Technical Report
TR-028

CMIP Specification
for ADSL Network
Element Management

May 1999

ABSTRACT:

This document updates the CMIP based management framework for ADSL Network
Elements defined in ADSL Forum TR-016. The updates reflect decisions taken by
the Network Management working group to bring this specification in alignment with
ITU G.997.1 (G.ploam) and ANSI T1.413-1998.

Table of Contents

1 INTRODUCTION

This document specifies a CMIP based management framework to be used for the management of ADSL Network Elements. This framework is based on the general management criteria for ADSL Network Elements defined in ADSL Forum Technical Report TR-005 [1], ITU-T G.997.1 (G.ploam) [9], and ANSI T1.413 [10].

2 Management Framework

The general framework for management of ADSL Network Elements is specified in ADSL Forum Technical Report TR-005 [1]. This document uses the ADSL Forum System Reference Model specified in TR-005 (Figure 1) [1].
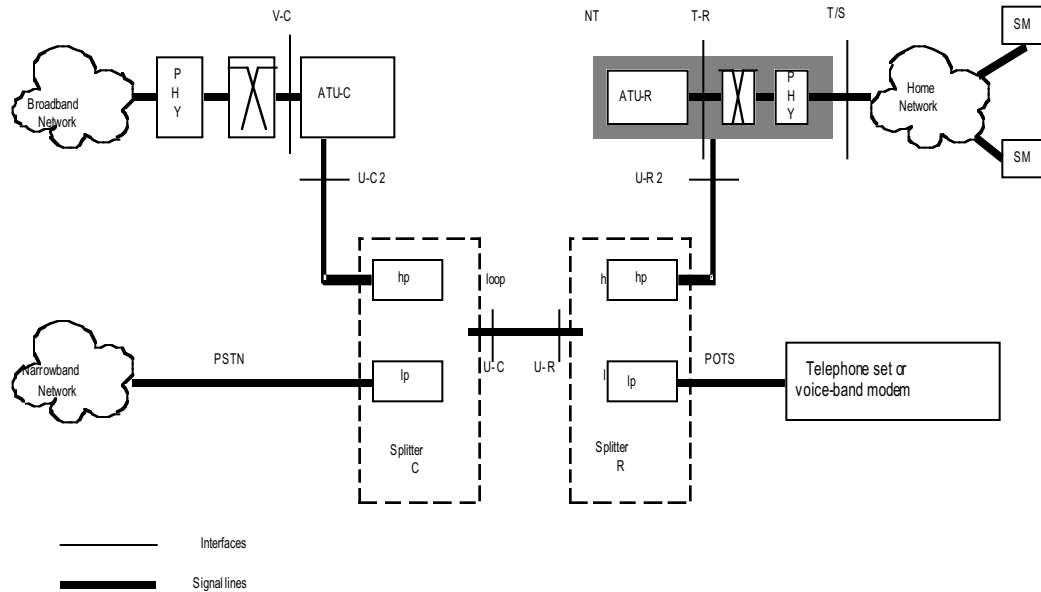
Figure 1 : ADSL Forum System Reference Model

This specification only deals with management of the following elements as per the above reference model:

- ADSL parameters in ATU-C (ADSL Termination Unit – Central)
- ADSL parameters in ATU-R (ADSL Termination Unit – Remote)
- ADSL Line (Physical transport medium between ATU-C & ATU-R)
- ADSL Channels (Transport channels defined over the ADSL Line.)

As outlined in TR-005, management of ADSL parameters in ATU-R is controlled by the ATU-C based on procedures specified in ANSI T1.413 specification.

3   Management Information Model

This section specifies the CMIP management information model to be used for the management of ADSL entities described in the Management Framework section. The management information model consists of GDMO (Guidelines for the Definition of Managed Objects) templates, ASN.1 (Abstract Syntax Notation One) syntax, and CMISE (Common Management Information Service Element) services and protocol.

This model is based on pre-existing object definitions from following ITU-T specifications:
- ITU-T M.3100
- ITU-T X.721
- ITU-T X.739
- ITU-T Q.822

Following sub-sections define new objects specifically needed for ADSL management. Figure-2 shows the containment tree diagram, while figures 3 and 4 show the inheritance relationships for the objects defined in this document.
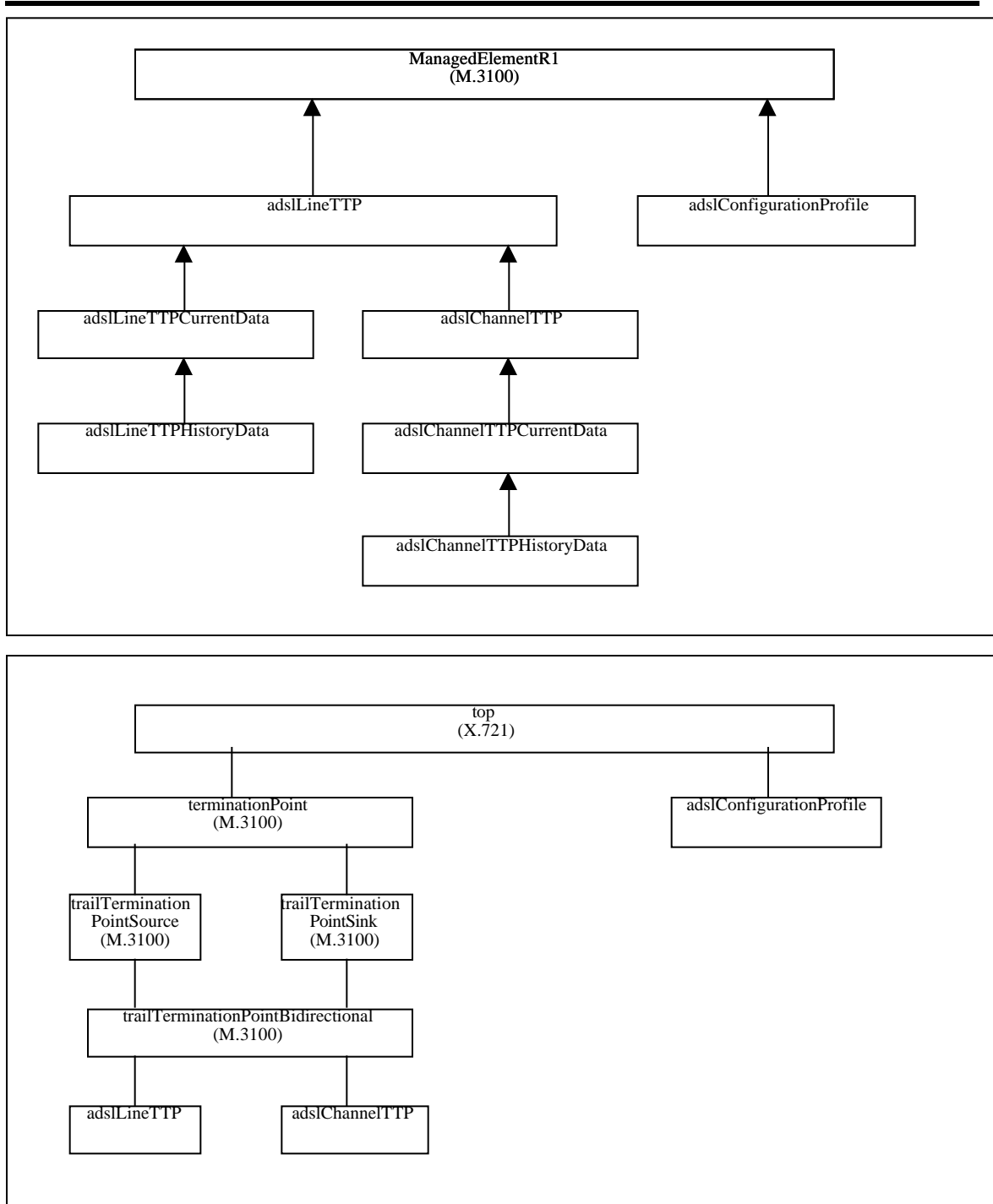
Figure 3 : Inheritance Tree Diagram (1 of 2)
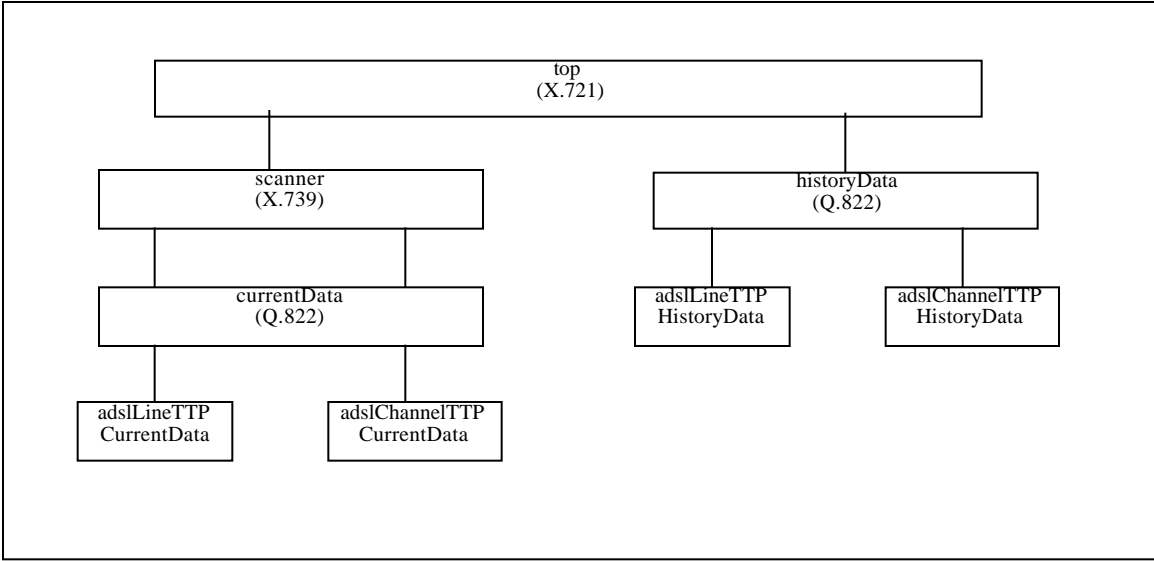
Figure 4 : Inheritance Tree Diagram (2 of 2)

3.1 Managed Object Definitions

3.1.1 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": attributeValueChangeNotificationsPackage,

    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). ";

3.1.2 adslChannelTTPCurrentData

adslChannelTTPCurrentData   MANAGED OBJECT CLASS
  DERIVED FROM
    "Rec. Q.822": currentData;
  CHARACTERIZED BY
      "Rec. M.3100": createDeleteNotificationsPackage,
      "Rec. M.3100": attributeValueChangeNotificationsPackage,
      "Rec. Q822": thresholdPkg,

      adslChannelTTPCurrentDataPkg PACKAGE
      BEHAVIOUR adslChannelTTPCurrentDataBeh;;;

  CONDITIONAL PACKAGES
    adslChannelRvcBlocksPkg 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";

3.1.3 adslChannelTTPHistoryData

adslChannelTTPHistoryData   MANAGED OBJECT CLASS
  DERIVED FROM
    "Rec. Q.822": historyData;
  CHARACTERIZED BY
      "Rec. X.721 | ISO/IEC 10165-2": objectDeleteNotificationPkg,
      "Rec. Q.822": historyDataSuspectIntervalFlagPkg,

      adslChannelTTPHistoryDataPkg PACKAGE
      BEHAVIOUR adslChannelTTPHistoryDataBeh;;;

CONDITIONAL PACKAGES
   adslChannelRvcBlocksRecordPkg 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
     "adslChannelTTPHistorytData object is used to keep previous
     performance monitoring counters of an ADSL channel.";

3.1.4 adslConfigurationProfile

adslConfigurationProfile MANAGED OBJECT CLASS
  DERIVED FROM
    "Rec. X.721 | ISO/IEC 10165-2": top;
  CHARACTERIZED BY
     "Rec. M.3100": createDeleteNotificationsPackage,
     "Rec. M.3100": attributeValueChangeNotificationsPackage,

     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.";

3.1.5 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": attributeValueChangeNotificationsPackage,
   "Rec. M.3100": stateChangeNotificationsPackage,
   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";

3.1.6 adslLineTTPCurrentData

adslLineTTPCurrentData   MANAGED OBJECT CLASS
  DERIVED FROM
    "Rec. Q.822": currentData;
  CHARACTERIZED BY
      "Rec. M.3100": createDeleteNotificationsPackage,
      "Rec. M.3100": attributeValueChangeNotificationsPackage,
      "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";

3.1.7 adslLineTTPHistoryData

adslLineTTPHistoryData   MANAGED OBJECT CLASS
  DERIVED FROM
    "Recommendation Q.822": historyData;
  CHARACTERIZED BY
      "Rec. X.721 | ISO/IEC 10165-2": 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.";

3.2 Conditional Packages

3.2.1 adslChannelCorrectedBlocksPkg

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

3.2.2 adslChannelCorrectedBlocksRecordPkg

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

3.2.3 adslChannelRcvBlocksPkg

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

3.2.4 adslChannelRcvBlocksRecordPkg

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

3.2.5 adslChannelTxBlocksPkg

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

3.2.6 adslChannelTxBlocksRecordPkg

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

3.2.7 adslChannelUncorrectedBlocksPkg

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

3.2.8 adslChannelUncorrectedBlocksRecordPkg

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

3.2.9 adslConfigurationProfilePointerPkg

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

3.2.10 adslEssPkg

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

3.2.11 adslEssRecordPkg

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

3.2.12 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 };

3.2.13 adslFastRetrainRecordPkg

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


3.2.14 adslLofsPkg

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


3.2.15 adslLofsRecordPkg

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


3.2.16 adslLolsPkg

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

3.2.17 adslLolsRecordPkg

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

3.2.18 adslLossPkg

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

3.2.19 adslLossRecordPkg

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

3.2.20 adslLprsPkg

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

3.2.21 adslLprsRecordPkg

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

3.2.22 adslSessPkg

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

3.2.23 adslSessRecordPkg

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

3.2.24 adslUassPkg

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

3.2.25 adslUassRecordPkg

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

3.2.26 allowedOperationalModesPkg

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

3.2.27 currentCrcBLPkg

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

3.2.28 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 };

3.2.29 initFailurePkg

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

3.2.30 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 };

3.2.31 interleaveDelayPkg

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

3.2.32 rateAdaptationNotificationPkg

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

3.2.33 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 };
```

3.2.34 rateChangeRatioPkg

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

3.2.35 powerManagementPkg

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

3.2.36 adslChannelCodeViolationsPkg

```
adslChannelCodeViolationsPkg  PACKAGE
      ATTRIBUTES
              adslChannelCodeViolations
                    REPLACE-WITH-DEFAULT
                    DEFAULT VALUE AdslfMIBMod.integerZero
                    GET;
```

REGISTERED AS { adslfNMPackage 36 };

3.2.37 adslChannelCodeViolationsRecordPkg

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

3.2.38 adslFecsPkg

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

3.2.39 adslChannelCodeViolationsRecordPkg

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

3.3 Attributes

3.3.1 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 ";

3.3.2 adslChannelCorrectedBlocks

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

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

3.3.3 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.";

3.3.4 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.";

3.3.5 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.";

3.3.6 adslChannelUncorrectedBlocks

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

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

3.3.7 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.";

3.3.8 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.";

3.3.9 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 ore more crc,
one or more los or sef defects).";

3.3.10 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.";

3.3.11 **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.";

3.3.12 **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.";

3.3.13 **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.";

3.3.14 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.";

3.3.15 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.";

3.3.16 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.";

3.3.17 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).";

3.3.18 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).";

3.3.19 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).";

3.3.20 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).";

3.3.21 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.";

3.3.22 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 $1/10^{th}$ of a dB.";

3.3.23 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.";

3.3.24 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.";

3.3.25 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. ";

3.3.26 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.";

3.3.27 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.";

3.3.28 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.";

3.3.29 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.";

3.3.30 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.";

3.3.31 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.";

3.3.32 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.";

3.3.33 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.";

3.3.34 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.";

3.3.35 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.";

3.3.36 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";

3.3.37 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.";

3.3.38 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.";

3.3.39 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.";

3.3.40 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.";

3.3.41 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.";

3.3.42 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.";

3.3.43 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).";

3.3.44 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.";

3.3.45 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.";

3.3.46 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
  $1/10^{th}$ of a dB";

3.3.47 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 $1/10^{th}$ of a dB.";

3.3.48 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.";

3.3.49 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.";

3.3.50 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
        $1/10^{th}$ of a dB for the associated ATU-C.";

3.3.51 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
        $1/10^{th}$ of a dB for the associated ATU-R.";

3.3.52 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";

3.3.53 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";

3.3.54 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.";

3.3.55 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.";

3.3.56 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.";

3.3.57 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.";

3.3.58 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)";

3.3.59 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)";

3.3.60 supportedChannelTypes

supportedChannelTypes ATTRIBUTE
    WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslChannelOptions;
        MATCHES FOR EQUALITY, SET-COMPARISON,
                        SET-INTERSECTION;
    BEHAVIOUR supportedChannelTypesBeh;
REGISTERED AS { adslfNMAttribute 60 };

supportedChannelTypesBeh BEHAVIOUR

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

3.3.61 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.";

3.3.62 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 $1/10^{th}$ of dB) the
     modem must achieve with a BER of 10-7 or better.";

3.3.63 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.";

3.3.64 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.";

3.3.65 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.";

3.3.66 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.";

3.3.67 configuredChannelTypes

configuredChannelTypes ATTRIBUTE
      WITH ATTRIBUTE SYNTAX AdslfMIBMod.AdslChannelOptions;
          MATCHES FOR EQUALITY, SET-COMPARISON,
                            SET-INTERSECTION;
      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)";

3.3.68 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.";

3.3.69 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.";

3.3.70 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.";

3.3.71 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.";

```
Name Bindings
```

3.3.72 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 };

3.3.73 adslChannelTTPCurrentData-adslChannelTTP

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

3.3.74 adslChannelTTPHistoryData-adslChannelTTPCurrentData

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

### 3.3.75  adslConfigurationProfile-managedElementR1

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

### 3.3.76  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 };

### 3.3.77  adslLineTTPCurrentData-adslLineTTP

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

### 3.3.78 adslLineTTPHistoryData-adslLineTTPCurrentData

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

## 3.4 Actions

*** None Defined At Present ***

## 3.5 Notifications

### 3.5.1 initFailedNotification

initFailedNotification NOTIFICATION
    BEHAVIOUR initFailedNotificationBeh;
    WITH INFORMATION SYNTAX AdslfMIBMod.AdslInitFailedInfo
    AND ATTRIBUTE IDS
        probableCause        ProbableCause,
        notificationIdentifier        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.";

### 3.5.2 rateChangeNotification

rateChangeNotification NOTIFICATION
    BEHAVIOUR rateChangeNotificationBeh;
    WITH INFORMATION SYNTAX AdslfMIBMod.AdslRateChangeInfo
    AND ATTRIBUTE IDS
        oldRate        Integer,
        newRate        Integer,
        notificationIdentifier        NotificationIdentifier;
REGISTERED AS { adslfNMNotification 2 };

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

## 3.6 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 {ccitt recommendation m(13) gnm(3100)
                                 informationModel(0) asn1Modules(2)
                                 asn1DefinedTypesModule(0) }
        DistinguishedName,
        RelativeDistinguishedName
    FROM InformationFramework {joint-iso-ccitt ds(5) modules(1)
                               informationFramework(1)}
        EventTypeId,
        ObjectInstance
    FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)}
        AdministrativeState,
        AttributeList,
        ProbableCause,
        SimpleNameType
    FROM Attribute-ASN1Module {joint-iso-ccitt 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
```

```
NotificationIdentifier ::= INTEGER

END
```

4 References

[1] ADSL Forum Technical Report TR-005, "ADSL Network Element Management", March 1998.

[2] ADSL Forum Contribution 98-010, "CMIP Model for ADSL Management", March 1998.

[3] ADSL Forum Contribution 97-056, "GDMO Representation of the ADSL Function Model & Information Model", May 1997.

[4] ITU-T Recommendation M.3100, "Generic Network Information Model", Version 2, March 1995.

[5] ITU-T Recommendation Q.822, "Stage 1, State 2, and Stage 3 Description for the Q3 Interface Performance Management", April 1994.

[6] ITU-T Recommendation X.721, "Information Technology - Open Systems Interconnection - Structure of Management Information - Part 2: Definition of Management Information", February 1992.

[7] ADSL Forum 99-083, "Liaison from ITU Q4/SG15", March 1999.

[8] ADSL Forum Contribution 98-196, "Aligning ADSL Line MIB with ANSI T1M1 and ITU-T G.997.1", November 1998.

[9] ITU-T Draft Recommendation G.997.1, "Physical Layer Management for Digital Subscriber Line (DSL) Transceivers", October 1998.

[10] ANSI T1.413 Issue-2, "Network and Customer Installation Interface – ADSL Metallic Interface", June 1998.