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SERIES Q: SWITCHING AND SIGNALLING

Q3 interface

Asymmetric digital subscriber line (ADSL) – Network element management: CMIP model

ITU-T Recommendation Q.833.1

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For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation Q.833.1

Asymmetric Digital Subscriber Line (ADSL) – Network element management: CMIP Model

Summary

This Recommendation specifies the Q3 interface between a Broadband Access Network based on Asymmetric Digital Subscriber Line (ADSL) technology and the Telecommunications Management Network (TMN).

Source

ITU-T Recommendation Q.833.1 was prepared by ITU-T Study Group 4 (2001-2004) and approved under the WTSA Resolution 1 procedure on 19 January 2001.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

ITU-T Recommendation Q.833.1

Asymmetric Digital Subscriber Line (ADSL) – Network element management: CMIP Model

1 Introduction

1.1 Purpose and scope

This Recommendation specifies the Q3 interface between a Broadband Access Network based on Asymmetric Digital Subscriber Line (ADSL) technology and the Telecommunications Management Network (TMN). The interface specified is that between TMN Network Elements or Q-Adapters which interface to TMN Operations Systems (OSs) without mediation and between OSs and Mediation Devices, as defined in ITU-T M.3010 [4].

Existing protocols are used where possible, and the focus of the work is on defining the object model. The definition of the functionality of TMN Operations Systems is outside the scope of this Recommendation.

Security management is also outside the scope of this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T G.992.1 (1999), *Asymmetric digital subscriber line (ADSL) transceivers*.

[2] ITU-T G.997.1 (1999), *Physical layer management for digital subscriber line (DSL) transceivers*.

[3] ITU-T I.751 (1996), *Asynchronous transfer mode management of the network element view*.

[4] ITU-T M.3010 (2000), *Principles for a telecommunications management network*.

[5] ITU-T M.3100 (1995), *Generic network information model*.

[6] ITU-T X.733 (1992) | ISO/IEC 10164-4: 1992, *Information technology – Open Systems Interconnection: Alarm reporting function*.

[7] ADSL Forum Technical Report TR-028 (1999), *CMIP Specification for ADSL Network Element Management*.

3 Definitions, abbreviations and conventions

3.1 Definitions

This Recommendation defines the following terms:

3.1.1 access network: The collection of network equipment which provides a transport capability for the provision of telecommunications services between a Service Node Interface (SNI) and one or more associated User Network Interfaces (UNI). User signalling is carried transparently by the AN.

3.1.2 customer: The person or organization that uses the services provided by the network provider or the service provider. A customer can be a service provider as well.

3.1.3 data communications network: Refers to the management communications network which is needed to transfer management information between OSFs and between OSFs and the NEs.

3.1.4 drop medium: Refers to the network used to transport services in a common format from the Remote Node to the Network Termination.

3.1.5 element management layer: EM functions manage the physical resources which reside in the access network. Typical management functions at this level are configuration, fault management and performance monitoring. EM functions are responsible for understanding the details of transmission technology information and equipment thus removing the need for this complexity of information to be held by higher layer management functions.

3.1.6 element/network/service management system: The collection of functions at a specific layer which are implemented on a physical platform.

3.1.7 extended feeder: Provides the physical resources to extend the AN over larger distances. These physical resources will not alter the transmission on the SNI and will require minimal management. This is not considered to be part of the Network Element.

3.1.8 network element layer: Refers to the physical resources that reside in the Access Network.

3.1.9 network management layer: NM functions coordinate the management of network elements to provide a user-to-user or service node to user path in order to transport telecommunications services. NM Functions will coordinate multiple EM OSFs to provide overall network supervision.

3.1.10 network termination: Physical resource which resides in the customers premises and forms the boundary of the access network (UNI). Provides onward transmission of services over building wiring to customer premises equipment.

3.1.11 operations system function: This is the collection of similar functions which provide different levels of management capability. Four layers of management capability are defined: Network Element (NE), Element Management (EM), Network Management (NM) and Service Management (SM). Each layer providing management services to the layer above.

3.1.12 service management layer: SM functions manage the services supported by the network. These functions are not concerned with the physical nature of the network. Typical functions of this layer are service creation, provision, cessation, billing and accounting information.

3.1.13 service node: A network element that provides access to various switched and/or permanent telecommunications services. For switched services, the Service node provides call control, connection control and resource handling functions.

3.1.14 user: A crafts person interacting with the management system.

3.2 Abbreviations

This Recommendation uses the following abbreviations:

AAL ATM adaptation layer

ADSL Asymmetric digital subscriber line

AIS Alarm indication signal

AN Access network

ASN.1 Abstract syntax notation one

ATM Asynchronous transfer mode

DCN Data communications network

EML Element management layer

ERD Entity relationship diagram

GDMO Guidelines for the definition of managed objects

MIB Management information base

MOC Managed object class

NEL Network element layer

NML Network management layer

NT Network termination

OAM Operations, administration and maintenance

OS Operations system

OSF Operations system function

RDI Remote defect indication

RDN Relative distinguished name

SDH Synchronous digital hierarchy

SML Service management layer

SN Service node

SNI Service node interface

TMN Telecommunications management network

TTP Trail termination point

UNI User network interface

VC Virtual channel

VDSL Very high speed digital subscriber line

VP Virtual path

VPC Virtual path connection

VPCI Virtual path connection identifier

3.3 Conventions

Objects and their characteristics and associated ASN.1 defined here are given names with capitals used to indicate the start of the next word and acronyms are treated as if they were words.

Throughout this Recommendation, all new attributes are named according to the following guidelines:

- The name of an attribute ends in the string "Ptr" if and only the attribute value is intended to identify a single object.
- The name of an attribute ends in the string "PtrList" if and only the attribute value is intended to identify one or more objects.
- The name of an attribute is composed of the name of an object class followed by the string "Ptr" if and only the attribute value is intended to identify a specific object class.

– If an attribute is intended to identify different object classes, a descriptive name is given to that attribute and a description is provided in the attribute behaviour.

– The name of an attribute ends in the string "Id" if and only the attribute value is intended to identify the name of an object, in which case this attribute should be the first one listed, should use ASN.1 NameType and should not be used to convey other information.

– The name of an attribute is composed of the name of an object class followed by the string "Id" if and only the attribute value is intended to identify the name of the object class holding that attribute.

4 General overview

The following information model diagrams have been drawn for the purpose of clarifying the relations between the different object classes of the model:

1) Entity Relationship Models showing the relations of the different managed objects.

2) Inheritance Hierarchy showing how managed objects are derived from each other (i.e. the different paths of inherited characteristics of the different managed objects).

These diagrams are only for clarification. The formal specification in terms of GDMO templates and ASN.1 type definitions are the relevant information for implementations.

4.1 Entity relationship models

The following conventions are used in the diagrams (see Figure 1):

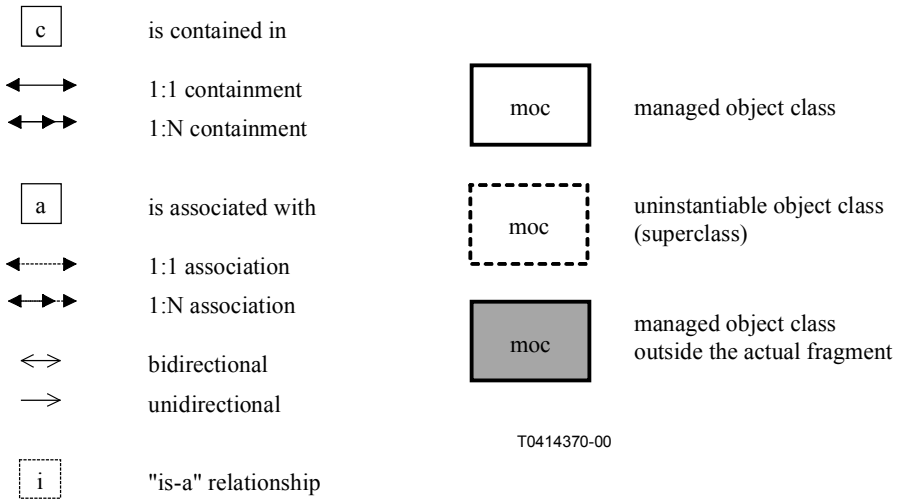

Figure 1/Q.833.1 – Conventions used in diagrams for Entity Relationship Models

Where the directionality of containment is not clear, it can be identified by implications since the root class is unique.

4.1.1 Entity relationship diagram for the ADSL fragment

See Figure 2.

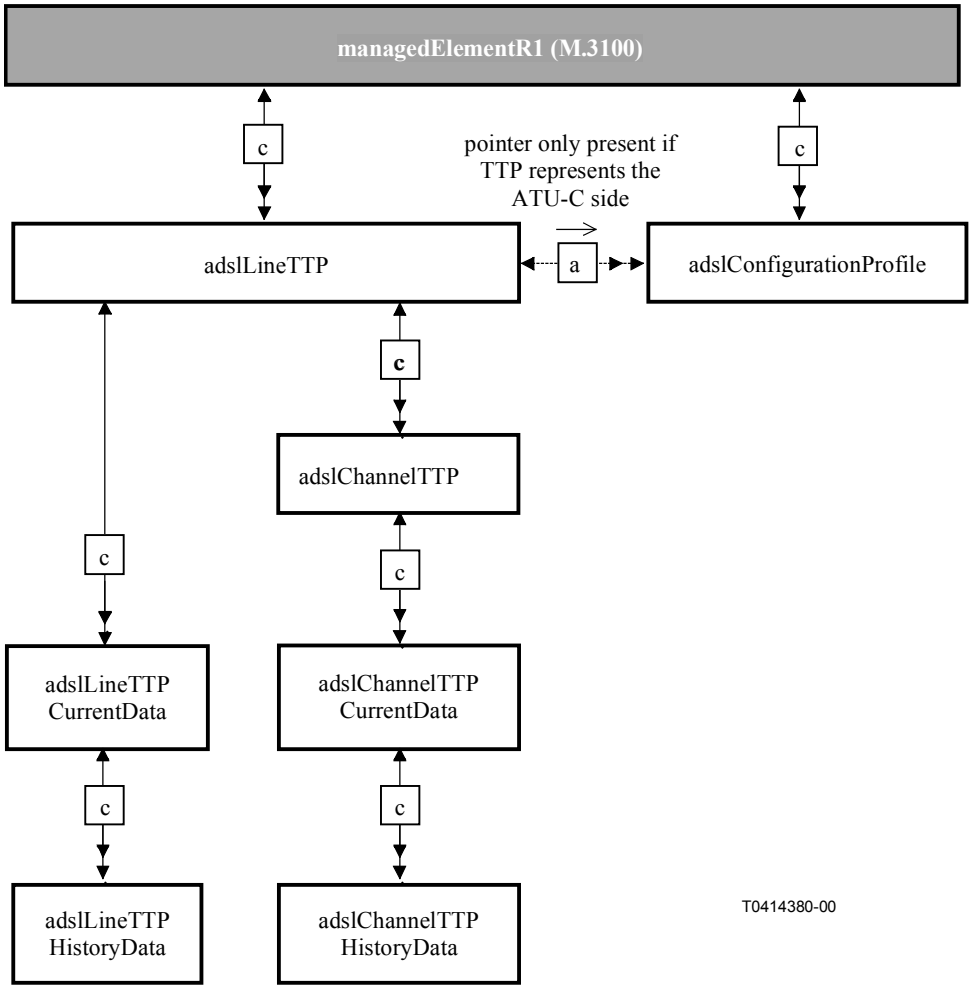

Figure 2/Q.833.1 – Entity relationship diagram – ADSL fragment

4.2 Inheritance hierarchy

See Figure 3.

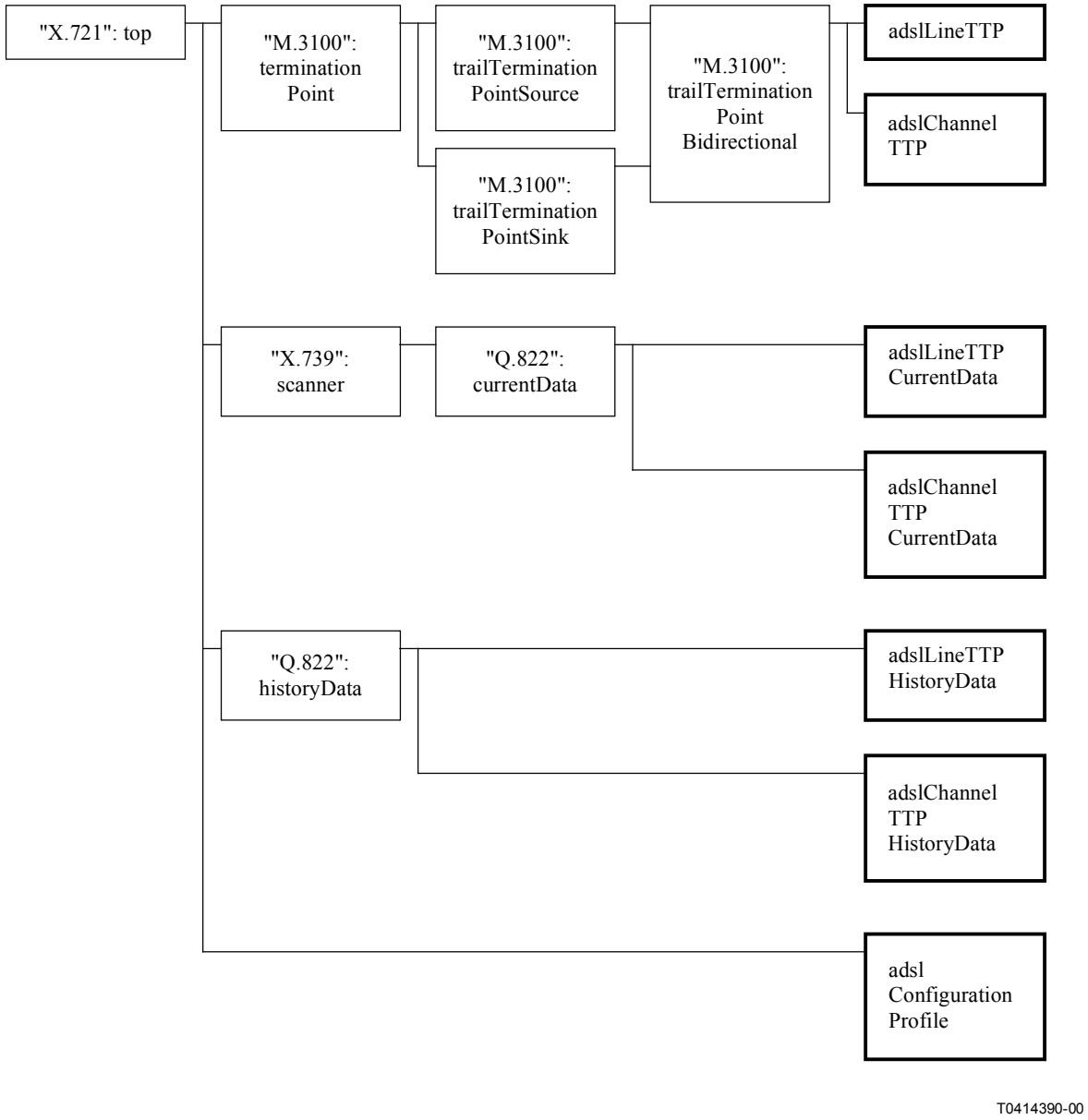

Figure 3/Q.833.1 – Inheritance hierarchy

5 Formal definitions

This clause gives the formal definitions of the managed object classes, name bindings, general packages, behaviours, attributes, actions and notifications.

5.1 Object classes

This clause specifies the object classes for all of the managed objects used in the management information model. These object classes are either defined here or by reference to other specifications. Classes of managed objects which are defined elsewhere and which are only used for containment are not included, but are identified by the name bindings for the classes specified here.

The following class that is defined in ITU-T M.3100 [5] may be instantiated:

– managedElementR1.

All of the classes that are defined in ADSL Forum Technical Report TR-028 [7] may be instantiated. These are:

– adslChannelTTP.

– adslChannelTTPCurrentData.

– adslChannelTTPHistoryData.

– adslConfigurationProfile.

– adslLineTTP.

– adslLineTTPCurrentData.

– adslLineTTPHistoryData.

6 Type definitions

No additional ASN.1 types are defined.

7 Protocol stacks

The protocol stacks specified in ITU-T Q.811, Q.812, G.773 and the SDH digital cross-connect part of ITU-T G.784 can be used as part of the protocol stack for this Recommendation. The following Recommendations should be used to extend these stacks to include ATM:

– Q.2811 Broadband Q3 and X interfaces – Lower Layer Protocols;

– Q.2812 Broadband Q3 and X interfaces – Upper Layer Protocols.

ANNEX A

Management requirements

This annex defines the high level management requirements for ADSL.

A.1 Configuration

A.1.1 Physical configuration

This clause defines requirements for the configuration of the physical equipment.

It should be possible to add and remove the following physical equipment:

1) An ADSL Multiplexer.

2) A shelf within a multiplexer.

3) A card on a shelf.

4) An ADSL line.

A.1.2 Logical configuration

This clause defines requirements for the configuration of the logical entities that have manageable features.

It should be possible to add, modify and remove the following logical entities:

1) A network node interface.

2) An ATU-C.
3) An ATU-R.
4) An ATM Port on an ATU-R.
5) An ATM connection.

A.2 Performance monitoring

This clause defines requirements for the performance monitoring of ADSL.

A.2.1 ADSL line terminations

It should be possible to measure and record the following:

1) The number of seconds with a loss of frame.
2) The number of seconds with a loss of link.
3) The number of seconds with a loss of signal.
4) The number of seconds with a loss of power.
5) The number of errored seconds.
6) The number of severely errored seconds.
7) The number of unavailable seconds.
8) The number of fast retrain attempts.
9) The number of failed retrain attempts.
10) The number of seconds with a forward error connection failures.

A.2.2 ADSL channel terminations

It should be possible to measure and record the following:

1) The number of received encoded blocks.
2) The number of transmitted encoded blocks.
3) The number of received blocks with errors that were corrected.
4) The number of received blocks with uncorrectable errors.
5) The number of CRC-8 anomalies in the channel.

APPENDIX I

Bibliography

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– ITU-T Q.822 (1994), *Stage 1, Stage 2 and Stage 3 description for the Q3 interface – Performance management*.

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– ITU-T X.739 (1993) | ISO/IEC 10164-11: 1994, *Information technology – Open Systems Interconnection – Systems management: Metric objects and attributes*.

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– ATM Forum Specification, *ATM User-Network Interface Specification, Version 3.0*.

– ATM Forum Specification, *ATM User-Network Interface Specification, Version 3.1*.

– ATM Forum Specification, *ATM User-Network Interface Specification, Version 4.0*.

APPENDIX II

Referenced Definitions

This appendix contains the formal definitions that are imported from TR-028 [7]. This is provided for convenience only and TR-028 should be consulted for the normative text.

II.1 Managed Object Definitions

adslChannelTTP

```
adslChannelTTP MANAGED OBJECT CLASS
     DERIVED FROM "Rec. M.3100":trailTerminationPointBidirectional;
     CHARACTERIZED BY
          "Rec. X.721 | ISO/IEC 10165-2":administrativeStatePackage,
          "Rec. M.3100":createDeleteNotificationsPackage,
          "Rec. M.3100":attributeValueChangeNotificationPackage,
          adslChannelTTPPkg PACKAGE
               BEHAVIOUR adslChannelTTPbeh;
               ATTRIBUTES
                    adslChannelTTPId
                         GET,
                    channelType
                         GET
                         SET-BY-CREATE,
                    currentChannelRate
                         GET,
                    previousChannelRate
                         GET;;;
          CONDITIONAL PACKAGES
               interleaveDelayPkg
                    PRESENT IF "The channelType is Interleaved",
               currentCrcBLPkg
                    PRESENT IF "The channelType is Fast or Interleaved",
               rateAdaptationNotificationPkg
                    PRESENT IF "The channelType is Fast or Interleaved, and
                    Run-time rate adaptation is supported";
REGISTERED AS { adslfNMObjectClass 1 };

adslChannelTTPbeh BEHAVIOUR
     DEFINED AS
          "adslChannelTTP object is used to model channel terminations on ATU-C
          and ATU-R. It represent both connection and trail termination aspects.
          One instance of this managed object class is created  for each
          supported channel.
          For a given adslLineTTP object instance the total of current channel
          rates of the contained adslChannelTTP instances cannot exceed its line
          rate. The inherited  supportedByObjectList attribute points to the
          associated equipment unit(s).";
```

adslChannelTTPCurrentData

```
adslChannelTTPCurrentData MANAGED OBJECT CLASS
```

```
     DERIVED FROM "Rec. Q.822":currentData;
     CHARACTERIZED BY
          "Rec. M.3100":createDeleteNotificationsPackage,
          "Rec. M.3100":attributeValueChangeNotificationPackage,
          "Rec. Q.822":thresholdPkg,
          adslChannelTTPCurrentDataPkg PACKAGE
               BEHAVIOUR adslChannelTTPCurrentDataBeh;;;
          CONDITIONAL PACKAGES
               adslChannelRcvBlocksPkg PRESENT IF
                    "an instance supports it",
               adslChannelTxBlocksPkg PRESENT IF
                    "an instance supports it",
               adslChannelCorrectedBlocksPkg PRESENT IF
                    "an instance supports it",
               adslChannelUncorrectedBlocksPkg PRESENT IF
                    "an instance supports it",
               adslChannelCodeViolationsPkg PRESENT IF
                    "an instance supports it";
REGISTERED AS { adslfNMObjectClass 2 };

adslChannelTTPCurrentDataBeh BEHAVIOUR
     DEFINED AS
          "adslChannelTTPCurrentData object is used to monitor performance
          monitoring aspects of an ADSL channel. Instances of this managed object
          class shall model  1 Day counters";
```

adslChannelTTPHistoryData

```
adslChannelTTPHistoryData MANAGED OBJECT CLASS
     DERIVED FROM "Rec. Q.822":historyData;
     CHARACTERIZED BY
          "Rec. Q.822":objectDeleteNotificationPkg,
          "Rec. Q.822":historyDataSuspectIntervalFlagPkg,
          adslChannelTTPHistoryDataPkg PACKAGE
               BEHAVIOUR adslChannelTTPHistoryDataBeh;;;
          CONDITIONAL PACKAGES
               adslChannelRcvBlocksRecordPkg PRESENT IF
                    "an instance supports it",
               adslChannelTxBlocksRecordPkg PRESENT IF
                    "an instance supports it",
               adslChannelCorrectedBlocksRecordPkg PRESENT IF
                    "an instance supports it",
               adslChannelUncorrectedBlocksRecordPkg PRESENT IF
                    "an instance supports it",
               adslChannelCodeViolationsRecordPkg PRESENT IF
                    "an instance supports it";
REGISTERED AS { adslfNMObjectClass 3 };

adslChannelTTPHistoryDataBeh BEHAVIOUR
     DEFINED AS
          "adslChannelTTPHistoryData object is used to keep previous performance
          monitoring counters of an ADSL channel.";
```

adslConfigurationProfile

```
adslConfigurationProfile MANAGED OBJECT CLASS
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2" top;
     CHARACTERIZED BY
          "Rec. M.3100":createDeleteNotificationsPackage,
          "Rec. M.3100":attributeValueChangeNotificationPackage,
          adslConfigurationProfilePkg PACKAGE
               BEHAVIOUR adslConfigurationProfileBeh;
               ATTRIBUTES
                    adslConfigurationProfileId
```

```
                    GET,
               rateModeAtuC
                    GET
                    SET-BY-CREATE,
               targetSnrMarginAtuC
                    GET
                    SET-BY-CREATE,
               maxSnrMarginAtuC
                    GET
                    SET-BY-CREATE,
               minSnrMarginAtuC
                    GET
                    SET-BY-CREATE,
               rateModeAtuR
                    GET
                    SET-BY-CREATE,
               targetSnrMarginAtuR
                    GET
                    SET-BY-CREATE,
               maxSnrMarginAtuR
                    GET
                    SET-BY-CREATE,
               minSnrMarginAtuR
                    GET
                    SET-BY-CREATE,
               configuredChannelTypes
                    GET
                    SET-BY-CREATE;;;
          CONDITIONAL PACKAGES
               rateAdaptivePkg
                    PRESENT IF "Rate adaptive ADSL mode is available",
               fastPkg
                    PRESENT IF "Fast channel mode is supported",
               interleavedPkg
                    PRESENT IF "Interleaved channel mode is supported",
               rateChangeRatioPkg
                    PRESENT IF "Rate adaptive ADSL mode is available, and, both
                    Fast and Interleaved channels are supported at the same time",
               powerManagementPkg
                    PRESENT IF "Optional power management procedures are
                    supported";
REGISTERED AS { adslfNMObjectClass 4 };

adslConfigurationProfileBeh BEHAVIOUR
     DEFINED AS
          "adslConfigurationProfile managed object class contains a list of
          parameters to be used in configuring an ADSL Modem.
          The instances of this object class is pointed to by adslLineTTP object
          instances representing ATU-C side of an ADSL Line. However, this object
          class defines the attributes  pertaining to both the ATU-C, as well as
          the related ATU-R. Note that the ATU-C configures the ATU-R.
          The fastPkg and interleavedPkg control the configuration of channels to
          be supported. If fastPkg is present, fast channel is configured. If
          interleavedPkg is present, the interleaved channel is configured. If
          both fastPkg and interleavedPkg are present, both channels are
          configured.";
```

adslLineTTP

```
adslLineTTP MANAGED OBJECT CLASS
     DERIVED FROM "Rec. M.3100":trailTerminationPointBidirectional;
     CHARACTERIZED BY
          "Rec. X.721 | ISO/IEC 10165-2":administrativeStatePackage,
          "Rec. M.3100":createDeleteNotificationsPackage,
```

```
          "Rec. M.3100":attributeValueChangeNotificationPackage,
          "Rec. M.3100":stateChangeNotificationPackage,
          initFailurePkg,
          adslLineTTPPkg PACKAGE
               BEHAVIOUR adslLineTTPBeh;
               ATTRIBUTES
                    adslLineTTPId
                         GET
                         SET-BY-CREATE,
                    lineCoding
                         GET,
                    currentSnrMargin
                         GET,
                    currentAttenuation
                         GET,
                    currentOutputPower
                         GET,
                    currentAttainableRate
                         GET,
                    currentLineRate
                         GET,
                    previousLineRate
                         GET,
                    supportedChannelTypes
                         GET,
                    adslAvailabilityStatus
                         GET,
                    supportedOperationalModes
                         GET,
                    currentOperationalMode
                         GET;;;
          CONDITIONAL PACKAGES
               adslConfigurationProfilePointerPkg
                    PRESENT IF "The object instance represents the ATU-C side of
                    the ADSL line",
               allowedOperationalModesPkg
                    PRESENT IF "The object instance represents the ATU-C side of
                    the ADSL line";
REGISTERED AS { adslfNMObjectClass 5 };

adslLineTTPBeh BEHAVIOUR
     DEFINED AS
          "adslLineTTP object is used to model a Physical ADSL line termination.
          The inherited  supportedByObjectList attribute points to the associated
          equipment unit(s).
          The inherited downstreamConnectivityPointer of an adslLineTTP instance
          representing the ATU-C side of the ADSL line, points to the related
          adslLineTTP instance representing the ATU-R side of the ADSL line.
          The inherited  upstreamConnectivityPointer of an adslLineTTP instance
          representing the ATU-R side of the ADSL line, points to the related
          adslLineTTP instance representing the ATU-C side of the ADSL line.
          The configurationProfilePointer  attribute, which is only present for
          the instances of adslLineTTP object representing the ATU-C side of the
          ADSL line, points to the object class instance representing physical
          line configuration information for both ATU-C and ATU-R.
          The adslAvailabilityStatus attribute further qualifies the inherited
          operationState attribute.
          The lineCodeSpecificProfilePointer attribute is included for future
          expansion of the model with vendor or line code specific information";
```

adslLineTTPCurrentData

```
adslLineTTPCurrentData MANAGED OBJECT CLASS
     DERIVED FROM "Rec. Q.822":currentData;
```

```
     CHARACTERIZED BY
          "Rec. M.3100":createDeleteNotificationsPackage,
          "Rec. M.3100":attributeValueChangeNotificationPackage,
          "Rec. Q.822":thresholdPkg,
          adslLineTTPCurrentDataPkg PACKAGE
               BEHAVIOUR adslLineTTPCurrentDataBeh;;;
          CONDITIONAL PACKAGES
               adslLofsPkg PRESENT IF
                    "an instance supports it",
               adslLolsPkg PRESENT IF
                    "an instance supports it",
               adslLossPkg PRESENT IF
                    "an instance supports it",
               adslLprsPkg PRESENT IF
                    "an instance supports it",
               adslEssPkg PRESENT IF
                    "an instance supports it",
               adslSessPkg PRESENT IF
                    "an instance supports it",
               adslUassPkg PRESENT IF
                    "an instance supports it",
               adslFastRetrainPkg PRESENT IF
                    "an instance supports it",
               adslFecsPkg PRESENT IF
                    "an instance supports it";
REGISTERED AS { adslfNMObjectClass 6 };

adslLineTTPCurrentDataBeh BEHAVIOUR
     DEFINED AS
          "adslLineTTPCurrentData object is used to monitor performance
          monitoring aspects of an ADSL physical line. Instances of this managed
          object class shall model 15 Min and 1 Day counters";
```

adslLineTTPHistoryData

```
adslLineTTPHistoryData MANAGED OBJECT CLASS
     DERIVED FROM "Rec. Q.822":historyData;
     CHARACTERIZED BY
          "Rec. Q.822":objectDeleteNotificationPkg,
          "Rec. Q.822":historyDataSuspectIntervalFlagPkg,
          adslLineTTPHistoryDataPkg PACKAGE
               BEHAVIOUR adslLineTTPHistoryDataBeh;;;
          CONDITIONAL PACKAGES
               adslLofsRecordPkg PRESENT IF
                    "an instance supports it",
               adslLolsRecordPkg PRESENT IF
                    "an instance supports it",
               adslLossRecordPkg PRESENT IF
                    "an instance supports it",
               adslLprsRecordPkg PRESENT IF
                    "an instance supports it",
               adslEssRecordPkg PRESENT IF
                    "an instance supports it",
               adslSessRecordPkg PRESENT IF
                    "an instance supports it",
               adslUassRecordPkg PRESENT IF
                    "an instance supports it",
               adslFastRetrainRecordPkg PRESENT IF
                    "an instance supports it",
               adslFecsRecordPkg PRESENT IF
                    "an instance supports it";
REGISTERED AS { adslfNMObjectClass 7 };

adslLineTTPHistoryDataBeh BEHAVIOUR
```

```
     DEFINED AS
          "adslLineTTPHistoryData object is used to keep previous performance
          counters of an ADSL physical line.";
```

II.2 Name Bindings

adslChannelTTP-adslLineTTP

```
adslChannelTTP-adslLineTTP NAME BINDING
     SUBORDINATE OBJECT CLASS adslChannelTTP;
     NAMED BY SUPERIOR OBJECT CLASS adslLineTTP;
     WITH ATTRIBUTE adslChannelTTPId;
     CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
     DELETE
          DELETES-CONTAINED-OBJECTS ;
REGISTERED AS { adslfNMNameBinding 1 };
```

adslChannelTTPCurrentData-adslChannelTTP

```
adslChannelTTPCurrentData-adslChannelTTP NAME BINDING
     SUBORDINATE OBJECT CLASS adslChannelTTPCurrentData;
     NAMED BY SUPERIOR OBJECT CLASS adslChannelTTP;
     WITH ATTRIBUTE "Rec. X.739":scannerId;
     CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
     DELETE
          DELETES-CONTAINED-OBJECTS ;
REGISTERED AS { adslfNMNameBinding 2 };
```

adslChannelTTPHistoryData-adslChannelTTPCurrentData

```
adslChannelTTPHistoryData-adslChannelTTPCurrentData NAME BINDING
     SUBORDINATE OBJECT CLASS adslChannelTTPHistoryData;
     NAMED BY SUPERIOR OBJECT CLASS adslChannelTTPCurrentData;
     WITH ATTRIBUTE "Rec. Q.822":historyDataId;
REGISTERED AS { adslfNMNameBinding 3 };
```

adslConfigurationProfile-managedElementR1

```
adslConfigurationProfile-managedElementR1 NAME BINDING
     SUBORDINATE OBJECT CLASS adslConfigurationProfile;
     NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1;
     WITH ATTRIBUTE adslConfigurationProfileId;
     CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
     DELETE
          DELETES-CONTAINED-OBJECTS ;
REGISTERED AS { adslfNMNameBinding 4 };
```

adslLineTTP-managedElementR1

```
adslLineTTP-managedElementR1 NAME BINDING
     SUBORDINATE OBJECT CLASS adslLineTTP;
     NAMED BY SUPERIOR OBJECT CLASS "Rec. M.3100":managedElementR1;
     WITH ATTRIBUTE adslLineTTPId;
     CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
     DELETE
          DELETES-CONTAINED-OBJECTS ;
```

```
REGISTERED AS { adslfNMNameBinding 5 };
```

adslLineTTPCurrentData-adslLineTTP

```
adslLineTTPCurrentData-adslLineTTP NAME BINDING
     SUBORDINATE OBJECT CLASS adslLineTTPCurrentData;
     NAMED BY SUPERIOR OBJECT CLASS adslLineTTP;
     WITH ATTRIBUTE "Rec. X.739":scannerId;
     CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
     DELETE
          DELETES-CONTAINED-OBJECTS;
REGISTERED AS { adslfNMNameBinding 6 };
```

adslLineTTPHistoryData-adslLineTTPCurrentData

```
adslLineTTPHistoryData-adslLineTTPCurrentData NAME BINDING
     SUBORDINATE OBJECT CLASS adslLineTTPHistoryData;
     NAMED BY SUPERIOR OBJECT CLASS adslLineTTPCurrentData;
     WITH ATTRIBUTE "Rec. Q.822":historyDataId;
REGISTERED AS { adslfNMNameBinding 7 };
```

II.3 Packages

adslChannelCorrectedBlocksPkg

```
adslChannelCorrectedBlocksPkg PACKAGE
     ATTRIBUTES
          adslChannelCorrectedBlocks
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 1 };
```

adslChannelCorrectedBlocksRecordPkg

```
adslChannelCorrectedBlocksRecordPkg PACKAGE
     ATTRIBUTES
          adslChannelCorrectedBlocks
               GET;
REGISTERED AS { adslfNMPackage 2 };
```

adslChannelRcvBlocksPkg

```
adslChannelRcvBlocksPkg PACKAGE
     ATTRIBUTES
          adslChannelRcvBlocks
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 3 };
```

adslChannelRcvBlocksRecordPkg

```
adslChannelRcvBlocksRecordPkg PACKAGE
     ATTRIBUTES
          adslChannelRcvBlocks
               GET;
REGISTERED AS { adslfNMPackage 4 };
```

adslChannelTxBlocksPkg

```
adslChannelTxBlocksPkg PACKAGE
```

```
     ATTRIBUTES
          adslChannelTxBlocks
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 5 };
```

adslChannelTxBlocksRecordPkg

```
adslChannelTxBlocksRecordPkg PACKAGE
     ATTRIBUTES
          adslChannelTxBlocks
               GET;
REGISTERED AS { adslfNMPackage 6 };
```

adslChannelUncorrectedBlocksPkg

```
adslChannelUncorrectedBlocksPkg PACKAGE
     ATTRIBUTES
          adslChannelUncorrectedBlocks
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 7 };
```

adslChannelUncorrectedBlocksRecordPkg

```
adslChannelUncorrectedBlocksRecordPkg PACKAGE
     ATTRIBUTES
          adslChannelUncorrectedBlocks
               GET;
REGISTERED AS { adslfNMPackage  8};
```

adslConfigurationProfilePointerPkg

```
adslConfigurationProfilePointerPkg PACKAGE
     ATTRIBUTES
          adslConfigurationProfilePointer
               GET-REPLACE,
          lineCodeSpecificProfilePointer
               GET-REPLACE;
REGISTERED AS { adslfNMPackage 9 };
```

adslEssPkg

```
adslEssPkg PACKAGE
     ATTRIBUTES
          adslEss
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 10 };
```

adslEssRecordPkg

```
adslEssRecordPkg PACKAGE
     ATTRIBUTES
          adslEss
               GET;
REGISTERED AS { adslfNMPackage 11 };
```

adslFastRetrainPkg

```
adslFastRetrainPkg PACKAGE
     ATTRIBUTES
```

```
          adslNumFastRetrains
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET,
          adslFailedFastRetrains
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 12 };
```

adslFastRetrainRecordPkg

```
adslFastRetrainRecordPkg PACKAGE
     ATTRIBUTES
          adslNumFastRetrains
               GET,
          adslFailedFastRetrains
               GET;
REGISTERED AS { adslfNMPackage 13 };
```

adslLofsPkg

```
adslLofsPkg PACKAGE
     ATTRIBUTES
          adslLofs
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 14 };
```

adslLofsRecordPkg

```
adslLofsRecordPkg PACKAGE
     ATTRIBUTES
          adslLofs
               GET;
REGISTERED AS { adslfNMPackage 15 };
```

adslLolsPkg

```
adslLolsPkg PACKAGE
     ATTRIBUTES
          adslLols
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 16 };
```

adslLolsRecordPkg

```
adslLolsRecordPkg PACKAGE
     ATTRIBUTES
          adslLols
               GET;
REGISTERED AS { adslfNMPackage 17 };
```

adslLossPkg

```
adslLossPkg   PACKAGE
     ATTRIBUTES
          adslLoss
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 18 };
```

adslLossRecordPkg

```
adslLossRecordPkg PACKAGE
     ATTRIBUTES
          adslLoss
               GET;
REGISTERED AS { adslfNMPackage 19 };
```

adslLprsPkg

```
adslLprsPkg PACKAGE
     ATTRIBUTES
          adslLprs
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 20 };
```

adslLprsRecordPkg

```
adslLprsRecordPkg PACKAGE
     ATTRIBUTES
          adslLprs
               GET;
REGISTERED AS { adslfNMPackage 21 };
```

adslSessPkg

```
adslSessPkg PACKAGE
     ATTRIBUTES
          adslSess
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 22 };
```

adslSessRecordPkg

```
adslSessRecordPkg PACKAGE
     ATTRIBUTES
          adslSess
               GET;
REGISTERED AS { adslfNMPackage 23 };
```

adslUassPkg

```
adslUassPkg PACKAGE
     ATTRIBUTES
          adslUass
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 24 };
```

adslUassRecordPkg

```
adslUassRecordPkg PACKAGE
     ATTRIBUTES
          adslUass
               GET;
REGISTERED AS { adslfNMPackage 25 };
```

allowedOperationalModesPkg

```
allowedOperationalModesPkg PACKAGE
```

```
     ATTRIBUTES
          allowedOperationalModes
               GET-REPLACE
               ADD-REMOVE;
REGISTERED AS { adslfNMPackage 26 };
```

currentCrcBLPkg

```
currentCrcBLPkg PACKAGE
     ATTRIBUTES
          currentCrcBL
               GET;
REGISTERED AS { adslfNMPackage 27 };
```

fastPkg

```
fastPkg PACKAGE
     ATTRIBUTES
          fastMinTxRateAtuC
               GET
               SET-BY-CREATE,
          fastMaxTxRateAtuC
               GET
               SET-BY-CREATE,
          fastMinTxRateAtuR
               GET
               SET-BY-CREATE,
          fastMaxTxRateAtuR
               GET
               SET-BY-CREATE;
REGISTERED AS { adslfNMPackage 28 };
```

initFailurePkg

```
initFailurePkg PACKAGE
     ATTRIBUTES
          initFailedNotificationSwitch
               GET-REPLACE;
     NOTIFICATIONS
          initFailedNotification;
REGISTERED AS { adslfNMPackage  29 };
```

interleavedPkg

```
interleavedPkg PACKAGE
     ATTRIBUTES
          interleavedMinTxRateAtuC
               GET
               SET-BY-CREATE,
          interleavedMaxTxRateAtuC
               GET
               SET-BY-CREATE,
          maxInterleaveDelayAtuC
               GET
               SET-BY-CREATE,
          interleavedMinTxRateAtuR
               GET
               SET-BY-CREATE,
          interleavedMaxTxRateAtuR
               GET
               SET-BY-CREATE,
          maxInterleaveDelayAtuR
               GET
               SET-BY-CREATE;
```

```
REGISTERED AS { adslfNMPackage 30 };
```

interleaveDelayPkg

```
interleaveDelayPkg PACKAGE
     ATTRIBUTES
          interleaveDelay
               GET;
REGISTERED AS { adslfNMPackage 31 };
```

rateAdaptationNotificationPkg

```
rateAdaptationNotificationPkg PACKAGE
     ATTRIBUTES
          upThreshold
               GET-REPLACE,
          downThreshold
               GET-REPLACE;
     NOTIFICATIONS
          rateChangeNotification;
REGISTERED AS { adslfNMPackage  32 };
```

rateAdaptivePkg

```
rateAdaptivePkg PACKAGE
     ATTRIBUTES
          downShiftSnrMarginAtuC
               GET
               SET-BY-CREATE,
          upShiftSnrMarginAtuC
               GET
               SET-BY-CREATE,
          minDownShiftTimeAtuC
               GET
               SET-BY-CREATE,
          minUpShiftTimeAtuC
               GET
               SET-BY-CREATE,
          downShiftSnrMarginAtuR
               GET
               SET-BY-CREATE,
          upShiftSnrMarginAtuR
               GET
               SET-BY-CREATE,
          minDownShiftTimeAtuR
               GET
               SET-BY-CREATE,
          minUpShiftTimeAtuR
               GET
               SET-BY-CREATE
REGISTERED AS { adslfNMPackage 33 };
```

rateChangeRatioPkg

```
rateChangeRatioPkg PACKAGE
     ATTRIBUTES
          rateChangeRatioAtuC
               GET
               SET-BY-CREATE,
          rateChangeRatioAtuR
               GET
               SET-BY-CREATE;
REGISTERED AS { adslfNMPackage 34 };
```

powerManagementPkg

```
powerManagementPkg PACKAGE
     ATTRIBUTES
          lowPowerDataRateAtuC
               GET
               SET-BY-CREATE,
          lowPowerDataRateAtuR
               GET
               SET-BY-CREATE;
REGISTERED AS { adslfNMPackage 35 };
```

adslChannelCodeViolationsPkg

```
adslChannelCodeViolationsPkg PACKAGE
     ATTRIBUTES
          adslChannelCodeViolations
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 36 };
```

adslChannelCodeViolationsRecordPkg

```
adslChannelCodeViolationsRecordPkg PACKAGE
     ATTRIBUTES
          adslChannelCodeViolations
               GET;
REGISTERED AS { adslfNMPackage 37 };
```

adslFecsPkg

```
adslFecsPkg PACKAGE
     ATTRIBUTES
          adslFecs
               REPLACE-WITH-DEFAULT
               DEFAULT VALUE AdslfMIBMod.integerZero
               GET;
REGISTERED AS { adslfNMPackage 38 };
```

adslFecsRecordPkg

```
adslFecsRecordPkg PACKAGE
     ATTRIBUTES
          adslFecs
               GET;
REGISTERED AS { adslfNMPackage 39 };
```

II.4 Attributes

adslAvailabilityStatus

```
adslAvailabilityStatus ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslAvailabilityStatus;
     MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
     BEHAVIOUR adslAvailabilityStatusBeh;
REGISTERED AS { adslfNMAttribute 1 };

adslAvailabilityStatusBeh BEHAVIOUR
     DEFINED AS
          "This set-valued attribute further qualifies the operationState of the
          object  instance. Valid conditions that may be included in this
          set-valued attribute, for an instance representing the ATU-C side of an
          ADSL Line are: LOF, LOS, LPR, LOL, lossOfSigQuality, dataInitFailure,
```

```
          configInitFailure, protocolInitFailure, noPeerPresent, and
          lowPowerMode. For an instance representing ATU-R side of an ADSL Line
          the valid values are: LOF, LOS, LPR, lossOfSigQuality, and
          lowPowerMode";
```

adslChannelCorrectedBlocks

```
adslChannelCorrectedBlocks ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslChannelCorrectedBlocksBeh;
REGISTERED AS { adslfNMAttribute 2 };

adslChannelCorrectedBlocksBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of all blocks received with an
          error and corrected.";
```

adslChannelCTPId

```
adslChannelCTPId ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.NameType;
     MATCHES FOR EQUALITY;
     BEHAVIOUR adslChannelCTPIdBeh;
REGISTERED AS { adslfNMAttribute 3 };

adslChannelCTPIdBeh BEHAVIOUR
     DEFINED AS
          "This attribute is the object instance identifier for the
          adslChannelCTP.";
```

adslChannelRcvBlocks

```
adslChannelRcvBlocks ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslChannelRcvBlocksBeh;
REGISTERED AS { adslfNMAttribute 4 };

adslChannelRcvBlocksBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of all received encoded blocks.";
```

adslChannelTxBlocks

```
adslChannelTxBlocks ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslChannelTxBlocksBeh;
REGISTERED AS { adslfNMAttribute 5 };

adslChannelTxBlocksBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of all transmitted encoded
          blocks.";
```

adslChannelUncorrectedBlocks

```
adslChannelUncorrectedBlocks ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslChannelUncorrectedBlocksBeh;
REGISTERED AS { adslfNMAttribute 6 };

adslChannelUncorrectedBlocksBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of all  blocks received with
          uncorrectable errors.";
```

adslConfigurationProfileId

```
adslConfigurationProfileId ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.NameType;
     MATCHES FOR EQUALITY;
     BEHAVIOUR adslConfigurationProfileIdBeh;
REGISTERED AS { adslfNMAttribute 7 };

adslConfigurationProfileIdBeh BEHAVIOUR
     DEFINED AS
          "This attribute is the object instance identifier for the
          adslConfigurationProfile.";
```

adslConfigurationProfilePointer

```
adslConfigurationProfilePointer ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.ObjectInstance;
     MATCHES FOR EQUALITY;
     BEHAVIOUR adslConfigurationProfilePointerBeh;
REGISTERED AS { adslfNMAttribute 8 };

adslConfigurationProfilePointerBeh BEHAVIOUR
     DEFINED AS
          "This attribute is a pointer to the applicable ADSL Configuration
          Profile.";
```

adslEss

```
adslEss ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslEssBeh;
REGISTERED AS { adslfNMAttribute 9 };

adslEssBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of  errored seconds (one or more
          crc, one or more los or sef defects).";
```

adslFailedFastRetrains

```
adslFailedFastRetrains ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslFailedFastRetrainsBeh;
REGISTERED AS { adslfNMAttribute 10 };

adslFailedFastRetrainsBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of failed fast-retrain attempts.";
```

adslFecs

```
adslFecs ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslFecsBeh;
REGISTERED AS { adslfNMAttribute 72 };

adslFecsBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of FEC events.";
```

adslLineTTPId

```
adslLineTTPId ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.NameType;
```

```
     MATCHES FOR EQUALITY;
     BEHAVIOUR  adslLineTTPIdBeh;
REGISTERED AS { adslfNMAttribute 11 };

adslLineTTPIdBeh BEHAVIOUR
     DEFINED AS
          "This attribute is the object instance identifier for the
          adslLineTTP.";
```

adslLofs

```
adslLofs ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslLofsBeh;
REGISTERED AS { adslfNMAttribute 12 };

adslLofsBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of  seconds where there was a Loss
          of Frame.";
```

adslLols

```
adslLols ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslLolsBeh;
REGISTERED AS { adslfNMAttribute 13 };

adslLolsBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of  seconds where there was a Loss
          of Link.";
```

adslLoss

```
adslLoss ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslLossBeh;
REGISTERED AS { adslfNMAttribute 14 };

adslLossBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of  seconds where there was a Loss
          of Signal.";
```

adslLprs

```
adslLprs ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslLprsBeh;
REGISTERED AS { adslfNMAttribute 15 };

adslLprsBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of  seconds where there was a Loss
          of Power.";
```

adslNumFastRetrains

```
adslNumFastRetrains ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslNumFastRetrainsBeh;
REGISTERED AS { adslfNMAttribute 16 };

adslNumFastRetrainsBeh BEHAVIOUR
```

```
     DEFINED AS
          "This attribute indicates the count of  modem fast-retrain attempts.";
```

adslSess

```
adslSess ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslSessBeh;
REGISTERED AS { adslfNMAttribute 17 };

adslSessBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of Severely Errored Seconds
          (SES).";
```

adslUass

```
adslUass ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslUassBeh;
REGISTERED AS { adslfNMAttribute 18 };

adslUassBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of Unavailable Seconds (UAS).";
```

allowedOperationalModes

```
allowedOperationalModes ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslOperationalModes;
     MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
     BEHAVIOUR allowedOperationalModesBeh;
REGISTERED AS { adslfNMAttribute 19 };

allowedOperationalModesBeh BEHAVIOUR
     DEFINED AS
          "This set-valued attribute configures the modem Operational Modes that
          should be allowed by the ATU-C. The allowed Modes should be a subset of
          the Modes supported by the ATU-C (as per the supportedOperationalModes
          attribute).";
```

channelType

```
channelType ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslChannelType;
     MATCHES FOR EQUALITY;
     BEHAVIOUR channelTypeBeh;
REGISTERED AS { adslfNMAttribute 20 };

channelTypeBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the channel type (Fast, Interleaved,
          other).";
```

currentAttainableRate

```
currentAttainableRate ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR currentAttainableRateBeh;
REGISTERED AS { adslfNMAttribute 21 };

currentAttainableRateBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the current maximum attainable transmit rate
          for  the ATU in kbps. This value is greater than or equal to the
```

```
          current line rate.";
```

currentAttenuation

```
currentAttenuation ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR currentAttenuationBeh;
REGISTERED AS { adslfNMAttribute 22 };

currentAttenuationBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the measured difference in the total power
          transmitted by peer ATU and the total power received by this ATU in
          1/10th of a dB.";
```

currentChannelRate

```
currentChannelRate ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR currentChannelRateBeh;
REGISTERED AS { adslfNMAttribute 23 };

currentChannelRateBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the current transmit rate in kbps for the
          associated ADSL channel.";
```

currentCrcBL

```
currentCrcBL ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR currentCrcBLBeh;
REGISTERED AS { adslfNMAttribute 24 };

currentCrcBLBeh BEHAVIOUR
     DEFINED AS
          "This attribute represents the current length of the channel data-block
          on which the CRC is calculated in bytes.";
```

currentLineRate

```
currentLineRate ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR currentLineRateBeh;
REGISTERED AS { adslfNMAttribute 25 };

currentLineRateBeh BEHAVIOUR
     DEFINED AS
          "This attribute represents the current data rate for the ADSL line in
          kbps.";
```

currentOperationalMode

```
currentOperationalMode ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslOperationalMode;
     MATCHES FOR EQUALITY;
     BEHAVIOUR currentOperationalModeBeh;
REGISTERED AS { adslfNMAttribute 26 };

currentOperationalModeBeh BEHAVIOUR
     DEFINED AS
          "This attribute represents the currently selected modem Operational
          Mode.";
```

currentOutputPower

```
currentOutputPower ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR currentOutputPowerBeh;
REGISTERED AS { adslfNMAttribute 27 };

currentOutputPowerBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the measured total output power transmitted
          by the associated ATU in 1/10th dBm.";
```

currentSnrMargin

```
currentSnrMargin ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR currentSnrMarginBeh;
REGISTERED AS { adslfNMAttribute 28 };

currentSnrMarginBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the current noise margin for the received
          signal on the associated ATU in 1/10th of a dB.";
```

downShiftSnrMarginAtuC

```
downShiftSnrMarginAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR downShiftSnrMarginAtuCBeh;
REGISTERED AS { adslfNMAttribute 29 };

downShiftSnrMarginAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the signal/noise margin for rate downshift,
          in the case of a rate-adaptive ATU-C in 1/10th of a dB.";
```

downShiftSnrMarginAtuR

```
downShiftSnrMarginAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR downShiftSnrMarginAtuRBeh;
REGISTERED AS { adslfNMAttribute 30 };

downShiftSnrMarginAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the signal/noise margin for rate downshift,
          in the case of a rate-adaptive ATU-R in 1/10th of a dB.";
```

downThreshold

```
downThreshold ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR downThresholdBeh;
REGISTERED AS { adslfNMAttribute 31 };

downThresholdBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the amount of decrement  in the channel rate
          from the last time a rate-change notification was issued that will
          cause another rateChangeNotification to be sent.  It is in kbps.";
```

fastMaxTxRateAtuC

```
fastMaxTxRateAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR fastMaxTxRateAtuCBeh;
REGISTERED AS { adslfNMAttribute  32 };

fastMaxTxRateAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum transmit rate allowed for the
          fast channel for the associated ATU-C in kbps.";
```

fastMaxTxRateAtuR

```
fastMaxTxRateAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR fastMaxTxRateAtuRBeh;
REGISTERED AS { adslfNMAttribute 33 };

fastMaxTxRateAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum transmit rate allowed for the
          fast channel for the associated ATU-R in kbps.";
```

fastMinTxRateAtuC

```
fastMinTxRateAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR fastMinTxRateAtuCBeh;
REGISTERED AS { adslfNMAttribute 34 };

fastMinTxRateAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the minimum transmit rate acceptable for the
          fast channel in the associated ATU-C in kbps.";
```

fastMinTxRateAtuR

```
fastMinTxRateAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR fastMinTxRateAtuRBeh;
REGISTERED AS { adslfNMAttribute 35 };

fastMinTxRateAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the minimum transmit rate acceptable for the
          fast channel in the associated ATU-R in kbps.";
```

initFailedNotificationSwitch

```
initFailedNotificationSwitch ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Boolean;
     MATCHES FOR EQUALITY;
     BEHAVIOUR initFailedNotificationSwitchBeh;
REGISTERED AS { adslfNMAttribute 36 };

initFailedNotificationSwitchBeh BEHAVIOUR
     DEFINED AS
          "This attribute is used to enable (TRUE) / disable (FALSE) the
          initFailedNotifications";
```

integer

```
integer ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
REGISTERED AS { adslfNMAttribute 73 };
```

interleaveDelay

```
interleaveDelay ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR interleaveDelayBeh;
REGISTERED AS { adslfNMAttribute 37 };

interleaveDelayBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the current interleaved delay on the
          associated interleaved channel in milli-seconds.";
```

interleavedMaxTxRateAtuC

```
interleavedMaxTxRateAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR interleavedMaxTxRateAtuCBeh;
REGISTERED AS { adslfNMAttribute 38 };

interleavedMaxTxRateAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum transmit rate allowed on the
          interleaved channel for the associated ATU-C in kbps.";
```

interleavedMaxTxRateAtuR

```
interleavedMaxTxRateAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR interleavedMaxTxRateAtuRBeh;
REGISTERED AS { adslfNMAttribute 39 };

interleavedMaxTxRateAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum transmit rate on the interleaved
          channel for the associated ATU-R in kbps.";
```

interleavedMinTxRateAtuC

```
interleavedMinTxRateAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR interleavedMinTxRateAtuCBeh;
REGISTERED AS { adslfNMAttribute 40 };

interleavedMinTxRateAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the minimum transmit rate acceptable on the
          interleaved channel for the associated ATU-C in kbps.";
```

interleavedMinTxRateAtuR

```
interleavedMinTxRateAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR interleavedMinTxRateAtuRBeh;
REGISTERED AS { adslfNMAttribute 41 };
```

```
interleavedMinTxRateAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the minimum transmit rate acceptable on the
          interleaved channel for the associated ATU-R in kbps.";
```

lineCodeSpecificProfilePointer

```
lineCodeSpecificProfilePointer ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.PointerOrNull;
     MATCHES FOR EQUALITY ;
     BEHAVIOUR lineCodeSpecificProfilePointerBeh;
REGISTERED AS { adslfNMAttribute 42 };

lineCodeSpecificProfilePointerBeh BEHAVIOUR
     DEFINED AS
          "This attribute is a pointer to an optional line-code/vendor specific
          Configuration Profile. If the value is NULL, no profile is specified.";
```

lineCoding

```
lineCoding ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslLineCoding;
     MATCHES FOR EQUALITY;
     BEHAVIOUR  lineCodingBeh;
REGISTERED AS { adslfNMAttribute 43 };

lineCodingBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the supported line coding for the ADSL Line
          (DMT, CAP, QAM, other).";
```

maxInterleaveDelayAtuC

```
maxInterleaveDelayAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR maxInterleaveDelayAtuCBeh;
REGISTERED AS { adslfNMAttribute 44 };

maxInterleaveDelayAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum Interleave delay acceptable for
          the interleaved channel on the associated ATU-C in milli-seconds.";
```

maxInterleaveDelayAtuR

```
maxInterleaveDelayAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR maxInterleaveDelayAtuRBeh;
REGISTERED AS { adslfNMAttribute 45 };

maxInterleaveDelayAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum acceptable Interleave delay for
          the interleaved channel on the associated ATU-R in milli-seconds.";
```

maxSnrMarginAtuC

```
maxSnrMarginAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR maxSnrMarginAtuCBeh;
REGISTERED AS { adslfNMAttribute 46 };
```

```
maxSnrMarginAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum signal/noise margin the ATU-C
          should try to maintain before increasing the data-rate. The units are
          1/10th of a dB";
```

maxSnrMarginAtuR

```
maxSnrMarginAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR maxSnrMarginAtuRBeh;
REGISTERED AS { adslfNMAttribute 47 };

maxSnrMarginAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the maximum signal/noise margin the ATU-R
          should attempt to maintain before increasing the data-rate. The units
          are 1/10th of a dB.";
```

minDownShiftTimeAtuC

```
minDownShiftTimeAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR minDownShiftTimeAtuCBeh;
REGISTERED AS { adslfNMAttribute 48 };

minDownShiftTimeAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the minimum time for which the noise margin
          should be below the downShiftSnrMargin before the ATU-C should attempt
          a rate downshift. Only applicable to rate-adaptive modems. The unit is
          seconds.";
```

minDownShiftTimeAtuR

```
minDownShiftTimeAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR minDownShiftTimeAtuRBeh;
REGISTERED AS { adslfNMAttribute 49 };

minDownShiftTimeAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the minimum time for which current margin
          should be below the downShiftSnrMargin before the ATU-R should attempt
          a rate downshift. Only applicable to rate-adaptive modems. The unit is
          seconds.";
```

minSnrMarginAtuC

```
minSnrMarginAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR minSnrMarginAtuCBeh;
REGISTERED AS { adslfNMAttribute 50 };

minSnrMarginAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the minimum acceptable signal/noise margin
          in 1/10th of a dB for the associated ATU-C.";
```

minSnrMarginAtuR

```
minSnrMarginAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR minSnrMarginAtuRBeh;
REGISTERED AS { adslfNMAttribute 51 };

minSnrMarginAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the minimum acceptable signal/noise margin in
          1/10th of a dB for the associated ATU-R.";
```

minUpShiftTimeAtuC

```
minUpShiftTimeAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR minUpShiftTimeAtuCBeh;
REGISTERED AS { adslfNMAttribute 52 };

minUpShiftTimeAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the minimum time that the noise margin for
          the associated ATU-C should remain above the upShiftSnrMargin, before
          it should attempt a rate upshift. Only applicable to rate adaptive
          modems. Units are seconds";
```

minUpShiftTimeAtuR

```
minUpShiftTimeAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR minUpShiftTimeAtuRBeh;
REGISTERED AS { adslfNMAttribute 53 };

minUpShiftTimeAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the minimum time that the noise margin for
          the associated ATU-C should remain above the upShiftSnrMargin, before
          it should attempt a rate upshift. Only applicable to rate adaptive
          modems. Units are seconds";
```

previousChannelRate

```
previousChannelRate ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR previousChannelRateBeh;
REGISTERED AS { adslfNMAttribute 54 };

previousChannelRateBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the previous rate of the associated ADSL
          channel in kbps for a rate-adaptive ATU following rate-change.";
```

previousLineRate

```
previousLineRate ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":gauge;
     BEHAVIOUR previousLineRateBeh;
REGISTERED AS { adslfNMAttribute 55 };

previousLineRateBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the previous rate of the ADSL line in kbps
          for the associated rate-adaptive ATU following rate-change.";
```

rateChangeRatioAtuC

```
rateChangeRatioAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR rateChangeRatioAtuCBeh;
REGISTERED AS { adslfNMAttribute 56 };

rateChangeRatioAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the allocation ratio of excess transmit
          bandwidth between fast and interleaved channels, in the case where rate
          adaptive ADSL mode is available and both fast and interleaved channels
          are supported at the same time. The value is between 0..100 and is
          computed as follows:
             rateChangeRatio = [Fast / (Fast + Interleaved)] * 100.";
```

rateChangeRatioAtuR

```
rateChangeRatioAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR rateChangeRatioAtuRBeh;
REGISTERED AS { adslfNMAttribute 57 };

rateChangeRatioAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the allocation ratio of excess transmit
          bandwidth between fast and interleaved channels, in the case where rate
          adaptive ADSL mode is available and both fast and interleaved channels
          are supported at the same time. The value is between 0..100 and is
          computed as follows:
             rateChangeRatio = [Fast / (Fast + Interleaved)] * 100.";
```

rateModeAtuC

```
rateModeAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslRateMode;
     MATCHES FOR EQUALITY;
     BEHAVIOUR rateModeAtuCBeh;
REGISTERED AS { adslfNMAttribute 58 };

rateModeAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates what type of rate adaptation mode is
          supported. (Fixed, Adapt-At-Start, Adapt-At-Runtime)";
```

rateModeAtuR

```
rateModeAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslRateMode;
     MATCHES FOR EQUALITY;
     BEHAVIOUR rateModeAtuRBeh;
REGISTERED AS { adslfNMAttribute 59 };

rateModeAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates what type of rate adaptation mode is
          supported. (Fixed, Adapt-At-Start, Adapt-At-Runtime)";
```

supportedChannelTypes

```
supportedChannelTypes ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslChannelOptions;
```

```
     MATCHES FOR EQUALITY;
     BEHAVIOUR supportedChannelTypesBeh;
REGISTERED AS { adslfNMAttribute 60 };

supportedChannelTypesBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates supported channel types over an ADSL Line.
          (noChannel, fastOnly, interleavedOnly, fastAndInterleaved,
          fastOrInterleaved)";
```

supportedOperationalModes

```
supportedOperationalModes ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslOperationalModes;
     MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
     BEHAVIOUR supportedOperationalModesBeh;
REGISTERED AS { adslfNMAttribute 61 };

supportedOperationalModesBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates which ADSL Operational Modes are supported by
          the modem.";
```

targetSnrMarginAtuC

```
targetSnrMarginAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR targetSnrMarginAtuCBeh;
REGISTERED AS { adslfNMAttribute 62 };

targetSnrMarginAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the signal/noise margin (in 1/10th of dB) the
          modem must achieve with a BER of 10-7 or better.";
```

targetSnrMarginAtuR

```
targetSnrMarginAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR targetSnrMarginAtuRBeh;
REGISTERED AS { adslfNMAttribute 63 };

targetSnrMarginAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the signal/noise margin (in 1/10th of dB) the
          modem must achieve with a BER of 10-7 or better.";
```

upShiftSnrMarginAtuC

```
upShiftSnrMarginAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR upShiftSnrMarginAtuCBeh;
REGISTERED AS { adslfNMAttribute 64 };

upShiftSnrMarginAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the signal/noise margin for rate upshift, in
          the case of rate adaptive ADSL in 1/10th of a dB.";
```

upShiftSnrMarginAtuR

```
upShiftSnrMarginAtuR ATTRIBUTE
```

```
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR upShiftSnrMarginAtuRBeh;
REGISTERED AS { adslfNMAttribute 65 };

upShiftSnrMarginAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the signal/noise margin for rate upshift, in
          the case of rate adaptive ADSL in 1/10th of a dB.";
```

upThreshold

```
upThreshold ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR upThresholdBeh;
REGISTERED AS { adslfNMAttribute 66 };

upThresholdBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the minimum amount by which the rate must
          increase since the last notification in order to issue a new rate
          change notification. It is specified in kbps.";
```

configuredChannelTypes

```
configuredChannelTypes ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslChannelOptions;
     MATCHES FOR EQUALITY;
     BEHAVIOUR configuredChannelTypesBeh;
REGISTERED AS { adslfNMAttribute 67 };

configuredChannelTypesBeh BEHAVIOUR
     DEFINED AS
          "This attribute controls which channel type(s) are to be configured.
          (noChannel, fastOnly, interleavedOnly, fastAndInterleaved)";
```

lowPowerDataRateAtuC

```
lowPowerDataRateAtuC ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR lowPowerDataRateAtuCBeh;
REGISTERED AS { adslfNMAttribute 68 };

lowPowerDataRateAtuCBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the L1 (low-power/power-down) state transmit
          bit-rate for the ATU-C in kbps.";
```

lowPowerDataRateAtuR

```
lowPowerDataRateAtuR ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.Integer;
     MATCHES FOR EQUALITY, ORDERING;
     BEHAVIOUR lowPowerDataRateAtuRBeh;
REGISTERED AS { adslfNMAttribute 69 };

lowPowerDataRateAtuRBeh BEHAVIOUR
     DEFINED AS
          "This attribute configures the L1 (low-power/power-down) state transmit
          bit-rate for the ATU-R in kbps.";
```

adslChannelCodeViolations

```
adslChannelCodeViolations ATTRIBUTE
     DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2":counter;
     BEHAVIOUR adslChannelCodeViolationsBeh;
REGISTERED AS { adslfNMAttribute 70 };

adslChannelCodeViolationsBeh BEHAVIOUR
     DEFINED AS
          "This attribute indicates the count of crc-8 anomalies occurring in the
          data stream associated with this channel.";
```

adslChannelTTPId

```
adslChannelTTPId ATTRIBUTE
     WITH ATTRIBUTE SYNTAX AdslfMIBMod.NameType;
     MATCHES FOR EQUALITY;
     BEHAVIOUR adslChannelTTPIdBeh;
REGISTERED AS { adslfNMAttribute 71 };

adslChannelTTPIdBeh BEHAVIOUR
     DEFINED AS
          "This attribute is the object instance identifier for the
          adslChannelTTP.";
```

II.5 Actions

None Defined At Present

II.6 Notifications

initFailedNotification

```
initFailedNotification NOTIFICATION
     BEHAVIOUR initFailedNotificationBeh;
     WITH INFORMATION SYNTAX AdslfMIBMod.AdslInitFailedInfo
     AND ATTRIBUTE IDS
          probableCause          "Rec. X.721 | ISO/IEC 10165-2":probableCause,
          notificationIdentifier  "Rec. X.721 | ISO/IEC 10165-2":
                                       notificationIdentifier;
REGISTERED AS { adslfNMNotification 1 };

initFailedNotificationBeh BEHAVIOUR
     DEFINED AS
          "This notification is sent when the ATU-C cannot initialize the ATU-R,
          and the value of the initFailedNotificationSwitch attribute is TRUE
          (on). The probableCause attribute indicates reason for initialzation
          failure.";
```

rateChangeNotification

```
rateChangeNotification NOTIFICATION
     BEHAVIOUR rateChangeNotificationBeh;
     WITH INFORMATION SYNTAX AdslfMIBMod.AdslRateChangeInfo
     AND ATTRIBUTE IDS
          oldRate                integer,
          newRate                integer,
          notificationIdentifier  "Rec. X.721 | ISO/IEC 10165-2":
                                       notificationIdentifier;
REGISTERED AS { adslfNMNotification 2 };
```

```
rateChangeNotificationBeh BEHAVIOUR
     DEFINED AS
          "This notification is sent for Fast and Interleaved channels in the
          following cases:
          Rate increased since last notification by more than the 'upThreshold'
          value.
          Rate decreased since last notification by more than the 'downThreshold'
          value.";
```

II.7 Supporting Productions

```
AdslfMIBMod {1 3 6 1 4 1 adslForum(3561) adslForumNetworkManagement(1)
adslfLineMIB(1) informationModel(0) asn1Module(2) adslfMIBMod(0)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

-- exports everything

IMPORTS
     Boolean,
     NameType,
     PointerOrNull,
     ProblemCause
     FROM ASN1DefinedTypesModule {uit-t recommendation m(13) gnm(3100)
informationModel(0) asn1Modules(2) asn1DefinedTypesModule(0) }

     DistinguishedName,
     RelativeDistinguishedName
     FROM InformationFramework {joint-iso-uit-t ds(5) modules(1)
informationFramework(1)}

     EventTypeId,
     ObjectInstance
     FROM CMIP-1 {joint-iso-uit-t ms(9) cmip(1) modules(0) protocol(3)}

     AdministrativeState,
     AttributeList,
     NotificationIdentifier,
     ProbableCause,
     SimpleNameType
     FROM Attribute-ASN1Module {joint-iso-uit-t ms(9) smi(3) part2(2)
asn1Module(2) 1};

adslfNMInformationModel
OBJECT IDENTIFIER ::= {1 3 6 1 4 1 adslForum(3561) adslForumNetworkManagement(1)
adslfLineMIB(1) informationModel(0)}
adslfNMStandardSpecificExtension
     OBJECT IDENTIFIER ::= {adslfNMInformationModel 0}
adslfNMObjectClass
     OBJECT IDENTIFIER ::= {adslfNMInformationModel 3}
adslfNMPackage
     OBJECT IDENTIFIER ::= {adslfNMInformationModel 4}
adslfNMAttribute
     OBJECT IDENTIFIER ::= {adslfNMInformationModel 5}
adslfNMNameBinding
     OBJECT IDENTIFIER ::= {adslfNMInformationModel 6}
adslfNMAction
     OBJECT IDENTIFIER ::= {adslfNMInformationModel 7}
adslfNMNotification
     OBJECT IDENTIFIER ::= {adslfNMInformationModel 8}

-- default value definitions
booleanFalseDefault Boolean ::= FALSE
booleanTrueDefault Boolean ::= TRUE
```

```
integerZero INTEGER ::= 0

-- Additional probableCause Definitions
adslfNMProbableCause
     OBJECT IDENTIFIER ::= {adslfNMStandardSpecificExtension 0}
lossOfPower
     ProbableCause ::= globalValue : {adslfNMProbableCause 1}
lossOfLink
     ProbableCause ::= globalValue : {adslfNMProbableCause 2}
lossOfSignalQuality
     ProbableCause ::= globalValue : {adslfNMProbableCause 3}
dataInitFailure
     ProbableCause ::= globalValue : {adslfNMProbableCause 4}
configInitFailure
     ProbableCause ::= globalValue : {adslfNMProbableCause 5}
protocolInitFailure
     ProbableCause ::= globalValue : {adslfNMProbableCause 6}
noPeerAtuPresent
     ProbableCause ::= globalValue : {adslfNMProbableCause 7}

-- Additional eventTypes Definitions
adslfNMEventTypes
     OBJECT IDENTIFIER ::= {adslfNMStandardSpecificExtension 1}

-- Supporting productions

AdslAvailabilityStatus ::= SET OF AdslLineCondition

AdslChannelOptions ::= ENUMERATED {
     noChannels         (0),
     fastOnly           (1),
     interleavedOnly    (2),
     fastOrInterleaved  (3),
     fastAndInterleaved (4)}

AdslChannelType ::= ENUMERATED {
     fast          (0),
     interleaved   (1)}

AdslInitFailedInfo ::= SEQUENCE {
     probableCause           ProbableCause,
     notificationIdentifier  NotificationIdentifier OPTIONAL}

AdslLineCoding ::= ENUMERATED {
     other     (0),
     dmt       (1),
     cap       (2),
     qam       (3)}

AdslLineCondition ::= ENUMERATED {
     lossOfFraming           (0),
     lossOfSignal            (1),
     lossOfPower             (2),
     lossOfLink              (3),
     lossOfSignalQuality     (4),
     dataInitFailure         (5),
     configInitFailure       (6),
     protocolInitFailure     (8),
     noPeerAtuPresent        (9),
     lowPowerMode            (10)}

-- ADSL modem Operational Mode
AdslOperationalMode ::= ENUMERATED {
     ansi                    (0), -- ANSI T1.413
```

```
     etsi                    (1), -- ETSI DTS/TM06006
     potsNonOverlapped       (2), -- ITU G.992.1 POTS non-overlapped
     potsOverlapped          (3), -- ITU G.992.1 POTS overlapped
     isdnNonOverlapped       (4), -- ITU G.992.1 ISDN non-overlapped
     isdnOverlapped          (5), -- ITU G.992.1 ISDN overlapped
     isdnTcm                 (6), -- ITU G.992.1 with TCM-ISDN
     potsNonOverlappedLite   (7), -- ITU G.992.2 POTS non-overlapped
     potsOverlappedLite      (8), -- ITU G.992.2 POTS overlapped
     isdnTcmLite             (9)} -- ITU G.992.2 with TCM-ISDN

AdslOperationalModes ::= SET OF AdslOperationalMode

AdslRateChangeInfo ::= SEQUENCE {
     oldRate                 Integer,
     newRate                 Integer,
     notificationIdentifier  NotificationIdentifier OPTIONAL}

AdslRateMode ::= ENUMERATED {
     fixed              (0),
     adaptAtStartup     (1),
     adaptAtRuntime     (2)}

Integer ::= INTEGER


END
```

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