Network Working Group
Request for Comments: 2955
Category: Standards Track

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October 2000

Definitions of Managed Objects for Monitoring and Controlling the Frame Relay/ATM PVC Service Interworking Function

Status of this Memo

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Abstract

This memo defines a Management Information Base (MIB) to configure, monitor, and control a service interworking function (IWF) for Permanent Virtual Connections (PVC) between Frame Relay and Asynchronous Transfer Mode (ATM) technologies.

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1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- An overall architecture, described in RFC 2571 [1].

- Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIv1 and described in STD 16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIv2, is described in STD 58, RFC 2578 [5], STD 58, RFC 2579 [6] and STD 58, RFC 2580 [7].

- Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].

- Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].

- A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

A more detailed introduction to the current SNMP Management Framework can be found in RFC 2570 [16].

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

This memo specifies a MIB module that is compliant to the SMIv2. A MIB conforming to the SMIv1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIv2 will be converted into textual descriptions in SMIv1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

2. Conventions

The keywords MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, NOT RECOMMENDED, MAY, and OPTIONAL, when they appear in this document, are to be interpreted as described in RFC 2119 [23].

3. Overview

This document defines a Management Information Base (MIB) for monitoring and controlling a service interworking function (IWF) for Permanent Virtual Connections (PVC) between Frame Relay and Asynchronous Transfer Mode (ATM) technologies. The agreements on which this MIB is based were reached jointly by the Frame Relay Forum and the ATM Forum and are documented in the Frame Relay Forum Document FRF.8 [17].

3.1. Frame Relay/ATM Service Interworking Background

Frame relay to ATM interworking is a function that exchanges Protocol Data Units (PDU) between a frame relay service user and an ATM service user. Two types of interworking functions are specified for frame relay and ATM permanent virtual connection (PVC) service users: network interworking and service interworking.

Network interworking provides PDU forwarding between frame relay service users inter-connected by an ATM service. Both endpoints are frame relay PVCs. Frame Relay to ATM PVC Network Interworking is defined in [20].

Service interworking provides PDU forwarding so that the ATM service user performs no frame relaying service-specific functions and the frame relay service user performs no ATM service-specific functions. Optionally, the service IWF translates particular higher layer protocols to satisfy the requirements of end-systems. Frame Relay to ATM PVC Service Interworking is defined in [17].

This MIB describes management objects used to provision, monitor, and control a Frame Relay/ATM PVC Service IWF.

FRF.8 [17] does not address point-to-multipoint applications of the IWF. Implementations MAY provide support for point-to-multipoint capability using this MIB.

Consult FRF.8 [17] for more details on the operation of a Frame Relay/ATM PVC Service IWF.

3.2. Structure of the MIB

The Frame Relay/ATM PVC Service IWF managed objects are organized as follows:

(1) FR/ATM PVC Service IWF cross-connect table,

(2) Connection description table, and

(3) Notification object

The IWF cross-connect table contains one or more rows for each inter-worked connection. Each inter-worked connection is uniquely identified by the frAtmIwfConnIndex object. In the case of point-to-point, a single row is present. In the case of point-to-multipoint, one row exists for each multipoint destination. Index objects for the ATM port, VPI, VCI, frame relay port, and frame relay DLCI distinguish the constituent rows used in a point-to-multipoint case.

Each inter-worked connection has attributes governing behavior of the IWF. These attributes describe how the IWF should transform a PDU during the forwarding process and provide rules for:

(1) Mapping the ATM CLP bit to frame relay DE bit

(2) Mapping the ATM congestion notification bit to frame relay congestion bits

(3) Mapping higher protocol encapsulations between ATM and frame relay

(4) Performing fragmentation and reassembly

(5) Performing ARP translation between ATM and frame relay

Typically, most connections share the same attributes. The attributes are represented in this MIB by the connection description table. Each row of the connection description table contains the attribute settings common to one or more inter-worked connections. One example would be full mapping and translation. All cross-connect table entries that require full mapping and translation services set the frAtmIwfConnectionDescriptor object to the index value for the connection description table row that contains objects set to values that provide full mapping and translation services.

A notification object provides cross-connect status change alerts.

3.3. Relationship to Other MIBs

The Frame Relay/ATM PVC Service IWF MIB describes the cross-connections between frame relay and ATM service users. Each PVC endpoint is provisioned and managed with a technology-specific MIB as described below.

Each technology-specific MIB has a table of PVC endpoints (indexed by ifIndex and logical link address such as the DLCI or VPI/VCI). In the absence of interworking, two endpoints are cross-connected via a technology-specific cross connect table (e.g., the atmVcCrossConnectTable in the ATM MIB). However, a connection between a frame relay endpoint and an ATM endpoint requires a cross-connect in the ATM IWF MIB.

The following sections describe the relationship between the technology-specific MIBs and the FR/ATM PVC Service IWF MIB.

3.3.1. Frame Relay Service MIB

Frame relay PVC endpoints are provisioned as rows in the Frame Relay Services MIB [19] endpoint table.

Each frame relay PVC endpoint is described in the frPVCEndptTable. A connection between two frame relay endpoints is described by an entry in the frame relay PVC cross-connect table frPVCConnectTable. The frPVCEndptConnectIdentifier object of each endpoint points to the frPVCConnectTable cross-connect table row for the connection.

In the case of an inter-worked connection, the frPVCEndptConnectIdentifier object is set to zero. Instead, the frPVCEndptAtmIwfConnIndex object is set to the index of the FR/ATM IWF cross-connect table row.

The frame relay PVC cross-connect table (frPVCConnectTable) does not contain an entry for the FR/ATM inter-worked connection.

Note that the frPVCEndptConnectIdentifier and frPVCEndptAtmIwfConnIndex objects are set by the system as a side-effect of cross-connect establishment. Consequently, these objects are read-only.

3.3.2. Frame Relay DTE MIB

The Frame Relay DTE MIB described in [24] has no relevance to the FR/ATM PVC Service IWF MIB.

3.3.3. ATM MIB

ATM PVC endpoints are provisioned as rows in the ATM MIB [21] virtual connection link table.

Each ATM connection endpoint is described in the atmVclTable. A connection between two ATM endpoints is described by an entry in the ATM VCL cross-connect table atmVcCrossConnectTable. The atmVclCrossConnectIdentifier object of each endpoint points to the atmVcCrossConnectTable row for the connection.

In the case of an inter-worked connection, the atmVclCrossConnectIdentifier object is set to zero. Instead, the frAtmIwfVclCrossConnectIdentifier object in the frAtmIwfVclEntry is set to the index of the applicable FR/ATM IWF cross-connect table row.

Note that the frAtmIwfVclCrossConnectIdentifier object is defined not in the ATM MIB but in Section 5 of this MIB. Specifically, the object is defined as a column object in a table that AUGMENTs the ATM MIB VCL table.

The ATM VCL cross-connect table (atmVcCrossConnectTable) does not contain an entry for the inter-worked connection.

Note that the atmVclCrossConnectIdentifier and frAtmIwfVclCrossConnectIdentifier objects are set by the system as a side-effect of cross-connect establishment. Consequently, these objects are read-only.

3.3.4. IF MIB

The ifIndex defined in the IF MIB [22] identifies the specific frame relay and ATM endpoint interfaces. The values frAtmIwfConnAtmPort and frAtmIwfConnFrPort are used in this MIB as components in the index list for the frAtmIwfConnectionTable rows.

3.4. Point to Multipoint Considerations

This MIB supports IWF implementations providing point-to-multipoint functionality. All rows of the cross-connect table indexed by the same frAtmIwfConnIndex MUST utilize the same frAtmIwfConnectionDescriptor value.

A group of cross-connect table entries indexed by the same frAtmIwfConnIndex value MUST agree on which service the multipoint operation is offered. Two cases are possible:

(1) Many frame relay PVCs cross-connected to one ATM PVC, or

(2) One frame relay PVC cross-connected to many ATM PVCs

3.5. Theory of Operation

3.5.1. Creation Process

Multiple steps are required to create a frame relay to ATM cross-connection. First, rows must be created in the following tables:

(1) The Frame Relay Service MIB frPVCEndptTable

(2) The ATM MIB atmVclTable

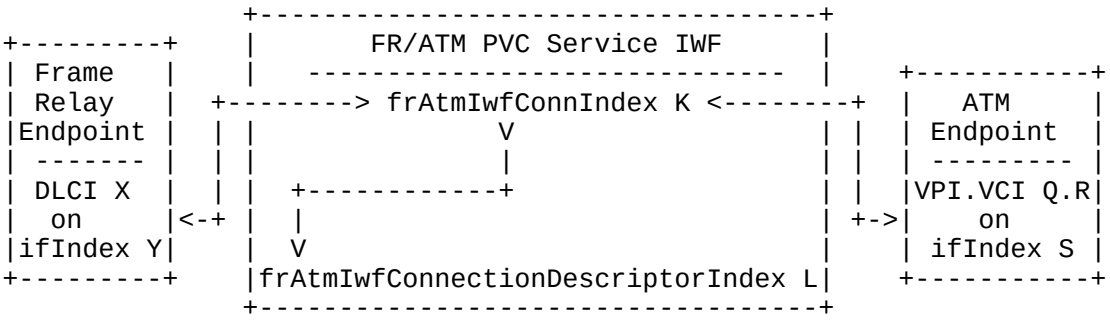
(3) The FR/ATM Service IWF MIB frAtmIwfConnectionDescriptorTable

(4) The FR/ATM Service IWF MIB frAtmIwfConnectionTable

Second, the newly created rows are cross-linked.

Finally, the administrative and operational status objects are set to 'up(1)'.

A step-by-step example is provided to illustrate the creation process. In this example, the term "Manager" refers to a network management system that issues SNMP protocol actions to an "Agent". The agent is integrated with the system that implements the frame relay to ATM service IWF. In this example, the following cross-connection is created:



Step 1 - Create the frame relay PVC endpoint

a) Manager requests creation of a new row in the frPVCEndptTable

b) Agent receives management request to create a row in frPVCEndptTable for the frame relay side

c) A new row is created in frPVCEndptTable as follows:

- frPVCEndptConnectIdentifier initialized to zero
- frPVCEndptAtmIwfConnIndex initialized to zero
- remaining row objects initialized as needed for DLCI X on ifIndex Y

Step 2 - Create the ATM PVC endpoint

a) Agent receives management request to create a row in atmVclTable for the ATM side

b) A new row is created in atmVclTable and frAtmIwfVclTable (the AUGMENT to the atmVclTable) as follows:

- atmVclCrossConnectIdentifier initialized to zero
- frAtmIwfVclCrossConnectIdentifier initialized to zero
- atmVclConnKind initialized to pvc(1)
- remaining row objects initialized as needed for VPI.VCI Q.R on ifIndex S

Step 3 - Create the FR/ATM connection descriptor

a) If an existing connection descriptor is appropriate for the new connection, go to Step 4 using the selected connection descriptor index value L

b) Manager requests a new connection descriptor index value by reading frAtmIwfConnectionDescriptorIndexNext from the agent

c) Agent receives GET request for frAtmIwfConnectionDescriptorIndexNext and responds with the next available value L

d) Manager requests a new connection descriptor row entry using the value L as the index

e) Agent receives SET request to create the frAtmIwfConnectionDescriptorTable row entry causes the system to create a row in the table.

Step 4 - Create the FR/ATM cross-connect

a) Manager requests a new cross-connect index value by reading frAtmIwfConnIndexNext from the agent

b) Agent receives GET request for frAtmIwfConnIndexNext and responds with the next available value K

c) Manager requests a new cross-connect row entry using the value K as the index

d) Agent receives SET request to create the frAtmIwfConnectionTable row entry (note: the frame relay and ATM PVC endpoints MUST exist and be specified as part of the index fields for the row 'K.S.Q.R.Y.X')

e) System creates a row in frAtmIwfConnectionTable for the following indices:

- frAtmIwfConnIndex of K
- frAtmIwfConnAtmPort of S
- frAtmIwfConnVpi of Q
- frAtmIwfConnVci of R
- frAtmIwfConnFrPort of Y
- frAtmIwfConnDlci of X
- frAtmIwfConnectionDescriptor of L

Step 5 - The system sets the frame relay PVC endpoint and ATM VCL endpoint to point to the FR/ATM cross-connect row (as a side-effect of Step 4).

a) System sets frPVCEndptAtmIwfConnIndex to K

b) System sets frAtmIwfVclCrossConnectIdentifier to K

Step 6 - Manager signals activation by issuing a SET for the frAtmIwfConnAdminStatus object using the value of 'up(1)'

Step 7 - Agent receives SET request for frAtmIwfConnAdminStatus and executes internal system mechanisms to activate each PVC segment and the IWF cross-connect. The successful activation permits the agent to respond with 'up(1)' when a GET request is received for the following fields:

- frAtmIwfConnAtm2FrOperStatus
- frAtmIwfConnFr2AtmOperStatus
- atmVclOperStatus (Note: there is no comparable FRS MIB object)

3.5.2. Destruction Process

Destruction of the frame relay to ATM cross-connection is initiated by the network management system. The agent's processing of the request stimulates implementation-specific system clean-up actions. Following removal of the row in the cross-connection table, the frAtmIwfVclCrossConnectIdentifier in the frAtmIwfVclTable (AUGMENT of

the ATM MIB endpoint table) and frPVCEndptAtmIwfConnIndex in the Frame Relay Service MIB endpoint table are both re-initialized to zero.

A step-by-step example is provided to illustrate the destruction process.

Step 1 - Manager requests destruction of an existing row in the frAtmIwfConnectionTable by setting frAtmIwfConnRowStatus to destroy(6)

Step 2 - Agent receives the SET request and performs implementation-specific system clean-up actions for the cross-connection row

Step 3 - System updates the relevant cross connect information for the frame relay PVC endpoint by setting frPVCEndptAtmIwfConnIndex to 0

Step 4 - System updates the relevant cross connect information for the ATM PVC endpoint as follows:

a) System sets frAtmIwfVclCrossConnectIdentifier to 0

b) System sets atmVclOperStatus to 'down(2)' (Note: there is no comparable FRS MIB object)

Following the destruction of the FR/ATM cross-connection entry, the manager MAY set the frPVCConnectRowStatus and/or atmVclRowStatus to destroy(6) the associated endpoint entries.

3.5.3. Modification Process

At the discretion of the agent, a FR/ATM cross-connect may be reconfigured by adding and/or deleting leafs to/from the IWF topology as per the FR/ATM IWF cross-connect creation/destruction procedures. Reconfiguration of traffic/service category parameter values requires release of the FR/ATM IWF cross-connect before those parameter values may be changed for individual frame relay or ATM endpoint segments.

4. Object Definitions

```
FR-ATM-PVC-SERVICE-IWF-MIB DEFINITIONS ::= BEGIN

IMPORTS
            MODULE-IDENTITY, OBJECT-TYPE,
            NOTIFICATION-TYPE,
            mib-2, Integer32, Counter32          FROM SNMPv2-SMI
```

```
        RowStatus, TimeStamp                    FROM SNMPv2-TC

        MODULE-COMPLIANCE, OBJECT-GROUP,
        NOTIFICATION-GROUP                      FROM SNMPv2-CONF

        AtmVpIdentifier, AtmVcIdentifier        FROM ATM-TC-MIB

        atmVclEntry                             FROM ATM-MIB

        InterfaceIndex                          FROM IF-MIB;

    frAtmIwfMIB MODULE-IDENTITY
        LAST-UPDATED "200009280000Z" -- September 28, 2000
        ORGANIZATION "IETF Frame Relay Service MIB Working Group"
        CONTACT-INFO
            "WG Charter:
              http://www.ietf.org/html.charters/frnetmib-charter
             WG-email:
              frnetmib@sunroof.eng.sun.com
             Subscribe:
              frnetmib-request@sunroof.eng.sun.com
             Email Archive:
              ftp://ftp.ietf.org/ietf-mail-archive/frnetmib

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        DESCRIPTION
                "The MIB module for monitoring and controlling the
                Frame Relay/ATM PVC Service Interworking
                Function."

        --
        -- Revision History
        --
```

```
            REVISION "200009280000Z"
            DESCRIPTION
                 "Published as RFC 2955"

        ::= { mib-2 86 }

        --
        -- Object Identifiers
        --
           frAtmIwfMIBObjects      OBJECT IDENTIFIER
                                        ::= { frAtmIwfMIB 1 }

           frAtmIwfTraps           OBJECT IDENTIFIER
                                        ::= { frAtmIwfMIB 2 }
           frAtmIwfTrapsPrefix     OBJECT IDENTIFIER
                                        ::= { frAtmIwfTraps 0 }

           frAtmIwfConformance     OBJECT IDENTIFIER
                                        ::= { frAtmIwfMIB 3 }
           frAtmIwfGroups          OBJECT IDENTIFIER
                                        ::= { frAtmIwfConformance 1 }
           frAtmIwfCompliances     OBJECT IDENTIFIER
                                        ::= { frAtmIwfConformance 2 }

        --
        --  The FR/ATM PVC Service IWF Group
        --
        --      The Frame Relay/ATM PVC Service Interworking Function
        --      Connection Table contains all connections utilizing
        --      the interworking function.
        --

        frAtmIwfConnIndexNext OBJECT-TYPE
             SYNTAX         Integer32 (0..2147483647)
             MAX-ACCESS     read-only
             STATUS         current
             DESCRIPTION
                    "This object contains an appropriate value to be
                    used for frAtmIwfConnIndex  when creating entries
                    in the frAtmIwfConnectionTable. The value 0
                    indicates that no unassigned entries are
                    available. To obtain the frAtmIwfConnIndexNext
                    value for a new entry, the manager issues a
                    management protocol retrieval operation to obtain
                    the current value of this object.  After each
                    retrieval, the agent should modify the value to
                    the next unassigned index."
             ::= { frAtmIwfMIBObjects 1 }
```

```
frAtmIwfConnectionTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF FrAtmIwfConnectionEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "A table in which each row represents a Frame
            Relay/ATM interworking connection."
    ::= { frAtmIwfMIBObjects 2 }

frAtmIwfConnectionEntry OBJECT-TYPE
    SYNTAX      FrAtmIwfConnectionEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "The FrAtmIwfConnectionEntry provides an entry for
            an interworking connection between a frame relay
            PVC and one or more ATM PVCs, or an ATM PVC and
            one or more frame relay PVCs.  A single frame
            relay PVC connected to a single ATM PVC is
            referred to as a 'point-to-point' connection and
            is represented by a single row in the FR/ATM IWF
            Connection Table.  The case of a single frame
            relay PVC connected to multiple ATM PVCs (or
            single ATM PVC connected to multiple frame relay
            PVCs) is referred to as a 'point-to-multipoint'
            connection and is represented by multiple rows in
            the FR/ATM IWF Connection Table.

            The object frAtmIwfConnIndex uniquely identifies
            each point-to-point or point-to-multipoint
            connection.  The manager obtains the
            frAtmIwfConnIndex value by reading the
            frAtmIwfConnIndexNext object.

            After a frAtmIwfConnIndex is assigned for the
            connection, the manager creates one or more rows
            in the Cross Connect Table; one for each cross-
            connection between the frame relay PVC and an ATM
            PVC. In the case of 'point-to-multipoint'
            connections, all rows are indexed by the same
            frAtmIwfConnIndex value and MUST refer to the same
            frame relay PVC or ATM PVC respectively.  An entry
            can be created only when at least one pair of
            frame relay and ATM PVCs exist.

            A row can be established by one-step set-request
            with all required parameter values and
            frAtmIwfConnRowStatus set to createAndGo(4). The
```

```
                    Agent should perform all error checking as needed.
                    A pair of cross-connected PVCs, as identified by a
                    particular value of the indexes, is released by
                    setting frAtmIwfConnRowStatus to destroy(6). The
                    Agent may release all associated resources. The
                    manager may remove the related PVCs thereafter.
                    Indexes are persistent across reboots of the
                    system."
            INDEX   { frAtmIwfConnIndex,
                      frAtmIwfConnAtmPort,
                      frAtmIwfConnVpi,
                      frAtmIwfConnVci,
                      frAtmIwfConnFrPort,
                      frAtmIwfConnDlci
                    }
            ::= { frAtmIwfConnectionTable 1 }

        FrAtmIwfConnectionEntry ::=
            SEQUENCE {
                frAtmIwfConnIndex                     Integer32,
                frAtmIwfConnAtmPort                   InterfaceIndex,
                frAtmIwfConnVpi                       AtmVpIdentifier,
                frAtmIwfConnVci                       AtmVcIdentifier,
                frAtmIwfConnFrPort                    InterfaceIndex,
                frAtmIwfConnDlci                      Integer32,
                frAtmIwfConnRowStatus                 RowStatus,
                frAtmIwfConnAdminStatus               INTEGER,
                frAtmIwfConnAtm2FrOperStatus          INTEGER,
                frAtmIwfConnAtm2FrLastChange          TimeStamp,
                frAtmIwfConnFr2AtmOperStatus          INTEGER,
                frAtmIwfConnFr2AtmLastChange          TimeStamp,
                frAtmIwfConnectionDescriptor          Integer32,
                frAtmIwfConnFailedFrameTranslate      Counter32,
                frAtmIwfConnOverSizedFrames           Counter32,
                frAtmIwfConnFailedAal5PduTranslate    Counter32,
                frAtmIwfConnOverSizedSDUs             Counter32,
                frAtmIwfConnCrcErrors                 Counter32,
                frAtmIwfConnSarTimeOuts               Counter32
        }

        frAtmIwfConnIndex  OBJECT-TYPE
            SYNTAX      Integer32  (1..2147483647)
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "A unique value for each point-to-point or point-
                    to-multipoint connection.  The manager obtains the
                    frAtmIwfConnIndex value by reading the
```

```
                    frAtmIwfConnIndexNext object.  A point-to-
                    multipoint connection will be represented in the
                    frAtmIwfConnectionTable with multiple entries that
                    share the same frAtmIwfConnIndex value."
            ::= { frAtmIwfConnectionEntry 1 }

        frAtmIwfConnAtmPort OBJECT-TYPE
            SYNTAX      InterfaceIndex
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "The index in the ifTable that identifies the ATM
                    port for this interworking connection."
            ::= { frAtmIwfConnectionEntry 2 }

        frAtmIwfConnVpi OBJECT-TYPE
            SYNTAX      AtmVpIdentifier
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "The VPI of the ATM PVC end point for this
                     interworking connection."
            ::= { frAtmIwfConnectionEntry 3 }

        frAtmIwfConnVci OBJECT-TYPE
            SYNTAX      AtmVcIdentifier
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "The VCI of the ATM PVC end point for this
                    interworking
                     connection."
            ::= { frAtmIwfConnectionEntry 4 }

        frAtmIwfConnFrPort OBJECT-TYPE
            SYNTAX      InterfaceIndex
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "The index in the ifTable that identifies the
                    frame relay port for this interworking
                    connection."
            ::= { frAtmIwfConnectionEntry 5 }

        frAtmIwfConnDlci OBJECT-TYPE
            SYNTAX      Integer32 (16..4194303)
            MAX-ACCESS  not-accessible
            STATUS      current
```

```
            DESCRIPTION
                    "The DLCI that identifies the frame relay PVC end
                    point for this interworking connection."
            ::= { frAtmIwfConnectionEntry 6 }

        frAtmIwfConnRowStatus OBJECT-TYPE
            SYNTAX      RowStatus
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "The table row may be created with
                    'createAndWait(5)' or 'createAndGo(4)'.
                    To activate a connection entry, a valid connection
                    descriptor MUST be established in the
                    frAtmIwfConnectionDescriptor object.

                    This object is set to 'destroy(6)' to delete the
                    table row.  Before the table row is destroyed, the
                    OperStatus/AdminStatus of the corresponding
                    endpoints MUST be 'down(2)'.  The deactivation of
                    the ATM endpoint MAY occur as a side-effect of
                    deleting the FR/ATM IWF cross-connection table
                    row.  Otherwise, 'destroy(6)' operation MUST fail
                    (error code 'inconsistentValue')."
            ::= { frAtmIwfConnectionEntry 7 }

        frAtmIwfConnAdminStatus OBJECT-TYPE
            SYNTAX      INTEGER { up(1), down(2) }
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "The desired operational state for this FR/ATM
                    interworked connection.

                    up(1)       = Activate the connection. Before the
                                  activation can be completed, the
                                  OperStatus/AdminStatus of the
                                  corresponding endpoints MUST be
                                  'up(1)'.  The activation of the
                                  corresponding endpoints MAY occur as
                                  a side-effect of activating the
                                  FR/ATM IWF cross-connection.

                    down(2)     = Deactivate the connection. Before
                                  the deactivation can be completed,
                                  the atmVclAdminStatus of the
                                  corresponding ATM endpoint MUST be
                                  'down(2)'.  The deactivation of the
```

```
                                ATM endpoint MAY occur as a
                                side-effect of deactivating the
                                FR/ATM IWF cross-connection."
        ::= { frAtmIwfConnectionEntry 8 }

    frAtmIwfConnAtm2FrOperStatus     OBJECT-TYPE
        SYNTAX      INTEGER { up(1), down(2) }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
                "The current operational state of this
                interworking connection in the ATM to frame
                relay direction."
        ::= { frAtmIwfConnectionEntry 9 }

    frAtmIwfConnAtm2FrLastChange  OBJECT-TYPE
        SYNTAX      TimeStamp
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
                "The value of sysUpTime at the time this
                interworking connection entered its current
                operational state in the ATM to FR direction.  If
                the current state was entered prior to the last
                re-initialization of the local network management
                subsystem, then this object contains a zero
                value."
        ::= { frAtmIwfConnectionEntry 10 }

    frAtmIwfConnFr2AtmOperStatus     OBJECT-TYPE
        SYNTAX      INTEGER { up(1), down(2) }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
                "The current operational state of this
                interworking connection in the frame relay
                to ATM direction."
        ::= { frAtmIwfConnectionEntry 11 }

    frAtmIwfConnFr2AtmLastChange  OBJECT-TYPE
        SYNTAX      TimeStamp
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
                "The value of sysUpTime at the time this
                interworking connection entered its current
                operational state in the FR to ATM direction.  If
                the current state was entered prior to the last
```

```
                re-initialization of the local network management
                subsystem, then this object contains a zero
                value."
        ::= { frAtmIwfConnectionEntry 12 }

    frAtmIwfConnectionDescriptor  OBJECT-TYPE
        SYNTAX      Integer32
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
                "The value represents a pointer to the relevant
                descriptor in the IWF descriptor table.  An
                attempt to set this value to an inactive or non-
                existent row in the Connection Descriptor Table
                MUST fail (error code 'inconsistentValue')."
        ::= { frAtmIwfConnectionEntry 13 }

    frAtmIwfConnFailedFrameTranslate OBJECT-TYPE
        SYNTAX      Counter32
        UNITS       "Frames"
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
                "This object counts the number of frames discarded
                by the IWF because, while operating in Translation
                Mode, the IWF is unable to decode the incoming
                frame payload header according to the mapping
                rules. (i.e., payload header not recognized by the
                IWF).

                Frame relay frames are received in the frame relay
                to ATM direction of the PVC.

                When operating in Transparent Mode, the IWF MUST
                return noSuchInstance."
                  REFERENCE
                          "FRF.8 [17], Section 5.3.1"
                  ::= { frAtmIwfConnectionEntry 14 }

    frAtmIwfConnOverSizedFrames OBJECT-TYPE
        SYNTAX      Counter32
        UNITS       "Frames"
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
                "Count of frames discarded by the IWF because the
                frame is too large to be processed by the AAL5
                segmentation procedure.  Specifically, the frame
```

```
                    does not conform to the size specified in the
                    atmVccAal5CpcsTransmitSduSize object associated
                    with the atmVclEntry at the ATM endpoint.
                    Frame relay frames are received in the frame relay
                    to ATM direction of the PVC."
                      REFERENCE
                              "ATM MIB [21], atmVclTable
                               FRF.8 [17], 5.3.1.4"
                      ::= { frAtmIwfConnectionEntry 15 }

        frAtmIwfConnFailedAal5PduTranslate OBJECT-TYPE
            SYNTAX      Counter32
            UNITS       "PDUs"
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
                    "This attribute counts the number of AAL5 PDUs
                    discarded by the IWF because, while operating in
                    Translation Mode, the IWF is unable to decode the
                    incoming AAL5 PDU payload header according to the
                    mapping rules. (i.e., payload header not
                    recognized by the IWF).

                    AAL5 PDUs are received in the ATM to frame relay
                    direction of the PVC.

                    When operating in Transparent Mode, the IWF MUST
                    return noSuchInstance."
                      REFERENCE
                              "FRF.8 [17], Section 5.3.1"
                      ::= { frAtmIwfConnectionEntry 16 }

        frAtmIwfConnOverSizedSDUs OBJECT-TYPE
            SYNTAX      Counter32
            UNITS       "SDUs"
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
                    "Count of AAL5 SDUs discarded by the IWF because
                    the SDU is too large to be forwarded on the frame
                    relay segment of the connection.  Specifically,
                    the frame does not conform to the size specified
                    in the frLportFragSize object of the FRS MIB [19].

                    AAL5 PDUs are received in the ATM to frame relay
                    direction of the PVC."
                      REFERENCE
                              "FRS MIB [19], frLportTable
```

```
                                FRF.8 [17], 5.3.1.4"
                    ::= { frAtmIwfConnectionEntry 17 }

        frAtmIwfConnCrcErrors OBJECT-TYPE
            SYNTAX      Counter32
            UNITS       "PDUs"
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
                    "The number of AAL5 CPCS PDUs received with CRC-32
                    errors on this AAL5 VCC at the IWF.

                    AAL5 PDUs are received in the ATM to frame relay
                    direction of the PVC."
                      REFERENCE
                              "ATM MIB [21], atmVclTable"
                      ::= { frAtmIwfConnectionEntry 18 }

        frAtmIwfConnSarTimeOuts OBJECT-TYPE
            SYNTAX      Counter32
            UNITS       "PDUs"
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
                    "The number of partially re-assembled AAL5 CPCS
                    PDUs which were discarded on this AAL5 VCC at the
                    IWF because they were not fully re-assembled
                    within the required time period.  If the re-
                    assembly timer is not supported, then this object
                    contains a zero value.

                    AAL5 PDUs are received in the ATM to frame relay
                    direction of the PVC."
                      REFERENCE
                              "ATM MIB [21], atmVclTable"
                      ::= { frAtmIwfConnectionEntry 19 }

        --
        -- The FR/ATM PVC Service IWF Connection Descriptor Group
        --
        --     The Frame Relay/ATM PVC Service Interworking Function
        --     Connection Descriptor table.  A descriptor provides the
        --     attributes for a type of interworked connection.
        --

        frAtmIwfConnectionDescriptorIndexNext OBJECT-TYPE
             SYNTAX      Integer32 (0..2147483647)
             MAX-ACCESS  read-only
```

```
            STATUS      current
            DESCRIPTION
                    "This object contains an appropriate value to be
                    used for frAtmIwfConnectionDescriptorIndex  when
                    creating entries in the
                    frAtmIwfConnectionDescriptorTable. The value 0
                    indicates that no unassigned entries are
                    available. To obtain the
                    frAtmIwfConnectionDescriptorIndexNext value for a
                    new entry, the manager issues a management
                    protocol retrieval operation to obtain the current
                    value of this object.  After each retrieval, the
                    agent should modify the value to the next
                    unassigned index."
            ::= { frAtmIwfMIBObjects 3 }

        frAtmIwfConnectionDescriptorTable OBJECT-TYPE
            SYNTAX      SEQUENCE OF FrAtmIwfConnectionDescriptorEntry
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "A table in which each row represents a descriptor
                    for one type of Frame Relay/ATM interworking
                    connection.  A descriptor may be assigned to zero
                    or more FR/ATM PVC service IWF connections."
            ::= { frAtmIwfMIBObjects 4 }

        frAtmIwfConnectionDescriptorEntry OBJECT-TYPE
            SYNTAX      FrAtmIwfConnectionDescriptorEntry
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "An entry for a descriptor in an interworking
                    connection between a frame relay PVC and an ATM
                    PVC."
            INDEX   { frAtmIwfConnectionDescriptorIndex  }
            ::= { frAtmIwfConnectionDescriptorTable 1 }

        FrAtmIwfConnectionDescriptorEntry ::=
            SEQUENCE {
                frAtmIwfConnectionDescriptorIndex      Integer32,
                frAtmIwfConnDescriptorRowStatus        RowStatus,
                frAtmIwfConnDeToClpMappingMode         INTEGER,
                frAtmIwfConnClpToDeMappingMode         INTEGER,
                frAtmIwfConnCongestionMappingMode      INTEGER,
                frAtmIwfConnEncapsulationMappingMode   INTEGER,
                frAtmIwfConnEncapsulationMappings      BITS,
                frAtmIwfConnFragAndReassEnabled        INTEGER,
```

```
            frAtmIwfConnArpTranslationEnabled      INTEGER
        }

        frAtmIwfConnectionDescriptorIndex OBJECT-TYPE
            SYNTAX      Integer32 (1..2147483647)
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                    "A unique value to identify a descriptor in the
                    table "
            ::= { frAtmIwfConnectionDescriptorEntry 1 }

        frAtmIwfConnDescriptorRowStatus OBJECT-TYPE
            SYNTAX      RowStatus
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "The status of this table row.  This object is
                    used to create or delete an entry in the
                    descriptor table.

                    Creation of the row requires a row index (see
                    frAtmIwfConnectionDescriptorIndexNext).  If not
                    explicitly set or in existence, all other columns
                    of the row will be created and initialized to the
                    default value.  During creation, this object MAY
                    be set to 'createAndGo(4)' or 'createAndWait(5)'.
                    The object MUST contain the value 'active(1)'
                    before any connection table entry references the
                    row.

                    To destroy a row in this table, this object is set
                    to the 'destroy(6)' action.  Row destruction MUST
                    fail (error code 'inconsistentValue') if any
                    connection references the row."
            ::= { frAtmIwfConnectionDescriptorEntry 2 }

        frAtmIwfConnDeToClpMappingMode OBJECT-TYPE
            SYNTAX      INTEGER {
                           mode1(1),
                           mode2Const0(2),
                           mode2Const1(3)
                        }
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "This object describes which mode of translation
                    is in use for loss priority mapping in the frame
```

```
                    relay to ATM direction.

                    mode1(1)        = the DE field in the Q.922 core
                                      frame shall be mapped to the ATM
                                      CLP field of every cell
                                      generated by the segmentation
                                      process of the AAL5 PDU
                                      containing the information of
                                      that frame.

                    mode2Contst0(2) = the ATM CLP field of every cell
                                      generated by the segmentation
                                      process of the AAL5 PDU
                                      containing the information of
                                      that frame shall be set to
                                      constant 0.

                    mode2Contst1(3) = the ATM CLP field of every cell
                                      generated by the segmentation
                                      process of the AAL5 PDU
                                      containing the information of
                                      that frame shall be set to
                                      constant 1."
                REFERENCE
                         "FRF.8 [17], Section 4.2.1"
                DEFVAL { mode1 }
                ::= { frAtmIwfConnectionDescriptorEntry 3 }

            frAtmIwfConnClpToDeMappingMode OBJECT-TYPE
                SYNTAX      INTEGER {
                              mode1(1),
                              mode2Const0(2),
                              mode2Const1(3)
                            }
                MAX-ACCESS  read-create
                STATUS      current
                DESCRIPTION
                        "This object describes which mode of translation
                        is in use for loss priority mapping in the ATM to
                        frame relay direction.

                        mode1(1)       = if one or more cells in a frame
                                         has its CLP field set, the DE
                                         field of the Q.922 core frame
                                         should be set.

                        mode2Const0(2) = the DE field of the Q.922 core
                                         frame should be set to the
```

```
                                    constant 0.

                    mode2Const1(3) = the DE field of the Q.922 core
                                     frame should be set to the
                                     constant 1."
            REFERENCE
                     "FRF.8 [17], Section 4.2.2"
            DEFVAL { mode1 }
            ::= { frAtmIwfConnectionDescriptorEntry 4 }

        frAtmIwfConnCongestionMappingMode OBJECT-TYPE
            SYNTAX      INTEGER {
                           mode1(1),
                           mode2(2)
                        }
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "This object describes which mode of translation
                    is in use for forward congestion indication
                    mapping in the frame relay to ATM direction.

                    mode1(1) = The FECN field in the Q.922 core frame
                               shall be mapped to the ATM EFCI field
                               of every cell generated by the
                               segmentation process of the AAL5 PDU
                               containing the information of that
                               frame.

                    mode2(2) = The FECN field in the Q.922 core frame
                               shall not be mapped to the ATM EFCI
                               field of cells generated by the
                               segmentation process of the AAL5 PDU
                               containing the information of that
                               frame. The EFCI field is always set to
                               'congestion not experienced'.

                    In both of the modes above, if there is congestion
                    in the forward direction in the ATM layer within
                    the IWF, then the IWF can set the EFCI field to
                    'congestion experienced'."
            REFERENCE
                        "FRF.8 [17], Section 4.3.1.1"
            DEFVAL      { mode1 }
            ::= { frAtmIwfConnectionDescriptorEntry 5 }

        frAtmIwfConnEncapsulationMappingMode OBJECT-TYPE
            SYNTAX      INTEGER {
```

```
                        transparentMode(1),
                        translationMode(2),
                        translationModeAll(3)
                    }
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "This object indicates whether the mapping of
                    upper layer protocol encapsulation is enabled on
                    this interworking connection.

                    transparentMode(1) = Forward the encapsulations
                                         unaltered.

                    translationMode(2) = Perform mapping between the
                                         two encapsulations due to the
                                         incompatibilities of the two
                                         methods. Mapping is provided
                                         for a subset of the potential
                                         encapsulations as itemized in
                                         frAtmIwfConnEncapsulationMapp
                                         ings.

                    translationModeAll(3) = Perform mapping between
                                         the two encapsulations due to
                                         the incompatibilities of the
                                         two methods. All
                                         encapsulations are
                                         translated."
            REFERENCE
                        "FRF.8 [17], Section 5.3"
            DEFVAL      { transparentMode }
            ::= { frAtmIwfConnectionDescriptorEntry 6 }

        frAtmIwfConnEncapsulationMappings OBJECT-TYPE
            SYNTAX      BITS {
                   none (0),
                   bridgedPdus(1),
                   bridged802dot6(2),
                   bPdus(3),
                   routedIp(4),
                   routedOsi(5),
                   otherRouted(6),
                   x25Iso8202(7),
                   q933q2931(8) }
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
```

```
                    "If upper layer protocol encapsulation mapping is
                    enabled on this interworking connection, then this
                    attribute enumerates which of the encapsulation
                    mappings are supported.

                    none(0)           = Transparent mode operation
                    bridgedPdus(1)    = PID: 0x00-01,-07,-02 or -08
                    bridged802dot6(2) = PID: 0x00-0B
                    bPdus(3)          = PID: 0x00-0E or -0F
                    routedIp(4)       = NLPID: OxCC
                    routedOsi(5)      = NLPID: Ox81, 0x82 or 0x83
                    otherRouted(6)    = Other routed protocols
                    x25Iso8202(7)     = X25
                    q933q2931(8)      = Q.933 and Q.2931"
            REFERENCE
                        "FRF.8 [17], Section 5.3.1"
            DEFVAL      { { none } }
            ::= { frAtmIwfConnectionDescriptorEntry 7 }

        frAtmIwfConnFragAndReassEnabled OBJECT-TYPE
            SYNTAX      INTEGER { enabled(1),  disabled(2)}
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "The attribute indicates whether fragmentation and
                    reassembly is enabled for this connection."
            REFERENCE
                        "FRF.8 [17], Section 5.3.1.4"
            DEFVAL      { disabled }
            ::= { frAtmIwfConnectionDescriptorEntry 8 }

        frAtmIwfConnArpTranslationEnabled OBJECT-TYPE
            SYNTAX      INTEGER { enabled(1),  disabled(2)}
            MAX-ACCESS  read-create
            STATUS      current
            DESCRIPTION
                    "The attribute indicates whether ARP translation
                    is enabled for this connection."
            REFERENCE
                        "FRF.8 [17], Section 5.4"
            DEFVAL      { disabled }
            ::= { frAtmIwfConnectionDescriptorEntry 9 }

        --
        -- Augmentation of ATM MIB VCL Endpoint Table (atmVclTable)
        --
        frAtmIwfVclTable OBJECT-TYPE
            SYNTAX      SEQUENCE OF FrAtmIwfVclEntry
```

```
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
                "The FR/ATM IWF VCL Table augments the ATM MIB VCL
                Endpoint table."
        ::= { frAtmIwfMIBObjects 5 }

    frAtmIwfVclEntry OBJECT-TYPE
        SYNTAX      FrAtmIwfVclEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
                "Entries in this table are created only by the
                agent. One entry exists for each ATM VCL managed
                by the agent."
        AUGMENTS    { atmVclEntry }
        ::= { frAtmIwfVclTable 1 }

    FrAtmIwfVclEntry ::= SEQUENCE {
        frAtmIwfVclCrossConnectIdentifier    Integer32
    }

    frAtmIwfVclCrossConnectIdentifier OBJECT-TYPE
        SYNTAX      Integer32  (1..2147483647)
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
                "This object contains the index value of the
                FR/ATM cross-connect table entry used to link the
                ATM VCL with a frame relay PVC.

                Each row of the atmVclTable that is not cross-
                connected with a frame relay PVC MUST return the
                value zero when this object is read.

                In the case of (frame relay) point to (ATM)
                multipoint, multiple ATM VCLs will have the same
                value of this object, and all their cross-
                connections are identified by entries that are
                indexed by the same value of
                frAtmIwfVclCrossConnectIdentifier in the
                frAtmIwfConnectionTable of this MIB module.

                The value of this object is initialized by the
                agent after the associated entries in the
                frAtmIwfConnectionTable have been created."
        ::= { frAtmIwfVclEntry 1 }
```

```
        --
        -- Frame Relay/ATM PVC Service Interworking NOTIFICATION
        --

        frAtmIwfConnStatusChange NOTIFICATION-TYPE
            OBJECTS {   frAtmIwfConnAdminStatus,
                        frAtmIwfConnAtm2FrOperStatus,
                        frAtmIwfConnFr2AtmOperStatus
                     }
            STATUS      current
            DESCRIPTION
                    "An indication that the status of this
                    interworking connection has changed."
            ::= { frAtmIwfTrapsPrefix 1 }

        --
        -- Conformance Information
        --

        --
        -- Compliance Statement For Equipment
        --

        frAtmIwfEquipmentCompliance MODULE-COMPLIANCE
            STATUS      current
            DESCRIPTION
                    "The compliance statement for equipment that
                    implements the FR/ATM Interworking MIB."

            MODULE -- this module
                MANDATORY-GROUPS { frAtmIwfBasicGroup,
                                   frAtmIwfConnectionDescriptorGroup,
                                   frAtmIwfAtmVclTableAugmentGroup,
                                   frAtmIwfNotificationsGroup }

                OBJECT      frAtmIwfConnDeToClpMappingMode
                SYNTAX      INTEGER { mode1(1) }
                DESCRIPTION
                    "Only support for Mode 1 is REQUIRED."

                OBJECT      frAtmIwfConnClpToDeMappingMode
                SYNTAX      INTEGER { mode1(1) }
                DESCRIPTION
                    "Only support for Mode 1 is REQUIRED."

                OBJECT      frAtmIwfConnCongestionMappingMode
                SYNTAX      INTEGER { mode1(1) }
                DESCRIPTION
```

```
                    "Only support for Mode 1 is REQUIRED."

                OBJECT      frAtmIwfConnEncapsulationMappingMode
                SYNTAX      INTEGER { transparentMode(1) }
                DESCRIPTION
                    "Support for Translation Mode is OPTIONAL."

                OBJECT      frAtmIwfConnEncapsulationMappings
                SYNTAX      BITS { none(0) }
                DESCRIPTION
                    "The IWF may provide one, some or none of the
                    encapsulation translations defined in section
                    5.3.1 of FRF.8 [17]."

                OBJECT      frAtmIwfConnFragAndReassEnabled
                SYNTAX      INTEGER { disabled(2) }
                DESCRIPTION
                    "Only support for Mode 1 is REQUIRED."

                OBJECT      frAtmIwfConnArpTranslationEnabled
                SYNTAX      INTEGER { disabled(2) }
                DESCRIPTION
                    "Support for ARP Translation is NOT REQUIRED."

            ::= { frAtmIwfCompliances 1 }

        --
        -- Compliance Statement For Service (CNM Interface)
        --

        frAtmIwfServiceCompliance MODULE-COMPLIANCE
            STATUS  current
            DESCRIPTION
                    "The compliance statement for a CNM interface that
                    implements the FR/ATM Interworking MIB."

            MODULE  -- this module
                MANDATORY-GROUPS { frAtmIwfBasicGroup,
                                   frAtmIwfConnectionDescriptorGroup,
                                   frAtmIwfAtmVclTableAugmentGroup,
                                   frAtmIwfNotificationsGroup }

                --
                -- Exceptions for each object type implemented for a
                -- CNM view of the FR/ATM Interworking MIB
                --
                OBJECT      frAtmIwfConnAdminStatus
                MIN-ACCESS  read-only
```

```
                DESCRIPTION
                    "Write access is not REQUIRED."

                OBJECT      frAtmIwfConnDeToClpMappingMode
                SYNTAX      INTEGER { mode1(1) }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "Support for Mode 1 is REQUIRED.  Other modes are
                    OPTIONAL.  Write access is NOT REQUIRED."

                OBJECT      frAtmIwfConnClpToDeMappingMode
                SYNTAX      INTEGER { mode1(1) }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "Support for Mode 1 is REQUIRED.  Other modes are
                    OPTIONAL.  Write access is NOT REQUIRED."

                OBJECT      frAtmIwfConnCongestionMappingMode
                SYNTAX      INTEGER { mode1(1) }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "Support for Mode 1 is REQUIRED.  Other modes are
                    OPTIONAL.  Write access is NOT REQUIRED."

                OBJECT      frAtmIwfConnEncapsulationMappingMode
                SYNTAX      INTEGER { transparentMode(1) }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "Support for Transparent Mode is REQUIRED.
                    Translation Mode is OPTIONAL.  Write access is not
                    required."

                OBJECT      frAtmIwfConnEncapsulationMappings
                SYNTAX      BITS { none(0) }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "The IWF may provide one, some or none of the
                    encapsulation translations defined in section
                    5.3.1 of FRF.8 [17]. Write access is not
                    required."

                OBJECT      frAtmIwfConnFragAndReassEnabled
                SYNTAX      INTEGER { disabled(2) }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "Support for Fragmentation and Reassembly is NOT
                    REQUIRED.  Write access is not required."
```

```
                OBJECT      frAtmIwfConnArpTranslationEnabled
                SYNTAX      INTEGER { disabled(2) }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "Support for ARP Translation is not required.
                    Write access is not required."

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

            ::= { frAtmIwfCompliances 2 }

        --
        -- Units of Conformance
        --

        --
        -- Basic FR/ATM IWF PVC Connection Group
        --
        frAtmIwfBasicGroup    OBJECT-GROUP
            OBJECTS { frAtmIwfConnIndexNext,
                      frAtmIwfConnAdminStatus,
                      frAtmIwfConnAtm2FrOperStatus,
                      frAtmIwfConnAtm2FrLastChange,
                      frAtmIwfConnFr2AtmOperStatus,
                      frAtmIwfConnFr2AtmLastChange,
                      frAtmIwfConnectionDescriptor,
                      frAtmIwfConnFailedFrameTranslate,
                      frAtmIwfConnOverSizedFrames,
                      frAtmIwfConnFailedAal5PduTranslate,
                      frAtmIwfConnOverSizedSDUs,
                      frAtmIwfConnCrcErrors,
                      frAtmIwfConnSarTimeOuts,
                      frAtmIwfConnRowStatus }
            STATUS  current
            DESCRIPTION
                    "The collection of basic objects for configuration
                    and control of FR/ATM interworking connections."
            ::= { frAtmIwfGroups 1 }

        --
        -- FR/ATM IWF PVC Connection Descriptor Group
        --

        frAtmIwfConnectionDescriptorGroup    OBJECT-GROUP
            OBJECTS {
```

```
                frAtmIwfConnectionDescriptorIndexNext,
                frAtmIwfConnDeToClpMappingMode,
                frAtmIwfConnClpToDeMappingMode,
                frAtmIwfConnCongestionMappingMode,
                frAtmIwfConnEncapsulationMappingMode,
                frAtmIwfConnEncapsulationMappings,
                frAtmIwfConnFragAndReassEnabled,
                frAtmIwfConnArpTranslationEnabled,
                frAtmIwfConnDescriptorRowStatus
                }
            STATUS  current
            DESCRIPTION
                    "The collection of basic objects for specification
                    of FR/ATM interworking connection descriptors."
            ::= { frAtmIwfGroups 2 }

        --
        -- ATM MIB VCL Endpoint Table Augmentation Group
        --

        frAtmIwfAtmVclTableAugmentGroup    OBJECT-GROUP
            OBJECTS {
                frAtmIwfVclCrossConnectIdentifier
                }
            STATUS  current
            DESCRIPTION
                    "The ATM MIB VCL Endpoint Table AUGMENT object
                    contained in the FR/ATM PVC Service Interworking
                    MIB."
            ::= { frAtmIwfGroups 3 }

        --
        -- Notification Group
        --

        frAtmIwfNotificationsGroup NOTIFICATION-GROUP
            NOTIFICATIONS { frAtmIwfConnStatusChange }
            STATUS  current
            DESCRIPTION
                    "The notification for FR/ATM interworking status
                    change."
            ::= { frAtmIwfGroups 4 }
        END
```

8. Acknowledgments

This document was produced by the Frame Relay Service MIB Working Group.

The Editors thank Bert Wijnen, Kaj Tesink, Keith McCloghrie, and David Perkins for providing many helpful comments and suggestions.

9. References

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10. Security Considerations

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

No managed objects in this MIB contain sensitive information.

SNMPv1 by itself is not a secure environment. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB.

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

It is then a customer/user responsibility to ensure that the SNMP entity giving access to an instance of this MIB, is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

11. Authors' Addresses

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Acknowledgement

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