The ATM Forum

ATM User-Network Interface, Version 3.1 (UNI 3.1) Specification

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Version 3.1
Draft of May 28, 1994

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Preface

Since the publication of The ATM Forum ATM User-Network Interface Specification, Version 3.0 (UNI 3.0), a number of international standards have been completed. Part I of this version, UNI 3.1, of the interface specification has been created to bring The ATM Forum impelementation agreements in line with the recent agreements in international standards and reflects only the changes to UNI 3.0 necessary to achieve this. Furthermore, The ATM Forum has completed the specification of additional physical layer interface agreements; these are contained in Part II of this document.

Acknowledgement

The assistance of the following individuals who provided source material for particular subject areas is appreciated. Without their efforts this document could not have been assembled.

- Signaling, John Sikora (AT&T)
- Network Management - OA&M, Henry Fowler (Bellcore)
- Network Management - ILMI, Bob Fenaglio (IBM)
- Physical Layer - UTP155, Bill Stephens (Bellcore)
- Physical Layer - UTP51.8, Rick Townsend (AT&T)
- Physical Layer - DS1, John Jaeger (SynOptics)
- Testing, Gregan Crawford (Hewlett-Packard Ltd)

The material submitted is based upon documents that have been edited at various times by Daun Langston (SSI), Ken Brinkerhoff (SMC), Moshe DeLeon (DEC), Stanley Ooi (HP), and David Foote (Hitachi Telecom USA). Their assitance as well as all the members of The ATM Forum who have brought contributions towards, discussed and reviewed the enclosed information is appreciated.

Greg Ratta, Chief Editor

The ATM Forum ATM User-Network Interface, Version 3.1 (UNI 3.1) Specification
Part I

Introduction to Part I

Recent progress within the ITU has resulted in agreements for the following ITU-T Recommendations: I.610, Q.2100, Q.2110, Q.2130 and Q.2931 that have bearing on the interface specified in The ATM Forum ATM User-Network Interface, Version 3.0 (UNI 3.0) Specification. The changes to UNI 3.0 that are included in this section are intended to allow interoperation of equipment designed to The ATM Forum Implementation Agreements and equipment designed to international standards.

The following changes to UNI 3.0 have been made to the designated sections. It should be noted that these changes render this new version incompatible with version 3.0 for signaling and signaling virtual channels:

Key to text style of Part I:

Bold - Section that changed
Italic - Description of change
Normal text - Actual changed text (Note: underlined text was added, ~~struck-through~~ text was deleted).

Global Changes

For the entire UNI 3.0 Specification, replace "ATM user cell rate" with "ATM traffic descriptor,"replace "Q.93B" with Q.2931," and replace "CCITT" with "ITU-T."

All the sections in which these changes occur are not shown here; they are shown only in sections in which there are other changes.

Specific Changes

3.4.4 Cell discrimination based on Payload Type (PT) Identifier field values

Clarify handling by network elements of PT code point 111 by adding the following requirement at the end of the section.

(R) Where equipment at the UNI is not terminating a VC, it shall ignore and pass through unmodified all valid cells having PT code points which it does not support.

3.5.1 ATM Layer Management Information Flows

Replace the last sentence as follows:

For a point-to-multipoint connection, the only allowed use of F4 and F5 OAM flows from leaf to root is segment flows. ~~Neither the user nor the network shall~~The leaf node shall not send end-to-end OAM flows.

4.2.3 ATM Layer (R)

Clarification as noted below.

The ILMI provides access to management information about the ATM Layer as defined in section 3.1.

There is one ATM layer per physical interface.

Certain attributes of the ATM layer are common across all Virtual Path Connections (VPCs) and Virtual Channel Connections (VCCs) at this UNI.

Configuration information at the ATM layer relates to the size of the VPI and VCI address fields in the ATM cell header, number of configured permanent VPCs and permanent VCCs, and maximum number of VPCs and VCCs allowed at this UNI.

4.4.3.2 Configuration Information (R)

Clarifications as noted below.

Configuration information about the number of Virtual Path Connections (VPCs) and Virtual Channel Connections (VCCs) on the local interface is defined here.

4.4.3.2.1 Maximum Number of VPCs (R)

This is the maximum number of switched and permanent VPCs which the local interface can support.

4.4.3.2.2 Maximum Number of VCCs (R)

This is the maximum number of switched and permanent VCCs which the local interface can support.

4.4.3.2.3 Number of Configured VPCs (R)

This is the current number of permanent VPCs for which the local interface is configured to process. This number represents the number of entries in the atmfVpcTable.

4.4.3.2.4 Number of Configured VCCs (R)

This is the current number of permanent VCCs for which the local interface is configured to process. This number represents the number of entries in the atmfVccTable.

4.4.3.2.8 ATM UNI Version (R)

Add this new object.

This is the latest version of the UNI specification supported on this UNI.

If the peer UME's value of this object is the same as, or later than the local UME's value, then the version corresponding to the local UME's value should be attempted. Otherwise, if the peer UME's value of this object is earlier, and supported locally, then the local UME should attempt the version corresponding to the peer UME's value. Otherwise, compatability of the two UMEs cannot be assumed.

4.4.3.2.9 SSCOP Version (R)

Add this new object. ***[Editor's note: I do not see any other information contained for this object.]***

This is the latest version of the signalling AAL supported on this UNI.

If the peer UME's value of this object is the same as, or later than the local UME's value, then the version corresponding to the local UME's value should be attempted. Otherwise, if the peer UME's value of this object is earlier, and supported locally, then the local UME should attempt the version corresponding to the peer UME's value. Otherwise, compatability of the two UMEs cannot be assumed.

4.4.5 Per-Virtual Path UNI MIB Attributes (R)

Clarification as noted below.

These attributes are located in the Virtual Path Group (atmfVpcGroup). This group is indexed by the interface index (atmfVpcPortIndex) and the VPI value (atmfVpcVpi). Only permanent virtual path connections are represented in this group. MIB information at this level includes:

- Interface Index
- VPI Value
- Transmit Traffic Descriptor
- Receive Traffic Descriptor
- Operational Status
- Transmit QoS Class
- Receive QoS Class

4.4.6 Per-Virtual Channel UNI MIB Attributes (R)

Clarification as noted below.

These attributes are located in the Virtual Channel Group (atmfVccGroup). This group is indexed by the interface index (atmfVccPortIndex), VCC VPI value (atmfVccVpi) and VCC VCI value (atmfVccVci). Only permanent virtual channel connections are represented in this group. MIB information at this level includes:

- Interface Index
- VPI/VCI Value
- Transmit Traffic Descriptor
- Receive Traffic Descriptor
- Operational Status
- Transmit QoS Class
- Receive QoS Class

4.4.7 ILMI Traps (R)

Add this new clause after 4.4.6.8.

Two traps have been defined for the ILMI in order to indicate a newly configured or deleted permanent VPC or permanent VCC.

For the VPC, the ILMI trap will provide the Virtual Path Identifier (VPI) value of the new or deleted configured VPC at a UNI. For the ILMI trap related to VCC, the trap will also provide the Virtual Channel Identifier (VCI) and the VPI values of the new or deleted configured VCC at a UNI.

4.6.2 Definitions

Revise MIB definitions as noted below.

```
ATM-FORUM-MIB DEFINITIONS ::= BEGIN

IMPORTS
        enterprises, Counter            FROM RFC1155-SMI
        DisplayString                   FROM RFC1213-MIB
        OBJECT-TYPE                     FROM RFC-1212;

atmForum            OBJECT IDENTIFIER ::= { enterprises 353 }

                    -- a subtree for defining administrative
                    -- object identifiers
atmForumAdmin   OBJECT IDENTIFIER ::= { atmForum 1 }

                    -- a subtree for defining UNI MIB object types
atmForumUni     OBJECT IDENTIFIER ::= { atmForum 2 }

-- Textual Conventions

-- All representations of ATM addresses in this MIB Module use
-- the data type:

AtmAddress ::= OCTET STRING (SIZE (0 .. 32))

-- Note this data type is used only by the deprecated object
-- atmfPortAddress. Another definition (a refined one) is
-- specified in the separate MIB for Address Registration.

-- Object Identifier definitions

-- The following values are defined for use as possible values
-- of the atmfPortTransmissionType object.

atmfTransmissionTypes OBJECT IDENTIFIER ::= { atmForumAdmin 2 }
        -- unknown transmission type
atmfUnknownType
                    OBJECT IDENTIFIER ::= { atmfTransmissionTypes 1}
        -- Sonet STS-3c physical layer at 155.52 Mbps
atmfSonetSTS3c
                    OBJECT IDENTIFIER ::= { atmfTransmissionTypes 2 }
        -- DS3 physical layer at 44.736 Mbps
atmfDs3
                    OBJECT IDENTIFIER ::= { atmfTransmissionTypes 3 }
        -- 4B/5B encoding physical layer at 100 Mbps
atmf4B5B
                    OBJECT IDENTIFIER ::= { atmfTransmissionTypes 4 }
        -- 8B/10B encoding physical layer at 155.52 Mbps
atmf8B10B
                    OBJECT IDENTIFIER ::= { atmfTransmissionTypes 5 }

-- The following values are defined for use as possible values
-- of the atmfPortMediaType object.
```

```
atmfMediaTypes OBJECT IDENTIFIER ::= { atmForumAdmin 3 }
        -- unknown media type
atmfMediaUnknownType
                OBJECT IDENTIFIER ::= { atmfMediaTypes 1 }
        -- Coaxial cable
atmfMediaCoaxCable
                OBJECT IDENTIFIER ::= { atmfMediaTypes 2 }
        -- Single Mode fiber
atmfMediaSingleMode
                OBJECT IDENTIFIER ::= { atmfMediaTypes 3 }
        -- Multi Mode fiber
atmfMediaMultiMode
                OBJECT IDENTIFIER ::= { atmfMediaTypes 4 }
        -- Shielded Twisted Pair
atmfMediaStp
                OBJECT IDENTIFIER ::= { atmfMediaTypes 5 }
        -- Unshielded Twisted Pair
atmfMediaUtp
                OBJECT IDENTIFIER ::= { atmfMediaTypes 6 }

-- The following values are defined for use as possible values
-- of the atmfVpcTransmitTrafficDescriptorType,
-- atmfVpcReceiveTrafficDescriptorType,
-- atmfVccTransmitTrafficDescriptorType and
-- atmfVccReceiveTrafficDescriptorType objects.

atmfTrafficDescrTypes OBJECT IDENTIFIER ::= { atmForumAdmin 4 }

        -- The “None” Traffic Descriptor Type
atmfNoDescriptor
                OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 1 }
–
atmfPeakRate
        OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 2 }
-- This type is no longer used

–
        -- The No CLP/No SCR Type
atmfNoClpNoScr
                OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 3 }
-- The use of the parameter vector for this type:
        -- Parameter #1 - peak cell rate in cells/second for CLP=0+1 traffic
        -- Parameters #2, #3, #4 and #5 are unused
```

```
--
        -- The CLP without Tagging/No SCR Type
atmfClpNoTaggingNoScr
                OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 4 }
-- The use of the parameter vector for this type:
        -- Parameter #1 - peak cell rate in cells/second for CLP=0+1 traffic
        -- Parameter #2 - peak cell rate in cells/second for CLP=0 traffic
        -- Parameters #3, #4 and #5 are unused

--
        -- The CLP with Tagging/No SCR Type
atmfClpTaggingNoScr
                OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 5 }
-- The use of the parameter vector for this type:
        -- Parameter #1 - peak cell rate in cells/second for CLP=0+1 traffic
        -- Parameter #2 - peak cell rate in cells/second for
        -- CLP=0 traffic, excess tagged as CLP=1
        -- Parameters #3, #4 and #5 are unused

--
        -- The SCR/No CLP Type
atmfNoClpScr
                OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 6 }
-- The use of the parameter vector for this type:
        -- Parameter #1 - peak cell rate in cells/second for CLP=0+1 traffic
        -- Parameter #2 - sustainable cell rate in cells/second for CLP=0+1 traffic
        -- Parameter #3 - maximum burst size in cells
        -- Parameters #4 and #5 are unused

--
        -- The CLP without Tagging/SCR Type
atmfClpNoTaggingScr
                OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 7 }
-- The use of the parameter vector for this type:
        -- Parameter #1 - peak cell rate in cells/second for CLP=0+1 traffic
        -- Parameter #2 - sustainable cell rate in cells/second for CLP=0 traffic
        -- Parameter #3 - maximum burst size in cells
        -- Parameters #4 and #5 are unused

--
        -- The CLP with Tagging/SCR Type
atmfClpTaggingScr
                OBJECT IDENTIFIER ::= { atmfTrafficDescrTypes 8 }
-- The use of the parameter vector for this type:
```

```
        -- Parameter #1 - peak cell rate in cells/second for CLP=0+1 traffic
        -- Parameter #2 - sustainable cell rate in cells/second for CLP=0
        --          traffic, excess tagged as CLP=1
        -- Parameter #3 - maximum burst size in cells
        -- Parameters #4 and #5 are unused

--                      The MIB groups
atmfPhysicalGroup       OBJECT IDENTIFIER ::= { atmForumUni 1 }
atmfAtmLayerGroup       OBJECT IDENTIFIER ::= { atmForumUni 2 }
atmfAtmStatsGroup       OBJECT IDENTIFIER ::= { atmForumUni 3 }
atmfVpcGroup            OBJECT IDENTIFIER ::= { atmForumUni 4 }
atmfVccGroup            OBJECT IDENTIFIER ::= { atmForumUni 5 }

--                      The Physical Port Group
-- This group is mandatory for all UNI devices.
--
-- The Physical Port Table

atmfPortTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF AtmfPortEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "A table of physical layer status and parameter information for the UNI's      physical interface."
        ::= { atmfPhysicalGroup 1 }

atmfPortEntry OBJECT-TYPE
        SYNTAX          AtmfPortEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "An entry in the table, containing information about the physical layer of a        UNI interface."
        INDEX   { atmfPortIndex }
        ::= { atmfPortTable 1 }

AtmfPortEntry ::=
        SEQUENCE {
                atmfPortIndex
                        INTEGER,
                atmfPortAddress
                        AtmAddress,
                atmfPortTransmissionType
```

```
                OBJECT IDENTIFIER,
        atmfPortMediaType
                OBJECT IDENTIFIER,
        atmfPortOperStatus
                INTEGER,
        atmfPortSpecific
                OBJECT IDENTIFIER
    }

atmfPortIndex OBJECT-TYPE
    SYNTAX          INTEGER (0..2147483647)
    ACCESS          read-only
    STATUS          mandatory
    DESCRIPTION
        "A unique value which identifies this port. The value of 0 has the special meaning of identifying
        the local UNI."
    ::= { atmfPortEntry 1 }

atmfPortAddress OBJECT-TYPE
    SYNTAX          AtmAddress
    ACCESS          read-only
    STATUS          deprecated
    DESCRIPTION
        "This object should not be implemented except as required for backward compatibility with version
        2.0 of the UNI specification. The Address Group, defined as part of the separate Address
        Registration MIB should be used instead."

    ::= { atmfPortEntry 2 }

atmfPortTransmissionType OBJECT-TYPE
    SYNTAX          OBJECT IDENTIFIER
    ACCESS          read-only
    STATUS          mandatory
    DESCRIPTION
        "The transmission type of this port. For example, for a port using the Sonet STS-3c physical
        layer at 155.52 Mbs, this object would have the Object Identifier value: atmfSonetSTS3c."
    ::= { atmfPortEntry 3 }

atmfPortMediaType OBJECT-TYPE
    SYNTAX          OBJECT IDENTIFIER
    ACCESS          read-only
    STATUS          mandatory
```

```
        DESCRIPTION
                "The type of media being used on this port. For example, for a port using coaxial cable, this
                object would have the Object Identifier value: atmfMediaCoaxCable."
        ::= { atmfPortEntry 4 }

atmfPortOperStatus OBJECT-TYPE
        SYNTAX          INTEGER {
                                other(1),
                                inService(2),
                                outOfService(3),
                                loopBack(4)
                        }
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The operational (i.e., actual) state of this port.

                The ILMI should not alarm on a physical interface for when the value of this object is
                outOfService(3). This capability is useful if equipment is to be disconnected, or for
                troubleshooting purposes.

                A value of loopBack(4) indicates that a local loopback is in place. "
        ::= { atmfPortEntry 5 }

atmfPortSpecific OBJECT-TYPE
        SYNTAX  OBJECT IDENTIFIER
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "This object 'points' to additional transmission and/or media specific information relating to this
                port. In particular, this object's value is the name of a specific instance of the first columnar object
                of a MIB table with such additional information, where the specific instance is the one which
                corresponds to this port.

                For example, for a DS3 interface, this object would contain the value, as defined in RFC 1407:
                        dsx3LineIndex.i
                where i would be the integer value uniquely identifying the DS3 interface corresponding to this
                port. If no additional transmission and/or media specific information is available, this object has
                the value { 0 0 }."
        ::= { atmfPortEntry 6 }
```

```
--                          The ATM Layer Group
-- This group is mandatory for all UNI devices.
--
-- ATM-layer specific information for the UNI interface
atmfAtmLayerTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF AtmfAtmLayerEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "A table of ATM layer status and parameter information for the UNI's physical interface."
        ::= { atmfAtmLayerGroup 1 }

atmfAtmLayerEntry OBJECT-TYPE
        SYNTAX          AtmfAtmLayerEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "An entry in the table, containing information about the ATM layer of a UNI interface."
        INDEX   { atmfAtmLayerIndex }
        ::= { atmfAtmLayerTable 1 }

AtmfAtmLayerEntry ::=
        SEQUENCE {
                atmfAtmLayerIndex
                        INTEGER,
                atmfAtmLayerMaxVPCs
                        INTEGER,
                atmfAtmLayerMaxVCCs
                        INTEGER,
                atmfAtmLayerConfiguredVPCs
                        INTEGER,
                atmfAtmLayerConfiguredVCCs
                        INTEGER,
                atmfAtmLayerMaxVpiBits
                        INTEGER,
                atmfAtmLayerMaxVciBits
                        INTEGER,
                atmfAtmLayerUniType
                        INTEGER
                atmfAtmLayerUniVersion
                        INTEGER
        }
atmfAtmLayerIndex OBJECT-TYPE
```

```
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The unique value which identifies the UNI port. The value of 0 has the special meaning of
                identifying the local UNI."
        ::= { atmfAtmLayerEntry 1 }

atmfAtmLayerMaxVPCs OBJECT-TYPE
        SYNTAX          INTEGER (0..255)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The maximum number of switched and permanent VPCs supported on this UNI."
        ::= { atmfAtmLayerEntry 2 }

atmfAtmLayerMaxVCCs OBJECT-TYPE
        SYNTAX          INTEGER (0..16777215)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The maximum number of switched and permanent VCCs supported on this UNI."
        ::= { atmfAtmLayerEntry 3 }

atmfAtmLayerConfiguredVPCs OBJECT-TYPE
        SYNTAX          INTEGER (0..255)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The number of permanent VPCs configured for use on this UNI."
        ::= { atmfAtmLayerEntry 4 }

atmfAtmLayerConfiguredVCCs OBJECT-TYPE
        SYNTAX          INTEGER (0..16777215)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The number of permanent VCCs configured for use on this UNI."
        ::= { atmfAtmLayerEntry 5 }

atmfAtmLayerMaxVpiBits OBJECT-TYPE
        SYNTAX          INTEGER (0..8)
        ACCESS          read-only
        STATUS          mandatory
```

```
        DESCRIPTION
                "The number of active VPI bits on this interface."
        ::= {atmfAtmLayerEntry 6 }

atmfAtmLayerMaxVciBits OBJECT-TYPE
        SYNTAX          INTEGER (0..16)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The number of active VCI bits on this interface."
        ::= {atmfAtmLayerEntry 7 }

atmfAtmLayerUniType OBJECT-TYPE
        SYNTAX          INTEGER {public(1), private(2)}
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The type of the ATM UNI, either public or private."
        ::= { atmfAtmLayerEntry 8 }

atmfAtmLayerUniVersion  OBJECT-TYPE
        SYNTAX          INTEGER  {version2point0(1), version3point0(2), version3point1(3)  }
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "An indication of the latest version of the ATM Forum UNI Specification that is supported on this
                UNI.  If this value is not present, a version of the UNI earlier than 3.1 is supported.  If a value
                greater than version3point1 is present, then UNI 3.1 communication should be attempted.

                If the peer UME's value of this object is the same as, or later than the local UME's value, then the
                version corresponding to the local UME's value should be attempted.  Otherwise, if the peer
                UME's value of this object is earlier, and supported locally, then the local UME should attempt
                the version corresponding to the peer UME's value.  Otherwise, compatability of the two UMEs
                cannot be assumed."
        ::= { atmfAtmLayerEntry 9 }

--                          The ATM Statistics Group
-- This group is optional. However, if any objects in this group
-- are supported, then all objects in the group must be supported.
--
-- ATM-layer statistics for the UNI interface

atmfAtmStatsTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF AtmfAtmStatsEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "A table of ATM layer statistics information for
                the UNI's physical interface."
        ::= { atmfAtmStatsGroup 1 }
```

```
atmfAtmStatsEntry OBJECT-TYPE
        SYNTAX          AtmfAtmStatsEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "An entry in the table, containing statistics for the ATM layer of a UNI interface."
        INDEX   { atmfAtmStatsIndex }
        ::= { atmfAtmStatsTable 1 }

AtmfAtmStatsEntry ::=
        SEQUENCE {
                atmfAtmStatsIndex
                        INTEGER,
                atmfAtmStatsReceivedCells
                        Counter,
                atmfAtmStatsDroppedReceivedCells
                        Counter,
                atmfAtmStatsTransmittedCells
                        Counter
        }
atmfAtmStatsIndex OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The unique value which identifies the UNI port. The value of 0 has the special meaning of
                identifying the local UNI."
        ::= { atmfAtmStatsEntry 1 }

atmfAtmStatsReceivedCells OBJECT-TYPE
        SYNTAX          Counter
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The accumulated number of ATM cells received on this UNI which were assigned and not
                dropped."
        ::= { atmfAtmStatsEntry 2 }

atmfAtmStatsDroppedReceivedCells OBJECT-TYPE
        SYNTAX          Counter
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The accumulated number of ATM cells which were dropped for the reasons defined in section
                4.4.4.2."
        ::= { atmfAtmStatsEntry 3 }
```

```
atmfAtmStatsTransmittedCells OBJECT-TYPE
        SYNTAX          Counter
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The accumulated number of assigned ATM cells which were transmitted across this interface."
        ::= { atmfAtmStatsEntry 4 }


--                      The Virtual Path Group
-- This group is mandatory for all UNI devices.
--
-- Information concerning Virtual Path Connections

atmfVpcTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF AtmfVpcEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "A table of status and parameter information on the virtual path connections which cross this UNI.
                There is one entry in this table for each permanent virtual path connection."
        ::= { atmfVpcGroup 1 }

atmfVpcEntry OBJECT-TYPE
        SYNTAX          AtmfVpcEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "An entry in the table, containing information about a particular virtual path connection."
        INDEX   { atmfVpcPortIndex, atmfVpcVpi }
        ::= { atmfVpcTable 1 }

AtmfVpcEntry ::=
        SEQUENCE {
                atmfVpcPortIndex
                        INTEGER,
                atmfVpcVpi
                        INTEGER,
                atmfVpcOperStatus
                        INTEGER,
                atmfVpcTransmitTrafficDescriptorType
                        OBJECT IDENTIFIER,
                atmfVpcTransmitTrafficDescriptorParam1
                        INTEGER,
                atmfVpcTransmitTrafficDescriptorParam2
                        INTEGER,
                atmfVpcTransmitTrafficDescriptorParam3
```

```
                INTEGER,
        atmfVpcTransmitTrafficDescriptorParam4
                INTEGER,
        atmfVpcTransmitTrafficDescriptorParam5
                INTEGER,
        atmfVpcReceiveTrafficDescriptorType
                OBJECT IDENTIFIER,
        atmfVpcReceiveTrafficDescriptorParam1
                INTEGER,
        atmfVpcReceiveTrafficDescriptorParam2
                INTEGER,
        atmfVpcReceiveTrafficDescriptorParam3
                INTEGER,
        atmfVpcReceiveTrafficDescriptorParam4
                INTEGER,
        atmfVpcReceiveTrafficDescriptorParam5
                INTEGER,
        atmfVpcQoSCategory
                INTEGER,
        atmfVpcTransmitQoSClass
                INTEGER,
        atmfVpcReceiveQoSClass
                INTEGER
    }

atmfVpcPortIndex OBJECT-TYPE
    SYNTAX          INTEGER (0..2147483647)
    ACCESS          read-only
    STATUS          mandatory
    DESCRIPTION
        "The unique value which identifies the UNI port. The value of 0 has the special meaning of
        identifying the local UNI."
    ::= { atmfVpcEntry 1 }

atmfVpcVpi OBJECT-TYPE
    SYNTAX          INTEGER (0..255)
    ACCESS          read-only
    STATUS          mandatory
    DESCRIPTION
        "The VPI value of this Virtual Path Connection at the local UNI."
    ::= { atmfVpcEntry 2 }

atmfVpcOperStatus OBJECT-TYPE
    SYNTAX INTEGER {
```

```
                        unknown(1),
                        end2endUp(2),
                        end2endDown(3),
                        localUpEnd2endUnknown(4),
                        localDown(5)
                }
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The present actual operational status of the VPC.

                A value of end2endUp(2) or end2endDown(3) would be used if the end-to-end status is known. If
                only local status information is available, a value of localUpEnd2endUnknown(4) or localDown(5)
                would be used."

                ::= { atmfVpcEntry 3 }

atmfVpcTransmitTrafficDescriptorType OBJECT-TYPE
        SYNTAX          OBJECT IDENTIFIER
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The type of traffic management, applicable to the transmit direction of this VPC. The type may
                indicate none, or a type with one or more parameters. These parameters are specified as a parameter
                vector, in the corresponding instances of the objects:
                atmfVpcTransmitTrafficDescriptorParam1,
                atmfVpcTransmitTrafficDescriptorParam2,
                atmfVpcTransmitTrafficDescriptorParam3,
                atmfVpcTransmitTrafficDescriptorParam4, and
                atmfVpcTransmitTrafficDescriptorParam5."
        ::= { atmfVpcEntry 4 }

atmfVpcTransmitTrafficDescriptorParam1 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The first parameter of the transmit parameter vector for this VPC, used according to the value of
                atmfVpcTransmitTrafficDescriptorType."
        ::= { atmfVpcEntry 5 }

atmfVpcTransmitTrafficDescriptorParam2 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
```

```
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The second parameter of the transmit parameter vector for this VPC, used according to the value
                of atmfVpcTransmitTrafficDescriptorType."
        ::= { atmfVpcEntry 6 }

atmfVpcTransmitTrafficDescriptorParam3 OBJECT-TYPE
        SYNTAX              INTEGER (0..2147483647)
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The third parameter of the transmit parameter vector for this VPC, used according to the value of
                atmfVpcTransmitTrafficDescriptorType."
        ::= { atmfVpcEntry 7 }

atmfVpcTransmitTrafficDescriptorParam4 OBJECT-TYPE
        SYNTAX              INTEGER (0..2147483647)
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The fourth parameter of the transmit parameter vector for this VPC, used according to the value of
                atmfVpcTransmitTrafficDescriptorType."
        ::= { atmfVpcEntry 8 }

atmfVpcTransmitTrafficDescriptorParam5 OBJECT-TYPE
        SYNTAX              INTEGER (0..2147483647)
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The fifth parameter of the transmit parameter vector for this VPC, used according to the value of
                atmfVpcTransmitTrafficDescriptorType."
        ::= { atmfVpcEntry 9 }

atmfVpcReceiveTrafficDescriptorType OBJECT-TYPE
        SYNTAX              OBJECT IDENTIFIER
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The type of traffic management, applicable to the traffic in the receive direction of this VPC. The
                type may indicate none, or a type with one or more parameters. These parameters are specified as a
                parameter vector, in the corresponding instances of the objects:
                atmfVpcReceiveTrafficDescriptorParam1,
```

```
                atmfVpcReceiveTrafficDescriptorParam2,
                atmfVpcReceiveTrafficDescriptorParam3,
                atmfVpcReceiveTrafficDescriptorParam4, and
                atmfVpcReceiveTrafficDescriptorParam5."
        ::= { atmfVpcEntry 10 }

atmfVpcReceiveTrafficDescriptorParam1 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The first parameter of the receive parameter vector for this VPC, used according to the value of
                atmfVpcReceiveTrafficDescriptorType."
        ::= { atmfVpcEntry 11 }

atmfVpcReceiveTrafficDescriptorParam2 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The second parameter of the receive parameter vector for this VPC, used according to the value of
                atmfVpcReceiveTrafficDescriptorType."
        ::= { atmfVpcEntry 12 }

atmfVpcReceiveTrafficDescriptorParam3 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The third parameter of the receive parameter vector for this VPC, used according to the value of
                atmfVpcReceiveTrafficDescriptorType."
        ::= { atmfVpcEntry 13 }

atmfVpcReceiveTrafficDescriptorParam4 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The fourth parameter of the receive parameter vector for this VPC, used according to the value of
                atmfVpcReceiveTrafficDescriptorType."
        ::= { atmfVpcEntry 14 }

atmfVpcReceiveTrafficDescriptorParam5 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
```

```
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The fifth parameter of the receive parameter vector for this VPC, used according to the value of
                atmfVpcReceiveTrafficDescriptorType."
        ::= { atmfVpcEntry 15 }

atmfVpcQoSCategory OBJECT-TYPE
        SYNTAX              INTEGER {
                                other(1),
                                deterministic (2),
                                statistical (3),
                                unspecified (4)
                            }
        ACCESS              read-only
        STATUS              deprecated
        DESCRIPTION
                "This object should not be implemented except as required for backward compatibility with version
                2.0 of the UNI specification."
        ::= { atmfVpcEntry 16 }

atmfVpcTransmitQoSClass OBJECT-TYPE
        SYNTAX              NTEGER (0..255)
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The QoS Class, as defined in section 4 of Appendix A, for the transmit direction of this VPC
                connection at the local UNI."
        ::= { atmfVpcEntry 17 }

atmfVpcReceiveQoSClass OBJECT-TYPE
        SYNTAX              INTEGER (0..255)
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION
                "The QoS Class, as defined in section 4 of Appendix A, for the receive direction of this VPC
                connection at the local UNI."
        ::= { atmfVpcEntry 18 }

--                          The Virtual Channel Group
-- This group is mandatory for all UNI devices.
--
-- Information concerning Virtual Channel Connections
atmfVccTable OBJECT-TYPE
```

```
        SYNTAX          SEQUENCE OF AtmfVccEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "A table of status and parameter information on the virtual channel connections which are visible
                at this UNI.  There is one entry in this table for each permanent virtual channel connection,
                including reserved VCCs that are supported;  e.g., signalling, OAM flows, and ILMI, but not
                unassigned cells."
        ::= { atmfVccGroup 1 }

atmfVccEntry OBJECT-TYPE
        SYNTAX          AtmfVccEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION
                "An entry in the table, containing information about a particular virtual channel connection."
        INDEX   { atmfVccPortIndex, atmfVccVpi, atmfVccVci }
        ::= { atmfVccTable 1 }

AtmfVccEntry ::=
        SEQUENCE {
                atmfVccPortIndex
                        INTEGER,
                atmfVccVpi
                        INTEGER,
                atmfVccVci
                        INTEGER,
                atmfVccOperStatus
                        INTEGER,
                atmfVccTransmitTrafficDescriptorType
                        OBJECT IDENTIFIER,
                atmfVccTransmitTrafficDescriptorParam1
                        INTEGER,
                atmfVccTransmitTrafficDescriptorParam2
                        INTEGER,
                atmfVccTransmitTrafficDescriptorParam3
                        INTEGER,
                atmfVccTransmitTrafficDescriptorParam4
                        INTEGER,
                atmfVccTransmitTrafficDescriptorParam5
                        INTEGER,
                atmfVccReceiveTrafficDescriptorType
                        OBJECT IDENTIFIER,
                atmfVccReceiveTrafficDescriptorParam1
                        INTEGER,
```

```
                atmfVccReceiveTrafficDescriptorParam2
                        INTEGER,
                atmfVccReceiveTrafficDescriptorParam3
                        INTEGER,
                atmfVccReceiveTrafficDescriptorParam4
                        INTEGER,
                atmfVccReceiveTrafficDescriptorParam5
                        INTEGER,
                atmfVccQoSCategory
                        INTEGER,
                atmfVccTransmitQoSClass
                        INTEGER,
                atmfVccReceiveQoSClass
                        INTEGER
        }

atmfVccPortIndex OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The unique value which identifies the UNI port. The value of 0 has the special meaning of
                identifying the local UNI."
        ::= { atmfVccEntry 1 }

atmfVccVpi OBJECT-TYPE
        SYNTAX          INTEGER (0..255)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The VPI value of this Virtual Channel Connection at the local UNI."
        ::= { atmfVccEntry 2 }

atmfVccVci OBJECT-TYPE
        SYNTAX          INTEGER (0..65535)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The VCI value of this Virtual Channel Connection at the local UNI."
        ::= { atmfVccEntry 3 }

atmfVccOperStatus OBJECT-TYPE
        SYNTAX INTEGER {
                        unknown(1),
```

```
                    end2endUp(2),
                    end2endDown(3),
                    localUpEnd2endUnknown(4),
                    localDown(5)
                    }
        ACCESS      read-only
        STATUS      mandatory
        DESCRIPTION
                "The present actual operational status of the VCC. A value of end2endUp(2) or end2endUp(3) is
                used if the end to end status is known.

                If only local status is known a value of localUpEnd2endUnknown(4) or localDown(5) is used.

        ::= { atmfVccEntry 4 }

atmfVccTransmitTrafficDescriptorType OBJECT-TYPE
        SYNTAX          OBJECT IDENTIFIER
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The type of traffic management, applicable to the transmit direction of this VCC. The type may
                indicate none, or a type with one or more parameters. These parameters are specified as a parameter
                vector, in the corresponding instances of the objects:
                atmfVccTransmitTrafficDescriptorParam1,
                atmfVccTransmitTrafficDescriptorParam2,
                atmfVccTransmitTrafficDescriptorParam3,
                atmfVccTransmitTrafficDescriptorParam4, and
                atmfVccTransmitTrafficDescriptorParam5."
        ::= { atmfVccEntry 5 }

atmfVccTransmitTrafficDescriptorParam1 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The first parameter of the transmit parameter vector for this VCC, used according to the value of
                atmfVccTransmitTrafficDescriptorType."
        ::= { atmfVccEntry 6 }

atmfVccTransmitTrafficDescriptorParam2 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
```

```
        STATUS          mandatory
        DESCRIPTION
                "The second parameter of the transmit parameter vector for this VCC, used according to the value
                of atmfVccTransmitTrafficDescriptorType."
        ::= { atmfVccEntry 7 }

atmfVccTransmitTrafficDescriptorParam3 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The third parameter of the transmit parameter vector for this VCC, used according to the value of
                atmfVccTransmitTrafficDescriptorType."
        ::= { atmfVccEntry 8 }

atmfVccTransmitTrafficDescriptorParam4 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The fourth parameter of the transmit parameter vector for this VCC, used according to the value
                of atmfVccTransmitTrafficDescriptorType."
        ::= { atmfVccEntry 9 }

atmfVccTransmitTrafficDescriptorParam5 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The fifth parameter of the transmit parameter vector for this VCC, used according to the value of
                atmfVccTransmitTrafficDescriptorType."
        ::= { atmfVccEntry 10 }

atmfVccReceiveTrafficDescriptorType OBJECT-TYPE
        SYNTAX          OBJECT IDENTIFIER
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The type of traffic management, applicable to the traffic in the receive direction of this VCC. The
                type may indicate none, or a type with one or more parameters. These parameters are specified as a
                parameter vector, in the corresponding instances of the objects:
                atmfVccReceiveTrafficDescriptorParam1,
                atmfVccReceiveTrafficDescriptorParam2,
```

atmfVccReceiveTrafficDescriptorParam3,
atmfVccReceiveTrafficDescriptorParam4, and
atmfVccReceiveTrafficDescriptorParam5."
::= { atmfVccEntry 11 }

atmfVccReceiveTrafficDescriptorParam1 OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The first parameter of the receive parameter vector for this VCC, used according to the value of atmfVccReceiveTrafficDescriptorType."
::= { atmfVccEntry 12 }

atmfVccReceiveTrafficDescriptorParam2 OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The second parameter of the receive parameter vector for this VCC, used according to the value of atmfVccReceiveTrafficDescriptorType."
::= { atmfVccEntry 13 }

atmfVccReceiveTrafficDescriptorParam3 OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The third parameter of the receive parameter vector for this VCC, used according to the value of atmfVccReceiveTrafficDescriptorType."
::= { atmfVccEntry 14 }

atmfVccReceiveTrafficDescriptorParam4 OBJECT-TYPE
SYNTAX INTEGER (0..2147483647)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The fourth parameter of the receive parameter vector for this VCC, used according to the value of atmfVccReceiveTrafficDescriptorType."
::= { atmfVccEntry 15 }

```
atmfVccReceiveTrafficDescriptorParam5 OBJECT-TYPE
        SYNTAX          INTEGER (0..2147483647)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The fifth parameter of the receive parameter vector for this VCC, used according to the value of
                atmfVccReceiveTrafficDescriptorType."
        ::= { atmfVccEntry 16 }

atmfVccQoSCategory OBJECT-TYPE
        SYNTAX          INTEGER {
                                other(1),
                                deterministic (2),
                                statistical (3),
                                unspecified (4)
                        }
        ACCESS          read-only
        STATUS          deprecated
        DESCRIPTION
                "This object should not be implemented except as required for backward compatibility with version
                2.0 of the UNI specification."

        ::= { atmfVccEntry 17 }

 atmfVccTransmitQoSClass OBJECT-TYPE
        SYNTAX          INTEGER (0..255)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The QoS Class, as defined in section 4 of Appendix A, for the transmit direction of this VCC
                connection at the local UNI."
        ::= { atmfVccEntry 18 }

atmfVccReceiveQoSClass OBJECT-TYPE
        SYNTAX           INTEGER (0..255)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION
                "The QoS Class, as defined in section 4 of Appendix A, for the receive direction of this VCC
                connection at the local UNI."
        ::= { atmfVccEntry 19 }

atmfVpcChange TRAP-TYPE
        ENTERPRISE      atmForum
        VARIABLES       {atmfVpcPortIndex, atmfVpcVpi, atmfVpcStatus }
        DESCRIPTION
                "An atmfVpcChange trap indicates that a VPC is added or deleted at this UNI.  The variables
                included in the trap identify the VPI value of the new or deleted configured VPC at this UNI."
        ::= 1
```

```
atmfVccChange TRAP-TYPE
        ENTERPRISE      atmForum
        VARIABLES       {atmfVccPortIndex, atmfVccVci, atmfVccVpi, atmfVccStatus }
        DESCRIPTION
                "An atmfVccChange trap indicates that a VCC is added or deleted at this UNI.  The variables
                included in the trap identify the VCI and VPI values of the new or deleted configured VCC at this
                UNI."
        ::= 2

END
```

5.1.3 Addressing

Replace the entire section with the following:

5.1.3.1 Private Networks

For the purposes of switched virtual connections established by the procedures of this specification, an ATM private network address uniquely identifies an ATM endpoint. The format of an ATM Address for endpoints in private ATM networks is modeled after the format of an OSI Network Service Access Point, as specified in ISO 8348 and ~~CCITT~~ITU-T X.213; specifically, using the same structure, abstract semantics, abstract syntax, and preferred binary encoding. The structure of the low-order part (ESI and SEL) of the Domain Specific Part (DSP) is as specified in ISO 10589. Three Initial Domain Identifier (IDI) formats are specified in this implementation agreement. The structure of the ATM address with the IDI in each of these formats is illustrated in Figures 5-1a, 5-1b, and 5-1c.

Note 1 - In the context of OSI Network Layer addressing, an ATM private network address is a subnetwork point of attachment.

Note 2 - The technical issues surrounding addressing and routing architecture are strongly interrelated. In general, routing has implications on addressing. Further study is needed of the routing architecture.

[Editor's Note: Only new figures 5.1a, 5.1b and 5.1c are shown.]

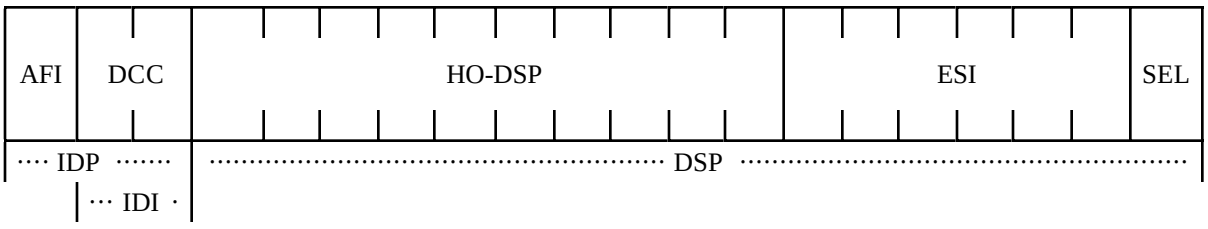


Figure 5-1a DCC ATM Format

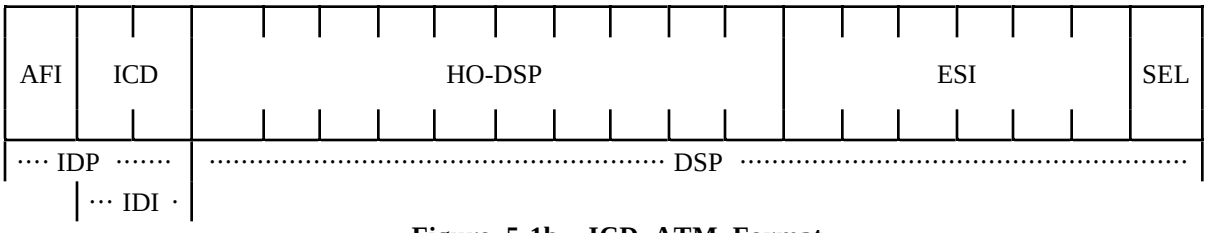


Figure 5-1b ICD ATM Format

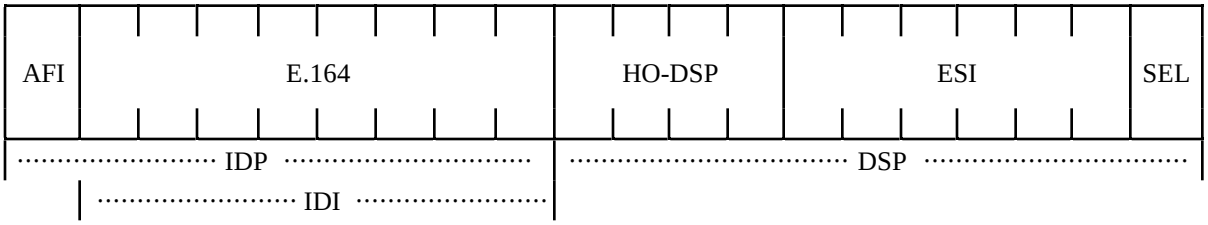


Figure 5-1c E.164 ATM Format

The ability of an endpoint to originate a call to any other endpoint shall be independent of the structure of the ATM address of the called system. All private networks shall be able to accept initial call setup messages containing ATM addresses with any of the IDI formats which are approved in this document, and progress the corresponding call towards the destination endpoint, if it is reachable. Selection of one of the IDI formats to be used for the addresses of endpoints attached to any particular private ATM network is beyond the scope of this implementation agreement.

In addition to the structure, abstract semantics, abstract syntax, and coding specified in this implementation agreement, endpoints and private networks may, by mutual agreement, support other forms of ATM address. However, the ATM address will always be 20 octets.

Guidelines for ATM addresses are provided in Annex A.

Each of the address fields in the formats above are specified below.

5.1.3.1.1 ~~Authority and Format Identifier (AFI)~~ Initial Domain Part (IDP)

The Initial Domain Part (IDP) uniquely specifies an administrative authority which has the responsibility for allocating and assigning values of the Domain Specific Part (DSP).

The IDP consists of two fields, the Authority and Format Identifier (AFI) and Initial Domain Identifier (IDI).

The Authority and Format IdentifierAFI identifies the authority allocating the Data Country Code, International Code Designator, or E.164 number; the format of the IDI, and the syntax of the remainder of the address. The length of this field is 1 octet. The digits are encoded in Binary Coded Decimal (BCD) syntax.

The following codes are specified:

AFI	Format of IDI and DSP
39	DCC ATM Format
47	ICD ATM Format
45	E.164 ATM Format

All other code values are reserved.

~~5.1.3.1.2~~ 5.1.3.1.1.1 Data Country Code (DCC)

The Data Country Code specifies the country in which an address is registered. The codes are given in ISO 3166. The length of this field is two octets. The digits of the Data Country Code are encoded in Binary Code Decimal (BCD) syntax. The codes will be left justified and padded on the right with the hexadecimal value 'F' to fill the two octets.

~~5.1.3.1.3~~ 5.1.3.1.1.2 International Code Designator (ICD)

The International Code Designator identifies an international organization. The registration authority for the International Code Designator is maintained by the British Standards Institute. The length of this field is two octets. The digits of the International Code Designator are encoded in Binary Coded Decimal (BCD) syntax. The codes will be left justified and padded on the right with the hexadecimal value 'F' to fill the two octets.

~~5.1.3.1.4~~ 5.1.3.1.1.3 E.164 (E.164)

E.164 specifies Integrated Services Digital Network numbers. These numbers include telephone numbers. The international format of these numbers will be used. These numbers can be up to 15 digits long. The length of this field is eight octets. The digits of the E.164 number are encoded in Binary Coded Decimal (BCD) syntax. The E.164 address is padded with leading semi octet 0000 to obtain the maximum length (15 digits). Semi octet value 1111 is used as a pad after the final semi octet to obtain an integral number of octets.

~~5.1.3.1.5 Domain Specific Part Format Identifier (DFI)~~

~~The Domain Specific Part Format Identifier specifies the structure, semantics, and administrative requirements for the remainder of the address. The length of this field is 1 octet.~~

~~5.1.3.1.6 Administrative Authority (AA)~~

~~The value of the Administrative Authority (AA) field is assigned to an organizational entity which is the administrative authority for allocation of addresses in the remainder of the DSP. This organizational entity could be, for example, an ATM service provider, the administrator of a private ATM network, or an ATM vendor.~~

~~For the ISO DCC IDI Format, the Administrative Authority (AA) is an organization identifier assigned by the ISO national member body. In the United States (IDI = '0x840f'), it is allocated and assigned by the ANSI-administered USA Registration Authority for OSI Organization Names.~~

~~For the ISO ICD IDI Format, the Administrative Authority (AA) is an organization identifier assigned by the international organization identified by the ICD.~~

~~The length of this field is 3 octets.~~

~~5.1.3.1.7 Reserved (RSRVD)~~

~~The Reserved field is reserved for future use, e.g., possible extension of the AA, RD, or Area field. The length of this field is 2 octets, and is set to zero when not used.~~

~~5.1.3.1.8 Routing Domain (RD)~~

~~The Routing Domain identifier specifies a domain that shall be unique within one of the following: E.164, DCC/DFI/AA, or ICD/DFI/AA. The length of this field is 2 octets.~~

~~5.1.3.1.9 Area (AREA)~~

~~The Area identifies a unique area within a Routing Domain. The length of this field is 2 octets.~~

5.1.3.1.2 Domain Specific Part (DSP)

The Domain Specific Part is subdivided into the High Order DSP (HO-DSP) and low order part which consists of the End System Identifier (ESI) and Selector (SEL).

5.1.3.1.2.1 HO-DSP

The coding of this field is specified by the authority identified by the IDP. The authority determines how identifiers will be assigned and interpreted within that domain. The authority can create further subdomains. That is, the authority may define some number of subfields of the HO-DSP and use these to identify a lower authority which in turn defines the balance of the HO-DSP. Sub-fields of the HO-DSP to the left are always more significant than fields to the right. The contents of this field not only describes the hierarchy of addressing authority, but also conveys topological significance. That is, the HO-DSP should be constructed in such a way that routing through interconnected ATM subnetworks is facilitated. Further details on how the HO-DSP is sub-allocated can be found in ISO 8348, RFC 1237 [36], and Annex A of this document.

~~5.1.3.1.10~~ 5.1.3.1.2.2 End System Identifier (ESI)

The end system identifier identifies an end system within an Area. This identifier must be unique within an Area a particular value of the IDP + HO-DSP. In addition, to ensure the ability of an end system to autoconfigure its address, this end system identifier can be a globally unique identifier specified by an IEEE MAC address. The length of this field is 6 octets.

~~5.1.3.1.11~~ 5.1.3.1.2.3 Selector

The selector is not used for ATM routing, but may be used by endsystems. The length of this field is 1 octet.

5.1.3.2 Public Networks

The Public UNI shall support one of the following:

1. E.164 address structure:

   Type of Number field = international
   Numbering Plan Indication = E.164
2. Private ATM Address Structure (all 3 formats, as defined in 5.1.3.1):

   Type of Number = Unknown
   Numbering Plan Indication = ISO NSAP, as discussed in §5.1.3.1
3. Both

Note - E.164 numbers are covered by the following definitions:

1. E.164 numbering is defined by ~~CCITT~~ITU-T Recommendation E.164.
2. E.164 numbers are administered by public networks.
3. E.164 numbers uniquely identify interfaces to public networks.
4. Several E.164 numbers can identify the same interface to the public network.
5. Routing internal to public networks based on E.164 is outside the scope of this Implementation Agreement.

5.3.1.7 SETUP

In Figure 5-7, change maximum length of AAL parameters to 21 and replace "ATM user cell rate" with " ATM traffic descriptor."

AAL parameters	5.4.5.5	both	O(1)	4-~~20~~ 21
ATM user cell rate traffic descriptor	5.4.5.6	both	M	12-30

5.4.5.1 Coding Rules

1. *In Table 5-5, change "ATM user cell rate" to "ATM traffic descriptor"*

0 1 0 1 1 0 0 1	ATM ~~user cell rate~~traffic descriptor	5.4.5.6	30	1

2. *In Figure 5-23 (octet 2), delete the spare bit; expand Action Indicator to three bits and rename it as IE Action Indicator :*

Bits

8	7	6	5	4	3	2	1	Octets
1 ext	Coding Standard		Flag	Res.	~~Spar~~ e	IE Action Indicator		2

3. *In Table 5-6, change the Action Indicator as follows:*

IE Action Indicator (octet 3) (Note 3)

Bits 3 2 1	Meaning
0 0 0	Clear call
0 0 1	Discard Information Element and proceed
0 1 0	Discard Information Element, proceed, and report status
1 0 1	Discard message and ignore
1 1 0	Discard message and report status
All others ~~11~~	Reserved

5.4.5.5 ATM Adaptation Layer Parameters

1. *Modify octets 9-12 and Note 1 in Figure 5-25 as follows:*

Multiplier Identifier								8* (Note 1)
1	0	0	0	0	1	1	1	
Multiplier								8.1* (Note 1)
Multiplier (continued)								8.2* (Note 1)
Source Clock Frequency Recovery Method ~~Type~~ Identifier								9*
1	0	0	0	1	0	0	0	
Source Clock Frequency Recovery Method ~~Type~~								9.1*
Error Correction Method Identifier								10*
1	0	0	0	1	0	0	1	
Error Correction Method								10.1*
Structured Data Transfer Blocksize Identifier								11*
1	0	0	0	1	0	1	0	
Structured Data Transfer Blocksize								11.1*
Structured Data Transfer Blocksize (continued)								11.2*
Partially Filled Cells Identifier								12*
1	0	0	0	1	0	1	1	
Partially Filled Cells Method								12.1*

Note 1 - These octets are only present if octet 7.1 indicates "n x 64 kbit/s" or "n x 8 kbps".

2. *Modify octets 8-10 and the figure heading for Figure 5-26 as follows:*

MID ~~Size~~ Range Identifier								8*
1	0	0	0	0	0	1	0	
MID ~~Size~~ Range (lowest MID value)								8.1*
MID Size Range (lowest MID value) (continued)								8.2*
MID Range (highest MID value)								8.3*
MID Range (highest MID value) (continued)								8.4*
~~Mode Identifier~~								~~9*~~
~~1~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~1~~	
~~Mode~~								~~9.1*~~
SSCS Type Identifier								~~10~~9*
1	0	0	0	0	1	0	0	
SSCS Type								~~10.1~~9.1*

Figure 5-26 ATM Adaptation Layer Parameters Information Element (Octet Groups 6-~~9~~10 for AAL Type 3/4)

3. Delete octet 8, renumber octet 9 and the figure heading for Figure 5-27 as follows:

~~Mode Identifier~~								~~8*~~
~~1~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~1~~	
~~Mode~~								~~8.1*~~
SSCS Type Identifier								89*
1	0	0	0	0	1	0	0	
SSCS Type								8.19.1*

Figure 5-27 ATM Adaptation Layer Parameters Information Element (Octet Groups 6-89 for AAL Type 5)

4. Add the following codepoint to the last entry in CBR rate (octet 7.1 for AAL type 1)

0 1 0 0 0 0 0 1 n x 8 kbit/s

5. The information element contents are modified as follows:

Subtype (octet 6.1 for AAL type 1)

Bits 8 7 6 5	Bits 4 3 2 1	Meaning
0 0 0 0	0 0 0 0	Null /~~empty~~
0 0 0 0	0 0 0 1	Voice-band signal transport ~~based on 64 kbit/s~~, (see Rec. G.711/G.722)
0 0 0 0	0 0 1 0	Circuit ~~emulation (synchronous)~~ transport (see Rec. I.363, Sec. 2.5.1.1)
~~0 0 0 0~~	~~0 0 1 1~~	~~Circuit emulation (asynchronous)~~
0 0 0 0	0 1 0 0	High-quality audio signal transport
0 0 0 0	0 1 0 1	Video signal transport

Multiplier (octets 8.1 and 8.2 for AAL type 1 and nx64kbit/s or n x 8 kbit/s indication in octet 7.1)

Integer representation of multiplier values between 2 and 2^{16}-1 for n x 64 kbit/s; integer representation of multiplier values between 1 and 7 for n x 8 kbit/s.

Source Clock Frequency rRecovery ~~type~~ Method (octet 9.1 for AAL type 1)

Bits 8 7 6 5	Bits 4 3 2 1	Meaning
0 0 0 0	0 0 0 0	Null (~~Timing is derived from physical interface~~ Synchronous circuit transport)
0 0 0 0	0 0 0 1	~~SRTS~~ (Synchronous Residual Time Stamp) (SRTS) method (Asynchronous circuit transport) (cf. Rec I.363 Section 2.5.2.2.1)
0 0 0 0	0 0 1 0	Adaptive Clock ~~recovery~~ method (cf. Rec. I.363 Section 2.5.2.2.1)

Error cCorrection Methodtype (octet 10.1 for AAL type 1)

Bits 8 7 6 5 4 3 2 1	Meaning
0 0 0 0 0 0 0 0	Null (no error correction is provided)
0 0 0 0 0 0 0 1	Interleaving FEC (Reed Solomon 128, 124). *Note* - This codepoint precludes the indication of SDT in Octet 11.1. A forward error correction method for loss sensitive signal transport (cf. I.363)
0 0 0 0 0 0 1 0	A forward error correction method for delay sensitive signal transport

Structured Data Transfer Blocksize (octet 11.1 and 11.2 for AAL type 1)

Bits 8 7 6 5 4 3 2 1	Meaning
0 0 0 0 0 0 0 0	Null
0 0 0 0 0 0 0 1	Structured Data Transfer (SDT). *Note* - This codepoint precludes the use of Interleaving FEC in Octet 10.1.

16-bit nteger representation of values between 1 and 65,535, i.e., 2^{16}-1. This parameter represents the blocksize of SDT CBR service.

Partially Filled Cells Method (octet 12.1 for AAL type 1)

Integer representation of the number of leading octets in use (values between 1 and 47).

Bits 8 7 6 5 4 3 2 1	Meaning
0 0 0 0 0 0 0 1 through 0 0 1 0 1 1 1 1	Integer representation of the number of leading octets of SAR-PDU payload in use (values between 1 and 47)

Forward Maximum CPCS-SDU Size (octets 6.1 and 6.2 for AAL type 3/4 and type 5)

16 bit integer representation of the values between 0 1 and 65,535, i.e., 2^{16}-1. This parameter indicates the Maximum CPCS-SDU size sent in the direction from the calling user to the called user.

Backward Maximum CPCS-SDU Size (octets 7.1 and 7.2 for AAL type 3/4 and type 5)

16 bit integer representation of the values between 0 1 and 65,535, i.e., 2^{16}-1. This parameter indicates the Maximum CPCS-SDU size sent in the direction from the called user to the calling user.

MID Size Range (octets 8.1, 8.2, 8.3, and 8.4 for AAL type 3/4)

Integer representation of the lowest number MID value (octet 8.1 and 8.2) and the highest MID value (octets 8.3 and 8.4) of the MID range; , only values between 1 0 and 1023 are valid.

Mode (octet 9.1 for AAL type 3/4; octet 8.1 for AAL type 5)

Bits 8 7 6 5 4 3 2 1	Meaning
0 0 0 0 0 0 0 1	Message mode
0 0 0 0 0 0 1 0	Streaming mode

5.4.5.6 ATM ~~User Cell Rate~~Traffic Descriptor

Replace Note 2 as follows:

Note 2 - ~~The traffic parameters encoded in this information element do not include OAM cells. Traffic descriptors for OAM cells are not supported in this Implementation Agreement.~~
The OAM traffic descriptor information element is not supported in this implementation agreement. The ATM Traffic Descriptor specified by the user shall include both user traffic and the end-to-end F5 OAM traffic. The user cells and the end-to-end F5 OAM cells shall be policed together. If the use of fault management procedures is anticipated, the user shall allocate at least one cell per second in the Peak Cell Rate and one cell per second in the Sustainable Cell Rate (when applicable) to accomodate the fault management traffic. If higher end-to-end F5 OAM cell rate is expected, the user shall allocate higher Peak Cell Rate (when applicable) accordingly to accomodate it.

5.4.5.7 Broadband Bearer Capability

Replace Note 1 to Figure 5-30 as shown below:

Note 1 - This octet ~~will~~ may only be present if Bearer Class X is indicated in Octet 5 (see Appendix G).

5.4.5.8 Broadband High layer Information

Delete the High layer profile codepoint as follows:

High Layer Information Type (octet 5)

Bits 7 6 5	Bits 4 3 2 1	Meaning
0 0 0	0 0 0 0	ISO (Note 1)
0 0 0	0 0 0 1	User Specific (Note 1)
~~0 0 0~~	~~0 0 1 0~~	~~High layer profile (Note 2)~~
0 0 0	0 0 1 1	Vendor-Specific Application identifier (Note 3)

Note 1 - ~~The exact coding of octets 6-13, when this high layer information type is used is for further study.~~This codepoint is reserved for use as specified in ISO/IEC standards.

Note 2 - ~~High Layer profiles consist of a 4 byte field containing a user to user profile identifier.~~ The exact coding of octets 6-13, when this higher layer information type is used, is user-defined. The use of this codepoint requires bilateral agreement between the two end users.

5.4.5.9 Broadband Low Layer Information

Make the following changes to User information layer 2 protocol (octet 6) codings:

01010	HDLC ~~ARM~~ NRM (ISO 4335) (Note 1)
01011	HDLC ~~ARM~~ ABM (ISO 4335) (Note 1)

5.4.5.15 Cause

Add the following codepoint to Cause value (octet 6):

001 0000	16	normal call clearing

5.4.5.18 Quality of Service Parameter

Replace the section with the following:

The purpose of the Quality of Service parameter information element is to request and indicate the Quality of Service Class for a connection.

If information about the requested Quality of Service Class is not available for the network at the terminating interface (e.g. because an intermediate network did not transfer the Quality of Service parameter information element), the network will generate the default value ("unspecified QoS class") for the Quality of Service parameter information element for the transfer to the called user.

Bits 8	7	6	5	4	3	2	1	Octets
Quality of Service parameter Information element identifier: 0	1	0	1	1	1	0	0	1
1 ext	Coding standard	IE Instruction Field						2
Length of quality of service parameter contents								3
Length of quality of service parameter contents (continued)								4
QoS Class Forward								5
QoS Class Backward								6

Figure 5-40 Quality of Service parameter Information Element

Coding Standard (octet 2)

Bits 7 6	Meaning
0 0	ITU-T standardized
1 1	Standard defined for the network (either public or private) present on the network side of the interface

IE Instruction Field (octet 2)

Bits 5 4 3 2 1	Meaning
0 0 0 0 0	IE instruction field not significant

QoS Class Forward (octet 6) (Note 1)

Bits 8 7 6 5 4 3 2 1	Meaning
0 0 0 0 0 0 0 0	QoS class 0 - Unspecified QoS class (Note 1)
0 0 0 0 0 0 0 1	QoS class 1 (Note 2)
0 0 0 0 0 0 1 0	QoS class 2 (Note 2)
0 0 0 0 0 0 1 1	QoS class 3 (Note 2)
0 0 0 0 0 1 0 0	QoS class 4 (Note 2)
1 1 1 1 1 1 1 1	Reserved by ITU-T for future indication of parameterized QoS (Note 3)

QoS Class Backward (octet 6) (Note 1)

Bits 8 7 6 5 4 3 2 1	Meaning
0 0 0 0 0 0 0 0	QoS class 0 - Unspecified QoS class (Note 1)
0 0 0 0 0 0 0 1	QoS class 1 (Note 2)
0 0 0 0 0 0 1 0	QoS class 2 (Note 2)
0 0 0 0 0 0 1 1	QoS class 3 (Note 2)
0 0 0 0 0 1 0 0	QoS class 4 (Note 2)
1 1 1 1 1 1 1 1	Reserved by ITU-T for future indication of parameterized QoS (Note 3)

Note 1 - If this class is indicated, the network does not guarantee any specific Quality of Service.

Note 12 These Codepoints are taken from the Coding Standard value 11 The meanings of these codepoints apply only for the coding standard value 11. For coding standard value 00 these code points are reserved by ITU-T. The ATM Forum reserved the right to assign all values for coding standard value 11. However, these values will be assigned in ascending sequence.

Note 3 - This code point has been reserved by ITU-T for use when individual QoS parameters are defined. The individual parameters would then be contained in octets 7 and higher.

Note 4 - For some public networks, only the Coding Standard value 00 may be allowed at the public UNI.

5.4.8.1 Endpoint Reference

Replace octet 5 and octet 6 explanations with the following

Endpoint Rreference Ttype (octet 5)

Bits 8 7 6 5 4 3 2 1	Meaning
0 0 0 0 0 0 0 0	Locally defined integer

Endpoint Rreference Fflag (octet 6)

Bit 8	Meaning
0	The message is sent from the side that originates the endpoint referenceRoot Initiated
1	The message is sent to the side that originates the endpoint reference

5.5.2.5.4 Call failure

In the last paragraph, add cause value. The modified paragraph is shown below:

If the network has received a CALL PROCEEDING message, but does not receive a CONNECT or RELEASE message prior to the expiration of timer T310, then the network shall: initiate clearing procedures toward the calling user with cause #18, “no user responding”, and initiate clearing procedures towards the called user with cause #102, "recovery on timer expiry".

5.5.2.7 Active indication

In the third paragraph, add cause value. The modified paragraph is shown below:

When timer T313 expires prior to receipt of a CONNECT ACKNOWLEDGE message, the called user shall initiate clearing with cause #102, "recovery on timer expiry" in accordance with §5.5.4.3.

5.5.4.3 Clearing initiated by the user

Add the following paragraph at the end of the section.

When user initiates normal call/connection clearing, cause #16 "normal call clearing" is used in the first clearing message.

5.5.5.1 Sending RESTART

Modify fourth paragraph as follows:

If a RESTART ACKNOWLEDGE message is received indicating a different set of virtual channels from the set indicated in the RESTART message, ~~an indication shall be given to the maintenance entity. It is the responsibility of the maintenance entity to determine what actions shall be taken on the channels which have not been returned to the idle condition. Those virtual channels that are acknowledged shall be considered free for reuse~~ the RESTART ACKNOWLEDGE message shall be discarded.

5.5.5.2 Receipt of RESTART

Add the following paragraph at the end of the section.

If the RESTART message is received in the Restart state, then the procedures in §5.5.6.4 shall be followed.

5.5.6.2 Message too short

Replace "type" with "length".

When a message is received that is too short to contain a complete Message length ~~type~~ information element, that message shall be ignored.

5.5.6.5 Message length error

Replace the existing text with the following text:

If the message length indicated in the Message length information element is inconsistent with the length of the message received, the message shall be handled normally as far as possible and, if necessary, the error handling procedures of §5.5.6.6 shall be followed.

5.5.6.6.3 Coding standard error

Add the following text:

If the user or the network receives an information element with the coding standard field indicating a coding standard that is not supported by the receiver, this information element shall be treated as an information element with a content error. Depending on the information element, the procesures as discribed in § 5.5.6.7.2 or § 5.5.6.8.2 shall be followed.

5.5.6.9 Signalling AAL reset

Replace "other parts of §5.5" with "§5.5.6.11".

c) Calls in the active state shall be maintained according to the procedures in ~~other parts of §5.5~~§5.5.6.11.

5.5.6.10 Signalling AAL failure

1. In paragraph 1, item a, delete "internally."

a) Any calls not in the Active state shall be cleared ~~internally~~.

2. Delete "(if implemented)" from paragraph 1 item (b).

b) If ~~For~~ any call is in the Active state a timer T309 shall be started ~~(if implemented)~~. If timer T309 is already running, it shall not be restarted.

3. Delete last two paragraphs.

~~The implementation of timer T309 is optional in the user side and mandatory in the network side.~~

~~When timer T309 is not implemented, the user shall: clear the attached connection (if any) with cause #27, "destination out of order"; disconnect and release the virtual channel; release the call reference; and enter the Null state.~~

5.5.6.12 Receiving a STATUS message

Add a new cause value in the fourth paragraph:

#101 Message not compatible with call state.

5.7.1 Timers in the Network Side

In Table 5-9, change the default value of T309 from 90 s to 10 s.

5.7.2 Timers in the User Side

The following changes should be made to timer T309 in Table 5-10:

TIMER NUM-BER	DEFAULT TIME OUT VALUE	STATE OF CALL	CAUSE FOR START	NORMAL STOP	AT THE FIRST EXPIRY	AT THE SECOND EXPIRY	IMPLEMEN-TATION
T309	~~90 s~~ 10 s	Any stable state	SAAL disconnec-tion. Calls in the active state are not lost.	SAAL reconnected.	Clear ~~network~~ internal connection. Release virtual channel and call reference	Not applicable.	~~Optional~~ Mandatory

5.9 Signalling ATM Adaptaion Layer (SAAL)

Replace the entire section with the following:

This section specifies the Signalling ATM Adaptation Layer (SAAL) for use at the UNI. The SAAL resides between the ATM layer and Q.~~93B~~2931. The purpose of the SAAL is to provide reliable transport of Q.~~93B~~2931 messages between peer Q.~~93B~~2931 entities (e.g., ATM Switch and host) over the ATM layer. The SAAL is composed of two sublayers, a common part and a service specific part. The service specific part is further subdivided into a Service Specific Coordination Function (SSCF), and a Service Specific Connection Oriented Protocol (SSCOP). Figure 5-47 illustrates the structure of the SAAL.

The SAAL for supporting signalling shall use the protocol structure as illustrated in Figure 5-47.

The Common Part AAL protocol provides unassured information transfer and a mechanism for detecting corruption of SDUs. AAL Type 5 Common Part protocol shall be used to support signalling. The AAL Type 5 Common Part Protocol is specified in Draft Recommendation I.363 [30].

~~The SAAL for supporting signalling at the UNI shall use AAL Type 5 Common Part protocol as specified in [30] with the following ammendments:~~

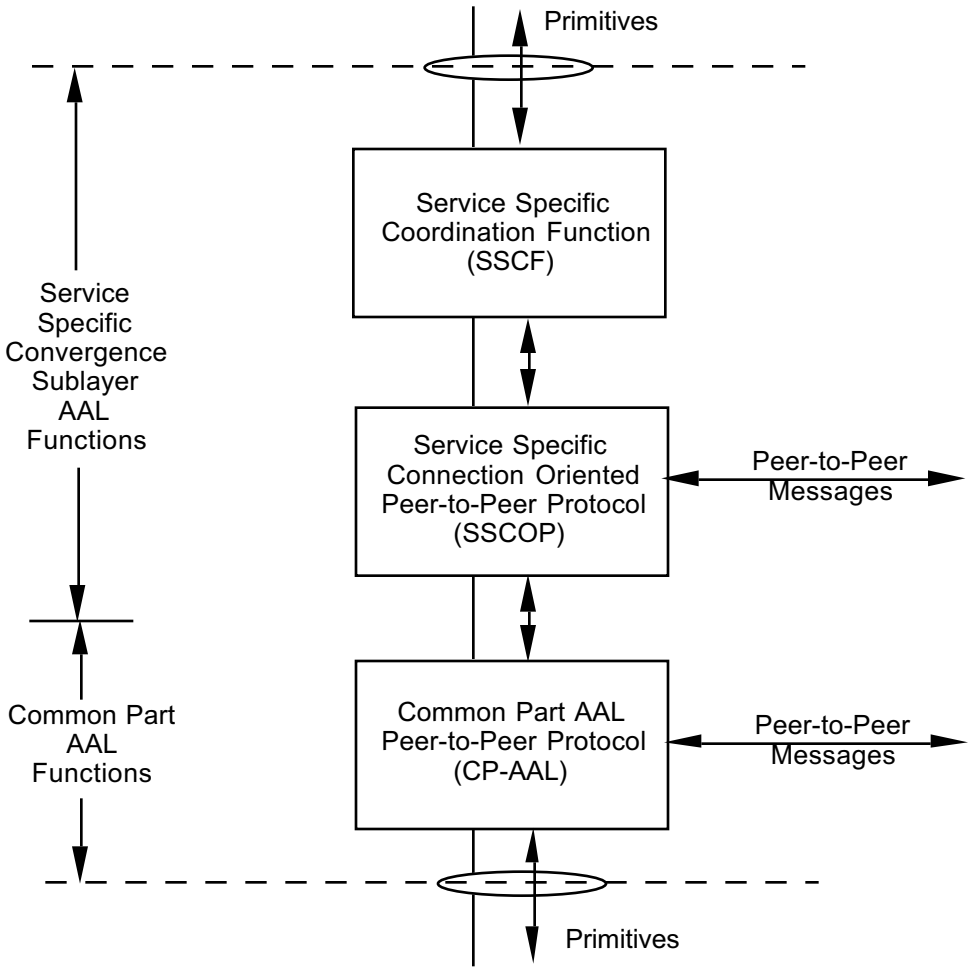
- ~~The "Reserved" fields of all SSCOP PDUs should be encoded as all zeros.~~
- ~~Upon reception of a BGN PDU while in state 2 (Outgoing Connection Pending), Timer_CC should be stopped, and VT(MS) should only be set BGN.N(MR) and not set to BGAK.N(MR) as illustrated in [31].~~
- ~~Upon reception of an AA-EST.res while in state 3 (Incoming Connection Pending) VT(MS) should retain its current value and not be set to zero as illustrated in [31].~~
- ~~Upon reception of a STAT PDU while in state 4 (Data Transfer Ready), VT(PA) is assigned the value N(PS) and not the value of N(PS) + 1 as illustrated in [31].~~

The Service Specific Connection Oriented Protocol (SSCOP) resides in the Service Specific Convergence Sublayer (SSCS) of the SAAL. SSCOP is used to transfer variable length Service Data Units (SDUs) between users of SSCOP. SSCOP provides for the recovery of lost or corrupted SDUs. SSCOP is specified in ~~Draft recommendation~~ Q.~~SAAL~~12110 [31].

The SAAL for supporting signalling shall utilize SSCOP as specified in Q.~~SAAL1~~2110 [31].

An SSCF maps the service of SSCOP to the needs of the SSCF user. Different SSCFs may be defined to support the needs of different AAL users. The SSCF used to support Q.~~93B~~2931 at the UNI is specified in ~~Draft Recommendation~~ Q.~~SAAL2~~2130 [32].

The external behavior of the SAAL at the UNI shall appear as if the UNI SSCF as specified in Q.~~SAAL2~~2130 [32] were implemented.



Note: the Figure represents the allocation of functions and is not intended to illustrate sub-layers as defined by OSI modeling principles.

Figure 5-47 SAAL Structure

References

Replace the following references and modify the note

~~[31] ITU Document DT/11/3-28 (Q.SAAL1) "Service Specific Connection Oriented Protocol (SSCOP) Specification", May 17 1993, Geneva. (Note)~~

~~[32] ITU Document DT/11/3-XX (Q.SAAL2) "Service Specific Connection Oriented Protocol (SSCOP) Specification", May 17 1993, Geneva. (Note)~~

[31] ITU-T Recommendation Q.2110, *BISDN - ATM Adaptation Layer - Service Specific Connection Oriented Protocol (SSCOP)* (Note)

[32] ITU-T Recommendation Q.2130, *BISDN Signalling ATM Adaptation Layer - Service Specific Coordination Function for support of signalling at the user-to-network interface (SSCF at UNI)* (Note)

Note - Postscript versions of [30], [31] and [32] are available for anonymous ftp at ~~thumper.bellcore.com : pub/smq~~from the ATM Forum ftp site. [30] is in AAL5.ps, [31] is available in ~~Q~~SAAL1~~2~~2110.ps and [32] is available in ~~Q~~SAAL2~~2~~2130.ps. Compressed versions of these files are also available and are identified by the suffix ".Z" on the file name.

Annex A Guidelines for Use of ATM Address Formats

Replace items 9 and 10 with the following:

~~9. A call originated on a Private UNI destined for an endsystem which only has a native (non-NSAP) E.164 address (i.e. a system directly attached to a public network supporting the native E.164 format) will code the Called Party Number information element in the (NSAP) E.164 Private ATM address format, with the RD, AREA, and ESI fields set to zero. The Called Party Subaddress information element is not used.~~

~~10. The purpose of the RD and Area fields of the private ATM address format is to allow hierarchical routing and efficient use of resources.~~

~~Note: These fields shall be assigned with topological significance.~~

9. A call originated on a Private UNI destined for an endsystem which only has a native (non-NSAP) E.164 address (i.e. a system directly attached to a public network supporting the native E.164 format) will code the Called Party Number information element in the (NSAP) E.164 Private ATM address format, with the DSP field set to zero. The Called Party Subaddress information element is not used.

10. The HO-DSP field of the private ATM address format should be constructed in such a way as to allow hierarchical routing and efficient use of resources. That is, the sub-allocation of fields within the HO-DSP shall be assigned with topological significance. This specification makes no restriction on the number of subfields within the HO-DSP. The total length of the HO-DSP is fixed at 10 octets for the DCC and ICD formats and at 4 octets for the E.164 private address format.

    As an example of how the HO-DSP might be sub-allocated consider the U.S. GOSIP format. This format falls within the ICD format and is indicated by an IDI of 0005. Of the 10 octets of the HO-DSP, GOSIP defines the first octet as a Domain Format Identifier (DFI). For a DFI value of 80, the next three octets are defined as the Administrative Authority (AA). The AA represents an organization to which NIST has delegated the administrative authority to sub-allocate addresses within that unique address prefix (IDP+DFI+AA). The remaining six octets of the HO-DSP can be carved up in whatever manner suits the internal structures of that organization. For example, they might want to structure a hierarchy around

divisions, campuses, buildings, and switches. They might designate the first three semi-octets to divisions, the next four to campuses, the next two to buildings, and the last three to switches or groups of switches.

Annex D Transit Network Selection

Add the following before section D.1:

Only one transit network selection is supported.

Annex E Cause Definitions

Add cause value 16:

Cause Number 16: normal call clearing

This cause indicates that the call is being cleared because one of the users involved in the call has requested that the call be cleared.

Under normal situations, the source of this cause is not the network.

Delete cause value 104:

~~Cause Number 104: incorrect message length~~

~~This cause is used to report an inconsistent message length.~~

Annex F

F.2 ATM adaptation layer parameter indication in the SETUP message

1. *Change "Clock Recovery Type" to "Source Clock Frequency Recovery Method", "Structured Data Transfer" to "Structure Data Transfer Blocksize", "Error Correction" to "Error Correction Method" and "Partially Filled Cells Indicator" to "Partially Filled Cells Method" in item (a).*
2. *Change "MID Size" to "MID range" in item (b).*
3. *Delete "Mode" from items (b) and (c).*
4. *Add a new paragraph at the end of the section.*

The revised part of the section is as follows:

a) for AAL Connection type 1:
   - Subtype,
   - CBR Rate,
   - Source Clock Frequency Recovery ~~Type~~ Method,
   - Error Correction,
   - Structured Data Transfer Blocksize,
   - Partially Filled Cells ~~Indicator~~ Method.

b) for AAL Connection type 3/4:
   - Forward and Backward Maximum CPCS-SDU Size (Note),
   - MID range ~~Size~~,
   - ~~Mode,~~
   - SSCS Type.

c) for AAL Connection type 5:

- Forward and Backward Maximum CPCS-SDU Size (Note),
- ~~Mode,~~
- SSCS Type.

d) for User defined AAL :
- User defined AAL information (four octets).

Note - Forward Maximum CPCS-SDU size and Backward Maximum CPCS-SDU Size shall either both be present or both be absent in the ATM adaptation layer parameters information element. For unidirectional (including point-to-multipoint) ATM virtual connections, the Backward Maximum CPCS-SDU size shall be set to 0.

If the called endpoint receives an ATM adaptation layer parameters information elment in the SETUP message which contains the forward or backward maximum CPCS-SDU size but not both, the called endpoint should clear the call with cause #100, "invalid information element contents".

F.4 MID ~~Size~~ range negotiation

1. Change title "MID Size negotiation " to "MID range negotiation" as shown above.
2. Add a new paragraph at the end of section.

The revised section is given below:

When the called user receives the ATM adaptation layer parameters information element in the SETUP message which indicates AAL type 3/4, the called user shall check the MID rangesize value. If the called user cannot support the indicated MID rangesize but it can support a smaller rangevalue, the called user includes an ATM adaptation layer parameters information element in the CONNECT message containing the MID rangesize that it can support.

The calling user will either accept the MID rangesize contained in the CONNECT message or will clear the call with cause #93, “AAL Parameters can not be supported.”

If the called user does not include the MID range in the CONNECT message, the calling user shall assume that the called user accepts the MID range indicated by the calling user in the SETUP message.

Appendix D Example Signalling Codings

1. Octets 6.1-10.1 in D.1.1 should be changed to reflect AAL modifications:

Subtype = **Video signal transport**								6.1
0	**0**	**0**	**0**	**0**	**1**	**0**	**1**	
Source Clock Frequency rRecovery type Method identifier								9
1	**0**	**0**	**0**	**1**	**0**	**0**	**0**	
Source Clock Frequency Recovery type Method = **Adaptive Clock ~~Recovery~~ Method**								9.1
0	**0**	**0**	**0**	**0**	**0**	**1**	**0**	
Error eCorrection Method iIdentifier								10
1	**0**	**0**	**0**	**1**	**0**	**0**	**1**	
Error Correction Method Type = **Null**								10.1
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

2. Octets 8-9.1 in D.1.2 should be changed to reflect AAL modifications:

~~Mode identifier~~								8
~~1~~	**~~0~~**	**~~0~~**	**~~0~~**	**~~0~~**	**~~0~~**	**~~1~~**	**~~1~~**	
~~Mode = **Message mode**~~								~~8.1~~
~~0~~	**~~0~~**	**~~0~~**	**~~0~~**	**~~0~~**	**~~0~~**	**~~0~~**	**~~1~~**	
SSCS-type identifier								~~8~~9
1	**0**	**0**	**0**	**0**	**1**	**0**	**0**	
SSCS-type = **NULL**								~~8.1~~9.1
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

D.3.2 Example of information element coding for transport of IP datagrams using the "Null encapsulation" over AAL5

Invert bit 7 of octet 7b in the table.

Bits

8	7	6	5	4	3	2	1	Octet
Broadband low layer information								
0	**1**	**0**	**1**	**1**	**1**	**1**	**1**	1
Information element identifier								
1 ext	Coding Standard **= ~~CCITT~~ ITU-T Specified**		IE Instruction Field = **Not Significant**					2
1	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Length of B-LLI contents								3
Length of B-LLI contents (continued) = **3** octets								4
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
0	**0**	**0**	**0**	**0**	**0**	**1**	**1**	
0/1 ext	1 1 Layer 3 id		User information layer 3 protocol **= ISO/IEC TR 9577**					7
0	**1**	**1**	**0**	**1**	**0**	**1**	**1**	
0 ext	ISO/IEC TR 9577 Initial Protocol Identification (IPI) (bits 8-2) **= Internet Protocol**							7a
0	**1**	**1**	**0**	**0**	**1**	**1**	**0**	
1 ext	IPI (bit1)	0	0	0	0	0	0	7b
			Spare					
1	**~~1~~0**	**0**	**0**	**0**	**0**	**0**	**0**	

D.3.3 Example of information element coding for transport of bridged frames using the "Null encapsulation" over AAL5

Invert bit 7 of octet 7b in the table

Bits 8	7	6	5	4	3	2	1	Octet
Broadband low layer information								
0	**1**	**0**	**1**	**1**	**1**	**1**	**1**	1
Information element identifier								
1 ext	Coding Standard **= ~~CCITT~~ ITU-T Specified**		IE Instruction Field **= Not Significant**					2
1	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Length of B-LLI contents								3
Length of B-LLI contents (continued) = **9** octets								4
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
0	**0**	**0**	**0**	**1**	**0**	**0**	**1**	
0/1 ext	1	1	User information layer 3 protocol **= ISO/IEC TR 9577**					7
Layer 3 id								
0	**1**	**1**	**0**	**1**	**0**	**1**	**1**	
0 ext	ISO/IEC TR 9577 Initial Protocol Identification (IPI) (bits 8-2) **= SNAP Identifier**							7a
0	**1**	**0**	**0**	**0**	**0**	**0**	**0**	
1 ext	IPI (bit1)	0	0	0	0	0	0	7b
			Spare					
1	**~~1~~0**	**0**	**0**	**0**	**0**	**0**	**0**	
1 ext	0	0	0	0	0	0	0	8
SNAP ID			Spare					
1	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SNAP Organization Unique Identifier (octet 1)								8.1
OUI octet 2								8.2
OUI octet 3 = **IEEE 802.1**								8.3
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
1	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
1	**1**	**0**	**0**	**0**	**0**	**1**	**0**	
PID (octet 1)								8.4
PID octet 2 = **FDDI without preserved FCS**								8.5
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
0	**0**	**0**	**0**	**1**	**0**	**1**	**0**	

Appendix E Differences with ITU-TS draft Recommendation Q.2931

Replace this appendix with the following:

The signaling protocol and procedures specified in this UNI Specification are based on ITU-T draft Recommendation Q.2931. The output of the ~~May~~ March 1994 ITU-T Study Group 11 Meeting is used. ~~(ITU-TS SG 11 TD 11/2-8R1, TD 11/2-6R1, TD 11/2-63, TD 11/PL-92R1, TD 11/2-43, TD 11/2-18, TD 11/2-51, TD 11/2-62, TD 11/2-19, and TD 11/2-7R1).~~

Differences exist between this UNI Specification and ITU-T draft Recommendation Q.2931. This Appendix summarizes the differences between this UNI Specification and ITU-T draft Recommendation Q.2931. This Appendix is not represented as complete; implementors cannot assume that the combination of this Appendix and ITU-T draft Recommendation Q.2931 will be the same as the main body of this UNI Specification. Not all minor editorial changes made are represented in this Appendix.

~~Items marked with a "*" are those items for which alignment of ITU-T draft Recommendation Q.93B with this UNI Specification is anticipated.~~

ITU-T Recommendation Q.2931 (Output of ~~May~~ March,1994 ITU-T SG 11 Meeting)	**ATM Forum User-Network Interface Specification Version 3.01**
1. ~~General~~ Scope	5.1 General Introductory section specific to this UNI Specification.
2. Overview of Call/~~Bearer~~ Connection Control	5.2 Overview of Call Control No differences.
2.1 B-ISDN Call / ~~or~~ Connection States	5.2.1 ATM Call States No differences.
2.1.1 Call/Connection States at the User Side of the Interface	5.2.1.1 Call States at the User Side of the Interface No differences.
2.1.1.1 Null (U0)	5.2.1.1.1 Null (U0) No differences.
2.1.1.2 Call Initiated (U1)	5.2.1.1.2 Call Initiated (U1) No differences.
2.1.1.3 Outgoing Call Proceeding (U3)	5.2.1.1.3 Outgoing Call Proceeding (U3) No differences.
2.1.1.4 Call Delivered (U4)	5.2.1.1.4 Call Delivered (U4) Not supported.
2.1.1.5 Call Present (U6)	5.2.1.1.5 Call Present (U6) No differences.
2.1.1.6 Call Received (U7)	5.2.1.1.6 Call Received (U7) Not supported.

2.1.1.7 Connect Request (U8)	5.2.1.1.7 Connect Request (U8) No differences.
2.1.1.8 Incoming Call Proceeding (U9)	5.2.1.1.8 Incoming Call Proceeding (U9) No differences.
2.1.1.9 Active (U10)	5.2.1.1.9 Active (U10) No differences.
2.1.1.10 Release Request (U11)	5.2.1.1.10 Release Request (U11) No differences.
2.1.1.11 Release Indication (U12)	5.2.1.1.11 Release Indication (U12) No differences.
2.1.2 Call/Connection States at the Network Side of the Interface	5.2.1.2 Call States at the Network Side of the Interface No differences.
2.1.2.1 Null (N0)	5.2.1.2.1 Null (N0) No differences.
2.1.2.2 Call Initiated (N1)	5.2.1.2.2 Call Initiated (N1) No differences.
2.1.2.3 Outgoing Call Proceeding (N3)	5.2.1.2.3 Outgoing Call Proceeding (N3) No differences.
2.1.2.4 Call Delivered (N4)	5.2.1.2.4 Call Delivered (N4) Not supported.
2.1.2.5 Call Present (N6)	5.2.1.2.5 Call Present (N6) No differences.
2.1.2.6 Call Received (N7)	5.2.1.2.6 Call Received (N7) Not supported.
2.1.2.7 Connect Request (N8)	5.2.1.2.7 Connect Request (N8) No differences.
2.1.2.8 Incoming Call Proceeding (N9)	5.2.1.2.8 Incoming Call Proceeding (N9) No differences.
2.1.2.9 Active (N10)	5.2.1.2.9 Active (N10) No differences.
2.1.2.10 Release Request (N11)	5.2.1.2.10 Release Request (N11) No differences.

2.1.2.11 Release Indication (N12)	5.2.1.2.11 Release Indication (N12) No differences.
~~2.1.2.12 Call Abort (N22)~~	5.2.1.2.12 Call Abort (N22) ~~Not supported.~~ Retained for section numbering.
2.2 Additional B-ISDN Call / ~~or~~ Connection States Relating to Interworking Requirements	5.2.2 ATM Call States Relating to Interworking Requirements Not supported.
2.3 B-ISDN Call / ~~or~~ Connection States for Global Call Reference	5.2.3 States Associated with the Global Call Reference No differences.
2.3.1 Call/Connection States at the User Side of the Interface	5.2.3.1 Call States at the User Side of the Interface No differences.
2.3.1.1 Null (Rest 0)	5.2.3.1.1 Null (Rest 0) No differences.
2.3.1.2 Restart Request (Rest 1)	5.2.3.1.2 Restart Request (Rest 1) No differences.
2.3.1.3 Restart (Rest 2)	5.2.3.1.3 Restart (Rest 2) No differences.
2.3.2 Call/Connection States at the Network Side of the Interface	5.2.3.2 Call States at the Network Side of the Interface No differences.
2.3.2.1 Null (Rest 0)	5.2.3.2.1 Null (Rest 0) No differences.
2.3.2.2 Restart Request (Rest 1)	5.2.3.2.2 Restart Request (Rest 1) No differences.
2.3.2.3 Restart (Rest 2)	5.2.3.2.3 Restart (Rest 2) No differences.
3 Message Functional Definitions and Contents	5.3 Message Functional Definitions and Contents User-network terminology modified. Information elements from codesets 4, 5, 6, and 7 not supported.

3.1 Messages for B-ISDN Call and Connection Control	5.3.1 Messages for ATM Point-to-Point Call and Connection Control ALERTING message not supported. NOTIFY message not supported.
3.1.1 ALERTING	5.3.1.1 ALERTING Not supported.
3.1.2 CALL PROCEEDING	5.3.1.2 CALL PROCEEDING Endpoint reference added for the point-to-multipoint procedures. Notification indicator not supported.
3.1.3 CONNECT	5.3.1.3 CONNECT AAL parameters maximum length modified from 21 to 11. End-to-end transit delay and Notification indicator not supported. Endpoint reference added for the point-to-multipoint procedures.
3.1.4 CONNECT ACKNOWLEDGE	5.3.1.4 CONNECT ACKNOWLEDGE ~~Sending of CONNECT ACKNOWLEDGE mandatory on the originating UNI.*~~ Notification indicator not supported.
3.1.5 RELEASE	5.3.1.5 RELEASE Notification indicator not supported.
3.1.6 RELEASE COMPLETE	5.3.1.6 RELEASE COMPLETE No differences.

3.1.7 SETUP	5.3.1.7 SETUP ATM user cell rate traffic descriptor ~~minimum and~~ maximum lengths modified from 20 to 30. Called party number is mandatory in the network-to-user direction. Called party number minimum length is increased and maximum length is specified. Calling party number maximum length is specified. Connection identifier is mandatory in the network-to-user direction. End-to-end transit delay, OAM traffic descriptor, and Notification indicator not supported. Broadband sending complete is optionally included in the user-to-network direction. Transit network selection maximum length specified at 8 octets. Endpoint reference added for the point-to-multipoint procedures.
3.1.8 STATUS	5.3.1.8 STATUS Endpoint reference added for the point-to-multipoint procedures. Endpoint state added for the point-to-multipoint procedures.
3.1.9 STATUS ENQUIRY	5.3.1.9 STATUS ENQUIRY Endpoint reference added for the point-to-multipoint procedures.
3.1.10 NOTIFY	Not supported.
3.2 Additional or Modified Messages for the Support of 64 kbit/s based ISDN Circuit Mode Services	5.3.2 Messages for the Support of 64 kbit/s based ISDN Circuit Mode Services Not supported.
~~3.3 Messages Related to Release 1 Supplementary Services~~	5.3.3 Messages Related to Release 1 Supplementary Services ~~Not supported.~~ Retained for section numbering.
3.3 ~~3.4~~ Messages used with the global call reference	5.3.4 Messages used with the global call reference No differences.
3.3.1 ~~3.4.1~~ RESTART	5.3.4.1 RESTART Restart of all virtual channels within a virtual path not supported.

3.3.2 ~~3.4.2~~ RESTART ACKNOWLEDGE	5.3.4.2 RESTART ACKNOWLEDGE Restart of all virtual channels within a virtual path not supported.
	5.3.5 Messages for Multipoint Call and Connection Control New messages added for the point-to-multipoint procedures. This material is not in ITU-T Q.2931.
4 General Message Format and Information Element Coding	5.4 General Message Format and Information Element Coding No differences.
4.1 Overview	5.4.1 Overview ~~CCITT Recommendation Q.931 call reference structure supported.*~~ No differences.
4.2 Protocol Discriminator	5.4.2 Protocol Discriminator No differences.
4.3 Call Reference	5.4.3 Call Reference ~~CCITT Recommendation Q.931 call reference structure supported.*~~ .
4.4 Message Type and Message Length	5.4.4 Message Type and Message Length No differences.
4.4.1 Message Type	5.4.4.1 Message Type The following message types are not supported: ALERTING PROGRESS SETUP ACKNOWLEDGE INFORMATION NOTIFY Escape to national specific message types is not supported. Explicit indication of message error handling procedures not supported.
4.4.2 Message Length	5.4.4.2 Message Length No differences.
4.5 Variable Length Information Elements	5.4.5 Variable Length Information Elements No differences.

4.5.1 Coding Rules	5.4.5.1 Coding Rules Locking shift repetition rules not supported. Non-locking shift repetition rules not supported. Maximum length and maximum number of occurrences are specified for each supported information element. Coding standard for ISO/IEC standard and national standard not supported. Reservation of the value "1111 1111" of the information element identifier is not supported Explicit indication of information element error handling procedures not supported.
4.5.2 Extension of Codesets	5.4.5.2 Extension of Codesets Not supported.
4.5.3 Broadband Locking Shift Procedures	5.4.5.3 Broadband Locking Shift Procedures Not supported. Recognition of Broadband locking shift information element is supported.
4.5.4 Broadband Non-Locking Shift Procedures	5.4.5.4 Broadband Non-Locking Shift Procedures Not supported. Recognition of Broadband non-locking shift information element is supported.
4.5.5 ATM Adaptation Layer Parameters	5.4.5.5 ATM Adaptation Layer Parameters AAL type 2 not supported. ~~AAL type is 8 bits.*~~ ~~Renamed Receive Maximum CPCS-SDU size subfield to Backward Maximum CPCS-SDU size.*~~ ~~Added Forward Maximum CPCS-SDU size subfield.*~~

4.5.6 ATM User Cell RateTraffic Descriptor	5.4.5.6 ATM User Cell RateTraffic Descriptor Traffic descriptor subfields added: Forward Sustainable Cell Rate (CLP=0) Backward Sustainable Cell Rate (CLP=0) Forward Sustainable Cell Rate (CLP=0+1) Backward Sustainable Cell Rate (CLP=0+1) Forward Maximum Burst Size (CLP=0) Backward Maximum Burst Size (CLP=0) Forward Maximum Burst Size (CLP=0+1) Backward Maximum Burst Size (CLP=0+1) Best Effort Indicator Traffic Management Options Identifier ~~Traffic descriptor identifier is 8 bits in length.*~~ ~~Forward Peak Cell Rate (CLP=0) is an optional subfield.*~~ ~~Backward Peak Cell Rate (CLP=0) is an optional subfield.*~~
4.5.7 Broadband Bearer Capability	5.4.5.7 Broadband Bearer Capability ~~BCOB-D bearer class not supported.~~ ~~BCOB-C bearer class added.*~~ ~~Bits 7-6 of Octet 5a made spare.*~~ Point-to-multipoint user plane connection configuration added.
4.5.8 Broadband High Layer Information	5.4.5.8 Broadband High Layer Information ~~Coding of Vendor-specific application identifier defined.*~~ The code value “000100” of the high layer information type is not supported
4.5.9 Broadband Low Layer Information	5.4.5.9 Broadband Low Layer Information User information layer 1 octet group not supported. Coding of ISO/IEC TR-9577 NLPIDs within the B-LLI defined. Coding for SNAP ID octet group added.
4.5.10 Call State	5.4.5.10 Call State Call states U2, N2, U4, N4, U7, N7, U15, N15, U17, N17, ~~N22~~, U25, and N25 not supported.

4.5.11 Called Party Number	5.4.5.11 Called Party Number Only two combinations of Type of Number and Addressing/Numbering Plan Identification are supported: Unknown/ISO NSAP International number/ISDN number plan (E.164)
4.5.12 Called Party Subaddress	5.4.5.12 Called Party Subaddress User-specified subaddress not supported.
4.5.13 Calling Party Number	5.4.5.13 Calling Party Number Only two combinations of Type of Number and Addressing/Numbering Plan Identification are supported: Unknown/ISO NSAP International number/ISDN number plan (E.164) ~~Presentation indicator codepoint, "Number not available due to interworking" changed to "Number not available".*~~
4.5.14 Calling Party Subaddress	5.4.5.14 Calling Party Subaddress User-specified subaddress not supported.
4.5.15 Cause	5.4.5.15 Cause Network-specific cause value 23 added. ~~Cause value 104 changed to 93.*~~ ~~New cause value 104 defined.*~~
4.5.16 Connection Identifier	5.4.5.16 Connection Identifier VP-associated signaling not supported. Preferred/exclusive indication "Exclusive VPCI/any VCI" not supported. The first octet of the VPCI field is coded to "00000000". The second octet of the VPCI field is numerically equal to the VPI value used. VCI values 16-31 are reserved for present or future use by this UNI Specification.
4.5.17 End-to-End Transit Delay	5.4.5.17 End-to-End Transit Delay Not supported.

4.5.18 Quality of Service Parameter	5.4.5.18 Quality of Service Parameter Network specific coding standard is used. ~~Forward QOS class field is one octet.*~~ ~~Backward QOS class field is one octet.*~~ QoS classes 0-4 are supported.
4.5.19 Broadband Repeat Indicator	5.4.5.19 Broadband Repeat Indicator No differences.
4.5.20 Restart Indicator	5.4.5.20 Restart Indicator Class codepoint "indicated VPC" not supported.
4.5.21 Broadband Sending Complete	5.4.5.21 Broadband Sending Complete No differences.
4.5.22 Transit Network Selection	5.4.5.22 Transit Network Selection Only one combination of Type of Network Identification and Network Identification Plan is supported: National network identification/ Carrier identification code
4.5.23 Notification Indicator	Not supported.
4.5.24 OAM Traffic Descriptor	Not supported.
4.6 Information Elements for the Support of 64kbit/s Based ISDN Circuit Mode Services	5.4.6 Information Elements for Interworking with 64kbit/s Based ISDN Not supported.
~~4.7 Information Elements for Supplementary Services~~	5.4.7 Information Elements for Supplementary Services ~~Not supported.~~ Retained for section numbering.
	5.4.8 ATM Forum Specified Information Elements New information elements added for the point-to-multipoint procedures. This material is not in ITU-T Q.2931.
5 B-ISDN Call/Connection Control Procedures	5.5 B-ISDN Call/Connection Control Procedures for ATM Point-to-Point Calls ~~Point-to-multipoint access configurations are not supported.~~ Signaling virtual channel uses VPI=0, VCI=5. ~~Meta-Signaling is not supported.~~ Specification and Description Language (SDL) diagrams are not included.

5.1 Call/Connection Establishment at the Originating Interface	5.5.1 Call/Connection Establishment at the Originating Interface No differences.
5.1.1 Call/Connection Request	5.5.1.1 Call/Connection Request ~~CCITT Recommendation Q.931 call reference structure is supported.*~~ Sending complete is optionally included by the user. Retransmission of SETUP is optional.
5.1.2 Connection Identifier (VPCI/VCI) Allocation/Selection	5.5.1.2 Connection Identifier (VPCI/VCI) Allocation/Selection No differences.
5.1.2.1 Connection Identifier Allocation/ Selection - Origination	5.5.1.2.1 Connection Identifier Allocation/ Selection - Origination VP-associated signaling is not supported. The network side always allocates the VPCI/VCI for the connection. The user does not include the Connection identifier in the SETUP message. Appropriate error handling procedures are defined.
5.1.2.1.1 Associated Signaling	
5.1.2.1.2 Non-Associated Signaling	
5.1.2.2 Use of VPCIs	5.5.1.2.2 Use of VPCIs VPCI values are numerically equal to the VPI value. VP cross connects between the user and the network and non-facility-associated signaling are not supported.
5.1.2.3 VCI Range	5.5.1.2.3 VPCI and VCI Ranges VCI values 16-31 are reserved for present or future use by this UNI Specification. VPCI range added.
5.1.3 QOS and Traffic Parameters Selection Procedures	5.5.1.3 QoS and Traffic Parameters Selection Procedures Error procedure for unsupported combination of traffic parameters added.
5.1.4 Invalid Call/Connection Control Information	5.5.1.4 Invalid Call/Connection Control Information No differences.

5.1.5 Call/Connection Proceeding	5.5.1.5 Call/Connection Proceeding Sending a CALL PROCEEDING message is optional. Consistent with Section 5.1.10Annex H of ITU-T Recommendation Q.2931.
5.1.6 Call/Connection Confirmation Indication	5.5.1.6 Call/Connection Confirmation Indication Not supported.
5.1.7 Call/Connection Acceptance	5.5.1.7 Call/Connection Acceptance ~~Sending a CONNECT ACKNOWLEDGE message is mandatory.*~~ No differences.
5.1.8 Call/Connection Rejection	5.5.1.8 Call/Connection Rejection No differences.
5.1.9 Transit Network Selection	5.5.1.9 Transit Network Selection No differences.
5.1.10 Extensions for Symmetric Call Operation	5.5.1.10 Extensions for Symmetric Call Operation Extensions to allow optional sending of the CALL PROCEEDING message is supported in Section 5.5.1.5 (See Annex H of Q.2931).
5.2 Call/Connection Establishment at the Destination Interface - Point-to-Point Access Configuration Call Offering	5.5.2 Call/Connection Establishment at the Destination Interface - Point-to-Point Access Configuration Call Offering No differences.
5.2.1 Incoming Call/Connection Request	5.5.2.1 Incoming Call/Connection Request Overlap receiving not supported. Retransmission of SETUP is optional.
5.2.2 Address and Compatibility Check	5.2.2 Address and Compatibility Check Not supported.
5.2.3 Connection Identifier (VPCI/VCI) Allocation/Selection - Destination	5.5.2.3 Connection Identifier (VPCI/VCI) Allocation/Selection - Destination VP-associated signaling is not supported. The network side always allocates the VPCI/VCI for the connection.
5.2.4 QOS and Traffic Parameter Selection Procedures	5.5.2.4 QoS and Traffic Parameter Selection Procedures No differences.
5.2.5 Call/Connection Confirmation	5.5.2.5 Call/Connection Confirmation
5.2.5.1 Response to En-bloc SETUP or Completion of Overlap Receiving	5.5.2.5.1 Response to SETUP Overlap receiving not supported.

	5.5.2.5.1.1 Procedures when the User is an ATM Endpoint This section is equivalent to Section 5.2.5.1 of ITU-T Recommendation Q.2931. ALERTING message not supported. New error procedure using network-specific cause 23, "user rejects all calls with calling line identification restriction (CLIR)", added.
	5.5.2.5.1.2 Procedures when the User is not an ATM Endpoint
5.2.5.2 Receipt of CALL PROCEEDING and ALERTING	5.5.2.5.2 Receipt of CALL PROCEEDING ALERTING message not supported.
5.2.5.3 Called User Clearing During Incoming Call Establishment	5.5.2.5.3 Called User Clearing During Incoming Call Establishment Timer T301 not supported.
5.2.5.4 Call Failure	5.5.2.5.4 Call Failure Retransmission of SETUP is optional. ALERTING message not supported. Timer T301 not supported.
5.2.6 Call/Connection Acceptance	5.5.2.6 Call/Connection Acceptance ALERTING message not supported.
5.2.7 Active Indication	5.5.2.7 Active Indication Timer T301 not supported.
5.3 Call/Connection Establishment at the Destination - Point-to-Multipoint Access Arrangement Call Offering	5.5.3 Call/Connection Establishment at the Destination - Point-to-Multipoint Access Arrangement Call Offering Not supported.
5.4 Call/Connection Clearing	5.5.4 Call/Connection Clearing No differences.
5.4.1 Terminology	5.5.4.1 Terminology ~~CCITT Recommendation Q.931 call reference structure is supported.*~~ <u>No differences.</u>
5.4.2 Exception Conditions	5.5.4.2 Exception Conditions No differences.

5.4.3 Clearing Initiated by the User	5.5.4.3 Clearing Initiated by the User ~~CCITT Recommendation Q.931 call reference structure is supported.*~~ No differences.
5.4.4 Clearing Initiated by the Network	5.5.4.4 Clearing Initiated by the Network No differences.
5.4.5 Clear Collision	5.5.4.5 Clear Collision No differences.
5.5 Restart Procedures	5.5.5 Restart Procedures Restart of all virtual channels within a virtual path not supported.
5.5.1 Sending RESTART	5.5.5.1 Sending RESTART Restart of all virtual channels within a virtual path not supported.
5.5.2 Receipt of RESTART	5.5.5.2 Receipt of RESTART Restart of all virtual channels within a virtual path not supported.
5.6 Handling of Error Conditions	5.5.6 Handling of Error Conditions No differences.
5.6.1 Protocol Discriminator Error	5.5.6.1 Protocol Discriminator Error No differences.
5.6.2 Message too Short	5.5.6.2 Message too Short No differences.
5.6.3 Call Reference Error	5.5.6.3 Call Reference Error No differences.
5.6.3.1 Invalid Call Reference Format	5.5.6.3.1 Invalid Call Reference Format ~~CCITT Recommendation Q.931 call reference structure is supported.*~~ No differences.
5.6.3.2 Call Reference Procedural Errors	5.5.6.3.2 Call Reference Procedural Errors ~~CCITT Recommendation Q.931 call reference structure is supported.*~~ No differences.

5.6.4 Message Type or Message Sequence Errors	5.5.6.4 Message Type or Message Sequence Errors No differences. ~~Sending of STATUS ENQUIRY for this error not supported.~~ ~~Exception condition for unexpected RELEASE message added.*~~
5.6.5 Message Length Error	5.5.6.5 Message Length Error ~~Error handling modified.*~~ No differences.
5.6.6 General Information Element Errors	5.5.6.6 General Information Element Errors Locking and non-locking shift procedures not supported.
5.6.6.1 Information Element Sequence	5.5.6.6.1 Information Element Sequence No differences.
5.6.6.2 Duplicated Information Elements	5.5.6.6.2 Duplicated Information Elements No differences.
5.6.6.3 Coding standard error	5.5.6.6.3 Coding standard error No differences.
5.6.7 Mandatory Information Element Error	5.5.6.7 Mandatory Information Element Error No differences.
5.6.7.1 Mandatory Information Element Missing	5.5.6.7.1 Mandatory Information Element Missing No differences.
5.6.7.2 Mandatory Information Element Content Error	5.5.6.7.2 Mandatory Information Element Content Error Explicit indication of information element error handling procedure not supported.
5.6.8 Non-Mandatory Information Element Errors	5.5.6.8 Non-Mandatory Information Element Errors Explicit indication of information element error handling procedure not supported.
5.6.8.1 Unrecognized Information Element	5.5.6.8.1 Unrecognized Information Element No differences.
5.6.8.2 Non-Mandatory Information Element Content Error	5.5.6.8.2 Non-Mandatory Information Element Content Error No differences.
5.6.8.3 Unexpected Recognized Information Element	5.5.6.8.3 Unexpected Recognized Information Element No differences.

5.6.9 Signaling AAL Reset	5.5.6.9 Signaling AAL Reset Calls in the establishment phase are cleared. Call states N4, N7, U4, and U7 not supported.
5.6.10 Signaling AAL Failure	5.5.6.10 Signaling AAL Failure ~~User-side procedures when T309 not implemented defined.*~~ No differences.
5.6.11 Status Enquiry Procedure	5.5.6.11 Status Enquiry Procedure No differences.
5.6.12 Receiving a STATUS Message	5.5.6.12 Receiving a STATUS Message No differences.
5.7 Error procedures with explicit action indication	5.5.7 Forward Compatibility Procedures Not supported.
5.8 Notification Procedure	Not supported.
6. Provision of 64 kbit/s based Circuit Mode ISDN Services in B-ISDN and Signaling Interworking between N-ISDN and B-ISDN	Not supported.
	5.6 Call/Connection Control for Multipoint Calls This material is not in ITU-T Q.2931.
7 List of Timers	5.7 List of Timers No differences.
7.1 Timers in the Network Side	5.7.1 Timers in the Network Side Timers for the provision of 64 kbit/s based circuit mode ISDN services in B-ISDN and signaling interworking between N-ISDN and B-ISDN not supported. Timer T301 not supported. Retransmission of SETUP is optional. ~~For SAAL disconnection, calls in the Active state are not lost.~~ Timer T398 added for the point-to-multipoint procedures. This material is not in ITU-T Q.2931. Timer T399 added for the point-to-multipoint procedures. This material is not in ITU-T Q.2931.

7.2 Timers in the User Side	5.7.2 Timers in the User Side Timers for the provision of 64 kbit/s based circuit mode ISDN services in B-ISDN and signaling interworking between N-ISDN and B-ISDN not supported. Retransmission of SETUP is optional. ~~For SAAL disconnection, calls in the Active state are not lost.~~ ~~Timer T310 is added.*~~ Timer T398 added for the point-to-multipoint procedures. This material is not in ITU-T Q.2931. Timer T399 added for the point-to-multipoint procedures. This material is not in ITU-T Q.2931.
8 Primitives	Not included.
	5.8 Address Registration This material is not in ITU-T Q.2931.
	References Similar material is in Appendix I of ITU-T Q.2931.
Annex A Specification and Description Language (SDL) Diagrams	~~Not supported.~~ Not included.
	Annex A Guidelines for Use of ATM Address Formats This material is not in ITU-T Q.2931.
Annex B Compatibility Checking	Annex B Compatibility Checking Not supported.
Annex C Broadband Low Layer Information Negotiation	Annex C B-LLI Negotiation No differences.
C.1 General	C.1 General Text describing the expected implementation of B-LLI negotiation added.
C.2 Low Layer Compatibility Notification to the Called User	C.2 B-LLI Notification to the Called User No differences.
C.3 B-LLI Negotiation Between Users	C.3 B-LLI Negotiation Between Users No differences.

C.4 Alternate Requested Values	C.4 Alternate Requested Values Relationship of B-LLI negotiation procedures to point-to-multipoint procedures defined. ~~Procedure for user incompatibility with B-LLI added.~~
Annex D Transit Network Selection	Annex D Transit Network Selection Clarifying text based on ANSI T1.607 has been added.
D.1 Selection not Supported	D.1 Selection not Supported No differences.
D.2 Selection Supported	D.2 Selection Supported Specification of more than one transit network is not supported.
Annex E: Mapping Functions to Support 64 kbit/s Based Circuit Mode ISDN Services in B-ISDN and Signaling Interworking between N-ISDN and B-ISDN	Not supported.
	Annex E Cause Definitions This material is not in ITU-T Q.2931.
Annex F ATM Adaptation Layer Parameters Indication and Negotiation	Annex F ATM Adaptation Layer Parameters Indication and Negotiation No differences.
F.1 General	F.1 General No differences.
F.2 ATM Adaptation Layer Parameter Indication in the SETUP Message	F.2 ATM Adaptation Layer Parameter Indication in the SETUP Message User defined AAL indication in the SETUP message added. ~~*~~ ~~Modified Receive Maximum CPCS-SDU size negotiation procedures.*~~
F.3 ATM Adaptation Layer Indication in the CONNECT Message	F.3 ~~Maximum CPCS-SDU Size Negotiation~~ ATM Adaption Layer Indication in the CONNECT Message Relationship of AAL parameters negotiation to point-to-multipoint procedures defined. ~~CPCS-SDU size negotiation procedures modified.*~~ ~~Cause value 104 changed to 93.*~~ User defined AAL indication in the CONNECT message added. ~~*~~

F.4 ~~ATM Adaptation Layer Negotiation -~~ MID range negotiation	F.4 MID Size Range Negotiation ~~Cause value 104 changed to 93.*~~ No differences.
F.5 Use of Forward and Backward Maximum CPCS-SDU Size by the AAL Entity	F.5 Use of Forward and Backward Maximum CPCS-SDU Size by the AAL Entity ~~*-~~ ~~Additional endpoint procedures for Forward and Backward Maximum CPCS-SDU size defined.~~ No differences.
Annex G Signaling for Semi-Permanent Connection Control	Not supported.
Annex H Extensions for Symmetric Call Operation	Extensions to allow optional sending of the CALL PROCEEDING message is supported in section 5.5.1.5.
Annex I Terminology~~Appendix I Definitions, Abbreviations, and References~~	Similar material is in the References section and Appendix F of the UNI Interface Specification.
	Appendix A Quality of Service Guidelines This material is not in ITU-T Q.2931.
	Appendix B Conformance Examples in a Traffic Contract This material is not in ITU-T Q.2931.
	Appendix C Multipoint State Machines This material is not in ITU-T Q.2931.
	Appendix D Example Signaling Codings This material is not in ITU-T Q.2931.
	Appendix E Differences with ITU-T draft Recommendation Q.2931 This material is not in ITU-T Q.2931.
	Appendix F Guidelines on the use of Bearer Class, Traffic Parameters and QoS This material is not in ITU-T Q.2931.
	Appendix G OAM Cell Error Detection Code Field This material is not in ITU-T Q.2931.
	Appendix F~~H~~ Glossary Similar material is in Appendix I of ITU-T Q.2931.
Appendix I Guidelines for the Use of Instruction Indicator	Not supported.

New Appendix F

Add new appendix F as shown below. The previous appendix F (Glossary) should become new appendix H.

Guidelines on the use of Bearer Class, Traffic Parameters and QoS

The following provides a brief description of what is meant by the various BCOB classes in the Bearer capability information element (see ITU-T Recommendation F.811 for additional information).

F.1 Bearer Class

F.1.1 BCOB-A

When the user specifies BCOB-A, the user is requesting more than an ATM only service. The network may look at the AAL IE to provide interworking based upon its contents. One example of such interworking would be between an ATM user calling a non-ATM user who has switched DS1 capability. In this case, the network interworking function would need to know the AAL be used to be able to perform this interworking function.

F.1.2 BCOB-C

As for BCOB-A, when the user specifies BCOB-C, the user is requesting more than an ATM only service. The network interworking function may look at the AAL and provide service based on it.

F.1.3 BCOB-X

When the user specifies BCOB-X, the user is requesting an ATM only service from the network. In this case, the network shall not process any higher layer protocols (e.g. AAL protocols).

The difference between BCOB-X and the other classes is what service is being requested from the network. For the VBR user that wants only a ATM cell relay service, the user should specify BCOB-X and Traffic Type VBR.

A user, that is placing a DS1 circuit emulation call but does not want to allow interworking, should specify BCOB-X and Traffic Type CBR. If the user wishes to allow interworking then the user should specify BCOB-A.

F.2. Allowed Combination of Bearer Capabilities, Traffic Parameters, and QoS

The parameters specified in the Broadband Bearer Capability IE, the Traffic Descriptor IE and the Quality of Service Parameters IE of the SETUP message should be consistent. Table F-1 shows the allowable combinations of the Broadband Bearer Capability classes, the Traffic Descriptor parameters and the Quality of Service classes based on tables 5-7 and 5-8.

Table F-1. Allowable Combinations of Traffic Related Parameters in the SETUP message

Broadband Bearer Capability												
Broadband Bearer	A,C	X	X	C	X	C	X	A,C	X	X	C	X
Traffic Type		CBR	&		&		&		CBR	&		&
Timing Required		Y	&&		&&		&&		Y	&&		&&
Traffic Descriptor												
PCR (CLP=0)	S	S	S									
PCR (CLP=0+1)	S	S	S	S	S	S	S	S	S	S	S	S
SCR (CLP=0)				S	S							
SCR (CLP=0+1)						S	S					
MBS (CLP=0)				S	S							
MBS (CLP=0+1)						S	S					
Best Effort											S	S
Tagging	Y/N	Y/N	Y/N	Y/N	Y/N	N	N	N	N	N	N	N
QOS ClAsses	*	*	*	*	*	*	*	*	*	*	0	0

PCR = Peak Cell Rate, SCR = Sustainable Cell Rate, MBS = Maximum Burst Size
Y = Yes, N = No, S= Specified
Y/N = either “Yes” or “No” is allowed
* = allowed QOS class values are a network option. Class D is always supported for alignment with ITU-T
& = parameter is coded to either “no indication” or “VBR” or octet 5a (Traffic Type / Timing Required) is absent; these three codings are treated as equivalent.
&& = parameter is coded to either “No indication” or “No” or octet 5a Traffic Type / Timing Required) is absent; these three codings are treated as equivalent.
A blank entry in the table indicates that the parameter is not present.

Appendix G OAM Cell Error Detection Code Field

This appendix is a new addition.

The Error Detection Code (EDC) field of all OAM cells carries a CRC-10 error detection code computed over the OAM cell Information Field excluding the EDC field. It shall be the remainder of the division (modulo 2) by the generator polynomial of the product of x^{10} and the content of the OAM cell Information Field (namely OAM Type, Function Type, function specific fields, and reserved field, excluding the EDC Field) (374 bits). Each bit of the concatenated fields mentioned above is considered as a coefficient (modulo 2) of a polynomial of degree 373 using the first bit as the coefficient of the highest order term. The CRC-10 generating polynomial is:

$$G(x) = 1 + x + x^4 + x^5 + x^9 + x^{10}$$

The result of the CRC calculation is placed with the least significant bit right justified in the CRC field.

One example test cell, with its corresponding calculated CRC-10 value, is shown below to provide some measure of assurance of a correctly implemented EDC generation function.

Example: CRC-10 for an RDI (formerly FERF) cell. The Cell Type is '0001', the Function Type is '0001', and the next 45 octets are all coded 6A hexadecimal. The reserved field consists of six '0' bits. The calculated CRC-10 is A F hexadecimal (i.e., '00 1010 1111'). The 48 octet information field is transmitted as:

1 1 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A
6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A
6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A
6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 6 A 0 0 A F