated with AAL entities
=====	=====
ifIndex	Each proprietary virtual, internal interface associated with AAL entities is represented by an ifEntry.
ifDescr	Description of the proprietary virtual, internal interface associated with AAL entities.
ifType	The value that is allocated for proprietary virtual, internal interface is 53.
ifSpeed	See [17]. Set to 0 if the speed is not known.
ifPhysAddress	See [17]. An octet string of zero length if no address is used for this interface.
ifAdminStatus	See [17].
ifOperStatus	See [17].
ifLastChange	See [17].
ifName	Textual name (unique on this system) of the interface or an octet string of zero length.
ifHighSpeed	See [17]. Set to 0 if the speed is not known.
ifConnectorPresent	Set to false (2).
ifLinkUpDownTrapEnable	Default is disabled (2).
ifAlias	The non-volatile 'alias' name for the interface as specified by a network manager.

7.5. AAL5 Connection Performance Statistics Table

An AAL5 connection table is used to provide AAL5 performance information for each AAL5 virtual connection that is terminated at the AAL5 entity contained within an ATM switch or host.

8. ILMI MIBs and the ATM Managed Objects

The ILMI MIBs are specified by the ATM Forum as a set of several MIBs, all currently defined in the ILMI Specification [23]. The ILMI protocols and MIBs allow two connected ATM Interface Management Entities (IMEs) to exchange bi-directional parameters, mainly to facilitate auto-configuration between ATM peer entities. The support of the ATM management functions by the ILMI MIBs and those contained in this memo are compared in Table 1. In this table, "yes" in the "ILMI MIBs" column indicates that the management functions are supported by the ILMI MIBs. The parenthesized numbers in the "This memo" column correspond to the sets of tables enumerated in Section 6.2.

For that subset of management information which the ILMI MIBs and this memo have in common, every effort has been made to retain identical semantics and syntax, even though the MIB objects are identified using different OBJECT IDENTIFIERS.

Table 1 - Structuring of ATM Managed Objects

ATM Mgmt.Inf.	ATM Managed Objects	This memo	ILMI MIBs
Local Interface Information:			
ATM interface: physical layer configuration	(1) port identifier (2) physical transmission types (3) operational status (4) administrative status (5) last change status	ATM MIB (1)* MIB II	yes * **
ATM interface: cell layer configuration	(1) active VPI/VCI fields (2) maximum number of VPCs/VCCs (3) configured VPCs/VCCs (4) ILMI VPI/VCI values (5) Neighbor system info (6) Max. number of VPI/VCI bits (7) ATM Subscribed Address	ATM MIB (1)	yes ** yes
ATM interface: cell layer performance	(1) received/transmitted cells (2) cells with HEC error (3) cell header validation errors	MIB II	yes

ATM interface: PLCP & TC layer performance	(1)DS3 PLCP severely errored framing seconds (2)DS3 PLCP unavailable seconds (3)DS3 PLCP alarm state (4)out of cell delineation events (5)TC alarm state	ATM MIB (2)	no
VP/VC link: configuration	(1)VPI or VPI/VCI value (2)VCL or VPL operational status (3)VCL/VPL administrative status (4)VCL/VPL last change status (5)transmit/receive traffic/ service category parameters (6)AAL type (7)transmit/receive AAL5 SDU size (8)AAL5 encapsulation type (9)connection topology type (10)use of call control	ATM MIB (3,4)	yes ***
VP/VC Cross-connect: configuration	(1)cross-connect identifier (2)port identifier of one end (3)port identifier of the other end (4)VPI or VPI/VCI value of one end (5)VPI or VPI/VCI value of the other end (6)VC/VP cross-connect operational status (7)VC/VP cross-connect administrative status (8)VC/VP last change status	ATM MIB (5)	no
VCC AAL5 CPCS layer: performance	(1)PDUs discarded for CRC errors (2)PDUs discarded due to reassembly time out (3)PDUs discarded due to large SDUs	ATM MIB (6)	no
AAL5 entity:	(1)received/transmitted PDUs (2)PDUs discarded due to protocol errors (3)a set of configuration/state parameters	MIB II	no

*The operational, administrative, and last change status of the ATM interface and the physical transmission type shall be supported by the interface table in MIB II [16][17]. ILMI does not contain the administrative and last change status of the ATM interface.

** The ILMI MIB contains read-only objects for various parameters at the ATM interface level.

***The ILMI MIBs contain local and end-to-end operational status of the VPC/VCC segment. However, it does not contain the VPC/VCC administrative and last change status and the VCC AAL information.

9. Definitions

ATM-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE,
Counter32, Integer32, IpAddress, mib-2
FROM SNMPv2-SMI
DisplayString, RowStatus, TruthValue
FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP
FROM SNMPv2-CONF
InterfaceIndex, ifIndex
FROM IF-MIB
AtmAddr, AtmConnKind, AtmConnCastType,
AtmServiceCategory, AtmTrafficDescrParamIndex,
AtmVpIdentifier, AtmVcIdentifier,
AtmVorXAdminStatus, AtmVorXLastChange,
AtmVorXOperStatus, atmNoClpNoScr
FROM ATM-TC-MIB;

atmMIB MODULE-IDENTITY

LAST-UPDATED "9810191200Z"
ORGANIZATION "IETF ATOM MIB Working Group"
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DESCRIPTION

"This is the MIB Module for ATM and AAL5-related objects for managing ATM interfaces, ATM virtual

```
links, ATM cross-connects, AAL5 entities, and
and AAL5 connections."
REVISION      "9810191200Z"
DESCRIPTION
"The initial revision of this module was published
as RFC 1695. Key revisions include:
o Textual Conventions and OBJECT IDENTITIES have
  been moved to a separate MIB module.
o Applicability of objects to PVCs, SVCs and Soft
  PVCs has been clarified.
o DEFVAL clauses have been added.
o The relationship of ifIndex values with different
  layers and sublayers related to ATM has been
  clarified.
o atmTrafficQosClass has been deprecated
  and replaced with atmServiceCategory.
o atmInterfaceCurrentMaxVpiBits and
  atmInterfaceCurrentMaxVciBits have been added with
  a description on their relationship with other
  objects.
o atmInterfaceAddressType and atmInterfaceAdminAddress
  have been deprecated and replaced by
  atmInterfaceSubscrAddress.
o atmInterfaceTCAlarmState has been clarified.
o atmTrafficDescrParamIndexNext has been introduced
  in order to provide a manager a free
  atmTrafficDescrParamIndex value.
o The atmTrafficFrameDiscard capability has been added.
o A connection topology type (atmVpl/VclCastType) and
  a call control type (atmVpl/VclConnKind) have been
  added.
o aal2 has been added to atmVccAalType."
REVISION      "9406072245Z"
DESCRIPTION
"The RFC1695 version of this MIB module."
::= { mib-2 37 }
```

```
atmMIBObjects OBJECT IDENTIFIER ::= {atmMIB 1}
```

```
-- {atmMIBObjects 1} has been moved to a separate
-- specification [19].
```

```
-- This ATM MIB Module consists of the following tables:
-- (1) ATM Interface configuration table
-- (2) ATM Interface DS3 PLCP table
-- (3) ATM Interface TC Sublayer table
```

```
-- (4) Atm Traffic Descriptor table
-- (5) ATM Interface VPL configuration table
-- (6) ATM Interface VCL configuration table
-- (7) ATM VP Cross Connect table (for PVCs)
-- (8) ATM VC Cross Connect table (for PVCs)
-- (9) ATM Interface AAL5 VCC performance statistics
--     table

--     ATM Interface Configuration Parameters Table

-- This table contains ATM specific
-- configuration information associated with
-- an ATM interface beyond those
-- supported using the ifTable.
```

```
atmInterfaceConfTable  OBJECT-TYPE
    SYNTAX               SEQUENCE OF AtmInterfaceConfEntry
    MAX-ACCESS           not-accessible
    STATUS               current
    DESCRIPTION
        "This table contains ATM local interface
        configuration parameters, one entry per ATM
        interface port."
    ::= { atmMIBObjects 2 }
```

```
atmInterfaceConfEntry  OBJECT-TYPE
    SYNTAX               AtmInterfaceConfEntry
    MAX-ACCESS           not-accessible
    STATUS               current
    DESCRIPTION
        "This list contains ATM interface configuration
        parameters and state variables and is indexed
        by ifIndex values of ATM interfaces."
    INDEX { ifIndex }
    ::= { atmInterfaceConfTable 1}
```

```
AtmInterfaceConfEntry ::= SEQUENCE {
    atmInterfaceMaxVpcs      INTEGER,
    atmInterfaceMaxVccs     INTEGER,
    atmInterfaceConfVpcs    INTEGER,
    atmInterfaceConfVccs    INTEGER,
    atmInterfaceMaxActiveVpiBits  INTEGER,
    atmInterfaceMaxActiveVciBits  INTEGER,
    atmInterfaceIlmiVpi      AtmVpIdentifier,
    atmInterfaceIlmiVci      AtmVcIdentifier,
```

```

atmInterfaceAddressType      INTEGER,
atmInterfaceAdminAddress    AtmAddr,
atmInterfaceMyNeighborIpAddress  IpAddress,
atmInterfaceMyNeighborIfName  DisplayString,
atmInterfaceCurrentMaxVpiBits  INTEGER,
atmInterfaceCurrentMaxVciBits  INTEGER,
atmInterfaceSubscrAddress    AtmAddr
}

```

```

atmInterfaceMaxVpcs OBJECT-TYPE
    SYNTAX      INTEGER (0..4096)
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
        "The maximum number of VPCs (PVPCs and SVPCs)
        supported at this ATM interface. At the ATM UNI,
        the maximum number of VPCs (PVPCs and SVPCs)
        ranges from 0 to 256 only."
    ::= { atmInterfaceConfEntry 1}

```

```

atmInterfaceMaxVccs OBJECT-TYPE
    SYNTAX      INTEGER (0..65536)
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
        "The maximum number of VCCs (PVCCs and SVCCs)
        supported at this ATM interface."
    ::= { atmInterfaceConfEntry 2}

```

```

atmInterfaceConfVpcs OBJECT-TYPE
    SYNTAX      INTEGER (0..4096)
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The number of VPCs (PVPC, Soft PVPC and SVPC)
        currently in use at this ATM interface. It includes
        the number of PVPCs and Soft PVPCs that are configured
        at the interface, plus the number of SVPCs
        that are currently established at the
        interface.

        At the ATM UNI, the configured number of
        VPCs (PVPCs and SVPCs) can range from
        0 to 256 only."
    ::= { atmInterfaceConfEntry 3}

```

```

atmInterfaceConfVccs OBJECT-TYPE

```

SYNTAX INTEGER (0..65536)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The number of VCCs (PVCC, Soft PVCC and SVCC)
 currently in use at this ATM interface. It includes
 the number of PVCCs and Soft PVCCs that are configured
 at the interface, plus the number of SVCCs
 that are currently established at the
 interface."
::= { atmInterfaceConfEntry 4}

atmInterfaceMaxActiveVpiBits OBJECT-TYPE
SYNTAX INTEGER (0..12)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The maximum number of active VPI bits
 configured for use at the ATM interface.
 At the ATM UNI, the maximum number of active
 VPI bits configured for use ranges from
 0 to 8 only."
::= { atmInterfaceConfEntry 5}

atmInterfaceMaxActiveVciBits OBJECT-TYPE
SYNTAX INTEGER (0..16)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The maximum number of active VCI bits
 configured for use at this ATM interface."
::= { atmInterfaceConfEntry 6}

atmInterfaceIlmiVpi OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The VPI value of the VCC supporting
 the ILMI at this ATM interface. If the values of
 atmInterfaceIlmiVpi and atmInterfaceIlmiVci are
 both equal to zero then the ILMI is not
 supported at this ATM interface."
DEFVAL { 0 }
::= { atmInterfaceConfEntry 7}

atmInterfaceIlmiVci OBJECT-TYPE
SYNTAX AtmVcIdentifier


```

MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
  "The VCI value of the VCC supporting
   the ILMI at this ATM interface.  If the values of
   atmInterfaceIlmiVpi and atmInterfaceIlmiVci are
   both equal to zero then the ILMI is not
   supported at this ATM interface."
DEFVAL { 16 }
::= { atmInterfaceConfEntry 8}

```

```

atmInterfaceAddressType OBJECT-TYPE
    SYNTAX          INTEGER {
                        private(1),
                        nsapE164(2),
                        nativeE164(3),
                        other(4)
                    }
    MAX-ACCESS      read-only
    STATUS          deprecated
    DESCRIPTION
        "The type of primary ATM address configured
         for use at this ATM interface."
    ::= { atmInterfaceConfEntry 9 }

```

```

-- The atmInterfaceAdminAddress object has been replaced by
-- atmInterfaceSubscrAddress.

```

```

atmInterfaceAdminAddress OBJECT-TYPE
    SYNTAX          AtmAddr
    MAX-ACCESS      read-only
    STATUS          deprecated
    DESCRIPTION
        "The primary address assigned for administrative purposes,
         for example, an address associated with the
         service provider side of a public network UNI
         (thus, the value of this address corresponds
         with the value of ifPhysAddress at the host side).
         If this interface has no assigned administrative
         address, or when the address used for
         administrative purposes is the same as that used
         for ifPhysAddress, then this is an octet string of
         zero length."
    ::= { atmInterfaceConfEntry 10 }

```

```

atmInterfaceMyNeighborIpAddress OBJECT-TYPE
    SYNTAX          IpAddress
    MAX-ACCESS      read-write

```

STATUS current

DESCRIPTION

"The IP address of the neighbor system connected to the far end of this interface, to which a Network Management Station can send SNMP messages, as IP datagrams sent to UDP port 161, in order to access network management information concerning the operation of that system. Note that the value of this object may be obtained in different ways, e.g., by manual configuration, or through ILMI interaction with the neighbor system."

::= { atmInterfaceConfEntry 11 }

atmInterfaceMyNeighborIfName OBJECT-TYPE

SYNTAX DisplayString

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The textual name of the interface on the neighbor system on the far end of this interface, and to which this interface connects. If the neighbor system is manageable through SNMP and supports the object ifName, the value of this object must be identical with that of ifName for the ifEntry of the lowest level physical interface for this port. If this interface does not have a textual name, the value of this object is a zero length string. Note that the value of this object may be obtained in different ways, e.g., by manual configuration, or through ILMI interaction with the neighbor system."

::= { atmInterfaceConfEntry 12 }

atmInterfaceCurrentMaxVpiBits OBJECT-TYPE

SYNTAX INTEGER (0..12)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum number of VPI Bits that may currently be used at this ATM interface.

The value is the minimum of atmInterfaceMaxActiveVpiBits, and the atmInterfaceMaxActiveVpiBits of the interface's UNI/NNI peer.

If the interface does not negotiate with its peer to determine the number of VPI Bits that can be used on the interface, then the

value of this object must equal
 atmInterfaceMaxActiveVpiBits."
 ::= { atmInterfaceConfEntry 13 }

atmInterfaceCurrentMaxVciBits OBJECT-TYPE
 SYNTAX INTEGER (0..16)
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The maximum number of VCI Bits that may
 currently be used at this ATM interface.
 The value is the minimum of
 atmInterfaceMaxActiveVciBits, and the
 atmInterfaceMaxActiveVciBits of the interface's
 UNI/NNI peer.

If the interface does not negotiate with
 its peer to determine the number of VCI Bits
 that can be used on the interface, then the
 value of this object must equal
 atmInterfaceMaxActiveVciBits."
 ::= { atmInterfaceConfEntry 14 }

atmInterfaceSubscrAddress OBJECT-TYPE
 SYNTAX AtmAddr
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "The identifier assigned by a service provider
 to the network side of a public network UNI.
 If this interface has no assigned service provider
 address, or for other interfaces this is an octet string
 of zero length."
 ::= { atmInterfaceConfEntry 15 }

-- The ATM Interface DS3 PLCP Table

-- This table contains the DS3 PLCP configuration and
 -- state parameters of those ATM interfaces
 -- which use DS3 PLCP for carrying ATM cells over DS3.

atmInterfaceDs3PlcpTable OBJECT-TYPE
 SYNTAX SEQUENCE OF AtmInterfaceDs3PlcpEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table contains ATM interface DS3 PLCP
 parameters and state variables, one entry per

```

    ATM interface port."
    ::= { atmMIBObjects 3}

```

```

atmInterfaceDs3PlcpEntry OBJECT-TYPE
    SYNTAX          AtmInterfaceDs3PlcpEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This list contains DS3 PLCP parameters and
        state variables at the ATM interface and is
        indexed by the ifIndex value of the ATM interface."
    INDEX           { ifIndex }
    ::= { atmInterfaceDs3PlcpTable 1}

AtmInterfaceDs3PlcpEntry ::= SEQUENCE {
    atmInterfaceDs3PlcpSEFSs      Counter32,
    atmInterfaceDs3PlcpAlarmState INTEGER,
    atmInterfaceDs3PlcpUASs      Counter32
}

```

```

atmInterfaceDs3PlcpSEFSs OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The number of DS3 PLCP Severely Errored Framing
        Seconds (SEFS). Each SEFS represents a
        one-second interval which contains
        one or more SEF events."
    ::= { atmInterfaceDs3PlcpEntry 1}

```

```

atmInterfaceDs3PlcpAlarmState OBJECT-TYPE
    SYNTAX          INTEGER {
                        noAlarm(1),
                        receivedFarEndAlarm(2),
                        incomingLOF(3)
                    }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This variable indicates if there is an
        alarm present for the DS3 PLCP. The value
        receivedFarEndAlarm means that the DS3 PLCP
        has received an incoming Yellow
        Signal, the value incomingLOF means that
        the DS3 PLCP has declared a loss of frame (LOF)
        failure condition, and the value noAlarm

```

means that there are no alarms present.
 Transition from the failure to the no alarm state
 occurs when no defects (e.g., LOF) are received
 for more than 10 seconds."
 ::= { atmInterfaceDs3PlcpEntry 2}

atmInterfaceDs3PlcpUASs OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The counter associated with the number of
 Unavailable Seconds encountered by the PLCP."
 ::= { atmInterfaceDs3PlcpEntry 3}

-- The ATM Interface TC Sublayer Table

-- This table contains TC sublayer configuration and
 -- state parameters of those ATM interfaces
 -- which use TC sublayer for carrying ATM cells over
 -- SONET/SDH or DS3.

atmInterfaceTCTable OBJECT-TYPE
 SYNTAX SEQUENCE OF AtmInterfaceTCEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table contains ATM interface TC
 Sublayer parameters and state variables,
 one entry per ATM interface port."
 ::= { atmMIBObjects 4}

atmInterfaceTCEntry OBJECT-TYPE
 SYNTAX AtmInterfaceTCEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This list contains TC Sublayer parameters
 and state variables at the ATM interface and is
 indexed by the ifIndex value of the ATM interface."
 INDEX {ifIndex}
 ::= { atmInterfaceTCTable 1}

AtmInterfaceTCEntry ::= SEQUENCE {
 atmInterfaceOCDEvents Counter32,
 atmInterfaceTCAlarmState INTEGER

```

    }

```

```

atmInterfaceOCDEvents  OBJECT-TYPE

```

```

    SYNTAX                Counter32

```

```

    MAX-ACCESS            read-only

```

```

    STATUS                 current

```

```

    DESCRIPTION

```

```

        "The number of times the Out of Cell
        Delineation (OCD) events occur.  If seven
        consecutive ATM cells have Header Error
        Control (HEC) violations, an OCD event occurs.
        A high number of OCD events may indicate a
        problem with the TC Sublayer."

```

```

    ::= { atmInterfaceTCEntry 1}

```

```

atmInterfaceTCAlarmState  OBJECT-TYPE

```

```

    SYNTAX                INTEGER {
                                noAlarm(1),
                                lcdFailure(2)
                                }

```

```

    MAX-ACCESS            read-only

```

```

    STATUS                 current

```

```

    DESCRIPTION

```

```

        "This variable indicates if there is an
        alarm present for the TC Sublayer.  The value
        lcdFailure(2) indicates that the TC Sublayer
        is currently in the Loss of Cell Delineation
        (LCD) defect maintenance state.  The value
        noAlarm(1) indicates that the TC Sublayer
        is currently not in the LCD defect
        maintenance state."

```

```

    ::= { atmInterfaceTCEntry 2}

```

```

--  ATM Traffic Descriptor Parameter Table

```

```

--  This table contains a set of self-consistent

```

```

--  ATM traffic parameters including the

```

```

--  ATM traffic service category.

```

```

--  The ATM virtual link tables (i.e., VPL and VCL tables)

```

```

--  will use this ATM Traffic Descriptor table

```

```

--  to assign traffic parameters and service category

```

```

--  to the receive and transmit directions of

```

```

--  the ATM virtual links (i.e., VPLs and VCLs).

```

```

--  The ATM VPL or VCL table will indicate a row

```

```

--  in the atmTrafficDescrParamTable

```

```

--  using its atmTrafficDescrParamIndex value.

```

- The management application can then compare a set of
- ATM traffic parameters with a single value.
- If no suitable row(s) in the atmTrafficDescrParamTable
- exists, the manager must create a new row(s) in this
- table. If such a row is created, agent checks the
- sanity of that set of ATM traffic parameter values.
- The manager may use atmTrafficDescrParamIndexNext
- in order to obtain a free atmTrafficDescrParamIndex
- value.
- When creating a new row, the parameter values
- will be checked for self-consistency.
- Predefined/template rows may be supported.
- A row in the atmTrafficDescrParamTable is deleted
- by setting the atmTrafficDescrRowStatus to destroy(6).
- The agent will check whether this row is still in use
- by any entry of the atmVplTable or atmVclTable.
- The agent denies the request if the row is still in
- use.
- The ATM Traffic Descriptor Parameter Table

```

atmTrafficDescrParamTable    OBJECT-TYPE
    SYNTAX                    SEQUENCE OF AtmTrafficDescrParamEntry
    MAX-ACCESS                not-accessible
    STATUS                    current
    DESCRIPTION
        "This table contains information on ATM traffic
        descriptor type and the associated parameters."
    ::= { atmMIBObjects 5}

```

```

atmTrafficDescrParamEntry    OBJECT-TYPE
    SYNTAX                    AtmTrafficDescrParamEntry
    MAX-ACCESS                not-accessible
    STATUS                    current
    DESCRIPTION
        "This list contains ATM traffic descriptor
        type and the associated parameters."
    INDEX {atmTrafficDescrParamIndex}
    ::= { atmTrafficDescrParamTable 1}

```

```

AtmTrafficDescrParamEntry    ::= SEQUENCE {
    atmTrafficDescrParamIndex  AtmTrafficDescrParamIndex,
    atmTrafficDescrType        OBJECT IDENTIFIER,

```

atmTrafficDescrParam1	Integer32,
atmTrafficDescrParam2	Integer32,
atmTrafficDescrParam3	Integer32,
atmTrafficDescrParam4	Integer32,
atmTrafficDescrParam5	Integer32,
atmTrafficQoSClass	INTEGER,
atmTrafficDescrRowStatus	RowStatus,
atmServiceCategory	AtmServiceCategory,
atmTrafficFrameDiscard	TruthValue

}

atmTrafficDescrParamIndex OBJECT-TYPE

SYNTAX AtmTrafficDescrParamIndex (1..2147483647)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object is used by the virtual link table (i.e., VPL or VCL table) to identify the row of this table. When creating a new row in the table the value of this index may be obtained by retrieving the value of atmTrafficDescrParamIndexNext."

::= { atmTrafficDescrParamEntry 1}

atmTrafficDescrType OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value of this object identifies the type of ATM traffic descriptor. The type may indicate no traffic descriptor or traffic descriptor with one or more parameters. These parameters are specified as a parameter vector, in the corresponding instances of the objects:

atmTrafficDescrParam1
atmTrafficDescrParam2
atmTrafficDescrParam3
atmTrafficDescrParam4
atmTrafficDescrParam5."

DEFVAL { atmNoClpNoScr }

::= { atmTrafficDescrParamEntry 2}

atmTrafficDescrParam1 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create


```
STATUS          current
DESCRIPTION
  "The first parameter of the ATM traffic descriptor
   used according to the value of
   atmTrafficDescrType."
DEFVAL { 0 }
::= { atmTrafficDescrParamEntry 3}

atmTrafficDescrParam2 OBJECT-TYPE
SYNTAX          Integer32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
  "The second parameter of the ATM traffic descriptor
   used according to the value of
   atmTrafficDescrType."
DEFVAL { 0 }
::= { atmTrafficDescrParamEntry 4}

atmTrafficDescrParam3 OBJECT-TYPE
SYNTAX          Integer32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
  "The third parameter of the ATM traffic descriptor
   used according to the value of
   atmTrafficDescrType."
DEFVAL { 0 }
::= { atmTrafficDescrParamEntry 5}

atmTrafficDescrParam4 OBJECT-TYPE
SYNTAX          Integer32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
  "The fourth parameter of the ATM traffic descriptor
   used according to the value of
   atmTrafficDescrType."
DEFVAL { 0 }
::= { atmTrafficDescrParamEntry 6}

atmTrafficDescrParam5 OBJECT-TYPE
SYNTAX          Integer32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
  "The fifth parameter of the ATM traffic descriptor
   used according to the value of
```

```

    atmTrafficDescrType."
    DEFVAL { 0 }
    ::= { atmTrafficDescrParamEntry 7}

atmTrafficQoSClass OBJECT-TYPE
    SYNTAX          INTEGER (0..255)
    MAX-ACCESS      read-create
    STATUS          deprecated
    DESCRIPTION
        "The value of this object identifies the QoS Class.
        Four Service classes have been
        specified in the ATM Forum UNI Specification:
        Service Class A: Constant bit rate video and
                        Circuit emulation
        Service Class B: Variable bit rate video/audio
        Service Class C: Connection-oriented data
        Service Class D: Connectionless data
        Four QoS classes numbered 1, 2, 3, and 4 have
        been specified with the aim to support service
        classes A, B, C, and D respectively.
        An unspecified QoS Class numbered '0' is used
        for best effort traffic."
    DEFVAL { 0 }
    ::= { atmTrafficDescrParamEntry 8}

atmTrafficDescrRowStatus 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."
    DEFVAL { active }
    ::= {atmTrafficDescrParamEntry 9}

atmServiceCategory OBJECT-TYPE
    SYNTAX          AtmServiceCategory
    MAX-ACCESS      read-create
    STATUS          current
    DESCRIPTION
        "The ATM service category."
    DEFVAL {ubr }
    ::= { atmTrafficDescrParamEntry 10}

atmTrafficFrameDiscard OBJECT-TYPE
    SYNTAX          TruthValue

```

```

MAX-ACCESS    read-create
STATUS        current
DESCRIPTION

```

```

    "If set to 'true', this object indicates that the network
    is requested to treat data for this connection, in the
    given direction, as frames (e.g. AAL5 CPCS_PDU's) rather
    than as individual cells. While the precise
    implementation is network-specific, this treatment may
    for example involve discarding entire frames during
    congestion, rather than a few cells from many frames."

```

```

DEFVAL { true }

```

```

 ::= { atmTrafficDescrParamEntry 11 }

```

```

-- ATM Interface Virtual Path Link (VPL) Table

```

```

-- This table contains configuration and state
-- information of a bi-directional Virtual Path Link
-- (VPL)

```

```

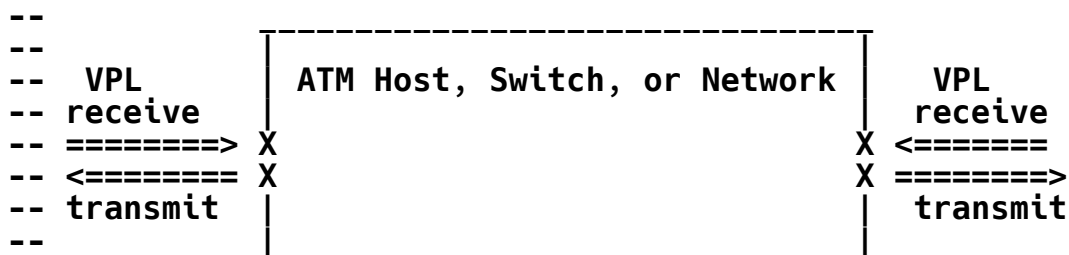
-- This table can be used to create, delete or modify
-- a VPL that is terminated in an ATM host or switch.
-- This table can also be used to create, delete or
-- modify a VPL which is cross-connected to another
-- VPL.

```

```

-- In the example below, the traffic flows on the receive
-- and transmit directions of the VPLs are characterized
-- by atmVplReceiveTrafficDescrIndex and
-- atmVplTransmitTrafficDescrIndex respectively.
-- The cross-connected VPLs are identified by
-- atmVplCrossConnectIdentifier.

```



```

-- The ATM Interface VPL Table

```

atmVplTable OBJECT-TYPE
 SYNTAX SEQUENCE OF AtmVplEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The Virtual Path Link (VPL) table. A
 bi-directional VPL is modeled as one entry
 in this table. This table can be used for
 PVCs, SVCs and Soft PVCs.
 Entries are not present in this table for
 the VPIs used by entries in the atmVclTable."
 ::= { atmMIBObjects 6}

atmVplEntry OBJECT-TYPE
 SYNTAX AtmVplEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An entry in the VPL table. This entry is
 used to model a bi-directional VPL.
 To create a VPL at an ATM interface,
 either of the following procedures are used:

Negotiated VPL establishment

- (1) The management application creates a VPL entry in the atmVplTable by setting atmVplRowStatus to createAndWait(5). This may fail for the following reasons:
 - The selected VPI value is unavailable,
 - The selected VPI value is in use.
 Otherwise, the agent creates a row and reserves the VPI value on that port.
- (2) The manager selects an existing row(s) in the atmTrafficDescrParamTable, thereby, selecting a set of self-consistent ATM traffic parameters and the service category for receive and transmit directions of the VPL.
 - (2a) If no suitable row(s) in the atmTrafficDescrParamTable exists, the manager must create a new row(s) in that table.
 - (2b) The manager characterizes the VPL's traffic parameters through setting the atmVplReceiveTrafficDescrIndex and the

atmVplTransmitTrafficDescrIndex values in the VPL table, which point to the rows containing desired ATM traffic parameter values in the atmTrafficDescrParamTable. The agent will check the availability of resources and may refuse the request. If the transmit and receive service categories are inconsistent, the agent should refuse the request.

- (3) The manager activates the VPL by setting the atmVplRowStatus to active(1). If this set is successful, the agent has reserved the resources to satisfy the requested traffic parameter values and the service category for that VPL.
- (4) If the VPL terminates a VPC in the ATM host or switch, the manager turns on the atmVplAdminStatus to up(1) to turn the VPL traffic flow on. Otherwise, the atmVpCrossConnectTable must be used to cross-connect the VPL to another VPL(s) in an ATM switch or network.

One-Shot VPL Establishment

A VPL may also be established in one step by a set-request with all necessary VPL parameter values and atmVplRowStatus set to createAndGo(4).

In contrast to the negotiated VPL establishment which allows for detailed error checking (i.e., set errors are explicitly linked to particular resource acquisition failures), the one-shot VPL establishment performs the setup on one operation but does not have the advantage of step-wise error checking.

VPL Retirement

A VPL is released by setting atmVplRowStatus to destroy(6), and the agent may release all associated resources."

```
INDEX {ifIndex, atmVplVpi }
 ::= { atmVplTable 1}
```

```

AtmVplEntry ::= SEQUENCE {
    atmVplVpi          AtmVpIdentifier,
    atmVplAdminStatus  AtmVorXAdminStatus,
    atmVplOperStatus   AtmVorXOperStatus,
    atmVplLastChange   AtmVorXLastChange,
    atmVplReceiveTrafficDescrIndex
                        AtmTrafficDescrParamIndex,
    atmVplTransmitTrafficDescrIndex
                        AtmTrafficDescrParamIndex,
    atmVplCrossConnectIdentifier INTEGER,
    atmVplRowStatus     RowStatus,
    atmVplCastType       AtmConnCastType,
    atmVplConnKind       AtmConnKind
}

atmVplVpi          OBJECT-TYPE
    SYNTAX           AtmVpIdentifier
    MAX-ACCESS       not-accessible
    STATUS            current
    DESCRIPTION
        "The VPI value of the VPL."
    ::= { atmVplEntry 1}

atmVplAdminStatus  OBJECT-TYPE
    SYNTAX           AtmVorXAdminStatus
    MAX-ACCESS       read-create
    STATUS            current
    DESCRIPTION
        "This object is instanciated only for a VPL
         which terminates a VPC (i.e., one which is
         NOT cross-connected to other VPLs).
         Its value specifies the desired
         administrative state of the VPL."
    DEFVAL { down }
    ::= { atmVplEntry 2}

atmVplOperStatus   OBJECT-TYPE
    SYNTAX           AtmVorXOperStatus
    MAX-ACCESS       read-only
    STATUS            current
    DESCRIPTION
        "The current operational status of the VPL."
    ::= { atmVplEntry 3}

atmVplLastChange   OBJECT-TYPE
    SYNTAX           AtmVorXLastChange
    MAX-ACCESS       read-only

```

STATUS current
DESCRIPTION
"The value of sysUpTime at the time this
VPL entered its current operational state."
::= { atmVplEntry 4 }

atmVplReceiveTrafficDescrIndex OBJECT-TYPE
SYNTAX AtmTrafficDescrParamIndex
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The value of this object identifies the row
in the atmTrafficDescrParamTable which
applies to the receive direction of the VPL."
DEFVAL { 0 }
::= { atmVplEntry 5 }

atmVplTransmitTrafficDescrIndex OBJECT-TYPE
SYNTAX AtmTrafficDescrParamIndex
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The value of this object identifies the row
in the atmTrafficDescrParamTable which
applies to the transmit direction of the VPL."
DEFVAL { 0 }
::= { atmVplEntry 6 }

atmVplCrossConnectIdentifier OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object is instantiated only for a VPL
which is cross-connected to other VPLs
that belong to the same VPC. All such
associated VPLs have the same value of this
object, and all their cross-connections are
identified either by entries that are indexed
by the same value of atmVpCrossConnectIndex in
the atmVpCrossConnectTable of this MIB module or by
the same value of the cross-connect index in
the cross-connect table for SVCs and Soft PVCs
(defined in a separate MIB module).
At no time should entries in these respective
cross-connect tables exist simultaneously
with the same cross-connect index value."

The value of this object is initialized by the agent after the associated entries in the atmVpCrossConnectTable have been created."
 ::= {atmVplEntry 7}

atmVplRowStatus OBJECT-TYPE
 SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "This object is used to create, delete or modify a row in this table. To create a new VCL, this object is initially set to 'createAndWait' or 'createAndGo'. This object should not be set to 'active' unless the following columnar objects have been set to their desired value in this row:
 atmVplReceiveTrafficDescrIndex and atmVplTransmitTrafficDescrIndex. The DESCRIPTION of atmVplEntry provides further guidance to row treatment in this table."
 DEFVAL { createAndWait }
 ::= {atmVplEntry 8}

atmVplCastType OBJECT-TYPE
 SYNTAX AtmConnCastType
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The connection topology type."
 DEFVAL { p2p }
 ::= {atmVplEntry 9}

atmVplConnKind OBJECT-TYPE
 SYNTAX AtmConnKind
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The use of call control."
 DEFVAL { pvc }
 ::= {atmVplEntry 10}

-- ATM Interface Virtual Channel Link (VCL) Table

-- This table contains configuration and state
 -- information of a bi-directional Virtual Channel
 -- Link (VCL) at an ATM interface.


```
-- This table can be used to create, delete or modify
-- a VCL that is terminated in an ATM host or switch.
-- This table can also be
-- used to create, delete or modify a VCL that is
-- cross-connected to another VCL.
```

```
-- The ATM Interface VCL Table
```

```
atmVclTable          OBJECT-TYPE
    SYNTAX            SEQUENCE OF AtmVclEntry
    MAX-ACCESS         not-accessible
    STATUS             current
    DESCRIPTION
        "The Virtual Channel Link (VCL) table. A
        bi-directional VCL is modeled as one entry
        in this table. This table can be used for
        PVCs, SVCs and Soft PVCs."
    ::= { atmMIBObjects 7}

atmVclEntry          OBJECT-TYPE
    SYNTAX            AtmVclEntry
    MAX-ACCESS         not-accessible
    STATUS             current
    DESCRIPTION
        "An entry in the VCL table. This entry is
        used to model a bi-directional VCL.
        To create a VCL at an ATM interface,
        either of the following procedures are used:

        Negotiated VCL establishment

        (1) The management application creates
            a VCL entry in the atmVclTable
            by setting atmVclRowStatus to createAndWait(5).
            This may fail for the following reasons:
            - The selected VPI/VCI values are unavailable,
            - The selected VPI/VCI values are in use.
            Otherwise, the agent creates a row and
            reserves the VPI/VCI values on that port.

        (2) The manager selects an existing row(s) in the
            atmTrafficDescrParamTable,
            thereby, selecting a set of self-consistent
            ATM traffic parameters and the service category
            for receive and transmit directions of the VCL.
```

- (2a) If no suitable row(s) in the atmTrafficDescrParamTable exists, the manager must create a new row(s) in that table.
- (2b) The manager characterizes the VCL's traffic parameters through setting the atmVclReceiveTrafficDescrIndex and the atmVclTransmitTrafficDescrIndex values in the VCL table, which point to the rows containing desired ATM traffic parameter values in the atmTrafficDescrParamTable. The agent will check the availability of resources and may refuse the request. If the transmit and receive service categories are inconsistent, the agent should refuse the request.
- (3) The manager activates the VCL by setting the atmVclRowStatus to active(1) (for requirements on this activation see the description of atmVclRowStatus). If this set is successful, the agent has reserved the resources to satisfy the requested traffic parameter values and the service category for that VCL.
- (4) If the VCL terminates a VCC in the ATM host or switch, the manager turns on the atmVclAdminStatus to up(1) to turn the VCL traffic flow on. Otherwise, the atmVcCrossConnectTable must be used to cross-connect the VCL to another VCL(s) in an ATM switch or network.

One-Shot VCL Establishment

A VCL may also be established in one step by a set-request with all necessary VCL parameter values and atmVclRowStatus set to createAndGo(4).

In contrast to the negotiated VCL establishment which allows for detailed error checking (i.e., set errors are explicitly linked to particular resource acquisition failures), the one-shot VCL establishment performs the setup on one operation but does not have the advantage of step-wise error checking.

VCL Retirement

A VCL is released by setting atmVclRowStatus to destroy(6), and the agent may release all associated resources."

```
INDEX {ifIndex, atmVclVpi, atmVclVci }
 ::= { atmVclTable 1}
```

```
AtmVclEntry ::= SEQUENCE {
    atmVclVpi                AtmVpIdentifier,
    atmVclVci                AtmVcIdentifier,
    atmVclAdminStatus        AtmVorXAdminStatus,
    atmVclOperStatus         AtmVorXOperStatus,
    atmVclLastChange         AtmVorXLastChange,
    atmVclReceiveTrafficDescrIndex
                               AtmTrafficDescrParamIndex,
    atmVclTransmitTrafficDescrIndex
                               AtmTrafficDescrParamIndex,
    atmVccAalType             INTEGER,
    atmVccAal5CpcsTransmitSduSize INTEGER,
    atmVccAal5CpcsReceiveSduSize INTEGER,
    atmVccAal5EncapsType      INTEGER,
    atmVclCrossConnectIdentifier INTEGER,
    atmVclRowStatus           RowStatus,
    atmVclCastType            AtmConnCastType,
    atmVclConnKind            AtmConnKind
}
```

```
atmVclVpi      OBJECT-TYPE
    SYNTAX      AtmVpIdentifier
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION  "The VPI value of the VCL."
    ::= { atmVclEntry 1}
```

```
atmVclVci      OBJECT-TYPE
    SYNTAX      AtmVcIdentifier
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION  "The VCI value of the VCL."
    ::= { atmVclEntry 2}
```

```
atmVclAdminStatus OBJECT-TYPE
    SYNTAX          AtmVorXAdminStatus
    MAX-ACCESS       read-create
    STATUS           current
```

DESCRIPTION

"This object is instantiated only for a VCL which terminates a VCC (i.e., one which is NOT cross-connected to other VCLs). Its value specifies the desired administrative state of the VCL."

DEFVAL { down }
 ::= { atmVclEntry 3 }

atmVclOperStatus OBJECT-TYPE
 SYNTAX AtmVorXOperStatus
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The current operational status of the VCL."
 ::= { atmVclEntry 4 }

atmVclLastChange OBJECT-TYPE
 SYNTAX AtmVorXLastChange
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The value of sysUpTime at the time this VCL entered its current operational state."
 ::= { atmVclEntry 5 }

atmVclReceiveTrafficDescrIndex OBJECT-TYPE
 SYNTAX AtmTrafficDescrParamIndex
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The value of this object identifies the row in the ATM Traffic Descriptor Table which applies to the receive direction of this VCL."
 DEFVAL { 0 }
 ::= { atmVclEntry 6 }

atmVclTransmitTrafficDescrIndex OBJECT-TYPE
 SYNTAX AtmTrafficDescrParamIndex
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The value of this object identifies the row of the ATM Traffic Descriptor Table which applies to the transmit direction of this VCL."
 DEFVAL { 0 }
 ::= { atmVclEntry 7 }

atmVccAalType OBJECT-TYPE
SYNTAX INTEGER {
 aal1(1),
 aal34(2),
 aal5(3),
 other(4),
 unknown(5),
 aal2(6)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "An instance of this object only exists when the
 local VCL end-point is also the VCC end-point,
 and AAL is in use.
 The type of AAL used on this VCC.
 The AAL type includes AAL1, AAL2, AAL3/4,
 and AAL5. The other(4) may be user-defined
 AAL type. The unknown type indicates that
 the AAL type cannot be determined."
DEFVAL { aal5 }
::= { atmVclEntry 8 }

atmVccAal5CpcsTransmitSduSize OBJECT-TYPE
SYNTAX INTEGER (1..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "An instance of this object only exists when the
 local VCL end-point is also the VCC end-point,
 and AAL5 is in use.
 The maximum AAL5 CPCS SDU size in octets that is
 supported on the transmit direction of this VCC."
DEFVAL { 9188 }
::= { atmVclEntry 9 }

atmVccAal5CpcsReceiveSduSize OBJECT-TYPE
SYNTAX INTEGER (1..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "An instance of this object only exists when the
 local VCL end-point is also the VCC end-point,
 and AAL5 is in use.
 The maximum AAL5 CPCS SDU size in octets that is
 supported on the receive direction of this VCC."
DEFVAL { 9188 }
::= { atmVclEntry 10 }

atmVccAal5EncapsType OBJECT-TYPE

SYNTAX INTEGER {
 vcMultiplexRoutedProtocol(1),
 vcMultiplexBridgedProtocol8023(2),
 vcMultiplexBridgedProtocol8025(3),
 vcMultiplexBridgedProtocol8026(4),
 vcMultiplexLANemulation8023(5),
 vcMultiplexLANemulation8025(6),
 llcEncapsulation(7),
 multiprotocolFrameRelaySscs(8),
 other(9),
 unknown(10)
 }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An instance of this object only exists when the local VCL end-point is also the VCC end-point, and AAL5 is in use.

The type of data encapsulation used over the AAL5 SSCS layer. The definitions reference RFC 1483 Multiprotocol Encapsulation over ATM AAL5 and to the ATM Forum LAN Emulation specification."

DEFVAL { llcEncapsulation }
 ::= { atmVclEntry 11 }

atmVclCrossConnectIdentifier OBJECT-TYPE

SYNTAX INTEGER (0..2147483647)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object is instantiated only for a VCL which is cross-connected to other VCLs that belong to the same VCC. All such associated VCLs have the same value of this object, and all their cross-connections are identified either by entries that are indexed by the same value of atmVcCrossConnectIndex in the atmVcCrossConnectTable of this MIB module or by the same value of the cross-connect index in the cross-connect table for SVCs and Soft PVCs (defined in a separate MIB module).

At no time should entries in these respective cross-connect tables exist simultaneously with the same cross-connect index value.

The value of this object is initialized by the agent after the associated entries in the atmVcCrossConnectTable have been created."
 ::= {atmVclEntry 12}

atmVclRowStatus OBJECT-TYPE
 SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "This object is used to create, delete or modify a row in this table. To create a new VCL, this object is initially set to 'createAndWait' or 'createAndGo'. This object should not be set to 'active' unless the following columnar objects have been set to their desired value in this row:
 atmVclReceiveTrafficDescrIndex,
 atmVclTransmitTrafficDescrIndex.
 In addition, if the local VCL end-point is also the VCC end-point:
 atmVccAalType.
 In addition, for AAL5 connections only:
 atmVccAal5CpcsTransmitSduSize,
 atmVccAal5CpcsReceiveSduSize, and
 atmVccAal5EncapsType. (The existence of these objects imply the AAL connection type.).
 The DESCRIPTION of atmVclEntry provides further guidance to row treatment in this table."
 DEFVAL { createAndWait }
 ::= {atmVclEntry 13}

atmVclCastType OBJECT-TYPE
 SYNTAX AtmConnCastType
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The connection topology type."
 DEFVAL { p2p }
 ::= {atmVclEntry 14}

atmVclConnKind OBJECT-TYPE
 SYNTAX AtmConnKind
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

```

    "The use of call control."
    DEFVAL { pvc }
    ::= {atmVclEntry 15}

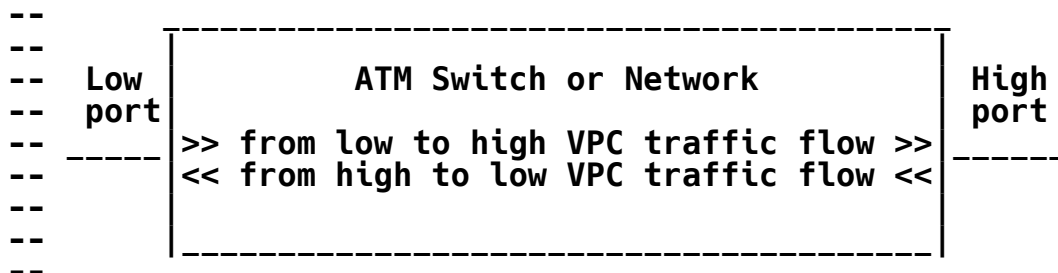
```

```
--      ATM Virtual Path (VP) Cross Connect Table
```

```
-- This table contains configuration and state
-- information of point-to-point,
-- point-to-multipoint, or multipoint-to-multipoint
-- VP cross-connects for PVCs.
```

```
-- This table has read-create access and can be used
-- to cross-connect the VPLs together in an ATM switch
-- or network. The atmVpCrossConnectIndex
-- is used to associate the related
-- VPLs that are cross-connected together.
```

```
-- The ATM VP Cross Connect Table
-- models each bi-directional VPC
-- cross-connect as a set of entries in
-- the atmVpCrossConnectTable. A
-- point-to-point VPC cross-connect is modeled
-- as one entry; a point-to-multipoint (N leafs) VPC
-- cross-connect as N entries in this table; and
-- a multipoint-to-multipoint (N parties) VPC cross-
-- connect as N(N-1)/2 entries in this table.
-- In the latter cases, all the N (or N(N-1)/2) entries
-- are associated with a single VPC cross-connect by
-- having the same value of atmVpCrossConnectIndex.
```



```
-- The terms low and high are chosen to represent
-- numerical ordering of the two interfaces associated
-- with a VPC cross-connect. That is, the ATM interface
-- with the lower value of ifIndex is termed 'low',
-- while the other ATM interface associated with the
-- VPC cross-connect is termed 'high'. This terminology
```



```
-- is used to provide directional information; for
-- example, the atmVpCrossConnectL2H0perStatus applies
-- to the low->high direction, and
-- atmVpCrossConnectH2L0perStatus applies to the
-- high->low direction, as illustrated above.
```

```
atmVpCrossConnectIndexNext OBJECT-TYPE
    SYNTAX          INTEGER (0..2147483647)
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object contains an appropriate value to
        be used for atmVpCrossConnectIndex when creating
        entries in the atmVpCrossConnectTable. The value
        0 indicates that no unassigned entries are
        available. To obtain the atmVpCrossConnectIndex
        value for a new entry, the manager issues a
        management protocol retrieval operation to obtain
        the current value of this object. After each
        retrieval, the agent should modify the value to
        the next unassigned index.
        After a manager retrieves a value the agent will
        determine through its local policy when this index
        value will be made available for reuse."
    ::= { atmMIBObjects 8 }
```

```
-- The ATM VP Cross Connect Table
```

```
atmVpCrossConnectTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF AtmVpCrossConnectEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The ATM VP Cross Connect table for PVCs.
        An entry in this table models two
        cross-connected VPLs.
        Each VPL must have its atmConnKind set
        to pvc(1)."
    ::= { atmMIBObjects 9 }
```

```
atmVpCrossConnectEntry OBJECT-TYPE
    SYNTAX          AtmVpCrossConnectEntry
```

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"An entry in the ATM VP Cross Connect table.
This entry is used to model a bi-directional
ATM VP cross-connect which cross-connects
two VPLs.

Step-wise Procedures to set up a VP Cross-connect

Once the entries in the atmVplTable are created,
the following procedures are used
to cross-connect the VPLs together.

- (1) The manager obtains a unique
atmVpCrossConnectIndex by reading the
atmVpCrossConnectIndexNext object.
- (2) Next, the manager creates a set of one
or more rows in the ATM VP Cross Connect
Table, one for each cross-connection between
two VPLs. Each row is indexed by the ATM
interface port numbers and VPI values of the
two ends of that cross-connection.
This set of rows specifies the topology of the
VPC cross-connect and is identified by a single
value of atmVpCrossConnectIndex.

Negotiated VP Cross-Connect Establishment

- (2a) The manager creates a row in this table by
setting atmVpCrossConnectRowStatus to
createAndWait(5). The agent checks the
requested topology and the mutual sanity of
the ATM traffic parameters and
service categories, i.e., the row creation
fails if:
 - the requested topology is incompatible with
associated values of atmVplCastType,
 - the requested topology is not supported
by the agent,
 - the traffic/service category parameter values
associated with the requested row are
incompatible with those of already existing
rows for this VP cross-connect.

[For example, for setting up
a point-to-point VP cross-connect, the
ATM traffic parameters in the receive direction

of a VPL at the low end of the cross-connect must equal to the traffic parameters in the transmit direction of the other VPL at the high end of the cross-connect, otherwise, the row creation fails.] The agent also checks for internal errors in building the cross-connect.

The atmVpCrossConnectIndex values in the corresponding atmVplTable rows are filled in by the agent at this point.

- (2b) The manager promotes the row in the atmVpCrossConnectTable by setting atmVpCrossConnectRowStatus to active(1). If this set is successful, the agent has reserved the resources specified by the ATM traffic parameter and Service category values for each direction of the VP cross-connect in an ATM switch or network.
- (3) The manager sets the atmVpCrossConnectAdminStatus to up(1) in all rows of this VP cross-connect to turn the traffic flow on.

One-Shot VP Cross-Connect Establishment

A VP cross-connect may also be established in one step by a set-request with all necessary parameter values and atmVpCrossConnectRowStatus set to createAndGo(4).

In contrast to the negotiated VP cross-connect establishment which allows for detailed error checking (i.e., set errors are explicitly linked to particular resource acquisition failures), the one-shot VP cross-connect establishment performs the setup on one operation but does not have the advantage of step-wise error checking.

VP Cross-Connect Retirement

A VP cross-connect identified by a particular value of atmVpCrossConnectIndex is released by:

- (1) Setting atmVpCrossConnectRowStatus of all

rows identified by this value of atmVpCrossConnectIndex to destroy(6). The agent may release all associated resources, and the atmVpCrossConnectIndex values in the corresponding atmVplTable row are removed. Note that a situation when only a subset of the associated rows are deleted corresponds to a VP topology change.

- (2) After deletion of the appropriate atmVpCrossConnectEntries, the manager may set atmVplRowStatus to destroy(6) the associated VPLs. The agent releases the resources and removes the associated rows in the atmVplTable.

VP Cross-connect Reconfiguration

At the discretion of the agent, a VP cross-connect may be reconfigured by adding and/or deleting leaves to/from the VP topology as per the VP cross-connect establishment/retirement procedures. Reconfiguration of traffic/service category parameter values requires release of the VP cross-connect before those parameter values may be changed for individual VPLs."

```
INDEX { atmVpCrossConnectIndex,
        atmVpCrossConnectLowIfIndex,
        atmVpCrossConnectLowVpi,
        atmVpCrossConnectHighIfIndex,
        atmVpCrossConnectHighVpi }
 ::= { atmVpCrossConnectTable 1 }
```

```
AtmVpCrossConnectEntry ::= SEQUENCE {
    atmVpCrossConnectIndex          INTEGER,
    atmVpCrossConnectLowIfIndex     InterfaceIndex,
    atmVpCrossConnectLowVpi         AtmVpIdentifier,
    atmVpCrossConnectHighIfIndex    InterfaceIndex,
    atmVpCrossConnectHighVpi        AtmVpIdentifier,
    atmVpCrossConnectAdminStatus    AtmVorXAdminStatus,
    atmVpCrossConnectL2HOperStatus  AtmVorXOperStatus,
    atmVpCrossConnectH2LOperStatus  AtmVorXOperStatus,
    atmVpCrossConnectL2HLastChange  AtmVorXLastChange,
    atmVpCrossConnectH2LLastChange  AtmVorXLastChange,
    atmVpCrossConnectRowStatus      RowStatus
}
```

atmVpCrossConnectIndex OBJECT-TYPE
SYNTAX INTEGER (1..2147483647)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A unique value to identify this VP cross-connect.
For each VPL associated with this cross-connect,
the agent reports this cross-connect index value
in the atmVplCrossConnectIdentifier attribute of
the corresponding atmVplTable entries."
::= { atmVpCrossConnectEntry 1 }

atmVpCrossConnectLowIfIndex OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The ifIndex value of the ATM interface for
this VP cross-connect. The term low implies
that this ATM interface has the numerically lower
ifIndex value than the other ATM interface
identified in the same atmVpCrossConnectEntry."
::= { atmVpCrossConnectEntry 2 }

atmVpCrossConnectLowVpi OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The VPI value at the ATM interface
associated with the VP cross-connect that is
identified by atmVpCrossConnectLowIfIndex."
::= { atmVpCrossConnectEntry 3 }

atmVpCrossConnectHighIfIndex OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The ifIndex value of the ATM interface for
this VP cross-connect. The term high implies that
this ATM interface has the numerically higher
ifIndex value than the other ATM interface
identified in the same atmVpCrossConnectEntry."
::= { atmVpCrossConnectEntry 4 }

atmVpCrossConnectHighVpi OBJECT-TYPE
SYNTAX AtmVpIdentifier

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The VPI value at the ATM interface
associated with the VP cross-connect that is
identified by atmVpCrossConnectHighIfIndex."
::= { atmVpCrossConnectEntry 5 }

atmVpCrossConnectAdminStatus OBJECT-TYPE
SYNTAX AtmVorXAdminStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The desired administrative status of this
bi-directional VP cross-connect."
DEFVAL { down }
::= { atmVpCrossConnectEntry 6 }

atmVpCrossConnectL2HOperStatus OBJECT-TYPE
SYNTAX AtmVorXOperStatus
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The operational status of the VP cross-connect
in one direction; (i.e., from the low to
high direction)."
::= { atmVpCrossConnectEntry 7 }

atmVpCrossConnectH2LOperStatus OBJECT-TYPE
SYNTAX AtmVorXOperStatus
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The operational status of the VP cross-connect
in one direction; (i.e., from the high to
low direction)."
::= { atmVpCrossConnectEntry 8 }

atmVpCrossConnectL2HLastChange OBJECT-TYPE
SYNTAX AtmVorXLastChange
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value of sysUpTime at the time this
VP cross-connect entered its current operational
state in the low to high direction."
::= { atmVpCrossConnectEntry 9 }

atmVpCrossConnectH2LLastChange OBJECT-TYPE

SYNTAX AtmVorXLastChange

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at the time this
VP cross-connect entered its current operational
in the high to low direction."
::= { atmVpCrossConnectEntry 10 }

atmVpCrossConnectRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this entry in the
atmVpCrossConnectTable. This object is used to
create a cross-connect for cross-connecting
VPLs which are created using the atmVplTable
or to change or delete an existing cross-connect.
This object must be initially set
to 'createAndWait' or 'createAndGo'.
To turn on a VP cross-connect,
the atmVpCrossConnectAdminStatus
is set to 'up'."

DEFVAL { createAndWait }

::= { atmVpCrossConnectEntry 11 }

-- ATM Virtual Channel (VC) Cross Connect Table

-- This table contains configuration and state
-- information of point-to-point,
-- point-to-multipoint or multipoint-to-multipoint
-- VC cross-connects for PVCs.

-- This table has read-create access and is used
-- to cross-connect the VCLs together in an ATM switch
-- or network that belong to a VC connection.
-- The atmVcCrossConnectIndex is used to associate
-- the related VCLs that are cross-connected together.

-- The model using step-wise procedures described for setting
-- up a VP cross-connect is also used for setting up
-- a VC cross-connect.

```

atmVcCrossConnectIndexNext OBJECT-TYPE
    SYNTAX          INTEGER (0..2147483647)
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object contains an appropriate value to
        be used for atmVcCrossConnectIndex when creating
        entries in the atmVcCrossConnectTable. The value
        0 indicates that no unassigned entries are
        available. To obtain the atmVcCrossConnectIndex
        value for a new entry, the manager issues a
        management protocol retrieval operation to obtain
        the current value of this object. After each
        retrieval, the agent should modify the value to
        the next unassigned index.
        After a manager retrieves a value the agent will
        determine through its local policy when this index
        value will be made available for reuse."
    ::= { atmMIBObjects 10 }

```

-- The ATM VC Cross Connect Table

```

atmVcCrossConnectTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF AtmVcCrossConnectEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The ATM VC Cross Connect table for PVCs.
        An entry in this table models two
        cross-connected VCLs.
        Each VCL must have its atmConnKind set
        to pvc(1)."
    ::= { atmMIBObjects 11 }

```

```

atmVcCrossConnectEntry OBJECT-TYPE
    SYNTAX          AtmVcCrossConnectEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "An entry in the ATM VC Cross Connect table.
        This entry is used to model a bi-directional ATM
        VC cross-connect cross-connecting two end points.

        Step-wise Procedures to set up a VC Cross-connect

```


Once the entries in the atmVclTable are created, the following procedures are used to cross-connect the VCLs together to form a VCC segment.

- (1) The manager obtains a unique atmVcCrossConnectIndex by reading the atmVcCrossConnectIndexNext object.
- (2) Next, the manager creates a set of one or more rows in the ATM VC Cross Connect Table, one for each cross-connection between two VCLs. Each row is indexed by the ATM interface port numbers and VPI/VCI values of the two ends of that cross-connection. This set of rows specifies the topology of the VCC cross-connect and is identified by a single value of atmVcCrossConnectIndex.

Negotiated VC Cross-Connect Establishment

- (2a) The manager creates a row in this table by setting atmVcCrossConnectRowStatus to createAndWait(5). The agent checks the requested topology and the mutual sanity of the ATM traffic parameters and service categories, i.e., the row creation fails if:
 - the requested topology is incompatible with associated values of atmVclCastType,
 - the requested topology is not supported by the agent,
 - the traffic/service category parameter values associated with the requested row are incompatible with those of already existing rows for this VC cross-connect.[For example, for setting up a point-to-point VC cross-connect, the ATM traffic parameters in the receive direction of a VCL at the low end of the cross-connect must equal to the traffic parameters in the transmit direction of the other VCL at the high end of the cross-connect, otherwise, the row creation fails.] The agent also checks for internal errors in building the cross-connect.

The atmVcCrossConnectIndex values in the

corresponding atmVclTable rows are filled in by the agent at this point.

- (2b) The manager promotes the row in the atmVcCrossConnectTable by setting atmVcCrossConnectRowStatus to active(1). If this set is successful, the agent has reserved the resources specified by the ATM traffic parameter and Service category values for each direction of the VC cross-connect in an ATM switch or network.
- (3) The manager sets the atmVcCrossConnectAdminStatus to up(1) in all rows of this VC cross-connect to turn the traffic flow on.

One-Shot VC Cross-Connect Establishment

A VC cross-connect may also be established in one step by a set-request with all necessary parameter values and atmVcCrossConnectRowStatus set to createAndGo(4).

In contrast to the negotiated VC cross-connect establishment which allows for detailed error checking i.e., set errors are explicitly linked to particular resource acquisition failures), the one-shot VC cross-connect establishment performs the setup on one operation but does not have the advantage of step-wise error checking.

VC Cross-Connect Retirement

A VC cross-connect identified by a particular value of atmVcCrossConnectIndex is released by:

- (1) Setting atmVcCrossConnectRowStatus of all rows identified by this value of atmVcCrossConnectIndex to destroy(6). The agent may release all associated resources, and the atmVcCrossConnectIndex values in the corresponding atmVclTable row are removed. Note that a situation when only a subset of the associated rows are deleted corresponds

to a VC topology change.

- (2) After deletion of the appropriate atmVcCrossConnectEntries, the manager may set atmVclRowStatus to destroy(6) the associated VCLs. The agent releases the resources and removes the associated rows in the atmVclTable.

VC Cross-Connect Reconfiguration

At the discretion of the agent, a VC cross-connect may be reconfigured by adding and/or deleting leafs to/from the VC topology as per the VC cross-connect establishment/retirement procedures. Reconfiguration of traffic/service category parameter values requires release of the VC cross-connect before those parameter values may be changed for individual VCLs."

```
INDEX { atmVcCrossConnectIndex,
        atmVcCrossConnectLowIfIndex,
        atmVcCrossConnectLowVpi,
        atmVcCrossConnectLowVci,
        atmVcCrossConnectHighIfIndex,
        atmVcCrossConnectHighVpi,
        atmVcCrossConnectHighVci }
 ::= { atmVcCrossConnectTable 1 }
```

```
AtmVcCrossConnectEntry ::= SEQUENCE {
    atmVcCrossConnectIndex          INTEGER,
    atmVcCrossConnectLowIfIndex     InterfaceIndex,
    atmVcCrossConnectLowVpi         AtmVpIdentifier,
    atmVcCrossConnectLowVci         AtmVcIdentifier,
    atmVcCrossConnectHighIfIndex    InterfaceIndex,
    atmVcCrossConnectHighVpi        AtmVpIdentifier,
    atmVcCrossConnectHighVci        AtmVcIdentifier,
    atmVcCrossConnectAdminStatus    AtmVorXAdminStatus,
    atmVcCrossConnectL2HOperStatus  AtmVorXOperStatus,
    atmVcCrossConnectH2LOperStatus  AtmVorXOperStatus,
    atmVcCrossConnectL2HLastChange  AtmVorXLastChange,
    atmVcCrossConnectH2LLastChange  AtmVorXLastChange,
    atmVcCrossConnectRowStatus      RowStatus
}
```

```
atmVcCrossConnectIndex OBJECT-TYPE
    SYNTAX          INTEGER (1..2147483647)
    MAX-ACCESS      not-accessible
```

STATUS current
DESCRIPTION
 "A unique value to identify this VC cross-connect.
 For each VCL associated with this cross-connect,
 the agent reports this cross-connect index value
 in the atmVclCrossConnectIdentifier attribute of
 the corresponding atmVclTable entries."
::= { atmVcCrossConnectEntry 1 }

atmVcCrossConnectLowIfIndex OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The ifIndex value of the ATM interface for this
 VC cross-connect. The term low implies
 that this ATM interface has the numerically lower
 ifIndex value than the other ATM interface
 identified in the same atmVcCrossConnectEntry."
::= { atmVcCrossConnectEntry 2 }

atmVcCrossConnectLowVpi OBJECT-TYPE
SYNTAX AtmVpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The VPI value at the ATM interface
 associated with the VC cross-connect that is
 identified by atmVcCrossConnectLowIfIndex."
::= { atmVcCrossConnectEntry 3 }

atmVcCrossConnectLowVci OBJECT-TYPE
SYNTAX AtmVcIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The VCI value at the ATM interface
 associated with this VC cross-connect that is
 identified by atmVcCrossConnectLowIfIndex."
::= { atmVcCrossConnectEntry 4 }

atmVcCrossConnectHighIfIndex OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The ifIndex value for the ATM interface for
 this VC cross-connect. The term high implies

that this ATM interface has the numerically higher
ifIndex value than the other ATM interface
identified in the same atmVcCrossConnectEntry."
::= { atmVcCrossConnectEntry 5 }

atmVcCrossConnectHighVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The VPI value at the ATM interface
 associated with the VC cross-connect that is
 identified by atmVcCrossConnectHighIfIndex."
::= { atmVcCrossConnectEntry 6 }

atmVcCrossConnectHighVci OBJECT-TYPE

SYNTAX AtmVcIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The VCI value at the ATM interface
 associated with the VC cross-connect that is
 identified by atmVcCrossConnectHighIfIndex."
::= { atmVcCrossConnectEntry 7 }

atmVcCrossConnectAdminStatus OBJECT-TYPE

SYNTAX AtmVorXAdminStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The desired administrative status of this
 bi-directional VC cross-connect."
DEFVAL { down }
::= { atmVcCrossConnectEntry 8 }

atmVcCrossConnectL2HOperStatus OBJECT-TYPE

SYNTAX AtmVorXOperStatus
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The current operational status of the
 VC cross-connect in one direction; (i.e.,
 from the low to high direction)."
::= { atmVcCrossConnectEntry 9 }

atmVcCrossConnectH2LOperStatus OBJECT-TYPE

SYNTAX AtmVorXOperStatus

```

MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The current operational status of the
     VC cross-connect in one direction; (i.e.,
     from the high to low direction)."
```

::= { atmVcCrossConnectEntry 10 }

```

atmVcCrossConnectL2HLastChange OBJECT-TYPE
SYNTAX          AtmVorXLastChange
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The value of sysUpTime at the time this
     VC cross-connect entered its current
     operational state in low to high direction."
```

::= { atmVcCrossConnectEntry 11 }

```

atmVcCrossConnectH2LLastChange OBJECT-TYPE
SYNTAX          AtmVorXLastChange
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The value of sysUpTime at the time this
     VC cross-connect entered its current
     operational state in high to low direction."
```

::= { atmVcCrossConnectEntry 12 }

```

atmVcCrossConnectRowStatus OBJECT-TYPE
SYNTAX          RowStatus
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "The status of this entry in the
     atmVcCrossConnectTable. This object is used to
     create a new cross-connect for cross-connecting
     VCLs which are created using the atmVclTable
     or to change or delete existing cross-connect.
     This object must be initially set to
     'createAndWait' or 'createAndGo'.
     To turn on a VC cross-connect,
     the atmVcCrossConnectAdminStatus
     is set to 'up'."
```

DEFVAL { createAndWait }

::= { atmVcCrossConnectEntry 13 }

-- AAL5 Virtual Channel Connection Performance Statistics

-- Table

-- This table contains the AAL5
 -- performance statistics of a VCC at the
 -- interface associated with an AAL5 entity in an ATM
 -- host or ATM switch.

```
aal5VccTable      OBJECT-TYPE
    SYNTAX          SEQUENCE OF Aal5VccEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table contains AAL5 VCC performance
        parameters."
    ::= { atmMIBObjects 12 }
```

```
aal5VccEntry      OBJECT-TYPE
    SYNTAX          Aal5VccEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This list contains the AAL5 VCC
        performance parameters and is indexed
        by ifIndex values of AAL5 interfaces
        and the associated VPI/VCI values."
    INDEX { ifIndex, aal5VccVpi, aal5VccVci }
    ::= { aal5VccTable 1 }
```

```
Aal5VccEntry      ::= SEQUENCE {
    aal5VccVpi      AtmVpIdentifier,
    aal5VccVci      AtmVcIdentifier,
    aal5VccCrcErrors Counter32,
    aal5VccSarTimeOuts Counter32,
    aal5VccOverSizedSDUs Counter32
}
```

```
aal5VccVpi        OBJECT-TYPE
    SYNTAX          AtmVpIdentifier
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The VPI value of the AAL5 VCC at the
        interface identified by the ifIndex."
    ::= { aal5VccEntry 1 }
```

```
aal5VccVci        OBJECT-TYPE
```

```

SYNTAX          AtmVcIdentifier
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
  "The VCI value of the AAL5 VCC at the
   interface identified by the ifIndex."
 ::= { aal5VccEntry 2 }

```

```

aal5VccCrcErrors OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "The number of AAL5 CPCS PDUs received with
   CRC-32 errors on this AAL5 VCC at the
   interface associated with an AAL5 entity."
 ::= { aal5VccEntry 3 }

```

```

aal5VccSarTimeOuts OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "The number of partially re-assembled AAL5
   CPCS PDUs which were discarded
   on this AAL5 VCC at the interface associated
   with an AAL5 entity because they
   were not fully re-assembled within the
   required time period. If the re-assembly
   timer is not supported, then this object
   contains a zero value."
 ::= { aal5VccEntry 4 }

```

```

aal5VccOverSizedSDUs OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "The number of AAL5 CPCS PDUs discarded
   on this AAL5 VCC at the interface
   associated with an AAL5 entity because the
   AAL5 SDUs were too large."
 ::= { aal5VccEntry 5 }

```

```

--
-- The following object may be used in conjunction with
-- the atmTrafficDescrParamTable for the creation of

```



```
-- new table entries.
--
```

```
atmTrafficDescrParamIndexNext  OBJECT-TYPE
    SYNTAX          INTEGER (0..2147483647)
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object contains an appropriate value to
        be used for atmTrafficDescrParamIndex when
        creating entries in the
        atmTrafficDescrParamTable.
        The value 0 indicates that no unassigned
        entries are available. To obtain the
        atmTrafficDescrParamIndex value for a new
        entry, the manager issues a management
        protocol retrieval operation to obtain the
        current value of this object. After each
        retrieval, the agent should modify the value
        to the next unassigned index.
        After a manager retrieves a value the agent will
        determine through its local policy when this index
        value will be made available for reuse."
    ::= { atmMIBObjects 13 }
```

```
-- Conformance Information
```

```
atmMIBConformance    OBJECT IDENTIFIER ::= { atmMIB 2 }

atmMIBGroups          OBJECT IDENTIFIER
                      ::= { atmMIBConformance 1 }

atmMIBCompliances     OBJECT IDENTIFIER
                      ::= { atmMIBConformance 2 }
```

```
-- Compliance Statements
```

```
atmMIBCompliance2    MODULE-COMPLIANCE
    STATUS          current
    DESCRIPTION
        "The compliance statement for SNMP entities
        including networks which have ATM and
        AAL5 interfaces."
```

```
    MODULE -- this module
```

```
--
-- ***** Interface and Traffic Descriptor Support ***
```

--

MANDATORY-GROUPS {atmInterfaceConfGroup2,
atmTrafficDescrGroup2 }

OBJECT atmInterfaceMaxVpcs
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMaxVccs
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMaxActiveVpiBits
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required.
At the ATM UNI the maximum number of
active VPI bits configured for use ranges
from 0 to 8 only.
Implementations may support smaller ranges."

OBJECT atmInterfaceMaxActiveVciBits
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required.
Implementations may support smaller ranges."

OBJECT atmInterfaceIlmiVpi
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceIlmiVci
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMyNeighborIpAddress
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMyNeighborIfName
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceSubscrAddress
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmTrafficDescrParamIndexNext
DESCRIPTION
 "This object is only required for systems
 that support the creation of entries in
 the atmTrafficDescrParamTable."

OBJECT atmTrafficDescrType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmTrafficDescrParam1
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmTrafficDescrParam2
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmTrafficDescrParam3
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmTrafficDescrParam4
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmTrafficDescrParam5
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmServiceCategory
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmTrafficDescrRowStatus
SYNTAX INTEGER {active(1)}

```

-- subset of RowStatus
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required, and only one
    of the six enumerated values for the
    RowStatus textual convention need be
    supported, specifically: active(1)."
```

```

OBJECT          atmTrafficFrameDiscard
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."
```

```

--
-- ***** DS3 PLCP Support *****
--
GROUP           atmInterfaceDs3PlcpGroup
DESCRIPTION
    "This group is mandatory only for those
    ATM interfaces which implement the
    DS3 PLCP layer."
```

```

--
-- ***** TC Sublayer Support *****
--
GROUP           atmInterfaceTCGroup
DESCRIPTION
    "This group is mandatory only for those
    ATM interfaces which implement the
    TC Sublayer."
```

```

--
-- ***** VPC Support *****
--
GROUP           atmVpcTerminationGroup2
DESCRIPTION
    "This group is mandatory only for those
    ATM interfaces which implement ATM
    VPLs that terminate VPCs (i.e., ones which
    are NOT cross-connected to other VPLs)."
```

```

GROUP           atmVplCrossConnectGroup
DESCRIPTION
    "This group is mandatory only for those
    ATM interfaces which implement ATM
    VPLs that are not associated with VCLs
    and are cross-connected to other VPLs
    for VPCs."
```

GROUP atmVpPvcCrossConnectGroup
DESCRIPTION
 "This group is mandatory only for those
 ATM interfaces which implement ATM
 VPLs that are not associated with VCLs
 and are cross-connected to other VPLs
 for permanent VPCs (i.e., PVCs).
 This group is not used to crossconnect
 a PVC with an SVC to form a Soft PVC."

OBJECT atmVplAdminStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVplReceiveTrafficDescrIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVplTransmitTrafficDescrIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVplRowStatus
SYNTAX INTEGER {active(1)}
 -- subset of RowStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required, and only one
 of the six enumerated values for the
 RowStatus textual convention need be
 supported, specifically: active(1)."

OBJECT atmVplCastType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVplConnKind
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVpCrossConnectAdminStatus
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT atmVpCrossConnectRowStatus
SYNTAX INTEGER {active(1)}

-- subset of RowStatus

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required, and only one of the six enumerated values for the RowStatus textual convention need be supported, specifically: active(1)."

--

-- ***** VCC Support *****

--

GROUP atmVccTerminationGroup2

DESCRIPTION

"This group is mandatory only for those ATM interfaces which implement ATM VCLs that terminate VCCs (i.e., ones which are NOT cross-connected to other VCLs)."

GROUP atmVclCrossConnectGroup

DESCRIPTION

"This group is mandatory only for those ATM interfaces which implement ATM VCLs that are cross-connected to other VCLs for VCCs."

GROUP atmVcPvcCrossConnectGroup

DESCRIPTION

"This group is mandatory only for those ATM interfaces which implement ATM VCLs that are cross-connected to other VCLs for permanent VCCs (i.e., PVCs). This group is not used to crossconnect a PVC with an SVC to form a Soft PVC."

OBJECT atmVclAdminStatus

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmVclReceiveTrafficDescrIndex

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmVclTransmitTrafficDescrIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVccAalType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVclRowStatus
SYNTAX INTEGER {active(1)}
 -- subset of RowStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required, and only one
 of the six enumerated values for the
 RowStatus textual convention need be
 supported, specifically: active(1)."

OBJECT atmVclCastType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVclConnKind
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVcCrossConnectAdminStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVcCrossConnectRowStatus
SYNTAX INTEGER { active(1)}
 -- subset of RowStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required, and only one
 of the six enumerated values for the
 RowStatus textual convention need be
 supported, specifically: active(1)."

--
-- ***** AAL5 Support *****
--

GROUP aal5VccGroup

DESCRIPTION

"This group is mandatory for the
AAL5 virtual connections only."

OBJECT atmVccAal5CpcsTransmitSduSize

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmVccAal5CpcsReceiveSduSize

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmVccAal5EncapsType

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

::= { atmMIBCompliances 2 }

-- Units of Conformance

atmInterfaceDs3PlcpGroup OBJECT-GROUP

OBJECTS { atmInterfaceDs3PlcpSEFSs,
atmInterfaceDs3PlcpAlarmState,
atmInterfaceDs3PlcpUASs }

STATUS current

DESCRIPTION

"A collection of objects providing information
about DS3 PLCP layer at an ATM interface."

::= { atmMIBGroups 3 }

atmInterfaceTCGroup OBJECT-GROUP

OBJECTS { atmInterfaceOCDEvents,
atmInterfaceTCAlarmState }

STATUS current

DESCRIPTION

"A collection of objects providing information
about TC sublayer at an ATM interface."

::= { atmMIBGroups 4 }

aal5VccGroup OBJECT-GROUP

OBJECTS { atmVccAal5CpcsTransmitSduSize,
atmVccAal5CpcsReceiveSduSize,
atmVccAal5EncapsType,
aal5VccCrcErrors, aal5VccSarTimeOuts,
aal5VccOverSizedSDUs }

STATUS current

DESCRIPTION

"A collection of objects providing
AAL5 configuration and performance statistics
of a VCC."

::= { atmMIBGroups 9 }

atmInterfaceConfGroup2 OBJECT-GROUP**OBJECTS {**

atmInterfaceMaxVpcs, atmInterfaceMaxVccs,
atmInterfaceConfVpcs, atmInterfaceConfVccs,
atmInterfaceMaxActiveVpiBits,
atmInterfaceMaxActiveVciBits,
atmInterfaceIlmiVpi,
atmInterfaceIlmiVci,
atmInterfaceMyNeighborIpAddress,
atmInterfaceMyNeighborIfName,
atmInterfaceCurrentMaxVpiBits,
atmInterfaceCurrentMaxVciBits,
atmInterfaceSubscrAddress }

STATUS current

DESCRIPTION

"A collection of objects providing configuration
information about an ATM interface."

::= { atmMIBGroups 10 }

atmTrafficDescrGroup2 OBJECT-GROUP**OBJECTS {**

atmTrafficDescrType, atmTrafficDescrParam1,
atmTrafficDescrParam2, atmTrafficDescrParam3,
atmTrafficDescrParam4, atmTrafficDescrParam5,
atmTrafficDescrRowStatus, atmServiceCategory,
atmTrafficFrameDiscard,
atmTrafficDescrParamIndexNext }

STATUS current

DESCRIPTION

"A collection of objects providing information
about ATM traffic descriptor type and
the associated parameters."

::= { atmMIBGroups 11 }

atmVpcTerminationGroup2 OBJECT-GROUP

OBJECTS {atmVplOperStatus, atmVplAdminStatus,
atmVplLastChange,
atmVplReceiveTrafficDescrIndex,
atmVplTransmitTrafficDescrIndex,
atmVplRowStatus, atmVplCastType,
atmVplConnKind **}**

STATUS current

DESCRIPTION

"A collection of objects providing information about a VPL at an ATM interface which terminates a VPC (i.e., one which is NOT cross-connected to other VPLs)."

::= { atmMIBGroups 12 }

atmVccTerminationGroup2 **OBJECT-GROUP**
OBJECTS { atmVclOperStatus, atmVclAdminStatus,
 atmVclLastChange,
 atmVclReceiveTrafficDescrIndex,
 atmVclTransmitTrafficDescrIndex,
 atmVccAalType, atmVclRowStatus,
 atmVclCastType, atmVclConnKind }
STATUS current
DESCRIPTION

"A collection of objects providing information about a VCL at an ATM interface which terminates a VCC (i.e., one which is NOT cross-connected to other VCLs)."

::= { atmMIBGroups 13 }

atmVplCrossConnectGroup **OBJECT-GROUP**
OBJECTS { atmVplReceiveTrafficDescrIndex,
 atmVplTransmitTrafficDescrIndex,
 atmVplOperStatus, atmVplLastChange,
 atmVplRowStatus,
 atmVplCastType, atmVplConnKind }
STATUS current
DESCRIPTION

"A collection of objects providing information about the VPLs that are cross-connected together."

::= { atmMIBGroups 14 }

atmVpPvcCrossConnectGroup **OBJECT-GROUP**
OBJECTS { atmVpCrossConnectAdminStatus,
 atmVpCrossConnectL2HOperStatus,
 atmVpCrossConnectH2LOperStatus,
 atmVpCrossConnectL2HLastChange,
 atmVpCrossConnectH2LLastChange,
 atmVpCrossConnectRowStatus,
 atmVplCrossConnectIdentifier,
 atmVpCrossConnectIndexNext }
STATUS current
DESCRIPTION

"A collection of objects providing information about a VP cross-connect"

```

        for PVCs. These objects are not used
        for Soft PVCs or SVCs."
 ::= { atmMIBGroups 15 }

```

```

atmVclCrossConnectGroup    OBJECT-GROUP
  OBJECTS { atmVclReceiveTrafficDescrIndex,
             atmVclTransmitTrafficDescrIndex,
             atmVclOperStatus, atmVclLastChange,
             atmVclRowStatus,
             atmVclCastType, atmVclConnKind }
  STATUS      current
  DESCRIPTION
    "A collection of objects providing
    information about the VCLs that
    are cross-connected together."
 ::= { atmMIBGroups 16 }

```

```

atmVcPvcCrossConnectGroup  OBJECT-GROUP
  OBJECTS { atmVcCrossConnectAdminStatus,
             atmVcCrossConnectL2HOperStatus,
             atmVcCrossConnectH2LOperStatus,
             atmVcCrossConnectL2HLastChange,
             atmVcCrossConnectH2LLastChange,
             atmVcCrossConnectRowStatus,
             atmVclCrossConnectIdentifier,
             atmVcCrossConnectIndexNext }
  STATUS      current
  DESCRIPTION
    "A collection of objects providing
    information about a VC cross-connect
    for PVCs. These objects are not used
    for Soft PVCs or SVCs."
 ::= { atmMIBGroups 17 }

```

-- Deprecated Definitions - Objects

```

-- atmInterfaceAddressType
-- atmTrafficQoSClass

```

-- Deprecated Definitions - Compliance

```

atmMIBCompliance          MODULE-COMPLIANCE
  STATUS                   deprecated
  DESCRIPTION
    "The compliance statement for SNMP entities
    including networks which have ATM and

```

AAL5 interfaces."

MODULE -- this module

MANDATORY-GROUPS {atmInterfaceConfGroup,
atmTrafficDescrGroup}

OBJECT atmInterfaceMaxVpcs
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMaxVccs
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMaxActiveVpiBits
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMaxActiveVciBits
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceIlmiVpi
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceIlmiVci
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMyNeighborIpAddress
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmInterfaceMyNeighborIfName
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT atmTrafficDescrType
MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmTrafficDescrParam1
MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmTrafficDescrParam2
MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmTrafficDescrParam3
MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmTrafficDescrParam4
MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmTrafficDescrParam5
MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmTrafficQoSClass
MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmTrafficDescrRowStatus
SYNTAX INTEGER {active(1)}

-- subset of RowStatus

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required, and only one of the six enumerated values for the RowStatus textual convention need be supported, specifically: active(1)."

GROUP atmInterfaceDs3PlcpGroup

DESCRIPTION

"This group is mandatory only for those ATM interfaces which implement the DS3 PLCP layer."

GROUP atmInterfaceTCGroup
DESCRIPTION
 "This group is mandatory only for those
 ATM interfaces which implement the
 TC Sublayer."

GROUP atmVpcTerminationGroup
DESCRIPTION
 "This group is mandatory only for those
 ATM interfaces which implement ATM
 VPLs that terminate VPCs (i.e., ones which
 are NOT cross-connected to other VPLs)."

GROUP atmVpCrossConnectGroup
DESCRIPTION
 "This group is mandatory only for those
 ATM interfaces which implement ATM
 VPLs that are not associated with VCLs
 and are cross-connected to other VPLs."

OBJECT atmVplAdminStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVplReceiveTrafficDescrIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVplTransmitTrafficDescrIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVplRowStatus
SYNTAX INTEGER {active(1)}
 -- subset of RowStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required, and only one
 of the six enumerated values for the
 RowStatus textual convention need be
 supported, specifically: active(1)."

OBJECT atmVpCrossConnectAdminStatus
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT atmVpCrossConnectRowStatus
SYNTAX INTEGER {active(1)}
 -- subset of RowStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required, and only one
 of the six enumerated values for the
 RowStatus textual convention need be
 supported, specifically: active(1)."

GROUP atmVccTerminationGroup
DESCRIPTION
 "This group is mandatory only for those
 ATM interfaces which implement ATM
 VCLs that terminate VCCs (i.e., ones which
 are NOT cross-connected to other VCLs)."

GROUP atmVcCrossConnectGroup
DESCRIPTION
 "This group is mandatory only for those
 ATM interfaces which implement ATM
 VCLs that are cross-connected to
 other VCLs."

OBJECT atmVclAdminStatus
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVclReceiveTrafficDescrIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVclTransmitTrafficDescrIndex
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVccAalType
MIN-ACCESS read-only
DESCRIPTION
 "Write access is not required."

OBJECT atmVclRowStatus
SYNTAX INTEGER {active(1)}

```
-- subset of RowStatus
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required, and only one
    of the six enumerated values for the
    RowStatus textual convention need be
    supported, specifically: active(1)."
```

```
OBJECT          atmVcCrossConnectAdminStatus
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT          atmVcCrossConnectRowStatus
SYNTAX          INTEGER { active(1) }
                -- subset of RowStatus
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required, and only one
    of the six enumerated values for the
    RowStatus textual convention need be
    supported, specifically: active(1)."
```

```
GROUP          aal5VccGroup
DESCRIPTION
    "This group is mandatory for the
    AAL5 virtual connections only."
```

```
OBJECT          atmVccAal5CpcsTransmitSduSize
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT          atmVccAal5CpcsReceiveSduSize
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT          atmVccAal5EncapsType
MIN-ACCESS      read-only
DESCRIPTION
    "Write access is not required."
    ::= { atmMIBCompliances 1 }
```

-- Deprecated Definitions - Groups

atmInterfaceConfGroup **OBJECT-GROUP**
 OBJECTS {
 atmInterfaceMaxVpcs, atmInterfaceMaxVccs,
 atmInterfaceConfVpcs, atmInterfaceConfVccs,
 atmInterfaceMaxActiveVpiBits,
 atmInterfaceMaxActiveVciBits,
 atmInterfaceIlmiVpi,
 atmInterfaceIlmiVci,
 atmInterfaceAddressType,
 atmInterfaceAdminAddress,
 atmInterfaceMyNeighborIpAddress,
 atmInterfaceMyNeighborIfName }
 STATUS deprecated
 DESCRIPTION
 "A collection of objects providing configuration
 information about an ATM interface."
 ::= { atmMIBGroups 1 }

atmTrafficDescrGroup **OBJECT-GROUP**
 OBJECTS {
 atmTrafficDescrType, atmTrafficDescrParam1,
 atmTrafficDescrParam2, atmTrafficDescrParam3,
 atmTrafficDescrParam4, atmTrafficDescrParam5,
 atmTrafficQoSClass, atmTrafficDescrRowStatus}
 STATUS deprecated
 DESCRIPTION
 "A collection of objects providing information
 about ATM traffic descriptor type and
 the associated parameters."
 ::= { atmMIBGroups 2 }

atmVpcTerminationGroup **OBJECT-GROUP**
 OBJECTS {atmVplOperStatus, atmVplAdminStatus,
 atmVplLastChange,
 atmVplReceiveTrafficDescrIndex,
 atmVplTransmitTrafficDescrIndex,
 atmVplRowStatus }
 STATUS deprecated
 DESCRIPTION
 "A collection of objects providing
 information about a VPL at an ATM interface
 which terminates a VPC
 (i.e., one which is NOT cross-connected
 to other VPLs)."
 ::= { atmMIBGroups 5 }

atmVccTerminationGroup **OBJECT-GROUP**
 OBJECTS {atmVclOperStatus, atmVclAdminStatus,

```
    atmVclLastChange,  
    atmVclReceiveTrafficDescrIndex,  
    atmVclTransmitTrafficDescrIndex,  
    atmVccAalType, atmVclRowStatus }  
STATUS      deprecated  
DESCRIPTION  
    "A collection of objects providing information  
    about a VCL at an ATM interface  
    which terminates a VCC (i.e., one which is  
    NOT cross-connected to other VCLs)."  
 ::= { atmMIBGroups 6 }
```

```
atmVpCrossConnectGroup    OBJECT-GROUP  
OBJECTS { atmVplReceiveTrafficDescrIndex,  
    atmVplTransmitTrafficDescrIndex,  
    atmVplOperStatus, atmVplRowStatus,  
    atmVpCrossConnectAdminStatus,  
    atmVpCrossConnectL2HOperStatus,  
    atmVpCrossConnectH2LOperStatus,  
    atmVpCrossConnectL2HLastChange,  
    atmVpCrossConnectH2LLastChange,  
    atmVpCrossConnectRowStatus,  
    atmVplCrossConnectIdentifier,  
    atmVpCrossConnectIndexNext }  
STATUS      deprecated  
DESCRIPTION  
    "A collection of objects providing  
    information about a VP cross-connect  
    and the associated VPLs that are  
    cross-connected together."  
 ::= { atmMIBGroups 7 }
```

```
atmVcCrossConnectGroup    OBJECT-GROUP  
OBJECTS { atmVclReceiveTrafficDescrIndex,  
    atmVclTransmitTrafficDescrIndex,  
    atmVclOperStatus, atmVclRowStatus,  
    atmVcCrossConnectAdminStatus,  
    atmVcCrossConnectL2HOperStatus,  
    atmVcCrossConnectH2LOperStatus,  
    atmVcCrossConnectL2HLastChange,  
    atmVcCrossConnectH2LLastChange,  
    atmVcCrossConnectRowStatus,  
    atmVclCrossConnectIdentifier,  
    atmVcCrossConnectIndexNext }  
STATUS      deprecated  
DESCRIPTION  
    "A collection of objects providing  
    information about a VC cross-connect"
```

```
        and the associated VCLs that are
        cross-connected together."
 ::= { atmMIBGroups 8 }
```

```
-- {atmMIB 3} has been used by [19].
```

```
END
```

10. Acknowledgments

This memo is the result of the work of the AToMMIB Working Group.

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12. Security Considerations

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. 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.

The managed objects in this MIB contain sensitive information since, collectively, they allow tracing and influencing of virtual connections in ATM switches or networks and provide information of their traffic characteristics.

It is thus important to control even GET access to these objects and possibly to even encrypt the values of these object when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

SNMPv1 by itself is not a secure 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 2274 [12] and the View-based Access Control Model RFC 2275 [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 the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

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