

Network Working Group
Request for Comments: 3606
Category: Standards Track

F. Ly
Pedestal Networks
M. Noto
Cisco Systems
A. Smith
Consultant
E. Spiegel
Cisco Systems
K. Tesink
Telcordia Technologies
November 2003

Definitions of Supplemental Managed Objects for ATM Interface

Status of this Memo

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

Copyright Notice

Copyright (C) The Internet Society (2003). All Rights Reserved.

Abstract

This memo defines objects used for managing ATM-based interfaces, devices, and services, in addition to those defined in RFC 2515, the ATM-MIB, to provide additional support for the management of ATM Switched Virtual Connections (SVCs) and ATM Permanent Virtual Connections (PVCs).

Table of Contents

1.	The Internet-Standard Management Framework.	3
2.	Overview.	3
2.1.	Background.	3
2.2.	Important Definitions	4
3.	Conventions used in the MIB	6
3.1.	Structure	6
3.1.1.	ATM SVC VP Cross-Connect Table.	6
3.1.2.	ATM SVC VC Cross-Connect Table.	7
3.1.3.	ATM Interface Signalling Statistics Table	8
3.1.4.	ATM Signalling Capability Support	9
3.1.5.	Signalling Descriptor Parameter Table	10
3.1.6.	ATM Interface Registered Address Table.	10
3.1.7.	ATM VPI/VCI to Address Mapping Table.	11
3.1.8.	ATM Address to VPI/VCI Mapping Table.	11
3.1.9.	ATM VPL Statistics Table.	11
3.1.10.	ATM VPL Logical Port Table.	12
3.1.11.	ATM VCL Statistics Table.	15
3.1.12.	ATM VC General Information Table.	15
3.1.13.	ATM Interface Configuration Extension Table	16
3.1.14.	ATM ILMI Service Registry Table	17
3.1.15.	ILMI Network Prefix Table	19
3.1.16.	ATM Switch Address Table.	19
3.1.17.	AAL5 per-VCC Statistics Table	19
3.1.18.	ATM VP Cross-Connect Extension Table.	20
3.1.19.	ATM VC Cross-Connect Extension Table.	20
3.1.20.	Currently Failing PVPL Table.	20
3.1.21.	Currently Failing PVCL Table.	20
3.1.22.	Leaf Initiated Join Counter support	20
3.2.	Network and User Addresses.	20
3.3.	Configuration of VPLs, VCLs, and Cross-Connects	20
3.4.	ATM-related Trap Support.	20
4.	Conformance and Compliance.	21
5.	Definitions	21
6.	Acknowledgments	89
7.	References.	89
7.1.	Normative References.	89
7.2.	Informative References.	90
8.	Security Considerations	90
9.	Intellectual Property Statement	92
10.	Authors' Addresses.	93
11.	Full Copyright Statement.	94

1. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

2. Overview

The purpose of this memo is to provide additional capabilities, not found in the ATM-MIB [RFC2515], which are needed to manage ATM interfaces. This memo addresses the following areas:

- ATM Switch Support
- ATM Service Support
- ATM Host Support

In addition, this memo also provides ATM trap support.

2.1. 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 ([RFC2863]), the DS3 ([RFC2496]) or SONET MIBs ([RFC3592]) for management of SONET and DS3 physical interfaces, and, as appropriate, MIB modules for applications that make use of ATM, such as SMDS [RFC1694] and LAN Emulation [ATM Forum LANE]. These MIB modules are outside the scope of this specification.

This MIB module also requires the use of the ATM-MIB module defined in [RFC2515] and ATM-specific textual conventions defined in [RFC2514].

ATM Endpoint applications such as ATM LAN Emulation or Classical IP-over-ATM Clients and Servers use ATM to establish SVC/PVC connections for exchanging control and data information. The agents of these ATM applications must provide the network manager with information on the SVC/PVCs in use and which applications are using them. The information can be made generic so as to apply to all ATM

applications. This memo defines extensions to the ATM-MIB [RFC2515] in order to support this.

The current specification of this supplemental ATM2-MIB is based on SNMPv2 SMI.

2.2. Important Definitions

The following terms are defined here and used throughout this MIB:

- Virtual Path Link (VPL)
- Virtual Path Connection (VPC)
- Virtual Path Segment (VP Segment)
- Virtual Channel Link (VCL)
- Virtual Channel Connection (VCC)
- Virtual Channel Segment (VC Segment).

The figures on the next page show how these terms apply in typical ATM network topologies. Additional terms relevant to this MIB are defined and illustrated in the ATM Terminology section 3 of [RFC2515].

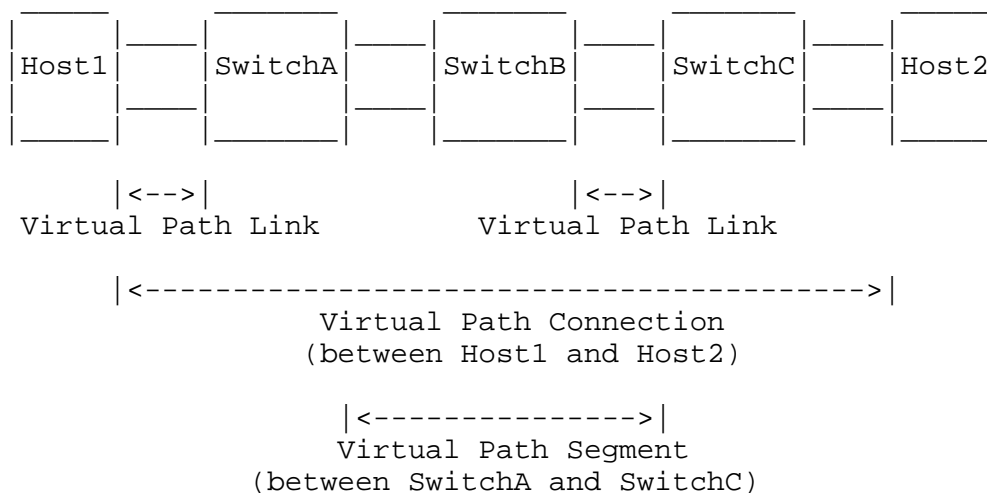


Figure 1: Examples of Virtual Path Links, Virtual Path Connection, and Virtual Path Segment

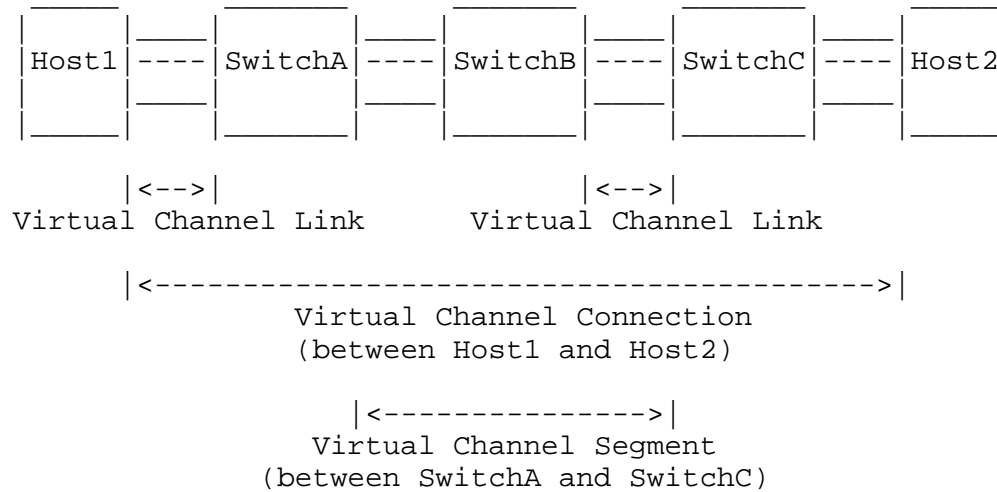


Figure 2: Examples of Virtual Channel Links, Virtual Channel Connection, and Virtual Channel Segment

3. Conventions used in the MIB

3.1. Structure

The managed ATM objects are arranged as follows:

Table	Host	Switch	Service
atmSvcVcCrossConnectTable		Y	Y
atmSvcVpCrossConnectTable		Y	Y
atmSigStatTable	Y	Y	Y
atmSigSupportTable		Y	Y
atmSigDescrParamTable	Y		
atmIfRegisteredAddrTable		Y	Y
atmVclAddrTable	Y		
atmAddrVclTable	Y		
atmVplStatTable	Y	Y	Y
atmVplLogicalPortTable	Y	Y	Y
atmVclStatTable	Y	Y	Y
atmAal5VclStatTable	Y		
atmVclGenTable	Y		
atmInterfaceExtTable	Y	Y	Y
atmIlmiSrvRegTable		Y	Y
atmIlmiNetworkPrefixTable		Y	Y
atmSwitchAddressTable		Y	
atmVpCrossConnectXTable			Y
atmVcCrossConnectXTable			Y
atmCurrentlyFailingPVplTable	Y	Y	Y
atmCurrentlyFailingPVclTable	Y	Y	Y

Table 1: MIB structure

3.1.1. ATM SVC VP Cross-Connect Table

This table provides the SVC VP Cross-Connect (SVPC) information. The equivalent PVC VP Cross-Connect table is defined in [RFC2515]. This table also includes cross-connect information for Soft PVPs.

This table contains configuration and state information of all SVC VP point-to-point, point-to-multipoint, or multipoint-to-multipoint VP cross-connects.

This table has read-only access and can be used to monitor the cross-connects which connect the VPLs together in an ATM switch or network. The atmSvcVpCrossConnectIndex is used to associate the related SVC VPLs that are cross-connected together. The atmSvcVpCrossConnectRowStatus object has read-write access to allow for tear-down.

The ATM SVC VP Cross-Connect Table models each bi-directional Switched Virtual Circuit (SVC) VP cross-connect as a set of entries in the atmSvcVpCrossConnectTable. 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 atmSvcVpCrossConnectIndex.

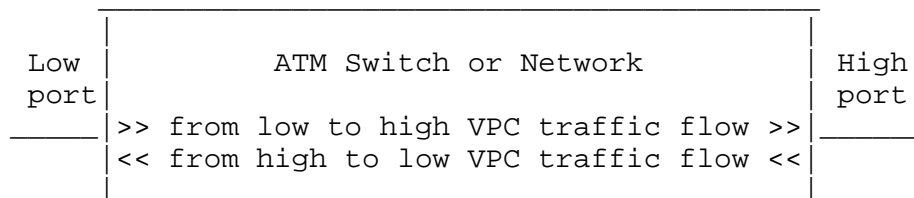


Figure 3: VPC Cross-Connect Model

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'.

3.1.2. ATM SVC VC Cross-Connect Table

This table provides the SVC Cross-Connect (SVCC) information. The equivalent PVC VC Cross-Connect table is defined in [RFC2515]. This table also includes cross-connect information for Soft PVCs.

This table is used to model a bi-directional point-to-point, point-to-multipoint or multipoint-to-multipoint SVC VC cross-connect.

This table has read-only access and is used to monitor the cross-connects which connect the VCLs together in an ATM switch or network that belong to a VC connection. The `atmSvcVcCrossConnectIndex` is used to associate the related SVC VCLs that are cross-connected together. The `atmSvcVcCrossConnectRowStatus` object has read-write access to allow for tear-down.

The ATM SVC VC Cross-Connect Table models each bi-directional Switched Virtual Circuit (SVC) VC cross-connect as a set of entries in the `atmSvcVcCrossConnectTable`. A point-to-point VC cross-connect is modeled as one entry; a point-to-multipoint (N leafs) VC 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 `atmSvcVcCrossConnectIndex`.

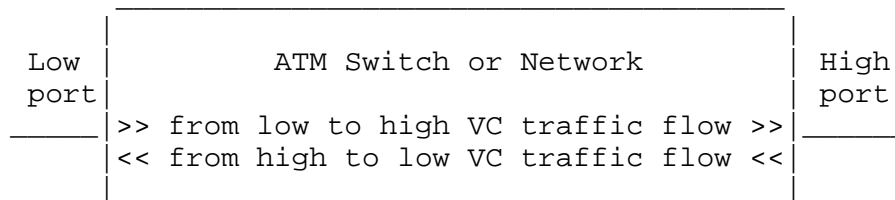


Figure 4: VC Cross-Connect Model

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'.

3.1.3. ATM Interface Signalling Statistics Table

This table provides statistical information of the signalling entity. A signalling entity can be deployed over an ATM interface as defined in the `atmInterfaceConfTable` [RFC2515], a logical ATM interface defined in section 5.1.10.1 in this document, or a proprietary virtual interface as described in the `atmInterfaceExtTable`. To monitor the signalling entity, a few counters are provided. They are defined as:

```

atmSigSSCOPConEvents
atmSigSSCOPErrdPdus
atmSigDetectSetupAttempts
atmSigEmitSetupAttempts
atmSigDetectUnavailRoutes

```



```
atmSigEmitUnavailRoutes
atmSigDetectUnavailResrcs
atmSigEmitUnavailResrcs
atmSigDetectCldPtyEvents
atmSigEmitCldPtyEvents
atmSigDetectMsgErrors
atmSigEmitMsgErrors
atmSigDetectClgPtyEvents
atmSigEmitClgPtyEvents
atmSigDetectTimerExpireds
atmSigEmitTimerExpireds
atmSigDetectRestarts
atmSigEmitRestarts
atmSigInEstabls
atmSigOutEstabls
```

3.1.4. ATM Signalling Capability Support

A number of Information Elements may or may not be supported by ATM switches or ATM Services. Hence, for trouble isolation it is important to keep track which particular Information Elements are supported. The corresponding group of objects must be supported by switches or services supporting SVCs, and indicate whether the following Information Elements are enabled/disabled:

- 1) Calling party number
- 2) Calling party subaddress
- 3) Called party subaddress
- 4) Broadband high layer information
- 5) Broadband low layer information
- 6) Broadband Repeat Indicator
- 7) AAL parameters

The last parameter, Preferred Carrier Pre-Subscription, identifies the carrier to which intercarrier calls originated from this interface are routed when transit network selection information is not provided by the calling party.

3.1.5. Signalling Descriptor Parameter Table

This table extends the ATM VCL table of the ATM-MIB [RFC2515] to include all other necessary signalling information as specified in the ATM Forum UNI Specifications [ATM Forum 3.0] and [ATM Forum UNI 3.1]. A user can create an entry with all signalling parameters and later use that entry to specify the signalling characteristics of SVCs.

Some of the signalling parameters, such as the AAL5 parameters information element, are reflected in the VCL and VPL tables, and this table only contains the remaining AAL5 parameters.

Signalling attributes can be grouped into following categories:

1) ATM Adaptation Layer Parameters

Information in this group is captured in the ATM Signalling Descriptor Parameter Table defined in this memo. Please refer to section 5.4.5.5 of [ATM Forum 3.0] and [ATM Forum UNI 3.1].

2) Broadband High Layer Information

Information in this group is captured by the ATM Signalling Descriptor Parameter Table defined in this memo. Please refer to section 5.4.5.8 of [ATM Forum 3.0] and [ATM Forum UNI 3.1].

3) Broadband Low Layer Information

Information in this group is captured by the ATM Signalling Descriptor Parameter Table defined in this memo. Please refer to section 5.4.5.9 of [ATM Forum 3.0] and [ATM Forum UNI 3.1].

3.1.6. ATM Interface Registered Address Table

This table contains a list of ATM addresses that can be used for calls to and from a given interface by a switch or service. The ATM addresses are either registered by the endsystem via ILMI or statically configured. This table does not expose PNNI reachability information. This table only applies to switches and network services. See also Section 5.2.

3.1.7. ATM VPI/VCI to Address Mapping Table

In the atmVclAddrTable, the object atmVclAddrAddr can either be an ATM Local Address or an ATM Remote Address which represent the two endpoint addresses of a VCL. ATM Local Address identifies the local endpoint of the VCL represented by this agent. The ATM Remote address represents the address of the ATM application at the other end of the VCL.

3.1.8. ATM Address to VPI/VCI Mapping Table

This table provides an alternative way to retrieve the atmVclTable. This table can be used to retrieve the indexing to the atmVclTable by an ATM address.

3.1.9. ATM VPL Statistics Table

The atmVplStatTable includes per-VPL cell counters. The VPL cell counters count the valid ATM cells. The valid ATM cells include the user and OAM cells but exclude the physical layer (e.g., idle cells) and unassigned cells. Cells coming into an ATM managed system are counted differently with the high Cell Loss Priority (CLP=0) or low Cell Loss Priority (CLP=1). The cells are tagged, passed or discarded depending on the incoming CLP value and the policed cell rate by the "traffic policing" entity in the ATM managed system. Refer to [ATM Forum 3.0] and [ATM Forum UNI 3.1] for a description of the traffic policing.

In the switch where the traffic policing is not supported, cells are passed or discarded depending on the bandwidth and buffering capacity of the switching fabric. The Output Tagged Cells counter, in this case, is always zero.

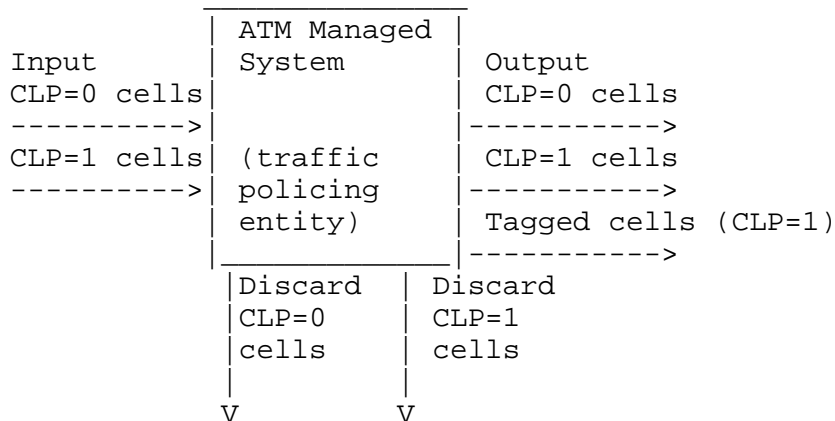


Figure 5: ATM Cell Counters per VPL

In this table, cells coming into and out of the managed ATM system are counted as the total number of cells and the cells with the CLP=0. The CLP=1 counter is derived by subtracting CLP=0 cells from the total cells. In addition, cells that are tagged on the output are also counted. The output CLP=1 cells equals the total cells out count minus both the CLP=0 cells and the tagged cells.

3.1.10. ATM VPL Logical Port Table

The ATM VPL Logical Port Table includes all ATM logical port interface configuration information.

3.1.10.1. ATM Logical Port Interface

The interface type "ATM Logical Port" (ifType=80) is defined to allow the representation of a VP Tunnel, which is a VPL used as a trunk connection (most likely between devices that are not physically adjacent), providing for multiplexing and demultiplexing of VCs on the VP. Figure 6 illustrates such a VP Tunnel.

Note: the "ATM Logical Port" interface is more of a logical port, compared with an interface of type "ATM" which is more of a physical port that provides for the transport of many VP and VC connections between adjacent devices.

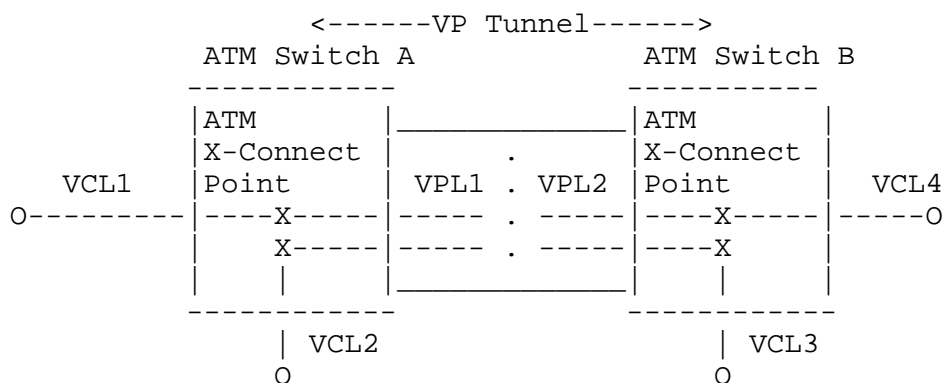


Figure 6: Virtual Path Tunnel

In Figure 6, a VP tunnel (denoted as VPL1 by Switch A, and as VPL2 by Switch B) is used to connect VCL1 with VCL4 and VCL2 with VCL3. Figure 6 shows only one VP tunnel, but there can be multiple VP tunnels over the same physical interface.

A particularly useful VP tunnel scenario is tunneling across a public network that does not support signalling. In Figure 6 above, assume Switches A and B are private switches that signal over the VP to set up connections transparently through the public network. The public network would just transport a PVC VP between the two switches.

Because the VP Tunnel constitutes an interface between two ATM devices that are not necessarily physically adjacent, most of the management information pertaining to the interface may differ for the tunnel, including:

- active VPI/VCI fields (the tunnel may be a subset of the parent interface).
- maximum number of VCCs
- configured VCCs
- ILMI VPI/VCI values
- ATM address type
- ATM administrative address
- received/transmitted cells.

3.1.10.2. How to create an ATM Logical Port interface

On ATM devices supporting VP tunnels, the ATM Logical Port Interface Table can be used to create VP tunnels. To create an ATM Logical Port interface via SNMP:

- Create a VPL (e.g., VPI=a on an existing ATM interface which has ifIndex=x) in the atmVplTable.
- Set the object atmVplLogicalPortDef to isLogicalIf. A new row in the ifTable is then created by the agent, with ifIndex=y, to represent the ATM Logical Port interface. The object atmVplLogicalPortIndex is also set to y by the agent to represent the ifIndex value of the ATM Logical Port interface.
- The ifEntry values are set for the ATM Logical Port interface (ifIndex=y) as discussed in RFC 2515, with the following exceptions:
 - * ifType - a new enumerated value of atmLogical(80) was added to IANAifType, specifying an "ATM Logical Port" interface.
 - * ifSpeed - The total bandwidth in bits per second for use by the ATM layer. Computed from the traffic descriptor for the VPL.

- * ifOperStatus - determined hierarchically, depending on the state of the physical atm-cell layer interface beneath it, and the ILMI on the VP.
 - * ifInOctets, ifOutOctets - support of these objects is not mandatory for ATM Logical Port interfaces.
 - * ifInErrors - always zero, HEC errors are specified for the atm cell-layer interface beneath it.
 - * ifInUnknownProtos - always zero, errors are specified for the atm cell-layer interface beneath it.
- The atmInterfaceConfEntry values are set and reported as discussed in [RFC2515], with the following exceptions:
 - * atmInterfaceMaxVpcs - 0.
 - * atmInterfaceConfVpcs - 0.
 - * atmInterfaceIlmiVpi - VPI of the VP tunnel.
- The atmInterfaceExtEntry values are set and reported as follows:
 - * atmInterfaceConfMaxSvpcVpi - VPI of the VP tunnel, although VPCs cannot be setup on a VP tunnel.
 - * atmInterfaceCurrentMaxSvpcVpi - VPI of VP tunnel, although VPCs cannot be setup on a VP tunnel.
 - * atmInterfaceConfMaxSvccVpi - VPI of the VP tunnel.
 - * atmInterfaceCurrentMaxSvccVpi - VPI of VP tunnel.
 - * atmIntfPvcFailures - Includes failures of PVCLs within the VP tunnel, but not of the PVPL itself, since those are reported on the atm(37) interface.
 - * atmIntfCurrentlyFailingPVpls - 0.
 - * atmIntfPvcFailuresTrapEnable - Enables traps for PVCL failures within the VP tunnel, but not for the PVPL itself, since the latter are generated on behalf of the atm(37) interface.
- An entry is created in the ifStackTable, with values: ifStackHigherLayer=y, ifStackLowerLayer=x.
- VCLs defined on the VP tunnel are indexed by ifIndex=y, VPI=a, VCI.

3.1.11. ATM VCL Statistics Table

The atmVclStatTable includes per-VCL cell counters. The VCL cell counters count the valid ATM cells. The valid ATM cells include the user and OAM cells but exclude the physical layer (e.g., idle cells) and unassigned cells. Cells coming into an ATM managed system are counted differently with the high Cell Loss Priority (CLP=0) or low Cell Loss Priority (CLP=1). The cells are tagged, passed or discarded depending on the incoming CLP value and the policed cell rate by the "traffic policing" entity in the ATM managed system. Refer to [ATM Forum 3.0] and [ATM Forum UNI 3.1] for the description of the traffic policing.

In a switch where the traffic policing is not supported, cells are passed or discarded depending on the bandwidth and buffering capacity of the switching fabric. The Output Tagged Cells counter, in this case, is always zero.

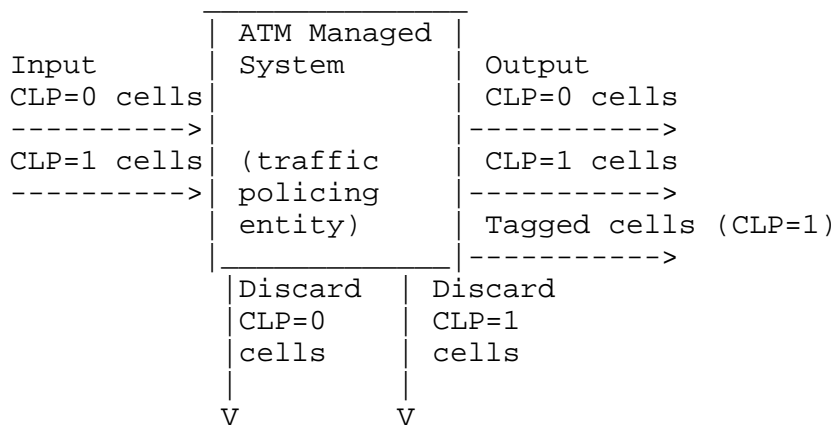


Figure 7: ATM Cell Counters per VCL

In this table, cells coming into and out of the managed ATM system are counted as the total number of cells and the cells with the CLP=0. The CLP=1 counter is derived by subtracting CLP=0 cells from the total cells. In addition, cells that are tagged on the output are also counted. The output CLP=1 cells equals the total cells out count minus both the CLP=0 cells and the tagged cells.

3.1.12. ATM VC General Information Table

This table contains the general information for each VC. It provides an index to the atmSigDescrParamTable defined in this MIB. This table is an extension to the atmVclTable defined in the ATM-MIB [RFC2515].

3.1.13. ATM Interface Configuration Extension Table

The ATM Interface Configuration Extension Table contains ATM interface information that supplements the `atmInterfaceConfTable` defined in [RFC2515]. It includes the configuration information of the interface type (i.e., connection setup procedures) and ILMI.

A network manager can configure the interface to run a specific type of connection setup procedures (i.e., protocol and version) such as ITU-T DSS2, ATM Forum UNI 3.1, PNNI 1.0 or BICI 2.0. It can also dictate the role of the managed entity as one side of the interface. For example, if an interface is configured to run ATM Forum UNI 3.1, the managed entity has to be told to run as either the network side or the user side of the UNI.

The objects `atmIntfConfigType` and `atmIntfConfigSide` are used for configuration and the objects `atmIntfActualType` and `atmIntfActualSide` are used for reading back the actual interface protocol and version.

The following table describes all the valid combinations of configuration of the interface type and side. Note that the value N/A meaning not applicable, should be set to the value `other(1)` when used.

<code>atmIntfConfigType</code> -----	<code>atmIntfConfigSide</code> -----
<code>autoConfig</code>	N/A
<code>ituDss2</code>	user/network
<code>atmfUni3Dot0</code>	user/network
<code>atmfUni3Dot1</code>	user/network
<code>atmfUni4Dot0</code>	user/network
<code>atmfIispUni3Dot0</code>	user/network
<code>atmfIispUni3Dot1</code>	user/network
<code>atmfIispUni4Dot0</code>	user/network
<code>atmfPnni1Dot0</code>	N/A
<code>atmfBici2Dot0</code>	N/A
<code>atmfUniPvcOnly</code>	user/network
<code>atmfNniPvcOnly</code>	N/A

When the value of the object `atmIntfConfigType` is configured to `autoConfig(2)`, the interface type is determined via the ATM Forum ILMI auto-configuration procedures [ATM Forum ILMI]. There is no need to set the interface side since it should be a derived value. The PNNI and BICI interfaces are always symmetric so setting the interface side is also not necessary.

This table also includes the configured and negotiated maximum VPI value per ATM interface, and the configured and negotiated minimum VCI value per ATM interface. Refer to [ATM Forum ILMI] Sections 8.2.3.8 through 8.2.3.10 for a detailed description.

The following figure provides an example how the current minimum VCI values are derived from the configured minimum VCI values and the neighboring minimum VCI values:



```

ifA:  Configured Min SVCC VCI = 32  (configured)
      Current Min SVCC VCI   = 40  (negotiated)

```

```

ifB:  Configured Min SVCC VCI = 40  (configured)
      Current Min SVCC VCI   = 40  (negotiated)

```

```

ifC:  Configured Min SVCC VCI = 32  (configured)
      Current Min SVCC VCI   = 32  (negotiated)

```

```

ifD:  Configured Min SVCC VCI = 32  (configured)
      Current Min SVCC VCI   = 32  (negotiated)

```

Between ifA and ifB, the maximum of the two values for atmInterfaceConfMinSvccVci is 40, so both interfaces set their atmInterfaceCurrentMinSvccVci values to 40. On the other hand, since ifC and ifD both are configured with atmInterfaceConfMinSvccVci values of 32, they set their atmInterfaceCurrentMinSvccVci values to 32.

Figure 8: Examples of configured vs. negotiated ILMI values

3.1.14. ATM ILMI Service Registry Table

This table contains information used by the switch/service to inform ATM hosts of the location of ATM network services such as the LAN Emulation Configuration Server (LECS), the ATM Name Server (ANS), the ATMARP Server, the Multicast Address Resolution Server (MARS), and the NHRP Server (NHS). Entries in this table are exported to adjacent devices via ILMI over either all or a few user selected ATM interfaces.

As an example, let's assume that:

- An ATM switch X has three interfaces if1, if2 and if3.
- There are two ATM network services offered, a1.a2...aN and b1.b2...bN, where a1.a2...aN is an object identifier used to identify the first service, and b1.b2...bN is the object identifier for the other service.
- The first service is available at the ATM address 'a'.
- The second service is available at the ATM address 'b'.
- The first service can be used by any device connecting to the switch X.
- The second service can be used only by devices that connect to interfaces if1 and if3 on switch X.

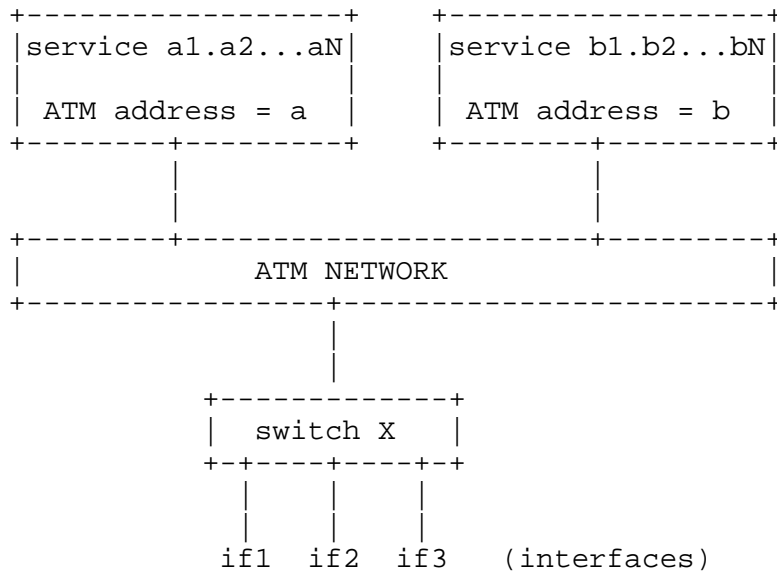


Figure 9: ATM topology with registered services

The table for switch X will contain three entries:

- one entry for the "a1.a2...aN", implicitly available to any devices on switch X.
- two entries for the "b1.b2...bN" (one for each interface where this service can be explicitly used).

The content of the table is:

- Service Identifier:	a1.a2...aN	b1.b2...bN	b1.b2...bN
- ATM address:	a	b	b
- Arbitrary index:	m	n	p
- Available interface:	0	1	3

where the Service Identifier values a1.a2...aN and b1.b2...bN are represented by atmIlmiSrvRegServiceID, the ATM addresses a and b are represented by atmIlmiSrvRegATMAddress, the values m, n, and p are arbitrary non-zero integer parameters (necessary in this example to differentiate the two entries for b1.b2...bN that are both available at the ATM address 'b') represented by atmIlmiSrvRegAddressIndex, and the available interfaces are represented by atmIlmiSrvRegIndex, where the special value 0 indicates any ATM interface.

When querying the ILMI service registry table, through the ILMI protocol:

- the device attached to interface if1 will obtain the address a and b.
- the device attached to interface if2 will obtain the address a only.
- the device attached to interface if3 will obtain the address a and b.

3.1.15. ILMI Network Prefix Table

A table specifying per-interface network prefix(es) supplied by the network side of the UNI during ILMI address registration. When no network prefixes are specified for a particular interface, one or more network prefixes based on the switch address(es) may be used for ILMI address registration.

3.1.16. ATM Switch Address Table

This table contains one or more ATM endsystem addresses on a per-switch basis. These addresses are used to identify the switch. When no ILMI network prefixes are configured for certain interfaces, network prefixes based on the switch address(es) may be used for ILMI address registration.

3.1.17. AAL5 per-VCC Statistics Table

This table contains the AAL5 statistics for the VCCs.

3.1.18. ATM VP Cross-Connect Extension Table

This table extends the atmVpCrossConnectTable defined in ATM-MIB [RFC2515].

3.1.19. ATM VC Cross-Connect Extension Table

This table extends the atmVcCrossConnectTable defined in ATM-MIB [RFC2515].

3.1.20. Currently Failing PVPL Table

This table contains all the PVPLs that are in trouble.

3.1.21. Currently Failing PVCL Table

This table contains all the PVCLs that are in trouble.

3.1.22. Leaf Initiated Join Counter support

Two counter objects are added to count the number of leaf initiated setup requests and setup failures.

3.2. Network and User Addresses

At the user side of a given ATM UNI interface there may be an address, "ifPhysAddress", to identify the interface. In addition, there may be several other addresses which can be used to originate and receive calls. These other addresses that are used to receive calls are listed in the "ifRcvAddrTable" defined in RFC 2863. The registered addresses on the network side are listed in the ATM Registered Address Table. The ATM Registered Address Table is supported by switches and network services. It is not supported by hosts.

3.3. Configuration of VPLs, VCLs, and Cross-Connects

The ATM Managed Objects needed to support the configuration of VPLs, VCLs, and Cross-Connects of the Permanent VPLs and VCLs are defined in the ATM-MIB [RFC2515]. Cross-Connects of the Switched VPLs and VCLs are defined in this memo.

3.4. ATM-related Trap Support

Traps are defined to detect changes in the status of permanent VPLs and VCLs. The current up/down status of each permanent VPL or VCL is indicated by the atmVplOperStatus or atmVclOperStatus object, respectively. Several tables and objects and one trap are defined in

order to help network managers quickly and efficiently detect changes in the status of permanent virtual links. Through use of these tables, objects, and traps, the time consuming and resource intensive task of continuously polling each row in the entire atmVplTable and atmVclTable can be avoided.

The atmIntfPvcFailures counter and the atmIntfCurrentlyFailingPVpls and atmIntfCurrentlyFailingPVcls gauges provide a quick means of determining the status of all PVPLs and PVCLs on an interface. The atmCurrentlyFailingPVplTable and the atmCurrentlyFailingPVclTable list all of the problematic PVPLs and PVCLs, respectively, allowing them to be quickly identified.

The atmIntfPvcFailuresTrap is generated just after a PVPL or PVCL on a particular interface leaves the 'up' operational state. Managers can then determine which PVPLs and/or PVCLs are failing by reading the atmCurrentlyFailingPVplTable and the atmCurrentlyFailingPVclTable. Generation of the atmIntfPvcFailuresTrap is rate limited by suppressing all traps that would occur within atmIntfPvcNotificationInterval of a previous trap for the same interface. Managers should continuously poll the tables and objects mentioned above for at least this amount of time in order to keep up with the state of the network.

4. Conformance and Compliance

See the conformance and compliance statements within the information module.

5. Definitions

ATM2-MIB DEFINITIONS ::= BEGIN

IMPORTS

```

MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
Gauge32, Counter32, Integer32
    FROM SNMPv2-SMI
TruthValue, RowStatus, TimeStamp
    FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
    FROM SNMPv2-CONF
SnmpAdminString
    FROM SNMP-FRAMEWORK-MIB
InterfaceIndex, InterfaceIndexOrZero, ifIndex
    FROM IF-MIB
atmMIBObjects, atmInterfaceConfEntry,
atmVplEntry, atmVplVpi,
atmVclEntry, atmVclVpi, atmVclVci,
```

```
atmVpCrossConnectEntry, atmVcCrossConnectEntry
    FROM ATM-MIB
AtmAddr, AtmSigDescrParamIndex,
AtmInterfaceType, AtmIlmiNetworkPrefix,
AtmVcIdentifier, AtmVpIdentifier,
AtmTrafficDescrParamIndex
    FROM ATM-TC-MIB;
```

atm2MIB MODULE-IDENTITY

LAST-UPDATED "200309230000Z"

ORGANIZATION "IETF ATOMMIB Working Group"

CONTACT-INFO

"ATOMMIB WG

<http://www.ietf.org/html.charters/atommib-charter.html>

Editors:

Faye Ly

Postal: Pedestal Networks
6503 Dumbarton Circle
Fremont, CA 94555
USA

Tel: +1 510 896 2908

E-Mail: faye@pedestalnetworks.com

Michael Noto

Postal: Cisco Systems
170 W. Tasman Drive
San Jose, CA 95134-1706
USA

E-mail: mnoto@cisco.com

Andrew Smith

Postal: Consultant

E-Mail: ah_smith@acm.org

Ethan Mickey Spiegel

Postal: Cisco Systems
170 W. Tasman Drive
San Jose, CA 95134-1706
USA

Tel: +1 408 526 6408

Fax: +1 408 526 6488

E-Mail: mspiegel@cisco.com

Kaj Tesink

Postal: Telcordia Technologies
331 Newman Springs Road

```

                                Red Bank, NJ 07701
                                USA
    Tel:      +1 732 758 5254
    E-mail:   kaj@research.telcordia.com"
DESCRIPTION
    "Copyright (C) The Internet Society (2003). This version of
    this MIB module is part of RFC 3606; see the RFC itself for
    full legal notices.

    This MIB Module is a supplement to the ATM-MIB
    defined in RFC 2515."
REVISION "200309230000Z"
DESCRIPTION
    "Initial version of this MIB, published as RFC 3606."

    ::= { atmMIBObjects 14 }

atm2MIBObjects OBJECT IDENTIFIER ::= {atm2MIB 1}

atm2MIBTraps OBJECT IDENTIFIER ::= {atm2MIB 2}

-- This ATM2-MIB Module consists of the following tables,
-- plus ATM trap support:
--     1. atmSvcVpCrossConnectTable
--     2. atmSvcVcCrossConnectTable
--     3. atmSigStatTable
--     4. atmSigSupportTable
--     5. atmSigDescrParamTable
--     6. atmIfRegisteredAddrTable
--     7. atmVclAddrTable
--     8. atmAddrVclTable
--     9. atmVplStatTable
--    10. atmVplLogicalPortTable
--    11. atmVclStatTable
--    12. atmAal5VclStatTable
--    13. atmVclGenTable
--    14. atmInterfaceExtTable
--    15. atmIlmiSrvRegTable
--    16. atmIlmiNetworkPrefixTable
--    17. atmSwitchAddressTable
--    18. atmVpCrossConnectXTable
--    19. atmVcCrossConnectXTable
--    20. atmCurrentlyFailingPVplTable
--    21. atmCurrentlyFailingPVclTable

-- 1. ATM VPL SVC Cross-Connect Table

atmSvcVpCrossConnectTable OBJECT-TYPE
```

SYNTAX SEQUENCE OF
 AtmSvcVpCrossConnectEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The ATM SVPC Cross-Connect table. A
 bi-directional VP cross-connect between two
 switched VPLs is modeled as one entry in this
 table. A Soft PVPC cross-connect, between a
 soft permanent VPL and a switched VPL, is
 also modeled as one entry in this table."
 ::= { atm2MIBObjects 1 }

atmSvcVpCrossConnectEntry OBJECT-TYPE

SYNTAX AtmSvcVpCrossConnectEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An entry in the ATM SVPC Cross-Connect table.
 This entry is used to model a bi-directional
 ATM VP cross-connect between two VPLs."
 INDEX { atmSvcVpCrossConnectIndex,
 atmSvcVpCrossConnectLowIfIndex,
 atmSvcVpCrossConnectLowVpi,
 atmSvcVpCrossConnectHighIfIndex,
 atmSvcVpCrossConnectHighVpi }
 ::= { atmSvcVpCrossConnectTable 1 }

AtmSvcVpCrossConnectEntry ::= SEQUENCE {
 atmSvcVpCrossConnectIndex INTEGER,
 atmSvcVpCrossConnectLowIfIndex InterfaceIndex,
 atmSvcVpCrossConnectLowVpi AtmVpIdentifier,
 atmSvcVpCrossConnectHighIfIndex InterfaceIndex,
 atmSvcVpCrossConnectHighVpi AtmVpIdentifier,
 atmSvcVpCrossConnectCreationTime TimeStamp,
 atmSvcVpCrossConnectRowStatus RowStatus
 }

atmSvcVpCrossConnectIndex OBJECT-TYPE

SYNTAX INTEGER (1..2147483647)
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "A unique value to identify this SVPC
 cross-connect. For each VP associated
 with this cross-connect, the agent reports
 this cross-connect index value in the
 atmVplCrossConnectIdentifier attribute of the

corresponding atmVplTable entries."
::= { atmSvcVpCrossConnectEntry 1 }

atmSvcVpCrossConnectLowIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the ifIndex value of the ATM interface port for this SVPC 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 atmSvcVpCrossConnectEntry."

::= { atmSvcVpCrossConnectEntry 2 }

atmSvcVpCrossConnectLowVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the VPI value associated with the SVPC cross-connect at the ATM interface that is identified by atmSvcVpCrossConnectLowIfIndex. The VPI value cannot exceed the number supported by the atmInterfaceCurrentMaxSvpcVpi at the low ATM interface port."

::= { atmSvcVpCrossConnectEntry 3 }

atmSvcVpCrossConnectHighIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the ifIndex value of the ATM interface port for this SVC 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 atmSvcVpCrossConnectEntry."

::= { atmSvcVpCrossConnectEntry 4 }

atmSvcVpCrossConnectHighVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the VPI value associated with the SVPC cross-connect at the ATM interface that is identified by atmSvcVpCrossConnectHighIfIndex. The VPI value cannot exceed the number supported by the atmInterfaceCurrentMaxSvpcVpi at the high ATM interface port."

```
::= { atmSvcVpCrossConnectEntry 5 }
```

atmSvcVpCrossConnectCreationTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of the sysUpTime object at the time this bi-directional SVPC cross-connect was created. If the current state was entered prior to the last re-initialization of the agent, then this object contains a zero value."

```
::= { atmSvcVpCrossConnectEntry 6 }
```

atmSvcVpCrossConnectRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object is used to delete rows in the atmSvcVpCrossConnectTable."

```
::= { atmSvcVpCrossConnectEntry 7 }
```

-- 2. ATM VCL SVC Cross-Connect Table

atmSvcVcCrossConnectTable OBJECT-TYPE

SYNTAX SEQUENCE OF AtmSvcVcCrossConnectEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The ATM SVCC Cross-Connect table. A bi-directional VC cross-connect between two switched VCLs is modeled as one entry in this table. A Soft PVCC cross-connect, between a soft permanent VCL and a switched VCL, is also modeled as one entry in this table."

```
::= { atm2MIBObjects 2 }
```

atmSvcVcCrossConnectEntry OBJECT-TYPE

SYNTAX AtmSvcVcCrossConnectEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the ATM SVCC Cross-Connect table.

This entry is used to model a bi-directional ATM VC cross-connect between two VCLs."

```
INDEX { atmSvcVcCrossConnectIndex,
        atmSvcVcCrossConnectLowIfIndex,
        atmSvcVcCrossConnectLowVpi,
        atmSvcVcCrossConnectLowVci,
        atmSvcVcCrossConnectHighIfIndex,
        atmSvcVcCrossConnectHighVpi,
        atmSvcVcCrossConnectHighVci }
```

```
::= { atmSvcVcCrossConnectTable 1 }
```

AtmSvcVcCrossConnectEntry ::= SEQUENCE {

```
    atmSvcVcCrossConnectIndex          INTEGER,
    atmSvcVcCrossConnectLowIfIndex      InterfaceIndex,
    atmSvcVcCrossConnectLowVpi          AtmVpIdentifier,
    atmSvcVcCrossConnectLowVci          AtmVcIdentifier,
    atmSvcVcCrossConnectHighIfIndex     InterfaceIndex,
    atmSvcVcCrossConnectHighVpi         AtmVpIdentifier,
    atmSvcVcCrossConnectHighVci         AtmVcIdentifier,
    atmSvcVcCrossConnectCreationTime    TimeStamp,
    atmSvcVcCrossConnectRowStatus       RowStatus
}
```

atmSvcVcCrossConnectIndex OBJECT-TYPE

SYNTAX INTEGER (1..2147483647)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A unique value to identify this SVCC cross-connect. For each VP associated with this cross-connect, the agent reports this cross-connect index value in the atmVclCrossConnectIdentifier attribute of the corresponding atmVplTable entries."

```
::= { atmSvcVcCrossConnectEntry 1 }
```

atmSvcVcCrossConnectLowIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the ifIndex value of the ATM interface port for this

SVCC 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 atmSvcVcCrossConnectEntry."
::= { atmSvcVcCrossConnectEntry 2 }

atmSvcVcCrossConnectLowVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the VPI value associated with the SVCC cross-connect at the ATM interface that is identified by atmSvcVcCrossConnectLowIfIndex. The VPI value cannot exceed the number supported by the atmInterfaceCurrentMaxSvccVpi at the low ATM interface port."

::= { atmSvcVcCrossConnectEntry 3 }

atmSvcVcCrossConnectLowVci OBJECT-TYPE

SYNTAX AtmVcIdentifier

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the VCI value associated with the SVCC cross-connect at the ATM interface that is identified by atmSvcVcCrossConnectLowIfIndex. The VCI value cannot exceed the number supported by the atmInterfaceCurrentMaxSvccVci at the low ATM interface port."

::= { atmSvcVcCrossConnectEntry 4 }

atmSvcVcCrossConnectHighIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The value of this object is equal to the ifIndex value for the ATM interface port for this SVCC 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 atmSvcVcCrossConnectEntry."

::= { atmSvcVcCrossConnectEntry 5 }

atmSvcVcCrossConnectHighVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The value of this object is equal to the VPI value associated with the SVCC cross-connect at the ATM interface that is identified by atmSvcVcCrossConnectHighIfIndex. The VPI value cannot exceed the number supported by the atmInterfaceCurrentMaxSvccVpi at the high ATM interface port."
::= { atmSvcVcCrossConnectEntry 6 }

atmSvcVcCrossConnectHighVci OBJECT-TYPE

SYNTAX AtmVcIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The value of this object is equal to the VCI value associated with the SVCC cross-connect at the ATM interface that is identified by atmSvcVcCrossConnectHighIfIndex. The VCI value cannot exceed the number supported by the atmInterfaceMaxVciBits at the high ATM interface port."
::= { atmSvcVcCrossConnectEntry 7 }

atmSvcVcCrossConnectCreationTime OBJECT-TYPE

SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of the sysUpTime object at the time this bi-directional SVCC cross-connect was created. If the current state was entered prior to the last re-initialization of the agent, then this object contains a zero value."
::= { atmSvcVcCrossConnectEntry 8 }

atmSvcVcCrossConnectRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "This object is used to delete rows in the atmSvcVcCrossConnectTable."
::= { atmSvcVcCrossConnectEntry 9 }

-- 3. ATM Interface Signalling Statistics Table --

```

atmSigStatTable          OBJECT-TYPE
    SYNTAX                SEQUENCE OF AtmSigStatEntry
    MAX-ACCESS             not-accessible
    STATUS                 current
    DESCRIPTION
        "This table contains ATM interface signalling
        statistics, one entry per ATM signalling
        interface."
    ::= { atm2MIBObjects 3 }

atmSigStatEntry          OBJECT-TYPE
    SYNTAX                AtmSigStatEntry
    MAX-ACCESS             not-accessible
    STATUS                 current
    DESCRIPTION
        "This list contains signalling statistics variables."
    INDEX { ifIndex }
    ::= { atmSigStatTable 1}

AtmSigStatEntry ::= SEQUENCE {
    atmSigSSCOPConEvents      Counter32,
    atmSigSSCOPerrdPdus      Counter32,
    atmSigDetectSetupAttempts Counter32,
    atmSigEmitSetupAttempts  Counter32,
    atmSigDetectUnavailRoutes Counter32,
    atmSigEmitUnavailRoutes  Counter32,
    atmSigDetectUnavailResrcs Counter32,
    atmSigEmitUnavailResrcs  Counter32,
    atmSigDetectCldPtyEvents Counter32,
    atmSigEmitCldPtyEvents   Counter32,
    atmSigDetectMsgErrors    Counter32,
    atmSigEmitMsgErrors      Counter32,
    atmSigDetectClgPtyEvents Counter32,
    atmSigEmitClgPtyEvents   Counter32,
    atmSigDetectTimerExpireds Counter32,
    atmSigEmitTimerExpireds  Counter32,
    atmSigDetectRestarts     Counter32,
    atmSigEmitRestarts       Counter32,
    atmSigInEstabls          Counter32,
    atmSigOutEstabls         Counter32
}

atmSigSSCOPConEvents     OBJECT-TYPE
    SYNTAX                Counter32
    MAX-ACCESS             read-only
    STATUS                 current

```

DESCRIPTION

"SSCOP Connection Events Counter. This counter counts the sum of the following errors:

1) SSCOP Connection Disconnect Counter

The abnormal occurrence of this event is characterized by the expiry of Timer_NO_RESPONSE. (This event is communicated to the layer management with MAA-ERROR code P. See ITU-T Q.2110.)

2) SSCOP Connection Initiation Failure

This condition indicates the inability to establish an SSCOP connection. This event occurs whenever the number of expiries of the connection control timer (Timer_CC) equals or exceeds the MaxCC, or upon receipt of a connection reject message BGREJ PDU. (This event is communicated to layer management with MAA-ERROR code O. See ITU-T Q.2110.)

3) SSCOP Connection Re-Establ/Resynch

This event occurs upon receipt of a BGN PDU or RS PDU."

REFERENCE

"ITU-T Recommendation Q.2110, Broadband Integrated Services Digital Network (B-ISDN) - ATM Adaptation Layer - Service Specific Connection Oriented Protocol (SSCOP) Specification, July 1994."

::= { atmSigStatEntry 1 }

atmSigSSCOPErrdPdus OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"SSCOP Errored PDUs Counter. This counter counts the sum of the following errors:

1) Invalid PDUs.

These are defined in SSCOP and consist of PDUs with an incorrect length (MAA-ERROR code U), an undefined PDU type code, or that are not 32-bit aligned.

2) PDUs that result in MAA-ERROR codes and are

discarded.

See MAA-ERROR codes A-D, F-M, and Q-T defined in ITU-T Q.2110."

REFERENCE

"ITU-T Recommendation Q.2110, Broadband Integrated Services Digital Network (B-ISDN) - ATM Adaptation Layer - Service Specific Connection Oriented Protocol (SSCOP) Specification, July 1994."

```
::= { atmSigStatEntry 2 }
```

atmSigDetectSetupAttempts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Call Setup Attempts Counter. This counter counts the number of call setup attempts (both successful and unsuccessful) detected on this interface."

```
::= { atmSigStatEntry 3 }
```

atmSigEmitSetupAttempts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Call Setup Attempts Counter. This counter counts the number of call setup attempts (both successful and unsuccessful) transmitted on this interface."

```
::= { atmSigStatEntry 4 }
```

atmSigDetectUnavailRoutes OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Route Unavailability detected on this interface. This counter is incremented when a RELEASE, RELEASE COMPLETE (only when not preceded by a RELEASE message for the same call), ADD PARTY REJECT, or STATUS message that contains one of the following cause code values is received (Note: These cause values apply to both UNI3.0 and UNI3.1):

Cause Value	Meaning
-------------	---------

1	unallocated (unassigned) number
2	no route to specified transit network
3	no route to destination

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

```
::= { atmSigStatEntry 5 }
```

atmSigEmitUnavailRoutes OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Route Unavailability transmitted from this interface. This counter is incremented when a RELEASE, RELEASE COMPLETE (only when not preceded by a RELEASE message for the same call), ADD PARTY REJECT, or STATUS message that contains one of the following cause code values is transmitted (Note: These cause values apply to both UNI3.0 and UNI3.1):

Cause Value	Meaning
1	unallocated (unassigned) number
2	no route to specified transit network
3	no route to destination

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

```
::= { atmSigStatEntry 6 }
```

atmSigDetectUnavailResrcs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Resource Unavailability detected on this interface. This counter is incremented when a RELEASE, RELEASE COMPLETE (only when not preceded by a RELEASE message for the same call), ADD PARTY REJECT, or STATUS message that contains one of the following

cause code values is received (Note: These cause values apply to both UNI3.0 and UNI3.1 unless otherwise stated):

Cause Value	Meaning
35	requested VPCI/VCI not available
37	user cell rate not available (UNI3.1 only)
38	network out of order
41	temporary failure
45	no VPCI/VCI available
47	resource unavailable, unspecified
49	Quality of Service unavailable
51	user cell rate not available (UNI3.0 only)
58	bearer capability not presently available
63	Service or option not available, unspecified
92	too many pending add party requests

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

```
::= { atmSigStatEntry 7 }
```

atmSigEmitUnavailResrcs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Resource Unavailability transmitted from this interface. This counter is incremented when a RELEASE, RELEASE COMPLETE (only when not preceded by a RELEASE message for the same call), ADD PARTY REJECT, or STATUS message that contains one of the following cause code values is transmitted (Note: These cause values apply to both UNI3.0 and UNI3.1 unless otherwise stated):

Cause Value	Meaning
35	requested VPCI/VCI not available
37	user cell rate not available (UNI3.1 only)
38	network out of order

41	temporary failure
45	no VPCI/VCI available
47	resource unavailable, unspecified
49	Quality of Service unavailable
51	user cell rate not available (UNI3.0 only)
58	bearer capability not presently available
63	Service or option not available, unspecified
92	too many pending add party requests

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

```
::= { atmSigStatEntry 8 }
```

```
atmSigDetectCldPtyEvents      OBJECT-TYPE
```

```
SYNTAX      Counter32
```

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

```
STATUS      current
```

```
DESCRIPTION
```

"Number of Called Party Responsible For Unsuccessful Call detected on this interface. This counter is incremented when a RELEASE, RELEASE COMPLETE (only when not preceded by a RELEASE message for the same call), ADD PARTY REJECT, or STATUS message that contains one of the following cause code values is received (Note: These cause values apply to both UNI3.0 and UNI3.1):

Cause Value	Meaning
17	user busy
18	no user responding
21	call rejected
22	number changed
23	user rejects all calls with calling line identification restriction (CLIR)
27	destination out of order
31	normal, unspecified
88	incompatible destination

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be

counted.

Note: Cause Value #30 'response to STATUS ENQUIRY' was not included in this memo since it did not apply to a hard failure."

```
::= { atmSigStatEntry 9 }
```

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

"Number of Called Party Responsible For Unsuccessful Call transmitted from this interface. This counter is incremented when a RELEASE, RELEASE COMPLETE (only when not preceded by a RELEASE message for the same call), ADD PARTY REJECT, or STATUS message that contains one of the following cause code values is transmitted (Note: These cause values apply to both UNI3.0 and UNI3.1):

Cause Value	Meaning
17	user busy
18	no user responding
21	call rejected
22	number changed
23	user rejects all calls with calling line identification restriction (CLIR)
27	destination out of order
31	normal, unspecified
88	incompatible destination

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted.

Note: Cause Value #30 'response to STATUS ENQUIRY' was not included in this memo since it did not apply to a hard failure."

```
::= { atmSigStatEntry 10 }
```

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

DESCRIPTION

"Number of Incorrect Messages detected on this interface. The Incorrect Messages Counter reflects any sort of incorrect information in a message. This includes:

- RELEASE, RELEASE COMPLETE, ADD PARTY REJECT, and STATUS messages transmitted, that contain any of the Cause values listed below.
- Ignored messages. These messages are dropped because the message was so damaged that it could not be further processed. A list of dropped messages is compiled below:

1. Message with invalid protocol discriminator
2. Message with errors in the call reference I.E.
 - Bits 5-8 of the first octet not equal to '0000'
 - Bits 1-4 of the first octet indicating a length other than 3 octets
 - RELEASE COMPLETE message received with a call reference that does not relate to a call active or in progress
 - SETUP message received with call reference flag incorrectly set to 1
 - SETUP message received with a call reference for a call that is already active or in progress.
3. Message too short

The following cause values are monitored by this counter (Note: These cause values apply to both UNI3.0 and UNI3.1 unless otherwise stated):

Cause Value	Meaning
10	VPCI/VCI unacceptable (UNI3.0 only)
36	VPCI/VCI assignment failure (UNI3.1 only)
81	invalid call reference value
82	identified channel does not exist
89	invalid endpoint reference
96	mandatory information element is missing
97	message type non-existent or not implemented
99	information element non-existent or not implemented

100 invalid information element contents
101 message not compatible with call state
104 incorrect message length
111 protocol error, unspecified

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

::= { atmSigStatEntry 11 }

atmSigEmitMsgErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Incorrect Messages transmitted on this interface.
The Incorrect Messages Counter reflects any sort of incorrect
information in a message. This includes:

- RELEASE, RELEASE COMPLETE, ADD PARTY REJECT,
and STATUS messages transmitted or
received, that contain any of the Cause values
listed below.
- Ignored messages. These messages are dropped
because the message was so damaged that it could
not be further processed. A list of dropped
messages is compiled below:
 1. Message with invalid protocol discriminator
 2. Message with errors in the call reference I.E.
 - Bits 5-8 of the first octet not equal to
'0000'
 - Bits 1-4 of the first octet indicating a
length other than 3 octets
 - RELEASE COMPLETE message received with a
call reference that does not relate to a
call active or in progress
 - SETUP message received with call reference
flag incorrectly set to 1
 - SETUP message received with a call
reference for a call that is already
active or in progress.
 3. Message too short

The following cause values are monitored by this counter
(Note: These cause values apply to both UNI3.0 and UNI3.1
unless otherwise stated):

Cause Value	Meaning
10	VPCI/VCI unacceptable (UNI3.0 only)
36	VPCI/VCI assignment failure (UNI3.1 only)
81	invalid call reference value
82	identified channel does not exist
89	invalid endpoint reference
96	mandatory information element is missing
97	message type non-existent or not implemented
99	information element non-existent or not implemented
100	invalid information element contents
101	message not compatible with call state
104	incorrect message length
111	protocol error, unspecified

NOTE: For this counter, RELEASE COMPLETE messages that are
a reply to a previous RELEASE message and contain the same
cause value, are redundant (for counting purposes) and
should not be counted."

```
::= { atmSigStatEntry 12 }
```

atmSigDetectClgPtyEvents OBJECT-TYPE

```
SYNTAX            Counter32
MAX-ACCESS       read-only
STATUS            current
```

DESCRIPTION

"Number of Calling Party Events detected on this interface.
This counter monitors error events that occur due to the
originating user doing something wrong. This counter is
incremented when a RELEASE, RELEASE COMPLETE (only when not
preceded by a RELEASE message for the same call), ADD PARTY
REJECT, or STATUS message that contains one of the following
cause code values is received (Note: These cause values
apply to both UNI3.0 and UNI3.1):

Cause Value	Meaning
28	invalid number format (address incomplete)
43	access information discarded
57	bearer capability not authorized
65	bearer capability not implemented

- 73 unsupported combination of traffic parameters
- 78 AAL parameters cannot be supported (UNI3.1 only)
- 91 invalid transit network selection
- 93 AAL parameters cannot be supported (UNI3.0 only)

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

```
::= { atmSigStatEntry 13 }
```

atmSigEmitClgPtyEvents OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Calling Party Events transmitted from this interface. This counter monitors error events that occur due to the originating user doing something wrong. This counter is incremented when a RELEASE, RELEASE COMPLETE (only when not preceded by a RELEASE message for the same call), ADD PARTY REJECT, or STATUS message that contains one of the following cause code values is transmitted (Note: These cause values apply to both UNI3.0 and UNI3.1):

Cause Value	Meaning
-------------	---------

- | | |
|----|--|
| 28 | invalid number format (address incomplete) |
| 43 | access information discarded |
| 57 | bearer capability not authorized |
| 65 | bearer capability not implemented |
| 73 | unsupported combination of traffic parameters |
| 78 | AAL parameters cannot be supported (UNI3.1 only) |
| 91 | invalid transit network selection |
| 93 | AAL parameters cannot be supported (UNI3.0 only) |

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."


```
::= { atmSigStatEntry 14 }
```

```
atmSigDetectTimerExpireds    OBJECT-TYPE
```

```
SYNTAX                      Counter32
```

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

```
STATUS                      current
```

```
DESCRIPTION
```

"Number of Timer Expiries detected on this interface. The Timer Expiries Counter provides a count of network timer expiries, and to some extent, host or switch timer expiries. The conditions for incrementing this counter are:

- Expiry of any network timer
- Receipt of a RELEASE or RELEASE COMPLETE message with Cause #102, 'recovery on timer expiry'.

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

```
::= { atmSigStatEntry 15 }
```

```
atmSigEmitTimerExpireds     OBJECT-TYPE
```

```
SYNTAX                      Counter32
```

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

```
STATUS                      current
```

```
DESCRIPTION
```

"Number of Timer Expiries transmitted from this interface. The Timer Expiries Counter provides a count of network timer expiries, and to some extent, host or switch timer expiries. The conditions for incrementing this counter are:

- Expiry of any network timer
- Receipt of a RELEASE or RELEASE COMPLETE message with Cause #102, 'recovery on timer expiry'.

NOTE: For this counter, RELEASE COMPLETE messages that are a reply to a previous RELEASE message and contain the same cause value, are redundant (for counting purposes) and should not be counted."

```
::= { atmSigStatEntry 16 }
```

```

atmSigDetectRestarts      OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Number of Restart Activity errors detected on this interface.
        The Restart Activity Counter provides a count of host, switch,
        or network restart activity. This counter is incremented when
        receiving a RESTART message."

```

```
 ::= { atmSigStatEntry 17 }
```

```

atmSigEmitRestarts      OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Number of Restart Activity errors transmitted from this
        interface. The Restart Activity Counter provides a count of
        host, switch, or network restart activity. This counter is
        incremented when transmitting a RESTART message."

```

```
 ::= { atmSigStatEntry 18 }
```

```

atmSigInEstabls      OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Number of SVCs established at this signalling entity for
        incoming connections."

```

```
 ::= { atmSigStatEntry 19 }
```

```

atmSigOutEstabls      OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Number of SVCs established at this signalling entity for
        outgoing connections."

```

```
 ::= { atmSigStatEntry 20 }
```

```

-- 4. ATM Interface Signalling Support Table
--
-- This table provides information to support
-- the signalling process which is used to establish
-- ATM Switched Virtual Connections (SVCs).

```

```

atmSigSupportTable          OBJECT-TYPE
    SYNTAX      SEQUENCE OF AtmSigSupportEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table contains ATM local interface configuration
        parameters, one entry per ATM signalling interface."
    ::= { atm2MIBObjects 4 }

atmSigSupportEntry          OBJECT-TYPE
    SYNTAX      AtmSigSupportEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This list contains signalling configuration parameters
        and state variables."
    INDEX { ifIndex }
    ::= { atmSigSupportTable 1}

AtmSigSupportEntry ::= SEQUENCE {
    atmSigSupportClgPtyNumDel    INTEGER,
    atmSigSupportClgPtySubAddr  INTEGER,
    atmSigSupportCldPtySubAddr  INTEGER,
    atmSigSupportHiLyrInfo      INTEGER,
    atmSigSupportLoLyrInfo      INTEGER,
    atmSigSupportBlliRepeatInd  INTEGER,
    atmSigSupportAALInfo        INTEGER,
    atmSigSupportPrefCarrier    OCTET STRING
}

atmSigSupportClgPtyNumDel    OBJECT-TYPE
    SYNTAX      INTEGER { enabled(1), disabled(2) }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object indicates whether the Calling Party Number
        Information Element is transferred to the called party
        address. The value of this object can be:

        - enabled(1) This Information Element is transferred
          to the called party

        - disabled(2) This Information Element is NOT
          transferred to the called party."

    ::= { atmSigSupportEntry 1 }

atmSigSupportClgPtySubAddr    OBJECT-TYPE

```

```

SYNTAX      INTEGER { enabled(1), disabled(2) }
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION

```

"This object indicates whether to accept and transfer the Calling Party Subaddress Information Element from the calling party to the called party. Calling party subaddress information shall only be transferred to the called party if calling party number delivery is enabled (i.e., atmSigSupportClgPtyNumDel = 'enabled(1)'). The value of this object can be:

- enabled(1) This Information Element is transferred to the called party
- disabled(2) This Information Element is NOT transferred to the called party."

```
 ::= { atmSigSupportEntry 2 }
```

```

atmSigSupportCldPtySubAddr      OBJECT-TYPE
SYNTAX      INTEGER { enabled(1), disabled(2) }
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION

```

"This object indicates whether to accept, transfer, and deliver the Called Party Subaddress Information Element from the calling party to the called party. The value of this object can be:

- enabled(1) This Information Element is transferred to the called party
- disabled(2) This Information Element is NOT transferred to the called party."

```
 ::= { atmSigSupportEntry 3 }
```

```

atmSigSupportHiLyrInfo          OBJECT-TYPE
SYNTAX      INTEGER { enabled(1), disabled(2) }
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION

```

"This object indicates whether to accept, transfer, and deliver the Broadband High Layer Information Element from the calling party to the called party. The value of this object can be:

- enabled(1) This Information Element is transferred to the called party

- disabled(2) This Information Element is NOT transferred to the called party."

::= { atmSigSupportEntry 4 }

atmSigSupportLoLyrInfo OBJECT-TYPE

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

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object indicates whether to accept, transfer, and deliver the Broadband Low Layer Information Element from the calling party to the called party. The value of this object can be:

- enabled(1) This Information Element is transferred to the called party
- disabled(2) This Information Element is NOT transferred to the called party."

::= { atmSigSupportEntry 5 }

atmSigSupportBlliRepeatInd OBJECT-TYPE

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

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object indicates whether to accept, transfer, and deliver the Broadband Repeat Indicator with two or three instances of the Broadband Low Layer Information Element for low layer information selection from the calling party to the called party. This object's value should always be disabled(2) if the value of atmSigSupportLoLyrInfo is disabled(2).

The value of this object can be:

- enabled(1) This Information Element is transferred to the called party
- disabled(2) This Information Element is NOT transferred to the called party."

::= { atmSigSupportEntry 6 }

atmSigSupportAALInfo OBJECT-TYPE

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

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object indicates whether to accept, transfer, and deliver the ATM Adaptation Layer Parameters Information Element from the calling party to the called party. The value of this object can be:

- enabled(1) This Information Element is transferred to the called party
- disabled(2) This Information Element is NOT transferred to the called party."

::= { atmSigSupportEntry 7 }

atmSigSupportPrefCarrier OBJECT-TYPE
 SYNTAX OCTET STRING (SIZE(0|4))
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"This parameter identifies the carrier to which intercarrier calls originated from this interface are routed when transit network selection information is not provided by the calling party. If a Carrier Identification Code (CIC) is used the parameter shall contain the CIC. For three-digit CICs, the first octet shall be '0' and the CIC is contained in the three following octets. If the preferred carrier feature is not supported the value is a zero-length string."

::= { atmSigSupportEntry 8 }

-- 5. ATM Signalling Descriptor Parameter Table

atmSigDescrParamTable OBJECT-TYPE
 SYNTAX SEQUENCE OF AtmSigDescrParamEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"A table contains signalling capabilities of VCLs except the Traffic Descriptor. Traffic descriptors are described in the atmTrafficDescrParamTable."

REFERENCE

"ATM User-Network Interface Specification, Version 3.1 (UNI 3.1), September 1994, Section 5.4.5 Variable Length Information Elements."

::= { atm2MIBObjects 5 }

atmSigDescrParamEntry OBJECT-TYPE

```

SYNTAX      AtmSigDescrParamEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "Each entry in this table represents a
    set of signalling capabilities that can
    be applied to a VCL. There is no requirement
    for unique entries, except that the index must
    be unique."
INDEX { atmSigDescrParamIndex }
 ::= { atmSigDescrParamTable 1 }

```

```

AtmSigDescrParamEntry ::=
    SEQUENCE {
        atmSigDescrParamIndex
                                AtmSigDescrParamIndex,
        atmSigDescrParamAalType    INTEGER,
        atmSigDescrParamAalScsType  INTEGER,
        atmSigDescrParamBhliType    INTEGER,

        atmSigDescrParamBhliInfo    OCTET STRING,
        atmSigDescrParamBbcConnConf  INTEGER,
        atmSigDescrParamBlliLayer2   INTEGER,
        atmSigDescrParamBlliLayer3   INTEGER,
        atmSigDescrParamBlliPktSize  INTEGER,
        atmSigDescrParamBlliSnapId   INTEGER,
        atmSigDescrParamBlliOuiPid   OCTET STRING,
        atmSigDescrParamRowStatus    RowStatus
    }

```

```

atmSigDescrParamIndex OBJECT-TYPE
    SYNTAX      AtmSigDescrParamIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The value of this object is used by the
        atmVclGenSigDescrIndex object in the atmVclGenTable to
        identify a row in this table."

    ::= { atmSigDescrParamEntry 1 }

```

```

atmSigDescrParamAalType OBJECT-TYPE
    SYNTAX      INTEGER {
        other(1),      -- not defined
        aal1(2),       -- AAL type 1
        aal34(3),      -- AAL type 3/4
        aal5(4),       -- AAL type 5
    }

```

```

        userDefined(5), -- User-Defined AAL
        aal2(6)         -- AAL type 2
    }
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The AAL type. The value of this object is set to other(1)
    when not defined."

DEFVAL { other }
::= { atmSigDescrParamEntry 2 }

atmSigDescrParamAalSscsType OBJECT-TYPE
    SYNTAX      INTEGER {
        other(1),      -- other, or not used
        assured(2),    -- Data SSCS based on SSCOP
                        -- assured operation
        nonassured(3), -- Data SSCS based on SSCOP
                        -- non-assured operation
        frameRelay(4), -- frame relay SSCS
        null(5)        -- null
    }
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The SSCS type used by this entry."

DEFVAL { other }
::= { atmSigDescrParamEntry 3 }

atmSigDescrParamBhliType OBJECT-TYPE
    SYNTAX      INTEGER {
        other(1),      -- not defined
        iso(2),        -- ISO
        user(3),        -- User specific
        hiProfile(4),   -- Higher layer profile
                        -- this enum applicable to
                        -- UNI 3.0 only
        vendorSpecific(5) -- Vender specific
                        -- application identifier
    }
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The Broadband high layer type."

DEFVAL { other }

```



```
::= { atmSigDescrParamEntry 4 }
```

```
atmSigDescrParamBhliInfo OBJECT-TYPE
```

```
SYNTAX      OCTET STRING (SIZE(0..8))
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

"The Broadband high layer information. When atmSigDescrParamBhliType is set to iso(2), the value of this object is a zero length string. When atmSigDescrParamBhliType is set to user(3), the value of this object is an octet string with length ranging from 0 to 8. When atmSigDescrParamBhliType is set to hiProfile(4), the value of this object is a length of 4 octet string containing user to user profile identifier. When atmSigDescrParamBhliType is set to vendorSpecific(5), the value of this object is a length of 7 octet string, where the most significant 3 octets consist of a globally-administered OUI, and the least significant 4 octets are the vender administered application OUI."

```
DEFVAL { 'H' }
```

```
::= { atmSigDescrParamEntry 5 }
```

```
atmSigDescrParamBbcConnConf OBJECT-TYPE
```

```
SYNTAX      INTEGER {
```

```
    ptp(1),    -- point-to-point
```

```
    ptmp(2)    -- point-to-multipoint
```

```
    }
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

"The Broadband bearer capability user plane connection configuration parameter."

```
DEFVAL { ptp }
```

```
::= { atmSigDescrParamEntry 6 }
```

```
atmSigDescrParamBlliLayer2 OBJECT-TYPE
```

```
SYNTAX      INTEGER {
```

```
    other(1),    -- not specified
```

```
    iso1745(2),    -- Basic mode ISO 1745
```

```
    q921(3),      -- CCITT Recommendation Q.921
```

```
    x25linklayer(4), -- CCITT Recommendation X.25
```

```
                    -- Link Layer
```

```
    x25multilink(5), -- CCITT Recommendation X.25
```

```
                    -- Multilink
```

```
    lapb(6),      -- Extended LAPB; for half
```

```

        -- duplex operation
        hdlcArm(7),      -- HDLC ARM (ISO 4335)
        hdlcNrm(8),     -- HDLC NRM (ISO 4335)
        hdlcAbm(9),     -- HDLC ABM (ISO 4335)
        iso88022(10),   -- LAN logical link control
                        -- (ISO 8802/2)
        x75slp(11),     -- CCITT Recommendation X.75,
                        -- single link
                        -- procedure (SLP)
        q922(12),       -- CCITT Recommendation Q.922
        userDef(13),    -- User specified
        iso7776(14)     -- ISO 7776 DTE-DTE operation
    }
    MAX-ACCESS    read-create
    STATUS        current
    DESCRIPTION
        "The Broadband low layer information, protocol type of layer
        2. The value of this object is other(1) if layer 2 protocol
        is not used."

    DEFVAL { other }
    ::= { atmSigDescrParamEntry 7 }

atmSigDescrParamBlliLayer3 OBJECT-TYPE
    SYNTAX        INTEGER {
        other(1),      -- not specified
        x25pkt(2),     -- CCITT Recommendation X.25
                        -- packet layer
        isoiec8208(3), -- ISO/IEC 8208 (X.25 packet
                        -- level protocol for data
                        -- terminal equipment)
        x223iso8878(4), -- X.223/ISO 8878
        isoiec8473(5), -- ISO/IEC 8473 OSI
                        -- connectionless
                        -- mode protocol
        t70(6),        -- CCITT Recommendation T.70
                        -- minimum
                        -- network layer
        tr9577(7),     -- ISO/IEC TR 9577 Protocol
                        -- Identification in the
                        -- network layer
        userDef(8)     -- user specified
    }
    MAX-ACCESS    read-create
    STATUS        current
    DESCRIPTION
        "The Broadband low layer information, protocol type of layer

```

3. The value of this object is other(1) if layer 3 protocol is not used."

```
DEFVAL { other }
::= { atmSigDescrParamEntry 8 }
```

```
atmSigDescrParamBlliPktSize OBJECT-TYPE
    SYNTAX      INTEGER {
        other(1),      -- not used
        s16(2),        -- 16 octets
        s32(3),        -- 32 octets
        s64(4),        -- 64 octets
        s128(5),       -- 128 octets
        s256(6),       -- 256 octets
        s512(7),       -- 512 octets
        s1024(8),      -- 1028 octets
        s2048(9),      -- 2048 octets
        s4096(10)      -- 4096 octets
    }
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The default packet size defined in B-LLI."
```

```
DEFVAL { other }
::= { atmSigDescrParamEntry 9 }
```

```
atmSigDescrParamBlliSnapId OBJECT-TYPE
    SYNTAX      INTEGER {
        other(1),      -- not used
        true(2),       -- SNAP ID is 1
        false(3)       -- SNAP ID is 0
    }
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The SNAP ID used for Broadband low layer protocol layer 3.
        The value of this object is other(1) if
        atmSigDescrParamBlliLayer3 is set to other(1)."
```

```
DEFVAL { other }
::= { atmSigDescrParamEntry 10 }
```

```
atmSigDescrParamBlliOuiPid OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(0|5))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
```

"The OUI/PID encoding for Broadband low layer protocol layer 3. The value of this object is a zero length string if atmSigDescrParamBlliLayer3 is set to other(1). When used, it is always 5 octets with the most significant octet as the OUI Octet 1 and the least significant octet as the PID Octet 2."

```
DEFVAL { ''H }
::= { atmSigDescrParamEntry 11 }
```

atmSigDescrParamRowStatus OBJECT-TYPE

```
SYNTAX          RowStatus
MAX-ACCESS      read-create
STATUS          current
```

DESCRIPTION

"This object is used to create and delete rows in the atmSigDescrParamTable."

```
::= { atmSigDescrParamEntry 12 }
```

-- 6. ATM Interface Registered Address Table --

atmIfRegisteredAddrTable OBJECT-TYPE

```
SYNTAX          SEQUENCE OF AtmIfRegisteredAddrEntry
MAX-ACCESS      not-accessible
STATUS          current
```

DESCRIPTION

"This table contains a list of ATM addresses that can be used for calls to and from a given interface by a switch or service. The ATM addresses are either registered by the endsystem via ILMI or statically configured. This table does not expose PNNI reachability information. ILMI registered addresses cannot be deleted using this table. This table only applies to switches and network services."

```
::= { atm2MIBObjects 6 }
```

atmIfRegisteredAddrEntry OBJECT-TYPE

```
SYNTAX          AtmIfRegisteredAddrEntry
MAX-ACCESS      not-accessible
STATUS          current
```

DESCRIPTION

"An entry in the ATMInterface Registered Address table."

```
INDEX { ifIndex, atmIfRegAddrAddress }
```

```
::= { atmIfRegisteredAddrTable 1 }
```

```
AtmIfRegisteredAddrEntry ::= SEQUENCE {
    atmIfRegAddrAddress      AtmAddr,
```

```

atmIfRegAddrAddressSource    INTEGER,
atmIfRegAddrOrgScope        INTEGER,
atmIfRegAddrRowStatus        RowStatus
    }

```

atmIfRegAddrAddress OBJECT-TYPE

```

SYNTAX      AtmAddr
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```

"An address registered for a given switch or service interface."

```
 ::= { atmIfRegisteredAddrEntry 1 }
```

atmIfRegAddrAddressSource OBJECT-TYPE

```

SYNTAX      INTEGER {
    other(1),
    static(2),
    dynamic(3)
}

```

```

MAX-ACCESS  read-only
STATUS      current
DESCRIPTION

```

"The type of address source for a given ATM Address. The value dynamic(3) is indicated when ILMI is used."

```
 ::= { atmIfRegisteredAddrEntry 2 }
```

atmIfRegAddrOrgScope OBJECT-TYPE

```

SYNTAX      INTEGER {
    localNetwork(1),
    localNetworkPlusOne(2),
    localNetworkPlusTwo(3),
    siteMinusOne(4),
    intraSite(5),
    sitePlusOne(6),
    organizationMinusOne(7),
    intraOrganization(8),
    organizationPlusOne(9),
    communityMinusOne(10),
    intraCommunity(11),
    communityPlusOne(12),
    regional(13),
    interRegional(14),
    global(15)
}

```

```

MAX-ACCESS  read-create
STATUS      current
DESCRIPTION

```

"This object indicates the organizational scope for the referenced address. The information of the referenced address shall not be distributed outside the indicated scope. Refer to Annex 5.3 of ATM Forum UNI Signalling 4.0 for guidelines regarding the use of organizational scopes.

This value cannot be configured for ILMI-registered addresses.

The default values for organizational scope are localNetwork(1) for ATM group addresses, and global(15) for individual addresses."

```
::= { atmIfRegisteredAddrEntry 3 }
```

atmIfRegAddrRowStatus OBJECT-TYPE

```
SYNTAX      RowStatus
MAX-ACCESS   read-create
STATUS       current
```

DESCRIPTION

"This object is used to create and delete rows in the atmIfRegisteredAddrTable. Rows created dynamically (e.g., ILMI-registered addresses) cannot be deleted using this object."

```
::= { atmIfRegisteredAddrEntry 4 }
```

-- 7. ATM VPI/VCI to Address Mapping Table

atmVclAddrTable OBJECT-TYPE

```
SYNTAX      SEQUENCE OF AtmVclAddrEntry
MAX-ACCESS   not-accessible
STATUS       current
```

DESCRIPTION

"This table provides a mapping between the atmVclTable and the ATM called party/calling party address. This table can be used to retrieve the calling party and called party ATM address pair for a given VCL. Note that there can be more than one pair of calling party and called party ATM addresses for a VCL in a point to multi-point call."

```
::= { atm2MIBObjects 7 }
```

atmVclAddrEntry OBJECT-TYPE

```
SYNTAX      AtmVclAddrEntry
MAX-ACCESS   not-accessible
STATUS       current
```

DESCRIPTION

"Each entry in this table represents a binding between a VCL and an ATM address associated with this call. This ATM

address can be either the called party address or the calling party address. There can be more than one pair of calling/called party ATM addresses associated with the VCL entry for point to multi-point calls. Objects atmVclAddrType, and atmVclAddrRowStatus are required during row creation."

```
INDEX { ifIndex, atmVclVpi, atmVclVci,
        atmVclAddrAddr }
 ::= { atmVclAddrTable 1 }
```

AtmVclAddrEntry ::=

```
SEQUENCE {
    atmVclAddrAddr      AtmAddr,
    atmVclAddrType      INTEGER,
    atmVclAddrRowStatus RowStatus
}
```

atmVclAddrAddr OBJECT-TYPE

```
SYNTAX      AtmAddr
MAX-ACCESS  not-accessible
STATUS      current
```

DESCRIPTION

"An ATM address on one end of the VCL. For SVCs, the agent supplies the value of this object at creation time. For PVC VCL, the manager can supply the value of this object during or after the PVC VCL creation."

```
::= { atmVclAddrEntry 1 }
```

atmVclAddrType OBJECT-TYPE

```
SYNTAX      INTEGER {
    callingParty(1),
    calledParty(2)
}
```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The type of ATM Address represented by the object atmVclAddrAddr. Choices are either the calling party ATM address or the called party ATM address."

```
::= { atmVclAddrEntry 2 }
```

atmVclAddrRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object is used to create or destroy an entry from this table. Note that the manager entity

can only destroy the PVC VCLs."
 ::= { atmVclAddrEntry 3 }

-- 8. ATM Address to VPI/VCI Mapping Table

--

-- This table provides an alternative way to access
 -- a row in the atmVclAddrTable by using
 -- an ATM address as an index, instead of
 -- the ifIndex

atmAddrVclTable OBJECT-TYPE
 SYNTAX SEQUENCE OF AtmAddrVclEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table provides an alternative way to retrieve the
 atmVclTable. This table can be used to retrieve the
 indexing to the atmVclTable by an ATM address."

::= { atm2MIBObjects 8 }

atmAddrVclEntry OBJECT-TYPE
 SYNTAX AtmAddrVclEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "Each entry in this table represents an entry in the
 atmVclTable of the ATM-MIB by its ATM address. The ATM
 address is either the calling or called party ATM address
 of the call. Entries in this table are read only.
 They show up when entries are created in the
 atmVclAddrTable."
 REFERENCE
 "Tesink, K., Editor, Definitions of Managed Objects
 for ATM Management, RFC 2515, Bell Communications
 Research, February, 1999."
 INDEX { atmVclAddrAddr, atmAddrVclAtmIfIndex,
 atmAddrVclVpi, atmAddrVclVci }
 ::= { atmAddrVclTable 1 }

AtmAddrVclEntry ::=
 SEQUENCE {
 atmAddrVclAtmIfIndex InterfaceIndex,
 atmAddrVclVpi AtmVpIdentifier,
 atmAddrVclVci AtmVcIdentifier,
 atmAddrVclAddrType INTEGER
 }

atmAddrVclAtmIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The interface index of the ATM interface to which this VCL pertains. This object combined with the atmAddrVclVpi and atmAddrVclVci objects serves as an index to the atmVclTable."

::= { atmAddrVclEntry 1 }

atmAddrVclVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The VPI value of the VCL. This object combined with the atmAddrVclAtmIfIndex and atmAddrVclVci objects serves as an index to the atmVclTable."

::= { atmAddrVclEntry 2 }

atmAddrVclVci OBJECT-TYPE

SYNTAX AtmVcIdentifier

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The VCI value of the VCL. This object combined with the atmAddrVclAtmIfIndex and atmAddrVclVpi objects serves as an index to the atmVclTable."

::= { atmAddrVclEntry 3 }

atmAddrVclAddrType OBJECT-TYPE

SYNTAX INTEGER {

callingParty(1),

calledParty(2) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The type of ATM Address represented by the object atmVclAddrAddr. Choices are either calling party address or called party address."

::= { atmAddrVclEntry 4 }

-- 9. ATM VPL Statistics Table

atmVplStatTable OBJECT-TYPE

SYNTAX SEQUENCE OF AtmVplStatEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains all statistics counters per VPL. It is used to monitor the usage of the VPL in terms of incoming cells and outgoing cells."

::= { atm2MIBObjects 9 }

atmVplStatEntry OBJECT-TYPE

SYNTAX AtmVplStatEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry in this table represents a VPL."

INDEX { ifIndex, atmVplVpi }

::= { atmVplStatTable 1 }

AtmVplStatEntry ::=

SEQUENCE {

atmVplStatTotalCellIns	Counter32,
atmVplStatClp0CellIns	Counter32,
atmVplStatTotalDiscards	Counter32,
atmVplStatClp0Discards	Counter32,
atmVplStatTotalCellOuts	Counter32,
atmVplStatClp0CellOuts	Counter32,
atmVplStatClp0Tagged	Counter32

}

atmVplStatTotalCellIns OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of valid ATM cells received by this VPL including both CLP=0 and CLP=1 cells. The cells are counted prior to the application of the traffic policing."

::= { atmVplStatEntry 1 }

atmVplStatClp0CellIns OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of valid ATM cells received by this VPL with CLP=0. The cells are counted prior to the application of the traffic policing."

::= { atmVplStatEntry 2 }

atmVplStatTotalDiscards OBJECT-TYPE

```

SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current

```

DESCRIPTION

"The total number of valid ATM cells discarded by the traffic policing entity. This includes cells originally received with CLP=0 and CLP=1."

```
 ::= { atmVplStatEntry 3 }
```

atmVplStatClp0Discards OBJECT-TYPE

```

SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current

```

DESCRIPTION

"The total number of valid ATM cells received with CLP=0 and discarded by the traffic policing entity."

```
 ::= { atmVplStatEntry 4 }
```

atmVplStatTotalCellOuts OBJECT-TYPE

```

SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current

```

DESCRIPTION

"The total number of valid ATM cells transmitted by this VPL. This includes both CLP=0 and CLP=1 cells."

```
 ::= { atmVplStatEntry 5 }
```

atmVplStatClp0CellOuts OBJECT-TYPE

```

SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current

```

DESCRIPTION

"The total number of valid ATM cells transmitted with CLP=0 by this VPL."

```
 ::= { atmVplStatEntry 6 }
```

atmVplStatClp0Tagged OBJECT-TYPE

```

SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current

```

DESCRIPTION

"The total number of valid ATM cells tagged by the traffic policing entity from CLP=0 to CLP=1."

```
 ::= { atmVplStatEntry 7 }
```

-- 10. ATM Logical Port Configuration Table

atmVplLogicalPortTable OBJECT-TYPE

```

SYNTAX          SEQUENCE OF AtmVplLogicalPortEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "Indicates whether the VPL is an ATM Logical Port interface
    (ifType=80)."
```

::= { atm2MIBObjects 10 }

atmVplLogicalPortEntry OBJECT-TYPE

```

SYNTAX          AtmVplLogicalPortEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "An entry with information about the ATM Logical Port
    interface."
```

AUGMENTS { atmVplEntry }

::= { atmVplLogicalPortTable 1 }

AtmVplLogicalPortEntry ::=

```

SEQUENCE {
    atmVplLogicalPortDef          INTEGER,
    atmVplLogicalPortIndex       InterfaceIndexOrZero
}
```

atmVplLogicalPortDef OBJECT-TYPE

```

SYNTAX          INTEGER {
                    notLogicalIf(1),
                    isLogicalIf(2)
                  }
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "Indicates whether the VPC at this VPL interface is an ATM
    Logical Port interface."
```

DEFVAL { notLogicalIf }

::= { atmVplLogicalPortEntry 1 }

atmVplLogicalPortIndex OBJECT-TYPE

```

SYNTAX          InterfaceIndexOrZero
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The ifTable index of the ATM logical port interface
    associated with this VPL. The distinguished value of zero
    indicates that the agent has not (yet) assigned such an
    ifTable Index. The zero value must be assigned by the agent
    if the value of atmVplLogicalPortDef is set to notLogicalIf,
    or if the VPL row is not active."
```

```
::= { atmVplLogicalPortEntry 2 }
```

```
-- 11. ATM VCL Statistics Table
```

```
atmVclStatTable    OBJECT-TYPE
    SYNTAX          SEQUENCE OF AtmVclStatEntry
    MAX-ACCESS      not-accessible
    STATUS           current
    DESCRIPTION
        "This table contains all statistics counters per VCL. It is
        used to monitor the usage of the VCL in terms of incoming
        cells and outgoing cells."
    ::= { atm2MIBObjects 11 }
```

```
atmVclStatEntry    OBJECT-TYPE
    SYNTAX          AtmVclStatEntry
    MAX-ACCESS      not-accessible
    STATUS           current
    DESCRIPTION
        "Each entry in this table represents a VCL."
    INDEX { ifIndex, atmVclVpi, atmVclVci }
    ::= { atmVclStatTable 1 }
```

```
AtmVclStatEntry ::=
    SEQUENCE {
        atmVclStatTotalCellIns      Counter32,
        atmVclStatClp0CellIns       Counter32,
        atmVclStatTotalDiscards     Counter32,
        atmVclStatClp0Discards      Counter32,
        atmVclStatTotalCellOuts     Counter32,
        atmVclStatClp0CellOuts      Counter32,
        atmVclStatClp0Tagged        Counter32
    }
```

```
atmVclStatTotalCellIns OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION
        "The total number of valid ATM cells received by this VCL
        including both CLP=0 and CLP=1 cells. The cells are counted
        prior to the application of the traffic policing."
    ::= { atmVclStatEntry 1 }
```

```
atmVclStatClp0CellIns OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS           current
```

DESCRIPTION

"The number of valid ATM cells received by this VCL with CLP=0. The cells are counted prior to the application of the traffic policing."

::= { atmVclStatEntry 2 }

atmVclStatTotalDiscards OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of valid ATM cells discarded by the traffic policing entity. This includes cells originally received with CLP=0 and CLP=1."

::= { atmVclStatEntry 3 }

atmVclStatClp0Discards OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of valid ATM cells received with CLP=0 and discarded by the traffic policing entity."

::= { atmVclStatEntry 4 }

atmVclStatTotalCellOuts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of valid ATM cells transmitted by this VCL. This includes both CLP=0 and CLP=1 cells."

::= { atmVclStatEntry 5 }

atmVclStatClp0CellOuts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of valid ATM cells transmitted with CLP=0 by this VCL."

::= { atmVclStatEntry 6 }

atmVclStatClp0Tagged OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of valid ATM cells tagged by the traffic policing entity from CLP=0 to CLP=1."
 ::= { atmVclStatEntry 7 }

-- 12. ATM AAL5 per-VCC Statistics Table

atmAal5VclStatTable OBJECT-TYPE
 SYNTAX SEQUENCE OF AtmAal5VclStatEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table provides a collection of objects providing AAL5 configuration and performance statistics of a VCL."
 ::= { atm2MIBObjects 12 }

atmAal5VclStatEntry OBJECT-TYPE
 SYNTAX AtmAal5VclStatEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "Each entry in this table represents an AAL5 VCL, and is indexed by ifIndex values of AAL5 interfaces and the associated VPI/VCI values."
 INDEX { ifIndex, atmVclVpi, atmVclVci }
 ::= { atmAal5VclStatTable 1 }

AtmAal5VclStatEntry ::=
 SEQUENCE {
 atmAal5VclInPkts Counter32,
 atmAal5VclOutPkts Counter32,
 atmAal5VclInOctets Counter32,
 atmAal5VclOutOctets Counter32
 }

atmAal5VclInPkts OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of AAL5 CPCS PDUs received on the AAL5 VCC at the interface identified by the ifIndex."
 ::= { atmAal5VclStatEntry 1 }

atmAal5VclOutPkts OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

```

        "The number of AAL5 CPCS PDUs transmitted on the AAL5 VCC
        at the interface identified by the ifIndex."
 ::= { atmAal5VclStatEntry 2 }

```

```
atmAal5VclInOctets OBJECT-TYPE
```

```
SYNTAX Counter32
```

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

```
STATUS current
```

```
DESCRIPTION
```

```

        "The number of octets contained in AAL5 CPCS PDUs received
        on the AAL5 VCC at the interface identified by the ifIndex."

```

```
 ::= { atmAal5VclStatEntry 3 }
```

```
atmAal5VclOutOctets OBJECT-TYPE
```

```
SYNTAX Counter32
```

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

```
STATUS current
```

```
DESCRIPTION
```

```

        "The number of octets contained in AAL5 CPCS PDUs
        transmitted on the AAL5 VCC at the interface identified by
        the ifIndex."

```

```
 ::= { atmAal5VclStatEntry 4 }
```

-- 13. ATM VC General Information Table

```
atmVclGenTable OBJECT-TYPE
```

```
SYNTAX SEQUENCE OF AtmVclGenEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```

        "General Information for each VC."

```

```
 ::= { atm2MIBObjects 13 }
```

```
atmVclGenEntry OBJECT-TYPE
```

```
SYNTAX AtmVclGenEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```

        "An entry with general information about the ATM VC."

```

```
AUGMENTS { atmVclEntry }
```

```
 ::= { atmVclGenTable 1 }
```

```
AtmVclGenEntry ::=
```

```
SEQUENCE {
```

```
    atmVclGenSigDescrIndex      AtmSigDescrParamIndex
```

```
}
```



```

atmVclGenSigDescrIndex    OBJECT-TYPE
    SYNTAX                 AtmSigDescrParamIndex
    MAX-ACCESS             read-create
    STATUS                 current
    DESCRIPTION
        "The value of this object identifies the row in the ATM
        Signalling Descriptor Parameter Table which applies to this
        VCL."
    ::= { atmVclGenEntry 1 }

```

-- 14. ATM Interface Configuration Extension Table

```

atmInterfaceExtTable      OBJECT-TYPE
    SYNTAX                 SEQUENCE OF AtmInterfaceExtEntry
    MAX-ACCESS             not-accessible
    STATUS                 current
    DESCRIPTION
        "This table contains ATM interface configuration and monitoring
        information not defined in the atmInterfaceConfTable from the
        ATM-MIB. This includes the type of connection setup procedures,
        ILMI information, and information on the VPI/VCI range."
    REFERENCE
        "Tesink, K., Editor, Definitions of Managed Objects
        for ATM Management, RFC 2515, Bell Communications
        Research, February, 1999."
    ::= { atm2MIBObjects 14 }

```

```

atmInterfaceExtEntry      OBJECT-TYPE
    SYNTAX                 AtmInterfaceExtEntry
    MAX-ACCESS             not-accessible
    STATUS                 current
    DESCRIPTION
        "An entry extends the atmInterfaceConfEntry defined in the ATM-
        MIB. Each entry corresponds to an ATM interface."
    REFERENCE
        "Tesink, K., Editor, Definitions of Managed Objects
        for ATM Management, RFC 2515, Bell Communications
        Research, February, 1999."
    AUGMENTS { atmInterfaceConfEntry }
    ::= { atmInterfaceExtTable 1 }

```

```

AtmInterfaceExtEntry      ::= SEQUENCE {
    atmIntfConfigType      AtmInterfaceType,
    atmIntfActualType      AtmInterfaceType,
    atmIntfConfigSide      INTEGER,
    atmIntfActualSide      INTEGER,
    atmIntfIlmiAdminStatus BITS,
    atmIntfIlmiOperStatus  BITS,

```

```

atmIntfIlmiFsmState                INTEGER,
atmIntfIlmiEstablishConPollIntvl   Integer32,
atmIntfIlmiCheckConPollIntvl      Integer32,
atmIntfIlmiConPollInactFactor      Integer32,
atmIntfIlmiPublicPrivateIndctr     INTEGER,
atmInterfaceConfMaxSvpcVpi         INTEGER,
atmInterfaceCurrentMaxSvpcVpi      INTEGER,
atmInterfaceConfMaxSvccVpi         INTEGER,
atmInterfaceCurrentMaxSvccVpi      INTEGER,
atmInterfaceConfMinSvccVci         INTEGER,
atmInterfaceCurrentMinSvccVci      INTEGER,
atmIntfSigVccRxTrafficDescrIndex   AtmTrafficDescrParamIndex,
atmIntfSigVccTxTrafficDescrIndex   AtmTrafficDescrParamIndex,
atmIntfPvcFailures                  Counter32,
atmIntfCurrentlyFailingPVpls        Gauge32,
atmIntfCurrentlyFailingPVcls        Gauge32,
atmIntfPvcFailuresTrapEnable        TruthValue,
atmIntfPvcNotificationInterval     INTEGER,
atmIntfLeafSetupFailures            Counter32,
atmIntfLeafSetupRequests            Counter32 }

```

atmIntfConfigType OBJECT-TYPE

SYNTAX AtmInterfaceType

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The type of connection setup procedures configured for the ATM interface. Setting this variable to a value of 'other' is not allowed."

DEFVAL { autoConfig }

::= { atmInterfaceExtEntry 1 }

atmIntfActualType OBJECT-TYPE

SYNTAX AtmInterfaceType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The type of connection setup procedures currently being used on the interface. This may reflect a manually configured value for the interface type, or may be determined by other means such as auto-configuration. A value of 'autoConfig' indicates that auto-configuration was requested but has not yet been completed."

::= { atmInterfaceExtEntry 2 }

atmIntfConfigSide OBJECT-TYPE

SYNTAX INTEGER {

```

        other(1),
        user(2),
        network(3) }
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
    "The configured role of the managed entity as one side of the ATM
    interface. This value does not apply when the object
    atmIntfConfigType is set to 'autoConfig', 'atmfPnnilDot0', or
    'atmfBici2Dot0'."
 ::= { atmInterfaceExtEntry 3 }

atmIntfActualSide    OBJECT-TYPE
SYNTAX                INTEGER {
                        other(1),
                        user(2),
                        network(3),
                        symmetric(4) }
MAX-ACCESS            read-only
STATUS                current
DESCRIPTION
    "The current role used by the managed entity to represent one
    side of the ATM interface."
 ::= { atmInterfaceExtEntry 4 }

atmIntfIlmiAdminStatus    OBJECT-TYPE
SYNTAX                    BITS { ilmi(0),
                                ilmiAddressRegistration(1),
                                ilmiConnectivity(2),
                                ilmiPvcPvpMgmt(3),
                                ilmiSigVccParamNegotiation(4) }
MAX-ACCESS                read-write
STATUS                    current
DESCRIPTION
    "Indicates which components of ILMI are administratively enabled
    on this interface. If the 'ilmi' bit is not set, then no ILMI
    components are operational. ILMI components other than auto-
    configuration that are not represented in the value have their
    administrative status determined according to the 'ilmi' bit.
    The ILMI auto-configuration component is enabled/disabled by the
    atmIntfConfigType object."
 ::= { atmInterfaceExtEntry 5 }

atmIntfIlmiOperStatus    OBJECT-TYPE
SYNTAX                    BITS { ilmi(0),
                                ilmiAddressRegistration(1),
                                ilmiConnectivity(2),
                                ilmiPvcPvpMgmt(3),

```

```

                                ilmiSigVccParamNegotiation(4) }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "Indicates which components of ILMI are operational on this
    interface."
 ::= { atmInterfaceExtEntry 6 }

atmIntfIlmiFsmState      OBJECT-TYPE
SYNTAX             INTEGER { stopped(1),
                             linkFailing(2),
                             establishing(3),
                             configuring(4),
                             retrievingNetworkPrefixes(5),
                             registeringNetworkPrefixes(6),
                             retrievingAddresses(7),
                             registeringAddresses(8),
                             verifying(9) }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "Indicates the state of the ILMI Finite State Machine associated
    with this interface."

    REFERENCE
        "ATM Forum, Integrated Local Management Interface
        (ILMI) Specification, Version 4.0, af-ilmi-0065.000,
        September 1996, Appendix 1"
 ::= { atmInterfaceExtEntry 7 }

atmIntfIlmiEstablishConPollIntvl      OBJECT-TYPE
SYNTAX      Integer32 (1..65535)
UNITS       "seconds"
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The amount of time S between successive transmissions of ILMI
    messages on this interface for the purpose of detecting
    establishment of ILMI connectivity."
REFERENCE
    "ATM Forum, Integrated Local Management Interface
    (ILMI) Specification, Version 4.0, af-ilmi-0065.000,
    September 1996, Section 8.3.1"
DEFVAL { 1 }
 ::= { atmInterfaceExtEntry 8 }

atmIntfIlmiCheckConPollIntvl      OBJECT-TYPE
SYNTAX      Integer32 (0..65535)

```

UNITS "seconds"
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "The amount of time T between successive transmissions of ILMI messages on this interface for the purpose of detecting loss of ILMI connectivity. The distinguished value zero disables ILMI connectivity procedures on this interface."

REFERENCE

"ATM Forum, Integrated Local Management Interface (ILMI) Specification, Version 4.0, af-ilmi-0065.000, September 1996, Section 8.3.1"

DEFVAL { 5 }
 ::= { atmInterfaceExtEntry 9 }

atmIntfIlmiConPollInactFactor OBJECT-TYPE

SYNTAX Integer32 (0..65535)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The number K of consecutive polls on this interface for which no ILMI response message is received before ILMI connectivity is declared lost."

REFERENCE

"ATM Forum, Integrated Local Management Interface (ILMI) Specification, Version 4.0, af-ilmi-0065.000, September 1996, Section 8.3.1"

DEFVAL { 4 }
 ::= { atmInterfaceExtEntry 10 }

atmIntfIlmiPublicPrivateIndctr OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 public(2),
 private(3)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Specifies whether this end of the interface is advertised in ILMI as a device of the 'public' or 'private' type."

DEFVAL { private }
 ::= { atmInterfaceExtEntry 11 }

atmInterfaceConfMaxSvpcVpi OBJECT-TYPE

SYNTAX INTEGER (0..4095)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The maximum VPI that the signalling stack on the ATM interface is configured to support for allocation to switched virtual path connections."

::= { atmInterfaceExtEntry 12 }

atmInterfaceCurrentMaxSvpcVpi OBJECT-TYPE

SYNTAX INTEGER (0..4095)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum VPI that the signalling stack on the ATM interface may currently allocate to switched virtual path connections. This value is the minimum of atmInterfaceConfMaxSvpcVpi, and the atmInterfaceMaxSvpcVpi of the interface's UNI/NNI peer.

If the interface does not negotiate with its peer to determine the maximum VPI that can be allocated to SVPCs on the interface, then the value of this object must equal atmInterfaceConfMaxSvpcVpi."

::= { atmInterfaceExtEntry 13 }

atmInterfaceConfMaxSvccVpi OBJECT-TYPE

SYNTAX INTEGER (0..4095)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The maximum VPI that the signalling stack on the ATM interface is configured to support for allocation to switched virtual channel connections."

::= { atmInterfaceExtEntry 14 }

atmInterfaceCurrentMaxSvccVpi OBJECT-TYPE

SYNTAX INTEGER (0..4095)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum VPI that the signalling stack on the ATM interface may currently allocate to switched virtual channel connections. This value is the minimum of atmInterfaceConfMaxSvccVpi, and the atmInterfaceConfMaxSvccVpi of the interface's UNI/NNI peer.

If the interface does not negotiate with its peer to determine the maximum VPI that can be allocated to SVCCs on the interface, then the value of this object must equal atmInterfaceConfMaxSvccVpi."

::= { atmInterfaceExtEntry 15 }

atmInterfaceConfMinSvccVci OBJECT-TYPE
SYNTAX INTEGER (0..65535)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The minimum VCI that the signalling stack on the ATM interface
 is configured to support for allocation to switched virtual
 channel connections."
 ::= { atmInterfaceExtEntry 16 }

atmInterfaceCurrentMinSvccVci OBJECT-TYPE
SYNTAX INTEGER (0..65535)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The minimum VCI that the signalling stack on the ATM interface
 may currently allocate to switched virtual channel connections.
 This value is the maximum of atmInterfaceConfMinSvccVci, and the
 atmInterfaceConfMinSvccVci of the interface's UNI/NNI peer.
 If the interface does not negotiate with its peer to determine
 the minimum VCI that can be allocated to SVCCs on the interface,
 then the value of this object must equal
 atmInterfaceConfMinSvccVci."
 ::= { atmInterfaceExtEntry 17 }

atmIntfSigVccRxTrafficDescrIndex OBJECT-TYPE
SYNTAX AtmTrafficDescrParamIndex
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "This object identifies the row in the atmTrafficDescrParamTable
 used during ILMI auto-configuration to specify the advertised
 signalling VCC traffic parameters for the receive direction.
 The traffic descriptor resulting from ILMI auto-configuration of
 the signalling VCC is indicated in the atmVclTable."
 ::= { atmInterfaceExtEntry 18 }

atmIntfSigVccTxTrafficDescrIndex OBJECT-TYPE
SYNTAX AtmTrafficDescrParamIndex
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "This object identifies the row in the atmTrafficDescrParamTable
 used during ILMI auto-configuration to specify the advertised
 signalling VCC traffic parameters for the transmit direction.
 The traffic descriptor resulting from ILMI auto-configuration of
 the signalling VCC is indicated in the atmVclTable."
 ::= { atmInterfaceExtEntry 19 }

atmIntfPvcFailures OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times the operational status of a PVPL or PVCL on this interface has gone down."

```
::= { atmInterfaceExtEntry 20 }
```

atmIntfCurrentlyFailingPVpls OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current number of VPLs on this interface for which there is an active row in the atmVplTable having an atmVplConnKind value of 'pvc' and an atmVplOperStatus with a value other than 'up'."

```
::= { atmInterfaceExtEntry 21 }
```

atmIntfCurrentlyFailingPVcls OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current number of VCLs on this interface for which there is an active row in the atmVclTable having an atmVclConnKind value of 'pvc' and an atmVclOperStatus with a value other than 'up'."

```
::= { atmInterfaceExtEntry 22 }
```

atmIntfPvcFailuresTrapEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Allows the generation of traps in response to PVCL or PVPL failures on this interface."

DEFVAL { false }

```
::= { atmInterfaceExtEntry 23 }
```

atmIntfPvcNotificationInterval OBJECT-TYPE

SYNTAX INTEGER (1..3600)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The minimum interval between the sending of atmIntfPvcFailuresTrap notifications for this interface."

DEFVAL { 30 }


```
::= { atmInterfaceExtEntry 24 }
```

```
atmIntfLeafSetupFailures OBJECT-TYPE
```

```
SYNTAX Counter32
```

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

```
STATUS current
```

```
DESCRIPTION
```

"Number of setup failures. For root, this is the number of rejected setup requests and for leaf, this is the number of setup failure received."

```
::= { atmInterfaceExtEntry 25 }
```

```
atmIntfLeafSetupRequests OBJECT-TYPE
```

```
SYNTAX Counter32
```

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

```
STATUS current
```

```
DESCRIPTION
```

"Number of setup requests. For root, this includes both incoming setup request and root initiated setup requests."

```
::= { atmInterfaceExtEntry 26 }
```

-- 15. ATM ILMI Service Registry Table

```
atmIlmiSrvcRegTable OBJECT-TYPE
```

```
SYNTAX SEQUENCE OF AtmIlmiSrvcRegEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

"This table contains a list of all the ATM network services known by this device.

The characteristics of these services are made available through the ILMI, using the ILMI general-purpose service registry MIB. These services may be made available to all ATM interfaces (atmIlmiSrvcRegIndex = 0) or to some specific ATM interfaces only (atmIlmiSrvcRegIndex = ATM interface index)."

```
::= { atm2MIBObjects 15 }
```

```
atmIlmiSrvcRegEntry OBJECT-TYPE
```

```
SYNTAX AtmIlmiSrvcRegEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

"Information about a single service provider that is available to the user-side of an adjacent device through the ILMI.

Implementors need to be aware that if the size of the atmIlmiSrvcRegServiceID exceeds 112 sub-identifiers then OIDs of

column instances in this table will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2, or SNMPv3."

```
INDEX { atmIlmiSrvcRegIndex,
        atmIlmiSrvcRegServiceID,
        atmIlmiSrvcRegAddressIndex }
 ::= { atmIlmiSrvcRegTable 1 }
```

```
AtmIlmiSrvcRegEntry ::= SEQUENCE {
    atmIlmiSrvcRegIndex          InterfaceIndexOrZero,
    atmIlmiSrvcRegServiceID      OBJECT IDENTIFIER,
    atmIlmiSrvcRegAddressIndex   INTEGER,
    atmIlmiSrvcRegATMAddress     AtmAddr,
    atmIlmiSrvcRegParm1          OCTET STRING,
    atmIlmiSrvcRegRowStatus      RowStatus
}
```

```
atmIlmiSrvcRegIndex OBJECT-TYPE
    SYNTAX      InterfaceIndexOrZero
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
```

"The ATM interface where the service defined in this entry can be made available to an ATM device attached to this interface.

The value of 0 has a special meaning: when an ATM service is defined in an entry whose atmIlmiSrvcRegIndex is zero, the ATM service is available to ATM devices connected to any ATM interface. (default value(s)).

When the user-side of an adjacent device queries the content of the ILMI service registry MIB (using the ILMI protocol), the local network-side responds with the ATM services defined in atmIlmiSrvcRegTable entries, provided that these entries are indexed by:

- the corresponding ifIndex value (atmIlmiSrvcRegIndex equal to the ifIndex of the interface to which the adjacent device is connected) - zero (atmIlmiSrvcRegIndex=0)."

```
::= { atmIlmiSrvcRegEntry 1 }
```

```
atmIlmiSrvcRegServiceID OBJECT-TYPE
    SYNTAX      OBJECT IDENTIFIER
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
```

"This is the service identifier which uniquely identifies the

type of service at the address provided in the table. The object identifiers for the LAN Emulation Configuration Server (LECS) and the ATM Name Server (ANS) are defined in the ATM Forum ILMI Service Registry MIB. The object identifiers for the ATMARP Server, the Multicast Address Resolution Server (MARS), and the NHRP Server (NHS) are defined in RFC 2601, RFC 2602, and RFC 2603, respectively."

```
::= { atmIlmiSrvcRegEntry 2 }
```

atmIlmiSrvcRegAddressIndex OBJECT-TYPE

SYNTAX INTEGER (1..2147483647)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An arbitrary integer to differentiate multiple rows containing different ATM addresses for the same service on the same interface. This number need NOT be the same as the corresponding ILMI atmSrvcRegAddressIndex MIB object."

```
::= { atmIlmiSrvcRegEntry 3 }
```

atmIlmiSrvcRegATMAddress OBJECT-TYPE

SYNTAX AtmAddr

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This is the full address of the service. The user-side of the adjacent device may use this address to establish a connection with the service."

```
::= { atmIlmiSrvcRegEntry 4 }
```

atmIlmiSrvcRegParm1 OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(1..255))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An octet string used according to the value of atmIlmiSrvcRegServiceID."

```
::= { atmIlmiSrvcRegEntry 5 }
```

atmIlmiSrvcRegRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object is used to create or destroy an entry from this table."

```
::= { atmIlmiSrvcRegEntry 6 }
```

-- 16. ILMI Network Prefix Table

```

atmIlmiNetworkPrefixTable    OBJECT-TYPE
    SYNTAX          SEQUENCE OF AtmIlmiNetworkPrefixEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "A table specifying per-interface network prefix(es) supplied by
        the network side of the UNI during ILMI address registration.
        When no network prefixes are specified for a particular
        interface, one or more network prefixes based on the switch
        address(es) may be used for ILMI address registration."
    ::= { atm2MIBObjects 16 }

atmIlmiNetworkPrefixEntry OBJECT-TYPE
    SYNTAX          AtmIlmiNetworkPrefixEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Information about a single network prefix supplied by the
        network side of the UNI during ILMI address registration. Note
        that the index variable atmIlmiNetPrefixPrefix is a variable-
        length string, and as such the rule for variable-length strings
        in section 7.7 of RFC 2578 applies."
    INDEX           { ifIndex,
                     atmIlmiNetPrefixPrefix }
    ::= { atmIlmiNetworkPrefixTable 1 }

AtmIlmiNetworkPrefixEntry ::=
    SEQUENCE {
        atmIlmiNetPrefixPrefix      AtmIlmiNetworkPrefix,
        atmIlmiNetPrefixRowStatus    RowStatus
    }

atmIlmiNetPrefixPrefix    OBJECT-TYPE
    SYNTAX          AtmIlmiNetworkPrefix
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The network prefix specified for use in ILMI address
        registration."
    ::= { atmIlmiNetworkPrefixEntry 1 }

atmIlmiNetPrefixRowStatus    OBJECT-TYPE
    SYNTAX          RowStatus
    MAX-ACCESS      read-create
    STATUS          current
    DESCRIPTION

```

"Used to create, delete, activate and de-activate network prefixes used in ILMI address registration."

::= { atmIlmiNetworkPrefixEntry 2 }

-- 17. ATM Switch Address Table

atmSwitchAddressTable OBJECT-TYPE

SYNTAX SEQUENCE OF AtmSwitchAddressEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains one or more ATM endsystem addresses on a per-switch basis. These addresses are used to identify the switch. When no ILMI network prefixes are configured for certain interfaces, network prefixes based on the switch address(es) may be used for ILMI address registration."

::= { atm2MIBObjects 17 }

atmSwitchAddressEntry OBJECT-TYPE

SYNTAX AtmSwitchAddressEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the ATM Switch Address table."

INDEX { atmSwitchAddressIndex }

::= { atmSwitchAddressTable 1 }

AtmSwitchAddressEntry ::=

```
SEQUENCE {
    atmSwitchAddressIndex      Integer32,
    atmSwitchAddressAddress    OCTET STRING,
    atmSwitchAddressRowStatus  RowStatus
}
```

atmSwitchAddressIndex OBJECT-TYPE

SYNTAX Integer32 (1..65535)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An arbitrary index used to enumerate the ATM endsystem addresses for this switch."

::= { atmSwitchAddressEntry 1 }

atmSwitchAddressAddress OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(13|20))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An ATM endsystem address or address prefix used to identify this switch. When no ESI or SEL field is specified, the switch may generate the ESI and SEL fields automatically to obtain a complete 20-byte ATM endsystem address."

::= { atmSwitchAddressEntry 2 }

atmSwitchAddressRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"Used to create, delete, activate, and de-activate addresses used to identify this switch."

::= { atmSwitchAddressEntry 3 }

-- 18. ATM VP Cross-Connect Extension Table

atmVpCrossConnectXTable OBJECT-TYPE

SYNTAX SEQUENCE OF AtmVpCrossConnectXEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"This table contains one row per VP Cross-Connect represented in the atmVpCrossConnectTable."

::= { atm2MIBObjects 18 }

atmVpCrossConnectXEntry OBJECT-TYPE

SYNTAX AtmVpCrossConnectXEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"Information about a particular ATM VP Cross-Connect.

Each entry provides an two objects that name the Cross-Connect.

One is assigned by the Service User and the other by the Service Provider."

AUGMENTS { atmVpCrossConnectEntry }

::= { atmVpCrossConnectXTable 1 }

AtmVpCrossConnectXEntry ::= SEQUENCE {
 atmVpCrossConnectUserName SnmpAdminString,
 atmVpCrossConnectProviderName SnmpAdminString
}

atmVpCrossConnectUserName OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(0..255))
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This is a service user assigned textual representation of a VPC PVC."

::= { atmVpCrossConnectXEntry 1 }

atmVpCrossConnectProviderName OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(0..255))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a system supplied textual representation of VPC PVC. It is assigned by the service provider."

::= { atmVpCrossConnectXEntry 2 }

-- 19. ATM VC Cross-Connect Extension Table

atmVcCrossConnectXTable OBJECT-TYPE

SYNTAX SEQUENCE OF AtmVcCrossConnectXEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains one row per VC Cross-Connect represented in the atmVcCrossConnectTable."

::= { atm2MIBObjects 19 }

atmVcCrossConnectXEntry OBJECT-TYPE

SYNTAX AtmVcCrossConnectXEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about a particular ATM VC Cross-Connect.

Each entry provides an two objects that name the Cross-Connect.

One is assigned by the Service User and the other by the Service Provider."

AUGMENTS { atmVcCrossConnectEntry }

::= { atmVcCrossConnectXTable 1 }

AtmVcCrossConnectXEntry ::= SEQUENCE {

atmVcCrossConnectUserName SnmpAdminString,

atmVcCrossConnectProviderName SnmpAdminString

}

atmVcCrossConnectUserName OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(0..255))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This is a service user assigned textual representation of a VCC

```

    PVC."
 ::= { atmVcCrossConnectXEntry 1 }

```

```

atmVcCrossConnectProviderName OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(0..255))
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "This is a system supplied textual representation of VCC PVC.  It
         is assigned by the service provider."
 ::= { atmVcCrossConnectXEntry 2 }

```

-- 20. Currently Failing PVPL Table

```

atmCurrentlyFailingPVplTable      OBJECT-TYPE
    SYNTAX      SEQUENCE OF AtmCurrentlyFailingPVplEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "A table indicating all VPLs for which there is an active row in
         the atmVplTable having an atmVplConnKind value of 'pvc' and an
         atmVplOperStatus with a value other than 'up'."
 ::= { atm2MIBObjects 20 }

atmCurrentlyFailingPVplEntry      OBJECT-TYPE
    SYNTAX      AtmCurrentlyFailingPVplEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "Each entry in this table represents a VPL for which the
         atmVplRowStatus is 'active', the atmVplConnKind is 'pvc', and the
         atmVplOperStatus is other than 'up'."
    INDEX      { ifIndex, atmVplVpi }
 ::= { atmCurrentlyFailingPVplTable 1 }

```

```

AtmCurrentlyFailingPVplEntry ::=
    SEQUENCE {
        atmCurrentlyFailingPVplTimeStamp      TimeStamp
    }

```

```

atmCurrentlyFailingPVplTimeStamp OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The time at which this PVPL began to fail."
 ::= { atmCurrentlyFailingPVplEntry 1 }

```


-- 21. Currently Failing PVCL Table

```

atmCurrentlyFailingPVclTable      OBJECT-TYPE
    SYNTAX          SEQUENCE OF AtmCurrentlyFailingPVclEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "A table indicating all VCLs for which there is an active row in
        the atmVclTable having an atmVclConnKind value of 'pvc' and an
        atmVclOperStatus with a value other than 'up'."
    ::= { atm2MIBObjects 21 }

atmCurrentlyFailingPVclEntry      OBJECT-TYPE
    SYNTAX          AtmCurrentlyFailingPVclEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Each entry in this table represents a VCL for which the
        atmVclRowStatus is 'active', the atmVclConnKind is 'pvc', and the
        atmVclOperStatus is other than 'up'."
    INDEX           { ifIndex, atmVclVpi, atmVclVci }
    ::= { atmCurrentlyFailingPVclTable 1 }

AtmCurrentlyFailingPVclEntry ::=
    SEQUENCE {
        atmCurrentlyFailingPVclTimeStamp      TimeStamp
    }

atmCurrentlyFailingPVclTimeStamp  OBJECT-TYPE
    SYNTAX          TimeStamp
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The time at which this PVCL began to fail."
    ::= { atmCurrentlyFailingPVclEntry 1 }

-- ATM PVC Traps

atmPvcTraps      OBJECT IDENTIFIER ::= { atm2MIBTraps 1 }

atmPvcTrapsPrefix  OBJECT IDENTIFIER ::= { atmPvcTraps 0 }

atmIntfPvcFailuresTrap  NOTIFICATION-TYPE
    OBJECTS          { ifIndex, atmIntfPvcFailures,
                      atmIntfCurrentlyFailingPVpls,
                      atmIntfCurrentlyFailingPVcls }
    STATUS          current
    DESCRIPTION

```

"A notification indicating that one or more PVPLs or PVCLs on this interface has failed since the last atmPvcFailuresTrap was sent. If this trap has not been sent for the last atmIntfPvcNotificationInterval, then it will be sent on the next increment of atmIntfPvcFailures."

::= { atmPvcTrapsPrefix 1 }

-- Conformance Information

atm2MIBConformance OBJECT IDENTIFIER ::= {atm2MIB 3}

atm2MIBGroups OBJECT IDENTIFIER ::= {atm2MIBConformance 1}

atm2MIBCompliances OBJECT IDENTIFIER ::= {atm2MIBConformance 2}

-- Compliance Statements

atm2MIBCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for SNMP entities which represent ATM interfaces. The compliance statements are used to determine if a particular group or object applies to hosts, networks/switches, or both. The Common group is defined as applicable to all three."

MODULE -- this module

MANDATORY-GROUPS { atmCommonGroup }

-- Objects in the ATM Switch/Service/Host Group

GROUP atmCommonStatsGroup

DESCRIPTION

"This group is mandatory for systems that are supporting per-VPC or per-VCC counters."

OBJECT atmVplLogicalPortDef

MIN-ACCESS read-only

DESCRIPTION

"This object is mandatory for systems support ATM Logical Port interfaces."

OBJECT atmIntfSigVccRxTrafficDescrIndex

DESCRIPTION

"This object is mandatory for systems that support negotiation of signalling VCC traffic parameters through ILMI."

OBJECT atmIntfSigVccTxTrafficDescrIndex

DESCRIPTION

"This object is mandatory for systems that support negotiation of signalling VCC traffic parameters through ILMI."

OBJECT atmCurrentlyFailingPVplTimeStamp

DESCRIPTION

"This object is optional."

OBJECT atmCurrentlyFailingPVclTimeStamp

DESCRIPTION

"This object is optional."

OBJECT atmIntfLeafSetupFailures

DESCRIPTION

"This object is optional."

OBJECT atmIntfLeafSetupRequests

DESCRIPTION

"This object is optional."

-- Objects in the ATM Switch/Service Group

GROUP atmSwitchSvcGroup

DESCRIPTION

"This group is mandatory for a Switch/Service that implements ATM interfaces."

OBJECT atmIfRegAddrRowStatus

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 atmSvcVpCrossConnectRowStatus

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 atmSvcVcCrossConnectRowStatus

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)"

-- Objects in the ATM Switch/Service Signalling Group

GROUP atmSwitchServcSigGroup

DESCRIPTION

"This group's write access is not required."

-- Objects in the ATM Switch/Service Notifications Group

GROUP atmSwitchServcNotifGroup

DESCRIPTION

"This group is optional for systems implementing support for an ATM Switch or an ATM Network Service."

-- Objects in the ATM Switch Group

GROUP atmSwitchGroup

DESCRIPTION

"This group is optional for a switch that implements ATM interfaces."

-- Objects in the ATM Service Group

GROUP atmServcGroup

DESCRIPTION

"This group is mandatory for systems implementing support for an ATM Network Service."

-- Objects in the ATM Host Group

GROUP atmHostGroup

DESCRIPTION

"This group is mandatory for a Host that implements ATM interfaces."

OBJECT atmVclAddrType

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT atmVclAddrRowStatus

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)."

-- ATM Host Sig Descriptor Parameter Group

GROUP atmHostSigDescrGroup

DESCRIPTION

"This group is mandatory for a Host that implements ATM interfaces. Write access is not required for this group."

::= { atm2MIBCompliances 1 }

-- *****

-- Units of Conformance

-- Mandatory for ATM hosts and switch/service providers

atmCommonGroup OBJECT-GROUP

OBJECTS {

 atmSigSSCOPConEvents,
 atmSigSSCOPErrdPdus,
 atmSigDetectSetupAttempts,
 atmSigEmitSetupAttempts,
 atmSigDetectUnavailRoutes,
 atmSigEmitUnavailRoutes,
 atmSigDetectUnavailResrcs,
 atmSigEmitUnavailResrcs,
 atmSigDetectCldPtyEvents,
 atmSigEmitCldPtyEvents,
 atmSigDetectMsgErrors,
 atmSigEmitMsgErrors,
 atmSigDetectClgPtyEvents,
 atmSigEmitClgPtyEvents,
 atmSigDetectTimerExpireds,
 atmSigEmitTimerExpireds,
 atmSigDetectRestarts,
 atmSigEmitRestarts,
 atmSigInEstabls,
 atmSigOutEstabls,
 atmVplLogicalPortDef,
 atmVplLogicalPortIndex,
 atmInterfaceConfMaxSvpcVpi,
 atmInterfaceCurrentMaxSvpcVpi,
 atmInterfaceConfMaxSvccVpi,
 atmInterfaceCurrentMaxSvccVpi,
 atmInterfaceConfMinSvccVci,
 atmInterfaceCurrentMinSvccVci,
 atmIntfSigVccRxTrafficDescrIndex,
 atmIntfSigVccTxTrafficDescrIndex,
 atmIntfPvcFailures,
 atmIntfCurrentlyFailingPVpls,
 atmIntfCurrentlyFailingPVcls,

```

    atmIntfPvcNotificationInterval,
    atmIntfPvcFailuresTrapEnable,
    atmIntfLeafSetupFailures,
    atmIntfLeafSetupRequests,
    atmIntfConfigType,
    atmIntfActualType,
    atmIntfConfigSide,
    atmIntfActualSide,
    atmIntfIlmiAdminStatus,
    atmIntfIlmiOperStatus,
    atmIntfIlmiFsmState,
    atmIntfIlmiEstablishConPollIntvl,
    atmIntfIlmiCheckConPollIntvl,
    atmIntfIlmiConPollInactFactor,
    atmIntfIlmiPublicPrivateIndctr,
    atmCurrentlyFailingPVplTimeStamp,
    atmCurrentlyFailingPVclTimeStamp
}

STATUS          current
DESCRIPTION
    "A collection of objects providing information
    for a Switch/Service/Host that implements
    ATM interfaces."
 ::= { atm2MIBGroups 1 }

atmCommonStatsGroup      OBJECT-GROUP

OBJECTS {
    atmVclStatTotalCellIns,
    atmVclStatClp0CellIns,
    atmVclStatTotalDiscards,
    atmVclStatClp0Discards,
    atmVclStatTotalCellOuts,
    atmVclStatClp0CellOuts,
    atmVclStatClp0Tagged,
    atmVplStatTotalCellIns,
    atmVplStatClp0CellIns,
    atmVplStatTotalDiscards,
    atmVplStatClp0Discards,
    atmVplStatTotalCellOuts,
    atmVplStatClp0CellOuts,
    atmVplStatClp0Tagged
}

STATUS          current
DESCRIPTION
    "A collection of objects providing information

```

```
    for a Switch/Service/Host that implements
    ATM VCL and VPL Statistics"
 ::= { atm2MIBGroups 2 }

atmSwitchSrvcGroup      OBJECT-GROUP

OBJECTS {
    atmIlmiSrvcRegATMAddress,
    atmIlmiSrvcRegParm1,
    atmIlmiSrvcRegRowStatus,
    atmIlmiNetPrefixRowStatus,
    atmSvcVpCrossConnectCreationTime,
    atmSvcVpCrossConnectRowStatus,
    atmSvcVcCrossConnectCreationTime,
    atmSvcVcCrossConnectRowStatus,
    atmIfRegAddrAddressSource,
    atmIfRegAddrOrgScope,
    atmIfRegAddrRowStatus}
STATUS      current
DESCRIPTION
    "A collection of objects providing information
    for a Switch/Service that implements ATM interfaces."
 ::= { atm2MIBGroups 3 }

atmSwitchSrvcSigGroup   OBJECT-GROUP

OBJECTS {
    atmSigSupportClgPtyNumDel,
    atmSigSupportClgPtySubAddr,
    atmSigSupportCldPtySubAddr,
    atmSigSupportHiLyrInfo,
    atmSigSupportLoLyrInfo,
    atmSigSupportBlldRepeatInd,
    atmSigSupportAALInfo,
    atmSigSupportPrefCarrier}
STATUS      current
DESCRIPTION
    "A collection of objects providing information
    for a Switch/Service that implements ATM signalling."
 ::= { atm2MIBGroups 4 }

atmSwitchSrvcNotifGroup NOTIFICATION-GROUP

NOTIFICATIONS { atmIntfPvcFailuresTrap }
STATUS      current
DESCRIPTION
    "A collection of notifications providing information
    for a Switch/Service that implements ATM interfaces."
```

```
::= { atm2MIBGroups 5 }

atmSwitchGroup      OBJECT-GROUP
  OBJECTS {
    atmSwitchAddressAddress,
    atmSwitchAddressRowStatus }
  STATUS      current
  DESCRIPTION
    "A collection of objects providing information
    for an ATM switch."
  ::= { atm2MIBGroups 6 }

atmSvcGroup         OBJECT-GROUP

OBJECTS {
  atmVpCrossConnectUserName,
  atmVpCrossConnectProviderName,
  atmVcCrossConnectUserName,
  atmVcCrossConnectProviderName }
STATUS      current
DESCRIPTION
  "A collection of objects providing information
  for an ATM Network Service."
::= { atm2MIBGroups 7 }

atmHostGroup        OBJECT-GROUP

OBJECTS {
  atmAal5VclInPkts,
  atmAal5VclOutPkts,
  atmAal5VclInOctets,
  atmAal5VclOutOctets,
  atmVclAddrType,
  atmVclAddrRowStatus,
  atmAddrVclAddrType,
  atmVclGenSigDescrIndex}
STATUS      current
DESCRIPTION
  "A collection of objects providing information
  for a Host that implements ATM interfaces."
::= { atm2MIBGroups 8 }

atmHostSigDescrGroup  OBJECT-GROUP

OBJECTS {
  atmSigDescrParamAalType,
  atmSigDescrParamAalSscsType,
  atmSigDescrParamBhliType,
```



```

        atmSigDescrParamBhliInfo,
        atmSigDescrParamBbcConnConf,
        atmSigDescrParamBlliLayer2,
        atmSigDescrParamBlliLayer3,
        atmSigDescrParamBlliPktSize,
        atmSigDescrParamBlliSnapId,
        atmSigDescrParamBlliOuiPid,
        atmSigDescrParamRowStatus}
STATUS      current
DESCRIPTION
    "A collection of objects providing information
    for a Host that implements ATM interfaces."
 ::= { atm2MIBGroups 9 }

```

END

6. Acknowledgments

This document is a product of the ATOMMIB Working Group. Special thanks go to Gary Hanson of ADC Telecommunications for his quality contributions to this specification.

The authors also like to acknowledge John Flick of HP for his thorough and valuable review of this memo.

7. References

7.1. Normative References

- | | |
|---------------------|---|
| [RFC2515] | Tesink, K., Ed., "Definitions of Managed Objects for ATM Management", RFC 2515, February 1999. |
| [ATM Forum 3.0] | ATM Forum, "ATM User-Network Interface Specification, Version 3.0 (UNI 3.0)", September 1993. |
| [ATM Forum UNI 3.1] | ATM Forum, "ATM User-Network Interface Specification, Version 3.1 (UNI 3.1)", September 1994. |
| [ATM Forum LANE] | ATM Forum, "LAN Emulation Client Management Specification, Version 1.0", af-lane-0038.000, September 1995. |
| [RFC1694] | Brown, T. and K. Tesink, "Definitions of Managed Objects for SMDS Interfaces using SMiv2", RFC 1694, August 1994. |

- [ATM Forum ILMI] ATM Forum, "Integrated Local Management Interface (ILMI) Specification, Version 4.0",
- [RFC3592] Tesink, K., "Definitions of Managed Objects for the Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Interface Type", RFC 3592, September 2003.
- [RFC2496] Fowler, D., Ed., "Definitions of Managed Objects for the DS3/E3 Interface Type", RFC 2496, January 1999.
- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.

7.2. Informative References

- [RFC3410] Case, J., Mundy, R., Partain, D. and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

8. Security Considerations

There are a number of management objects defined in this MIB module with 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. These are the tables and objects and their sensitivity/vulnerability:

Table	Sensitivity/vulnerability
1. atmSvcVpCrossConnectTable	Deletion of VP cross-connects
2. atmSvcVcCrossConnectTable	Deletion of VC cross-connects
3. atmSigStatTable	Signalling read-only statistics
4. atmSigSupportTable	Signalling configuration params
5. atmSigDescrParamTable	Signalling configuration params
6. atmIfRegisteredAddrTable	Interface address table
7. atmVclAddrTable	VCL/Address mapping table
8. atmAddrVclTable	VCL/Address mapping table (read-only)
9. atmVplStatTable	VPL statistics (read-only)
10. atmVplLogicalPortTable	VPL logical port configuration
11. atmVclStatTable	VCL statistics (read-only)
12. atmAal5VclStatTable	AAL5 statistics (read-only)
13. atmVclGenTable	Signalling configuration
14. atmInterfaceExtTable	Interface configuration
15. atmIlmiSrvRegTable	ILMI config params
16. atmIlmiNetworkPrefixTable	ILMI config params
17. atmSwitchAddressTable	Switch address info
18. atmVpCrossConnectXTable	VP cross-connect params
19. atmVcCrossConnectXTable	VC cross-connect params
20. atmCurrentlyFailingPVplTable	PVPL status info (read-only)
21. atmCurrentlyFailingPVclTable	PVCL status info (read-only)

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP.

SNMP versions prior to SNMPv3 did not include adequate security. 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 module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an

instance of this MIB module 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.

9. Intellectual Property Statement

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

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director.

10. Authors' Addresses

Faye Ly
Pedestal Networks
6503 Dumbarton Circle
Fremont, CA 94555
USA

Phone (510) 896-2908
EMail: faye@pedestalnetworks.com

Michael Noto
Cisco Systems
170 W. Tasman Drive
San Jose, CA 95134-1706
USA

EMail: mnoto@cisco.com

Andrew Smith
Consultant

EMail: ah_smith@acm.org

Ethan Mickey Spiegel
Cisco Systems
170 W. Tasman Drive
San Jose, CA 95134-1706

Phone: (408) 526-6408
EMail: mspiegel@cisco.com

Kaj Tesink
Telcordia Technologies
331 Newman Springs Road
Red Bank, NJ 07701-7020

Phone: (732) 758-5254
EMail: kaj@research.telcordia.com

11. Full Copyright Statement

Copyright (C) The Internet Society (2003). All Rights Reserved.

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

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

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

Acknowledgement

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

