International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.988
Amendment 1
(05/2014)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

Digital sections and digital line system – Optical line systems for local and access networks

ONU management and control interface (OMCI) specification

Amendment 1: Maintenance

Recommendation ITU-T G.988 (2012) – Amendment 1

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA AND OPTICAL SYSTEMS CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
General	G.900–G.909
Parameters for optical fibre cable systems	G.910–G.919
Digital sections at hierarchical bit rates based on a bit rate of 2048 kbit/s	G.920–G.929
Digital line transmission systems on cable at non-hierarchical bit rates	G.930–G.939
Digital line systems provided by FDM transmission bearers	G.940–G.949
Digital line systems	G.950–G.959
Digital section and digital transmission systems for customer access to ISDN	G.960–G.969
Optical fibre submarine cable systems	G.970–G.979
Optical line systems for local and access networks	**G.980–G.989**
Metallic access networks	G.990–G.999
MULTIMEDIA QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
PACKET OVER TRANSPORT ASPECTS	G.8000–G.8999
ACCESS NETWORKS	G.9000–G.9999

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

Recommendation ITU-T G.988

ONU management and control interface (OMCI) specification

Amendment 1

Maintenance

Summary

Amendment 1 to Recommendation ITU-T G.988 (2012) continues the maintenance and evolution of optical network unit (ONU) management and control interface (OMCI). A number of robustness improvements are included, along with corrections of editorial errors. Significant feature extensions include the alignment of xDSL services with Recommendation ITU-T G.997.1 (2012) and the addition of managed entities (MEs) and attributes in support of Ethernet passive optical network (EPON).

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.988	2010-10-07	15	11.1002/1000/10891
1.1	ITU-T G.988 (2010) Amd. 1	2011-04-13	15	11.1002/1000/11126
1.2	ITU-T G.988 (2010) Amd. 2	2012-04-22	15	11.1002/1000/11501
1.3	ITU-T G.988 (2010) Cor. 1	2012-06-13	15	11.1002/1000/11641
2.0	ITU-T G.988	2012-10-29	15	11.1002/1000/11784
2.1	ITU-T G.988 (2012) Amd. 1	2014-05-14	15	11.1002/1000/12185

---

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). 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.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

Recommendation ITU-T G.988

ONU management and control interface (OMCI) specification

Amendment 1

Maintenance

1)   Scope

This amendment continues the maintenance and evolution of optical network unit (ONU) management and control interface (OMCI) as defined in Recommendation ITU-T G.988 (2012) as amended. A number of robustness improvements are included, along with corrections of editorial errors. Significant feature extensions include the alignment of xDSL services with ITU-T G.997.1 (2012) and the addition of managed entities (MEs) and attributes in support of Ethernet passive optical network (EPON).

NOTE – In the remainder of this amendment, the headings of clauses are the same as the corresponding headers in Recommendation ITU-T G.988 (2012).

2)   Modifications to ITU-T G.988

2.1)   Clause 2, References

In clause 2, replace the version of Recommendation ITU-T G.997.1 (2009) with the 2012 version, and add ITU-T G.993.5, ITU-T G.998.4 and IEEE P1904.1 (moved from the Bibliography) as follows:

[ITU-T G.997.1]   Recommendation ITU-T G.997.1 (2012), *Physical layer management for digital subscriber line transceivers.*

[ITU-T G.993.5]   Recommendation ITU-T G.993.5 (2010), *Self-FEXT cancellation (vectoring) for use with VDSL2 transceivers.*

[ITU-T G.998.4]   Recommendation ITU-T G.998.4 (2010), *Improved impulse noise protection for DSL transceivers.*

[IEEE P1904.1]   IEEE P1904.1, *Standard for Service Interoperability in Ethernet Passive Optical Networks (SIEPON).*

2.2)   Clause 4, Abbreviations and acronyms

Add the following new acronyms to clause 4 in alphabetic order:

DA   Destination Address

EFM   Ethernet in the First Mile

EPON   Ethernet Passive Optical Network

HEC   Header Error Check

MPCPDU   Multi-Point Control Protocol Data Unit

PME   Physical Medium Entity

REIN   Repetitive Electrical Impulse Noise

SHINE   Single High Impulse Noise Event

TQ   Time Quantum

VTU   VDSL2 Transceiver Unit

2.3)   Clause 8.1, Managed entities

Add the following new MEs to Table 8-1 in alphabetic order:

Clause	Managed entity	ITU-T G.984, ITU-T G.987	ITU-T G.986	IEEE 802.3, IEEE 802.3av
9.2.19	ANI-E			M
9.2.20	EPON downstream performance monitoring configuration			
9.2.18	L2 multicast GEM interworking termination point			
9.7.31	xDSL xTU-C performance monitoring history data part 2			
9.7.32	PTM performance monitoring history data xDSL			
9.7.33	VDSL2 line configuration extensions 3			
9.7.34	Vectoring line configuration extensions			
9.7.35	xDSL channel configuration profile part 2			
9.7.36	xTU data gathering configuration			
9.7.37	xDSL line inventory and status data part 8			
9.7.38	VDSL2 line inventory and status data part 4			
9.7.39	Vectoring line inventory and status data			
9.7.40	Data gathering line test, diagnostic and status			
9.9.21	SIP agent config data 2			
9.15.1	Physical path termination point RS232/RS485 UNI			
9.15.2	RS232/RS485 Port Operation Configuration data			
9.15.3	RS232/RS485 performance monitoring history data			
9.7.41	EFM bonding group			
9.7.42	EFM bonding link			
9.7.43	EFM bonding group performance monitoring history data			
9.7.44	EFM bonding group performance monitoring history data part 2			
9.7.45	EFM bonding link performance monitoring history data			
9.7.46	EFM bonding port performance monitoring history data			
9.7.47	EFM bonding port performance monitoring history data part 2			
9.3.34	Ethernet frame extended PM 64-Bit			
9.12.17	Threshold data 64-Bit			

2.4)   Clause 9.1.2, ONU2-G

Replace the OMCC version attribute definition in clause 9.1.2 with the following text:

OMCC version: This attribute identifies the version of the OMCC protocol being used by the ONU. This allows the OLT to manage a network with ONUs that support different OMCC versions. Release levels of [ITU-T G.984.4] are supported with code points of the form 0x8y and 0x9y, where y is a hexadecimal digit in the range 0..F. Support for continuing revisions of this Recommendation is defined in the 0xAy range.

0x80   ITU-T G.984.4 (06/04)

NOTE – for historic reasons, this code point may also appear in ONUs that support later versions of [ITU-T G.984.4].

0x81   ITU-T G.984.4 2004 Amd.1 (06/05)

0x82   ITU-T G.984.4 2004 Amd.2 (03/06)

0x83   ITU-T G.984.4 2004 Amd.3 (12/06)

0x84   ITU-T G.984.4 2008 (02/08)

0x85   ITU-T G.984.4 2008 Amd .1 (06/09)

0x86   ITU-T G.984.4 2008Amd.2 (2009). Baseline message set only, without the extended message set option

0x96   ITU-T G.984.4 2008 Amd.2 (2009). Extended message set option, in addition to the baseline message set.

0xA0   ITU-T G.988 (2010). Baseline message set only, without the extended message set option

0xA1   ITU-T G.988 Amd.1 (2011). Baseline message set only

0xA2   ITU-T G.988 Amd.2 (2012). Baseline message set only

0xA3   ITU-T G.988 (2013). Baseline message set only

0xA4   ITU-T G.988 Amd.1 (2014). Baseline message set only

0xB0   ITU-T G.988 (2010). Baseline and extended message set

0xB1   ITU-T G.988 Amd.1 (2011). Baseline and extended message set

0xB2   ITU-T G.988 Amd.2 (2012). Baseline and extended message set

0xB3   ITU-T G.988 (2013). Baseline and extended message set

0xB4   ITU-T G.988 (2014). Baseline and extended message set

(R) (mandatory) (1 byte)

2.5)   Clause 9.1.14, ONU dynamic power management control

Replace clause 9.1.14 with the following text:

This managed entity models the ONU's ability to enter power conservation modes in cooperation with the OLT in an ITU-T G.987 system. [ITU-T G.987.3] originally specified two alternative modes, doze and cyclic sleep. The subsequent revision of [ITU-T G.987.3] simplified the specification providing a single power conservation mode, watchful sleep.

An ONU that supports power conservation modes automatically creates an instance of this managed entity.

Relationships

One instance of this managed entity is associated with the ONU managed entity.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. There is only one instance, number 0. (R) (mandatory) (2 bytes)

Power reduction management capability: This attribute declares the ONU's support for managed power conservation modes, as defined in [ITU-T G.987.3]. It is a bit map in which the bit value 0 indicates no support for the specified mode, while the bit value 1 indicates that the ONU does support the specified mode. (R) (mandatory) (1 byte)

Codepoints are assigned as follows:

Value	Meaning
0	No support for power reduction
1	Doze mode supported
2	Cyclic sleep mode supported
3	Both doze and cyclic sleep modes supported
4	Watchful sleep mode supported
5..255	Reserved

Power reduction management mode: This attribute enables one or more of the ONU's managed power conservation modes. It is a bit map in which the bit value 0 disables the mode, while the value 1 enables the mode. Bit assignments are the same as those of the power reduction management capability attribute. The default value of each bit is 0. (R, W) (mandatory) (1 byte)

Itransinit: This attribute is the ONU vendor's statement of the complete transceiver initialization time: the worst-case time required for the ONU to regain full functionality when leaving the asleep state in cyclic sleep mode or low power state in watchful sleep mode (i.e., turning on both the receiver and the transmitter and acquiring synchronization to the downstream flow), measured in units of 125-microsecond frames. The value zero indicates that the sleeping ONU can respond to a bandwidth grant without delay. (R) (mandatory) (2 bytes)

Itxinit: This attribute is the ONU vendor's statement of the transmitter initialization time: the time required for the ONU to regain full functionality when leaving the listen state (i.e., turning on the transmitter), measured in units of 125-microsecond frames. The value zero indicates that the dozing ONU can respond to a bandwidth grant without delay. If watchful sleep is enabled, the ONU ignores this attribute. (R) (mandatory) (2 bytes)

Maximum sleep interval: The Isleep/Ilowpower attribute specifies the maximum time the ONU spends in its asleep, listen, or low power states, as a count of 125-microsecond frames. Local or remote events may truncate the ONU's sojourn in these states. The default value of this attribute is 0. (R, W) (mandatory) (4 bytes)

Maximum receiver-off interval: The Irxoff attribute specifies the maximum time the OLT can afford to wait from the moment it decides to wake up an ONU in the low

power state of the watchful sleep mode until the ONU is fully operational, specified as a count of 125-microsecond frames. (R, W) (mandatory) (4 bytes)

Minimum aware interval: The Iaware attribute specifies the time the ONU spends in its aware state, as a count of 125-microsecond frames, before it re-enters asleep or listen states. Local or remote events may independently cause the ONU to enter an active state rather than returning to a sleep state. The default value of this attribute is 0. (R, W) (mandatory) (4 bytes)

Minimum active held interval: The Ihold attribute specifies the minimum time during which the ONU remains in the active held state, as a count of 125-microsecond frames. Its initial value is zero. (R, W) (mandatory) (2 bytes)

Maximum sleep interval extension: This attribute designates maximum sleep interval values for doze mode and cyclic sleep mode separately. When it supports this attribute, the ONU ignores the value of the maximum sleep interval attribute.

Maximum sleep interval for doze mode   4 bytes

Maximum sleep interval for cyclic sleep mode   4 bytes

Maximum sleep interval for doze mode specifies the maximum time the ONU spends in its listen state, as a count of 125-microsecond frames. Local or remote events may truncate the ONU's sojourn in these states. The default value is 0.

Maximum sleep interval for cyclic sleep mode specifies the maximum time the ONU spends in its asleep state, as a count of 125-microsecond frames. Local or remote events may truncate the ONU's sojourn in these states. The default value is 0. If watchful sleep is enabled, the ONU ignores this attribute.

(R, W) (optional) (8 bytes)

EPON capability extension: This attribute declares Ethernet passive optical network (EPON) specific capabilities for the dynamic power management control.

Bits are assigned as follows:

Bit	**Name**	**Setting**
1 (LSB)	AckCapable	0: not supported
		1: supported
2	Sleep indication capability	0: not supported
		1: supported
3	Early wake-up capability	0: not supported
		1: supported
4	Sleep mode selection at ONU's discretion	
		0: not supported
		1: supported
5..8	Reserved	0

AckCapable has the value of supported if the ONU is capable of sending a SLEEP_ACK message, which is defined in [IEEE P1904.1], in response to

the SLEEP_ALLOW message from the OLT. The ONU may select the appropriate power conservation method by itself if AckCapable is supported.

Sleep indication capability represents ability to send a SLEEP_INDICATION message, defined in [IEEE P1904.1], to initiate the power saving cycle from the ONU.

Early wake-up capability shows whether the ONU has a function in which the ONU can awaken from the sleep mode based on local conditions such as off-hook condition on SIP ports, power down, etc.

ONU self-sleep mode selection indicates whether the ONU has a function to choose the appropriate power conservation method by itself if the SLEEP_ALLOW message, defined in [ITU-T G.epon], designates the ONU to enter low power sleep mode with a Tx or TRx SleepMode option. (Tx mode which is defined in [IEEE P1904.1] is equivalent to doze mode, and TRx mode which is also defined in [IEEE P1904.1] is equivalent to cyclic sleep mode.)

(R) (optional) (1 byte)

NOTE – The dynamic power management control in EPON is basically the same as the function in [ITU-T G.987.3]. That is EPON has two types of power-down modes which are equivalent to doze mode and cyclic sleep mode, where the former is defined as Tx mode and the latter is defined as TRx mode in [IEEE P1904.1].

However EPON has some differences from [ITU-T G.987.3] equivalent Tx mode or TRx mode:

- EPON may be operated without the SLEEP_ACK message (which is equivalent to Sleep_Request message in [ITU-T G.987.3])

- An EPON ONU may initiate the dynamic power management control sequence by an EPON-specific SLEEP_INDICATION message.

- EPON may be operated without the early wake-up sequence, which is equivalent to the transition to a full power state by local wake-up indications (LWI) of ONU in [ITU-T G.987.3].

- An EPON ONU may have no capability to choose Tx or TRx mode by itself. Therefore, the OLT can designate the ONU to enter a specific power-down mode in either explicit or implicit ways.

To negotiate the power management mode, the ONU indicates its capabilities by this attribute and then the OLT configures the ONU with the EPON setup extension attribute. In case of the following capabilities and configurations, an EPON system performs the same power-saving function as [ITU-T G.987.3].

- Capabilities:
  AckCapable = supported,
  Sleep indication capability = N/A,
  Early wake-up capability = supported,
  ONU self-sleep mode selection = supported

- Configurations:
  ackEnable configuration = enable,
  Sleep indication configuration = disable,
  Early wake-up configuration = enable

EPON setup extension: This attribute specifies EPON specific configurations for the dynamic power management control.

The bits are assigned as follows:

Bit	Name	Setting
1 (LSB)	ackEnable configuration	0: disable
		1: enable
2	Sleep indication configuration	0: disable
		1: enable
3	Early wake-up configuration	0: disable
		1: enable
4..8	Reserved	0

Each bit corresponds to bit 1-3 of the EPON capability extension and the OLT may enable each bit if the capability is supported or true. If the capability is not supported, the bit has no effect.

If the OLT does not designate configurations by the EPON setup extension, the ONU uses the following default values unless they are not supported.

ackEnable configuration = enable,
Sleep indication configuration = disable,
Early wake-up configuration = enable

(R, W) (optional) (1 byte)

Missing consecutive bursts threshold: The $Clob_i$ attribute specifies the maximum number of missing consecutive scheduled bursts from the ONU that the OLT is willing to tolerate without raising an alarm. The value of this attribute defaults to 4. (R, W) (mandatory) (4 bytes)

Actions

Get, set

Notifications

None.

2.6) Clause 9.2.14, Energy consumption performance monitoring history data

Replace clause 9.2.14 with the following text:

This managed entity collects performance monitoring data associated with the ONU's energy consumption. The time spent in various low-power states is recorded as a measure of their utility. Furthermore, the ONU may also include the equivalent of a Watt-hour meter, which can be sampled from time to time to measure actual power consumed.

For a complete discussion of generic PM architecture, refer to clause I.4.

Relationships

An instance of this managed entity is associated with the ONU in its entirety.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. The ME ID must be 0. (R, Set-by-create) (mandatory) (2 bytes)

> **Interval end time**: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

> **Threshold data 1/2 ID**: No thresholds are defined for this managed entity. For uniformity with other PM, the attribute is retained and shown as mandatory, but it should be set to a null pointer. (R, W, Set-by-create) (mandatory) (2 bytes)

> **Doze time**: This attribute records the time during which the ONU was in doze energy conservation mode, measured in microseconds. If watchful sleep is enabled in the ONU dynamic power management control ME, the ONU ignores this attribute. (R) (mandatory) (4 bytes)

> **Cyclic sleep time**: This attribute records the time during which the ONU was in cyclic sleep energy conservation mode, measured in microseconds. If watchful sleep is enabled in the ONU dynamic power management control ME, the ONU ignores this attribute. (R) (mandatory) (4 bytes)

> **Watchful sleep time**: This attribute records the time during which the ONU was in watchful sleep energy conservation mode, measured in microseconds. (R) (mandatory) (4 bytes)

> **Energy consumed**: This attribute records the energy consumed by the ONU, measured in millijoules. (R) (optional) (4 bytes)

Actions

> Create, delete, get, set

> Get current data (optional)

Notifications

> None.

2.7)   Clause 9.2.18, L2 multicast GEM interworking termination point

Add new clause 9.2.18 as follows:

An instance of this managed entity represents a point in an EPON ONU where a multicast service interworks with the GEM layer. At this point, a multicast bit stream is forwarded.

Instances of this managed entity are created and deleted by the OLT.

Multicast interworking GEM modes of operation

The default multicast operation of the EPON is one in which all the multicast content streams are carried in one PON layer connection (GEM port). This connection is then specified by the multicast MAC address filtering table. According to this table, the ONU filters the traffic based on Ethernet MAC addresses. The associated GEM port network CTP ME specifies the GEM port-ID that supports all multicast connections.

In the default multicast operation, all multicast content streams are placed in one PON layer connection (GEM port). The OLT sets up a completely conventional model, a pointer from the L2 multicast GEM interworking termination point to a GEM port network CTP. The OLT configures the GEM port-ID of the GEM port network CTP into the multicast MAC address filtering table attribute, along with the other table fields that specify multicast destination MAC addresses for filtering. The ONU accepts the entire multicast stream through the designated GEM port and then filters the traffic

based on Ethernet MAC address.

An optional multicast configuration supports separate multicast streams carried over separate PON layer connections, i.e., on separate GEM ports. This permits the ONU to filter multicast streams at the GEM level, which is hardware efficient, while ignoring other multicast streams that may be of interest to other ONUs on the PON.

After configuring the explicit model for the first multicast GEM port, the OLT supports multiple multicast GEM ports by configuring additional entries into the multicast MAC address filtering table, entries with different GEM port-IDs. The OMCI model is defined such that these ports are implicitly grouped together and served by the single explicit GEM port network CTP. No additional GEM network CTPs need be created or linked for the additional GEM ports.

Several L2 multicast GEM interworking termination points can exist, each linked to separate bridge ports or mappers, to serve different communities of interest in a complex ONU.

Discovery of multicast support

The OLT uses the L2 multicast GEM IW TP entity as the means to discover the ONU's multicast capability. This entity is mandatory if multicast is supported by an EPON ONU. If the OLT attempts to create this entity on an ONU that does not support multicast, the create command fails. The create command also fails if the OLT attempts to exploit optional features that the ONU does not support, for example in attempting to create multiple L2 multicast GEM interworking termination points.

This managed entity is defined by similarity to the unicast GEM interworking termination point, and a number of its attributes are not meaningful in a multicast context. These attributes are set to 0 and not used, as indicated below.

Relationships

> An instance of this managed entity exists for each layer 2 multicast community of interest.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. The value 0xFFFF is reserved. (R, Set-by-create) (mandatory) (2 bytes)

> **GEM port network CTP connectivity pointer**: This attribute points to an instance of the GEM port network CTP that is associated with this L2 multicast GEM interworking termination point. (R, W, Set-by-create) (mandatory) (2 bytes)

> **Interworking option**: This attribute identifies the type of non-GEM function that is being interworked. The option can be:

>> 0   This value is a "no-op" or "don't care". It should be used when the L2 multicast GEM IW TP is associated with several functions of different types. It can optionally be used in all cases, since the necessary information is available elsewhere. The previous code points are retained for backward compatibility:

>> 1   MAC bridged LAN

>> 3   Reserved

>> 5   IEEE 802.1p mapper

> (R, W, Set-by-create) (mandatory) (1 byte)

> **Service profile pointer**: This attribute is set to 0 and not used. For backward compatibility, it may also be set to point to a MAC bridge service profile or IEEE 802.1p mapper service profile. (R, W, Set-by-create) (mandatory) (2 bytes)

Not used 1: This attribute is set to 0 and not used. (R, W, Set-by-create) (mandatory) (2 bytes)

PPTP counter: This attribute represents the number of instances of PPTP managed entities associated with this instance of the L2 multicast GEM interworking termination point. This attribute conveys no information that is not available elsewhere; it may be set to 0xFF and not used. (R) (optional) (1 byte)

Operational state: This attribute indicates whether or not the managed entity is capable of performing its function. Valid values are enabled (0) and disabled (1). (R) (optional) (1 byte)

GAL profile pointer: This attribute is set to 0 and not used. For backward compatibility, it may also be set to point to a GAL Ethernet profile. (R, W, Set-by-create) (mandatory) (2 bytes)

Not used 2: This attribute is set to 0 and not used. (R, W, Set-by-create) (mandatory) (1 byte)

Multicast MAC address filtering capability: With this attribute, the ONU reports to the OLT its supported multicast MAC address registration methods and the maximum number of filtering table entries at the ONU.

Multicast MAC address registration method	1 byte
Maximum number of static registration entries	2 bytes
Maximum number of dynamic registration entries	2 bytes

The bits of the multicast MAC address registration method field are assigned as follows:

Bit	**Name**	**Setting**
1 (LSB)	Static MAC address registration	0: not supported 1: supported
2	Dynamic MAC address registration	0: not supported 1: supported
3..8	Reserved	0

(R) (mandatory) (5 bytes)

Multicast MAC address registration mode: This attribute allows the OLT to specify the multicast MAC address registration method.

0   Disable multicast MAC address filtering

1   Static MAC address registration

2   Dynamic MAC address registration

In L2-based multicast operation, the OLT handles the IGMP/MLD protocol of the network and the ONU filters the multicast data stream as instructed by the OLT. ONU may support the static MAC address registration method and/or the dynamic MAC address registration method according to its filter implementation.

In the static MAC address registration method, the OLT provisions all available multicast addresses at the ONU. For each of the available addresses, the OLT also provides a status flag, which designates either pass or drop.

In the dynamic MAC address registration method, the OLT provisions multicast addresses allowed at the ONU. A frame whose DA matches the provisioned MAC destination group address is forwarded to the output port. Frames whose DA is a MAC group address (except for the broadcast address) and does not match any of the provisioned allowed MAC group addresses are discarded. The target range of MAC address that is handled in this filtering mode is 0x01-00-5E-00-00-00 through 0x01-00-5E-7F-FF-FF for IPv4 multicast traffic and 0x33-33-00-01-00-00 through 33-33-FF-FF-FF-FF for IPv6 multicast traffic.

(R, W) (mandatory) (1 byte)

Aging timer: This attribute sets the aging timer value in seconds that is called the multicast address listener interval in IGMP/MLD specifications. The ONU starts or restarts the timer when an entry is added or overwritten in the multicast MAC address filtering table. If the timer expires, the ONU changes the corresponding pass/drop flag to drop in case of static MAC address registration, or removes the corresponding Multicast destination MAC address entry in case of dynamic MAC address registration. The configurable value is 0 to 0x0F-FF-EF seconds and is common for all MAC address entries. The aging timer can be separately enabled or disabled in each multicast MAC address filtering table entry.

(R, W) (optional) (3 bytes)

Multicast MAC address filtering table: This attribute is a list that specifies multicast MAC address filtering configurations. Each entry contains:

GEM port-ID	2 bytes
Secondary key	2 bytes
Filter	1 byte
Multicast destination MAC address	6 bytes

The first four bytes of each entry are treated as a key into the list. The secondary key shows the entry number for a given GEM port.

The bits of the filter byte are assigned as follows:

Bit	**Name**	**Setting**
1 (LSB)	Pass/drop	0: drop
		1: pass
2	Aging	0: disabled
		1: enabled
3..6	Reserved	0
7..8	Add/remove	10: Clear entire table (set operation)
		00: Remove this entry (set operation)
		01: Add/overwrite this entry (set operation)

Upon ME instantiation, the ONU sets this attribute to an empty table.

(R, W) (mandatory) (11N bytes, where N is the number of entries in the list.)

Actions

Create, delete, get, get next, set

Set table (optional)

Notifications

Attribute value change

Number	Attribute value change	Description
1..5	N/A	
6	Op state	Operational state change
7..12	N/A	
13..16	Reserved	

2.8)   Clause 9.2.19, ANI-E

Add new clause 9.2.19 as follows:

This managed entity organizes data associated with each access network interface supported by an EPON ONU. The ONU automatically creates one instance of this managed entity for each PON physical port.

Relationships

> An instance of this managed entity is associated with each instance of a physical PON interface.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. Its value indicates the physical position of the PON interface. The first byte is the slot ID, defined in clause 9.1.5. The second byte is the port ID. (R) (mandatory) (2 bytes)

> **Encryption and FEC capability**: This attribute is used by the OLT to read the encryption and FEC capabilities. The most significant 4 bits denote the encryption capability and the least significant 4 bits denote the FEC capability. It is noted that downstream encryption is mandatory.

> The coding for the most significant field is specified as follows:
> 0x0: upstream encryption is not supported (1G-EPON ONU)
> 0x1: upstream encryption is supported (1G-EPON ONU)
> 0x2: encryption is activated as part of [IEEE 802.1X] authentication/key establishment (10G/10G-EPON ONU or 10G/1G-EPON ONU)

> The coding for the least significant field is specified as follows:
> 0x0: FEC is not supported for 1G link (1G-EPON ONU or 10G/1G-EPON ONU)
> 0x1: FEC is supported for 1G link (1G-EPON ONU or 10G/1G-EPON ONU)
> 0x2: mandatory FEC capability (10G/10G-EPON ONU)

> (R) (optional) (1 byte)

> **Encryption and FEC configuration**: This attribute specifies the encryption and FEC operations. The most significant 4 bits designate the upstream encryption and the least significant 4 bits designate the FEC operation.

> The coding for the most significant field is specified as follows:
> 0x0: disable upstream encryption for 1G-EPON ONU
> 0x1: enable upstream encryption for 1G-EPON ONU

The coding for the least significant field is specified as follows:
    0x0: disable FEC for 1G link
    0x1: enable FEC for 1G link

A 10G/10G-EPON ONU and a 10G/1G-EPON ONU ignores the most significant field. A 10G/10G-EPON ONU also ignores the least significant field.

(R, W) (optional) (1 byte)

ONU capability to configure number of queue sets: This attribute specifies the ONU's capability to configure the number of queue sets. The ONU reports the highest value that it supports for the minimum number of queue sets, and the OLT can configure the minimum number of queue sets to a number that is equal to or less than the reported number.

The coding is specified as follows:
    0: reserved
    1: not supported
    2: supported: the highest value for minimum number of queue sets is 2
    3: supported: the highest value for minimum number of queue sets is 3
    4: supported: the highest value for minimum number of queue sets is 4

(R) (mandatory) (1 byte)

NOTE – The queue set is one of fields in the REPORT MPCPDU and consists of 8 queue reports, as defined in [IEEE 802.3], clause 64.3.6.2 and 77.3.6.2.

Number of queue sets: This attribute specifies the maximum number of queue sets and the minimum number of queue sets to be used by the given ONU to generate the REPORT MPCPDU. The most significant 4 bits denote the maximum number of queue sets and the least significant 4 bits denote the minimum number of queue sets. The admissible values for each field are 0x01, 0x02, 0x03 and 0x04 if they do not exceed the ONU capability. (R, W) (mandatory) (1 byte)

NOTE – This attribute is read-only, in case the ONU capability to configure number of queue sets attribute indicates code point 1. If flexible configuration is not supported, the ONU should reject an attempt to set it with a parameter error result-reason code.

Threshold configuration: This attribute specifies the threshold type and the threshold ordering to be used by the given ONU to generate the REPORT MPCPDU. The most significant 4 bits denote the threshold type and the least significant 4 bits denote the threshold ordering.

The coding for the most significant field is specified as follows. Code 0 is valid in the get operation.
    0x0: not configurable (ONU supports aggregated threshold type only)
    0x1: aggregated threshold
    0x2: dedicated threshold

The coding for the least significant field is specified as follows. Code 0 is valid in the get operation.
    0x0: not configurable (ONU supports descending order only)
    0x1: descending order
    0x2: ascending order

(R, W) (mandatory) (1 byte)

ONU capability to configure threshold starting point: This attribute specifies the ONU capability to configure the threshold starting point.

The coding is specified as follows:
0: supported
1: not supported

(R) (mandatory) (1 byte)

Threshold starting point: This attribute specifies the threshold starting point to be used by the given ONU to generate the REPORT MPCPDU.

The coding is specified as follows:
0: end of granted packet
1: buffer head

(R, W) (mandatory) (1 byte)

Number of queue threshold sets: This attribute specifies the number of queue threshold sets to be used by the given ONU to generate the REPORT MPCPDU. This number covers the queue set used to report the total queue length. The admissible values for this field are 1, 2, 3 and 4. (R, W) (mandatory) (1 byte)

Aggregated threshold table: This attribute is a list that specifies the value of aggregated threshold, in TQs, associated with the queues that are to be present in the REPORT MPCPDU generated by the ONU if the threshold type is aggregated threshold. The queue occupancy included in the queue #n report field in the REPORT MPCPDU is always less than or equal to the provisioned value of the #n threshold, while observing the frame boundaries.

Each list entry is as follows:

– threshold index number: 0-3 (1 byte)

– aggregated threshold value (2 bytes)

A set action to a particular value overwrites any existing entry with the same first one byte. If the last two bytes of a set command are all zero, that entry is cleared from the list. Moreover, if the first one byte of a set is 0xFF, the entire table is cleared.

(R, W) (mandatory) (3N bytes, where N is the number of entries in the table)

Dedicated threshold table: This attribute is a list that specifies the value of dedicated threshold, in TQs, to be associated with the given queue within the particular queue threshold set if the threshold type is dedicated threshold.

Each list entry is as follows:

– index number (1 byte)
bits 7-4: queue set index number 0-3
bits 3-0: threshold index number 0-7

– dedicated threshold value (2 bytes)

A set action to a particular value overwrites any existing entry with the same first one byte. If the last two bytes of a set command are all zero, that entry is cleared from the list. Moreover, if the first one byte of a set is 0xFF, the entire table is cleared.

(R, W) (mandatory) (3N bytes, where N is the number of entries in the table)

ONU capability to configure queue service procedure: This attribute specifies the ONU capability to configure queue service procedure.

> The coding is specified as follows:
> > 0: supported
> > 1: not supported

> (R) (mandatory) (1 byte)

Ability to set queue service procedure: This attribute specifies which type(s) of procedure are supported by the ONU.

> The bit map is specified as follows:
> > bit 1 (LSB): Threshold-first
> > 0: supported
> > 1: not supported
> > bit 2: Priority-first
> > 0: supported
> > 1: not supported
> > bit 3: Strict priority
> > 0: supported
> > 1: not supported

> (R) (mandatory) (1 bytes)

Queue service procedure: This attribute specifies the threshold starting point to be used by the given ONU to generate the REPORT MPCPDU.

> The coding is specified as follows:
> > 0: Threshold-first
> > 1: Priority-first
> > 2: Strict priority

> (R, W) (mandatory) (1 byte)

Holdover time out: This attribute is used by the OLT to configure the holdover timer in the ONU. The value is expressed in units of ms. The default value is 200 ms.

> (R, W) (optional) (4 bytes)

TLoS_optical: This attribute is used by the OLT to configure the TLoS_optical (time threshold of optical signal loss) value, which is the period of time that has to elapse before the ONU moves to the holdover state if no optical signal is detected. The value is expressed in units of ms. The default value is 200 ms.

> (R, W) (optional) (2 bytes)

TLoS_MAC: This attribute is used by the OLT to configure the TLoS_MAC (time threshold of GATE MPCPDU loss) value, which is the period of time that has to elapse before the ONU moves to the holdover state if no GATE MPCPDU is received. This parameter corresponds to the gate_timeout as specified in clauses 64.3.5.1 and 77.3.5.1 of [IEEE 802.3]. The value is expressed in units of ms. The default value is 50 ms.

> (R, W) (optional) (2 bytes

Actions

Get, set, get-next

Set table (optional)

Test: Test the ANI-E (optional). The test action can be used to collect some of the performance monitoring data for a small form factor (SFF)-8472 compliant transceiver on the ANI side, such as optical transceiver unit temperature, optical transceiver unit supply voltage, optical transmitter unit bias current, optical transceiver unit output power and optical transceiver unit input power. Test and test result messages are defined in Annex A.

Notifications

Test result: Test results are reported via a test message if the test is invoked by a test command from the OLT.

2.9)   Clause 9.2.20, EPON downstream performance monitoring configuration

Add new clause 9.2.20 as follows:

This managed entity represents window sizes and threshold values for EPON downstream performance monitoring operations which are defined in [IEEE 802.3] as: errored symbol period, errored frame, errored frame period and errored frame seconds summary.

The EPON ONU automatically instantiates an instance of this ME for each ANI-E.

Relationships

An instance of this managed entity is associated with an ANI-E.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the ANI-E. (R, Set-by-create) (mandatory) (2 bytes)

Errored symbol period window: This attribute specifies the number of symbols in the measurement period, as defined in [IEEE 802.3], clause 57.5.3.1. (R, W) (optional) (8 bytes)

Errored symbol period threshold: This attribute specifies the threshold of errored symbols for generating an event report, as defined in [IEEE 802.3], clause 57.5.3.1. (R, W) (optional) (8 bytes)

Errored frame window: This attribute specifies the duration in units of 100ms of the measurement period, as defined in [IEEE 802.3], clause 57.5.3.2. (R, W) (optional) (2 bytes)

Errored frame threshold: This attribute specifies the threshold of errored frames for generating an event report, as defined in [IEEE 802.3], clause 57.5.3.2. (R, W) (optional) (4 bytes)

Errored frame period window: This attribute specifies the duration in terms of frames of the measurement period, as defined in [IEEE 802.3], clause 57.5.3.3. (R, W) (optional) (4 bytes)

Errored frame period threshold: This attribute specifies the threshold of errored frames for generating an event report, as defined in [IEEE 802.3], clause 57.5.3.3. (R, W) (optional) (4 bytes)

Errored frame seconds summary window: This attribute specifies the duration in units of 100ms of the measurement period, as defined in [IEEE 802.3], clause 57.5.3.4. (R, W) (optional) (2 bytes)

Errored frame seconds summary threshold: This attribute specifies the threshold of errored frame seconds for generating an event report, as defined in [IEEE 802.3], clause 57.5.3.4. (R, W) (optional) (2 bytes)

Actions

Get, set

Notifications

None.

2.10)   Clause 9.3.4, MAC bridge port configuration data

Replace the TP Type attribute definition in clause 9.3.4 with the following text:

TP type: This attribute identifies the type of termination point associated with this MAC bridge port. Valid values are:

1   Physical path termination point Ethernet UNI

2   Interworking VCC termination point

3   IEEE 802.1p mapper service profile

4   IP host config data or IPv6 host config data

5   GEM interworking termination point

6   Multicast GEM interworking termination point

7   Physical path termination point xDSL UNI part 1

8   Physical path termination point VDSL UNI

9   Ethernet flow termination point

10 Reserved

11 Virtual Ethernet interface point

12 Physical path termination point MoCA UNI

13 Ethernet in the first mile (EFM) bonding group

(R, W, Set-by-create) (mandatory) (1 byte)

2.11)   Clause 9.3.10, IEEE 802.1p mapper service profile

Replace the TP Type attribute definition in clause 9.3.10 with the following text:

TP type: This attribute identifies the type of termination point associated with the mapper.

0   Mapper used for bridging-mapping

1   Mapper directly associated with a PPTP Ethernet UNI

2   Mapper directly associated with an IP host config data or IPv6 host config data ME

3 Mapper directly associated with an Ethernet flow termination point

4 Mapper directly associated with a PPTP xDSL UNI

5 Reserved

6 Mapper directly associated with a PPTP MoCA UNI

7 Mapper directly associated with a virtual Ethernet interface point

8 Mapper directly associated with an interworking VCC termination point

9 Mapper directly associated with an EFM bonding group

(R, W, Set-by-create) (optional) (1 byte)

2.12) Clause 9.3.12, VLAN tagging operation configuration data

Replace the Associated type attribute definition in clause 9.3.12 with the following text:

Association type: This attribute specifies the type of ME that is associated with this VLAN tagging operation configuration data ME. Values are assigned in accordance with the following list:

0 (Default) Physical path termination point Ethernet UNI (for backward compatibility, may also be an IP host config data ME; they must not have the same ME ID). The associated ME instance is implicit; its identifier is the same as that of this VLAN tagging operation configuration data.

1 IP host config data or IPv6 host config data

2 IEEE 802.1p mapper service profile

3 MAC bridge port configuration data

4 Physical path termination point xDSL UNI

5 GEM interworking termination point

6 Multicast GEM interworking termination point

7 Physical path termination point MoCA UNI

8 Reserved

9 Ethernet flow termination point

10 Physical path termination point Ethernet UNI

11 Virtual Ethernet interface point

12 MPLS pseudowire termination point

13 EFM bonding group

The associated ME instance is identified by the associated ME pointer. (R, W, Set-by-create) (optional) (1 byte)

2.13)   Clause 9.3.13, Extended VLAN tagging operation configuration data

Replace the Association type attribute definition in clause 9.3.13 with the following text:

Association type: This attribute identifies the type of the ME associated with this extended VLAN tagging ME. Values are assigned as follows:

0	MAC bridge port configuration data
1	IEEE 802.1p mapper service profile
2	Physical path termination point Ethernet UNI
3	IP host config data or IPv6 host config data
4	Physical path termination point xDSL UNI
5	GEM interworking termination point
6	Multicast GEM interworking termination point
7	Physical path termination point MoCA UNI
8	Reserved
9	Ethernet flow termination point
10	Virtual Ethernet interface point
11	MPLS pseudowire termination point
12	EFM bonding group

(R, W, Set-by-create) (mandatory) (1 byte)

2.14)   Clause 9.3.20, Dot1ag maintenance association

Revise the valid code points for the Short MA name format attribute in clause 9.3.20 to read as follows:

Value	Short MA name format	Short MA name attribute
1	Primary VID	2 octets, 12 LSBs specify primary VID, 0 if none
2	Character string	String of up to 45 printable characters
3	2-octet integer	2 octet unsigned integer
4	VPN ID	7 octets, as defined in [IETF RFC 2685]
32	ICC-based	ITU carrier code followed by locally assigned UMC code, 13 bytes with trailing nulls as needed. Defined in [ITU-T Y.1731] Annex A
Other	Reserved	

2.15)   Clause 9.3.27, Multicast operations profile

Revise the VLAN ID (ANI) field of the Dynamic access control list table attribute entry in clause 9.3.27 to read as follows:

VLAN ID (ANI). This field specifies the VLAN carrying the multicast group downstream. (2 bytes)

Values:

0 – Designates an untagged downstream flow.

1..4095 – Matched against the VID of the downstream multicast frame.

4096 – Reserved.

4097 – Matches downstream tagged messages only, but ignores the value of the VID.

0xFFFF – Unspecified.

2.16) Clause 9.3.34, Ethernet frame extended PM 64-Bit

Add clause 9.3.34 as follows:

This managed entity collects some of the performance monitoring data at a point where an Ethernet flow can be observed. It is based on the Etherstats group of [IETF RFC 2819] and [IETF RFC 2863]. Instances of this managed entity are created and deleted by the OLT. References to received frames are to be interpreted as the number of frames entering the monitoring point in the direction specified by the control block.

For a complete discussion of generic PM architecture, refer to clause I.4.

Relationships

> An instance of this managed entity may be associated with an instance of an ME at any Ethernet interface within the ONU. The specific ME is identified in the control block attribute.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. To facilitate discovery, it is encouraged to identify instances sequentially starting with 1. (R, Set-by-create) (mandatory) (2 bytes)

> **Interval end time**: This attribute identifies the most recently finished 15-minute interval. If continuous accumulation is enabled in the control block, this attribute is not used and has the fixed value 0. (R) (mandatory) (1 byte)

> **Control block**: This attribute contains fields defined as follows:

>> **Threshold data 3 id**: (2 bytes) This attribute points to an instance of the threshold data 3 managed entity that contains PM threshold values. When PM is collected on a continuously-running basis, rather than in 15-minute intervals, counter thresholds should not be established. There is no mechanism to clear a TCA, and any counter parameter may eventually be expected to cross any given threshold value.

>> **Parent ME class**: (2 bytes) This field contains the enumerated value of the ME class of the PM ME's parent. Together with the parent ME instance field, this permits a given PM ME to be associated with any OMCI ME. The supported ME classes are:

>>> 46   MAC bridge configuration data

>>> 47   MAC bridge port configuration data

>>> 11   Physical path termination point Ethernet UNI

>>> 98   Physical path termination point xDSL UNI part 1

>>> 266   GEM interworking termination point

>>> 281   Multicast GEM interworking termination point

>>> 329   Virtual Ethernet interface point

162   Physical path termination point MoCA UNI

Parent ME instance: (2 bytes) This field identifies the specific parent ME instance to which the PM ME is attached.

Accumulation disable: (2 bytes) This bit field allows PM accumulation to be disabled; refer to Table 9.3.32-1. The default value 0 enables PM collection. If bit 15 is set to 1, no PM is collected by this ME instance. If bit 15 = 0 and any of bits 14..1 are set to 1, PM collection is inhibited for the attributes indicated by the 1 bits. Inhibiting PM collection does not change the value of a PM attribute, but if PM is accumulated in 15-minute intervals, the value is lost at the next 15-minute interval boundary.

Bit 16 is an action bit that always reads back as 0. When written to 1, it resets all PM attributes in the ME, and clears any TCAs that may be outstanding.

TCA disable: (2 bytes) Also clarified in Table 9.3.32-1, this field permits TCAs to be inhibited, either individually or for the complete managed entity instance. As with the accumulation disable field, the default value 0 enables TCAs, and setting the global disable bit overrides the settings of the individual thresholds. Unlike the accumulation disable field, the bits are mapped to the thresholds defined in the associated threshold data 1 and 2 ME instances. When the global or attribute-specific value changes from 0 to 1, outstanding TCAs are cleared, either for the ME instance globally or for the individual disabled threshold. These bits affect only notifications, not the underlying parameter accumulation or storage.

If the threshold data 1/2 ID attribute does not contain a valid pointer, this field is not meaningful.

Thresholds should be used with caution if PM attributes are accumulated continuously.

Control fields: (2 bytes) This field is a bit map whose values govern the behaviour of the PM ME. Bits are assigned as follows:

Bit 1 (LSB)	The value 1 specifies continuous accumulation, regardless of 15-minute intervals. There is no concept of current and historic accumulators; get and get current data (if supported) both return current values. The value 0 specifies 15-minute accumulators exactly like those of classical PM.
Bit 2	This bit indicates directionality for the collection of data. The value 0 indicates that data is to be collected for upstream traffic. The value 1 indicates that data is to be collected for downstream traffic.
Bits 3..14	Reserved, should be set to 0 by the OLT and ignored by the ONU.
Bit 15	When this bit is 1, the P bits of the TCI field are used to filter the PM data collected. The value 0 indicates that PM is collected without regard to P bits.
Bit 16	When this bit is 1, the VID bits of the TCI field are used to filter the PM data collected. The value 0 indicates that PM is collected without regard to VID.

TCI: (2 bytes) This field contains the value optionally used as a filter for the PM data collected, under the control of bits 15..16 of the control fields. This value is matched to the outer tag of a frame. Untagged frames are not counted when this field is used.

Reserved: (2 bytes) Not used; should be set to 0 by the OLT and ignored by the ONU.

(R, W, Set-by-create) (mandatory) (16 bytes)

Drop events: The total number of events in which frames were dropped due to lack of resources. This is not necessarily the number of frames dropped; it is the number of times this event was detected. (R) (mandatory) (8 bytes)

Octets: The total number of octets received, including those in bad frames, excluding framing bits, but including FCS. (R) (mandatory) (8 bytes)

Frames: The total number of frames received, including bad frames, broadcast frames and multicast frames. (R) (mandatory) (8 bytes)

Broadcast frames: The total number of received good frames directed to the broadcast address. This does not include multicast frames. (R) (mandatory) (8 bytes)

Multicast frames: The total number of received good frames directed to a multicast address. This does not include broadcast frames. (R) (mandatory) (8 bytes)

CRC errored frames: The total number of frames received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad FCS with an integral number of octets (FCS error) or a bad FCS with a non-integral number of octets (alignment error). (R) (mandatory) (8 bytes)

Undersize frames: The total number of frames received that were less than 64 octets long but were otherwise well formed (excluding framing bits, but including FCS octets). (R) (mandatory) (8 bytes)

Oversize frames: The total number of frames received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed. (R) (mandatory) (8 bytes)

Frames 64 octets: The total number of received frames (including bad frames) that were 64 octets long, excluding framing bits, but including FCS. (R) (mandatory) (8 bytes)

Frames 65 to 127 octets: The total number of received frames (including bad frames) that were 65..127 octets long, excluding framing bits but including FCS. (R) (mandatory) (8 bytes)

Frames 128 to 255 octets: The total number of frames (including bad frames) received that were 128..255 octets long, excluding framing bits but including FCS. (R) (mandatory) (8 bytes)

Frames 256 to 511 octets: The total number of frames (including bad frames) received that were 256..511 octets long, excluding framing bits but including FCS. (R) (mandatory) (8 bytes)

Frames 512 to 1023 octets: The total number of frames (including bad frames) received that were 512..1023 octets long, excluding framing bits but including FCS. (R) (mandatory) (8 bytes)

Frames 1024 to 1518 octets: The total number of frames (including bad frames) received that were 1024..1518 octets long, excluding framing bits but including FCS. (R) (mandatory) (8 bytes)

Actions

Create, delete, get, set

Get current data (optional)

Notifications

Threshold crossing alert

Alarm number	Threshold crossing alert	Threshold data counter # (Note)
1	Drop events	1
2	CRC errored frames	2
3	Undersize frames	3
4	Oversize frames	4
NOTE – This number associates the TCA with the specified threshold value attribute of the threshold data 1 managed entity.		

2.17)   Clause 9.7.1, Physical path termination point xDSL UNI part 1

1)   *Replace the xDSL line configuration profile attribute definition in clause 9.7.1 with the following text:*

xDSL line configuration profile: This attribute points to an instance of the xDSL line configuration profiles (part 1, 2 and 3) managed entities, and if necessary, also to VDSL2 line configuration extensions (1 and 2) MEs, also to vectoring line configuration extension MEs. Upon ME instantiation, the ONU sets this attribute to 0, a null pointer. (R, W) (mandatory) (2 bytes)

2)   *Remove the following row from the Alarm table:*

17.207	Reserved	

3)   *Add the following alarms to the Alarm table:*

17	OOS	PTM near-end out-of-sync failure – see clause 7.1.5.1.1 of [ITU T G.997.1] and clause N.4 of [ITU T G.992.3]
18	OOS-FE	PTM far-end out-of-sync failure - see clause 7.1.5.2.1 of [ITU T G.997.1] and clause N.4 of [ITU T G.992.3]
19.207	Reserved	

2.18)   Clause 9.7.6, VDSL2 line configuration extensions

1)   *Replace the VDSL2 PSD mark class selection attribute definition in clause 9.7.6 with the following text:*

VDSL2 PSD mask class selection (CLASSMASK): To reduce the number of configuration possibilities, the limit PSD masks are grouped in the following PSD mask classes:

–   Class 998 Annex A of [ITU-T G.993.2]: D-32, D-48, D-64, D-128

–   Class 997-M1c Annex B of [ITU-T G.993.2]: 997-M1c-A-7

- Class 997-M1x Annex B of [ITU-T G.993.2]: 997-M1x-M
- Class 997-M2x Annex B of [ITU-T G.993.2]: 997E17-M2x-NUS0, 997E30-M2x-NUS0
- Class 998-M2x Annex B of [ITU-T G.993.2]: 998-M2x-A, 998-M2x-M, 998-M2x-B, 998-M2x-NUS0, 998E17-M2x-NUS0, 998E17-M2x-NUS0-M, 998E30-M2x-NUS0, 998E30-M2x-NUS0-M, 998E17-M2x-A
- Class 998ADE-M2x Annex B of [ITU-T G.993.2]: 998-M2x-A, 998-M2x-M, 998-M2x-B, 998-M2x-NUS0, 998ADE17-M2x-A, 998ADE17-M2x-B, 998ADE17-M2x-M, 998ADE17-M2x-NUS0-M, 998ADE30-M2x-NUS0-A, 998ADE30-M2x-NUS0-M, HPEADE1230, HPEADE1730
- Class 998-B Annex C: POTS-138b, POTS-276b (clause C.2.1.1 of [ITU-T G.993.2]), TCM-ISDN (clause C.2.1.2 of [ITU-T G.993.2])
- Class 998-CO Annex C of [ITU-T G.993.2]: POTS-138co, POTS-276co (clause C.2.1.1 of [ITU-T G.993.2])
- Class HPE-M1 Annex B of [ITU-T G.993.2]: HPE17-M1-NUS0, HPE30-M1-NUS0, HPE1230-M1-NUS0, HPE1730-M1-NUS0

Each class is designed such that the PSD levels of each limit PSD mask of a specific class are equal in their respective passbands above 552 kHz.

The CLASSMASK attribute is defined per [ITU-T G.993.2] annex enabled in the xTSE table (see Table 9.7.12-1). It selects a single PSD mask class per [ITU-T G.993.2] annex to be activated at the VTU-O. The coding is as follows:

Attribute value	G.993.2 Annex A	G.993.2 Annex B	G.993.2 Annex C
1	998	997-M1c	998-B
2		997-M1x	998-CO
3		997-M2x	
4		Deprecated	
5		998-M2x	
6		998ADE-M2x	
7		HPE	

NOTE 1 – A single PSD mask class may be selected per [ITU-T G.993.2] annex.

NOTE 2 – It is expected that only a single annex will be enabled at any given time, such that the CLASSMASK attribute, as well as the LIMITMASK and US0DISABLE attributes below, need not be vectors of values.

NOTE 3 – Attribute value 4 was formerly defined in [ITU-T G.997.1], and is no longer used.

(R, W, Set-by-create) (mandatory) (1 byte)

2) *Add the following attribute to the VDLS2 line configuration extensions ME:*

UPBOSHAPED (AELE-MODE, UPBOELMT): This attribute defines the UPBO electrical length estimation mode (AELE-MODE) and UPBO electrical length minimum threshold percentile (UPBOELMT) to be used in the alternative electrical length estimation method (ELE-M1). The format of this attribute is given in octet 1 of Table 12-27 of [ITU-T G.993.2]. (R, W) (optional) (1 byte)

3) *Replace Table 9.7.6-1 Limit mask definitions for each mask class with the following table:*

Table 9.7.6-1 – Limit mask definitions for each class mask

Bit	Annex A		Annex B						Annex C	
	998 Annex A		**998-M2x Annex B**	**998ADE-M2x Annex B**	**997-M1x Annex B**	**997-M1c Annex B**	**997-M2x Annex B**	**HPE-M1 Annex B**	**998-B Annex C**	**998-CO Annex C**
Octet 1, profile class 8										
1	D-32		M2x-A	M2x-A		M1c-A-7			POTS-138b	POTS-138co
2	D-48		M2x-B	M2x-B					TCM-ISDN	POTS-276co
3			M2x-M	M2x-M	M1x-M				POTS-276b	
4			M2x-NUS0	M2x-NUS0						
5										
6										
7										
8										
Octet 2, profile class 8										
1	D-64									
2	D-128									
3										
4										
5										
6										
7										
8										
Octet 3, profile class 12										
1	D-32		M2x-A	M2x-A					POTS-138b	POTS-138co
2	D-48		M2x-B	M2x-B					TCM-ISDN	POTS-276co
3			M2x-M	M2x-M	M1x-M				POTS-276b	
4			M2x-NUS0	M2x-NUS0						
5										
6										
7										
8										
Octet 4, profile class 12										
1	D-64									
2	D-128									
3										
4										
5										
6										
7										
8										
Octet 5, profile class 17										

Table 9.7.6-1 – Limit mask definitions for each class mask

Bit	998 Annex A		998-M2x Annex B	998ADE-M2x Annex B	997-M1x Annex B	997-M1c Annex B	997-M2x Annex B	HPE-M1 Annex B	998-B Annex C	998-CO Annex C
	Annex A				**Annex B**				**Annex C**	
1	D-32		E17-M2x-NUS0	ADE17-M2x-A			E17-M2x-NUS0	17-M1-NUS0	POTS-138b	
2	D-48		E17-M2x-NUS0-M	ADE17-M2x-B					TCM-ISDN	
3			E17-M2x-A	ADE17-M2x-NUS0-M					POTS-276b	
4				ADE17-M2x-M						
5										
6										
7										
8										
Octet 6, profile class 17										
1	D-64									
2	D-128									
3										
4										
5										
6										
7										
8										
Octet 7, profile class 30										
1	D-32		E30-M2x-NUS0	ADE30-M2x-NUS0-A			E30-M2x-NUS0	30-M1-NUS0	POTS-138b	
2	D-48		E30-M2x-NUS0-M	ADE30-M2x-NUS0-M				1230-M1-NUS0	TCM-ISDN	
3				HPEADE1230-NUS0				1730-M1-NUS0	POTS-276b	
4				HPEADE1730-NUS0						
5										
6										
7										
8										

Table 9.7.6-1 – Limit mask definitions for each class mask

Bit	998 Annex A		998-M2x Annex B	998ADE-M2x Annex B	997-M1x Annex B	997-M1c Annex B	997-M2x Annex B	HPE-M1 Annex B	998-B Annex C	998-CO Annex C
	Annex A	**Annex B**							**Annex C**	
Octet 8, profile class 30										
1	D-64									
2	D-128									
3										
4										
5										
6										
7										
8										
NOTE – All unassigned bits are reserved.										

NOTE – Some entries in this table have been modified relative to earlier versions of this Recommendation. See [ITU-T G.997.1] for details.

2.19) Clause 9.7.16, VDSL2 line inventory and status data part 1

Replace the Actual impulse noise protection ROC downstream attribute definition in clause 9.7.16 with the following text:

> **Actual impulse noise protection ROC downstream**: The ACTINP-ROC-ds attribute reports the actual impulse noise protection (INP) of the robust operations channel (ROC) in the downstream direction expressed in multiples of T_{4k}. The INP of this attribute is equal to the integer value multiplied by 0.1 symbols. Valid values and usage are given in clause 7.5.1.34.1 of [ITU-T G.997.1]. (R) (optional) (1 byte)

2.20) Clause 9.7.17, VDSL2 line inventory and status data part 2

Replace the Actual impulse noise protection ROC upstream attribute definition in clause 9.7.17 with the following text:

> **Actual impulse noise protection ROC upstream**: The ACTINP-ROC-us attribute reports the actual INP of the ROC in the upstream direction expressed in multiples of T_{4k}. The INP of this attribute is equal to the integer value multiplied by 0.1 symbols. Valid values and usage are given in clause 7.5.1.34.2 of [ITU-T G.997.1]. (R) (optional) (1 byte)

2.21) Clause 9.7.19, xDSL channel downstream status data

Add the following attribute to clause 9.7.19:

> **Actual impulse noise protection against REIN (ACTINP_REIN)**: If retransmission is used in a given transmit direction, this parameter reports the actual INP against repetitive electrical impulse noise (REIN) on the bearer channel. The INP of this attribute is equal to the integer value multiplied by 0.1 symbols. Valid values and usage are given in clause 7.5.2.9 of [ITU-T G.997.1] (R) (optional) (1 byte)

2.22) Clause 9.7.22, xDSL xTU-R performance monitoring history data

1)   *Add the following attributes to clause 9.7.22:*

"leftr" defect seconds: If retransmission is used, this parameter is a count of the seconds with a near-end "leftr" defect present – see clause 7.2.1.1.6 of [ITU-T G.997.1]. (R) (optional) (2 bytes)

Error-free bits counter: If retransmission is used, this parameter is a count of the number of error-free bits passed over the β1 reference point, divided by 2^{16} – see clause 7.2.1.1.7 of [ITU-T G.997.1]. (R) (optional) (4 bytes)

Minimum error-free throughput (MINEFTR): If retransmission is used, this parameter is the minimum error-free throughput in bits/sec – see clause 7.2.1.1.8 of [ITU-T G.997.1]. (R) (optional) (4 bytes)

2)   *Add the following threshold crossing alert to the Threshold crossing alert table:*

7	"leftr" defect seconds	8

2.23) Clause 9.7.25, TC adaptor performance monitoring history data xDSL

1)   *Replace the near-end user total cell count attribute definition in clause 9.7.25 with the following text:*

Near-end user total cell count (CU-P): This attribute counts the total number of cells in the ATM data path delivered at the V-C interface. (R) (mandatory) (4 bytes)

2)   *Replace the Far-end delineated total cell count attribute definition in clause 9.7.25 with the following text:*

Far-end delineated total cell count (CD-PFE): This attribute counts the total number of cells passed through the cell delineation process and header error check (HEC) function operating on the ATM data path while in the SYNC state. (R) (mandatory) (4 bytes)

3)   *Replace the Far-end user total cell count attribute definition in clause 9.7.25 with the following text:*

Far-end user total cell count (CU-PFE): This attribute counts the total number of cells in the ATM data path delivered at the T-R interface. (R) (mandatory) (4 bytes)

4)   *Add the following threshold crossing alerts to the threshold crossing alert table in clause 9.7.25*

4	Near-end delineated total cell count (CD-P)	5
5	Near-end user total cell count (CU-P)	6
6	Far-end delineated total cell count (CD-PFE)	7
7	Far-end user total cell count (CU-PFE)	8

2.24) Clause 9.7.26, VDSL2 line configuration extensions 2

1) *Replace the ROC minimum impulse noise protection downstream attribute definition in clause 9.7.26 with the following text:*

ROC minimum impulse noise protection downstream: The INPMIN-ROC-ds attribute specifies the minimum impulse noise protection to apply on the ROC in the downstream direction expressed in multiples of equivalent 4k discrete multi-tone, xDSL (DMT) symbol length. The minimum impulse noise protection is an integer ranging from 0 to 8. (R, W, Set-by-create) (optional) (1 byte)

2) *Replace the ROC minimum impulse noise protection upstream attribute definition in clause 9.7.26 with the following text:*

ROC minimum impulse noise protection upstream: The INPMIN-ROC-us attribute specifies the minimum impulse noise protection to apply on the ROC in the upstream direction expressed in multiples of equivalent 4k DMT symbol length. The minimum impulse noise protection is an integer ranging from 0 to 8. (R, W, Set-by-create) (optional) (1 byte).

2.25) Clause 9.7.31, xDSL xTU-C performance monitoring history data part 2

Add clause 9.7.31 as follows:

This managed entity collects performance monitoring data on the xTU-C to xTU-R path as seen from the xTU-C. Instances of this managed entity are created and deleted by the OLT.

For a complete discussion of generic PM architecture, refer to clause I.4.

Relationships

> An instance of this managed entity is associated with an xDSL UNI.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the physical path termination point xDSL UNI part 1. (R, Set-by-create) (mandatory) (2 bytes)

> **Interval end time**: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

> **Threshold data 1/2 ID**: This attribute points to an instance of the threshold data 1 and 2 managed entities that contain PM threshold values. (R, W, Set-by-create) (mandatory) (2 bytes)

> **"leftr" defect seconds**: If retransmission is used, this attribute is a count of the seconds with a near-end "leftr" defect present - see clause 7.2.1.1.6 of [ITU-T G.997.1]. (R) (mandatory) (2 bytes)

> **Error-free bits counter**: If retransmission is used, this attribute is a count of the number of error-free bits passed over the β1 reference point, divided by 2^{16} – see clause 7.2.1.1.7 of [ITU-T G.997.1]. (R) (mandatory) (4 bytes)

> **Minimum error-free throughput (MINEFTR)**: If retransmission is used, this attribute is the minimum error-free throughput in bits/sec – see clause 7.2.1.1.8 of [ITU-T G.997.1]. (R) (mandatory) (4 bytes)

Actions

> Create, delete, get, set

Get current data (optional)

Threshold crossing alert

Alarm number	Threshold crossing alert	Threshold value attribute # (Note)
0	"leftr" defect seconds	1
NOTE – This number associates the TCA with the specified threshold value attribute of the threshold data 1/2 managed entities.		

2.26) Clause 9.7.32, PTM performance monitoring history data xDSL

Add clause 9.7.32 as follows:

This managed entity collects performance monitoring data of an xTU-C to xTU-R PTM data path. Instances of this managed entity are created and deleted by the OLT.

For a complete discussion of generic PM architecture, refer to clause I.4.

Relationships

An instance of this managed entity is associated with an xDSL UNI.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. The two most significant bits of the first byte are the bearer channel ID. Excluding the first two bits of the first byte, the remaining part of the managed entity ID is identical to that of this ME's parent physical path termination point xDSL UNI part 1. (R) (mandatory) (2 bytes)

Interval end time: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

Threshold data 1/2 ID: This attribute points to an instance of the threshold data1 managed entity that contains PM threshold values. Since no threshold value attribute number exceeds 7, a threshold data 2 ME is optional. (R, W, Set-by-create) (mandatory) (2 bytes)

Near-end CRC-P counter: This attribute is a count of the number of occurrences of a CRC-n anomaly in the PTM data path at the near-end – see clause 7.2.5.1.1 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (2 bytes)

Near-end CRCP-P counter: This attribute is a count of the number of occurrences of a CRC-np anomaly in the PTM data path at the near-end – see clause 7.2.5.1.1 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (2 bytes)

Near-end CV-P counter: This attribute is a count of the number of occurrences of a CV-n anomaly in the PTM data path at the near-end – see clause 7.2.5.1.2 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (4 bytes)

Near-end CVP-P counter: This attribute is a count of the number of occurrences of a CV-np anomaly in the PTM data path at the near-end – see clause 7.2.5.1.2 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (4 bytes)

Far-end CRC-PFE counter: This attribute is a count of the number of occurrences of a CRC-n anomaly in the PTM data path at the far-end – see clause 7.2.5.2.1 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (2 bytes)

Far-end CRCP-PFE counter: This attribute is a count of the number of occurrences of a CRC-np anomaly in the PTM data path at the far-end – see clause 7.2.5.2.1 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (2 bytes)

Far-end CV-PFE counter: This attribute is a count of the number of occurrences of a CV-n anomaly in the PTM data path at the far-end – see clause 7.2.5.2.2 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (4 bytes)

Far-end CVP-PFE counter: This attribute is a count of the number of occurrences of a CV-np anomaly in the PTM data path at the far-end – see clause 7.2.5.2.2 of [ITU-T G.997.1] and clause N.4 of [ITU-T G.992.3]. (R) (mandatory) (4 bytes)

Actions

Create, delete, get, set

Get current data (optional)

Notifications

Threshold crossing alert

Alarm number	Threshold crossing alert	Threshold value attribute # (Note)
0	Near-end CRC-P counter	1
1	Near-end CRCP-P counter	2
2	Near-end CV-P counter	3
3	Near-end CVP-P counter	4
4	Far-end CRC-PFE counter	5
5	Far-end CRCP-PFE counter	6
6	Far-end CV-PFE counter	7
7	Far-end CVP-PFE counter	8
NOTE – This number associates the TCA with the specified threshold value attribute of the threshold data 1 managed entity.		

2.27) Clause 9.7.33, VDSL2 line configuration extensions 3

Add clause 9.7.33 as follows:

This managed entity extends the xDSL line configuration MEs.

An instance of this managed entity is created and deleted by the OLT.

Relationships

An instance of this managed entity may be associated with zero or more instances of an xDSL UNI.

The overall xDSL line configuration profile is modelled in several parts, all of which are associated together through a common managed entity ID (the client physical path termination

point xDSL UNI part 1 has a single pointer, which refers to the entire set of line configuration parts).

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. All xDSL and VDSL2 line configuration profiles and extensions that pertain to a given physical path termination point xDSL UNI must share a common managed entity ID. (R, Set-by-create) (mandatory) (2 bytes)

RIPOLICYds: This attribute indicates which policy shall be applied to determine the triggers for re-initialization in the downstream direction. Valid range of values are given in clause 7.3.1.1.12.1 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

RIPOLICYus: This attribute indicates which policy shall be applied to determine the triggers for re-initialization in the upstream direction. Valid range of values are given in clause 7.3.1.1.12.2 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

REINIT_TIME_THRESHOLDds: This attribute indicates defines the downstream threshold for re-initialization based on SES, to be used by the VTU receiver when re-initialization policy 1 is used in downstream. Valid range of values are given in clause 7.3.1.1.13.1 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

REINIT_TIME_THRESHOLDus: This attribute indicates defines the upstream threshold for re-initialization based on SES, to be used by the VTU receiver when re-initialization policy 1 is used in upstream. Valid range of values are given in clause 7.3.1.1.13.2 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

RXREFVNSFus: If SNRM_MODE = 4, this attribute defines the upstream receiver-referred virtual noise scaling factor. The attribute value ranges from 0 (–64.0 dBm) to 255 (+63.5 dBm) – see clause 7.3.1.7.5 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

TXREFVNSFds: If SNRM_MODE = 4, this attribute defines the downstream transmitter referred virtual noise scaling factor. The attribute value ranges from 0 (–64.0 dBm) to 255 (+63.5 dBm) – see clause 7.3.1.7.6 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

RTX_MODEds: This attribute controls the mode of operation of [ITU-T G.998.4] retransmission in the downstream direction. Valid range of values are given in clause 7.3.1.11 of [ITU-T G.997.1]. (R, W) (mandatory) (1 byte)

RTX_MODEus: This attribute controls the mode of operation of [ITU-T G.998.4] retransmission in the upstream direction. Valid range of values are given in clause 7.3.1.11 of [ITU-T G.997.1]. (R, W) (mandatory) (1 byte)

LEFTR_THRESH: If retransmission is used in a given transmit direction, LEFTR_THRESH specifies the threshold for declaring a near-end "leftr" defect. LEFTR_THRESH is equal to the integer value of this attribute multiplied by 0.01. Valid values and usage are given in clause 7.3.1.12 of [ITU-T G.997.1]. (R, W) (mandatory) (1 byte)

MAXDELAYOCTET-split parameter (MDOSPLIT): This attribute defines the percentage of the MAXDELAYOCTET_ext if operating in [ITU-T G.998.4] or MAXDELAYOCTET in other cases allocated to the downstream direction. MDOSPLIT is equal to the integer value of this attribute multiplied

by 1%. Valid values and usage are given in clause 7.3.1.14 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

ATTNDR Method (ATTNDR_METHOD): This attribute specifies the method to be used for the calculation of the ATTNDR in the downstream and upstream direction. Valid values are given in clause 7.3.1.15.1 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

ATTNDR MAXDELAYOCTET-split parameter (ATTNDR_MDOSPLIT): This attribute defines the percentage of the MAXDELAYOCTET_ext if operating in [ITU-T G.998.4] or MAXDELAYOCTET in other cases allocated to the downstream direction to be used in the improved method for calculation of the ATTNDR. The valid values are identical to the values of the line configuration parameter MDOSPLIT. See clause 7.3.1.15.2 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

Actions

Create, delete, get, set

Notifications

None.

2.28)   Clause 9.7.34, Vectoring line configuration extensions

Add clause 9.7.34 as follows:

This managed entity extends the xDSL line configuration MEs with attributes that are specific to vectoring. An instance of this managed entity is created and deleted by the OLT.

Relationships

An instance of this managed entity may be associated with zero or more instances of an xDSL UNI.

The overall xDSL line configuration profile is modelled in several parts, all of which are associated together through a common managed entity ID (the client physical path termination point xDSL UNI part 1 has a single pointer, which refers to the entire set of line configuration parts).

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. All xDSL and VDSL2 and vectoring line configuration profiles and extensions that pertain to a given physical path termination point xDSL UNI must share a common managed entity ID. (R, Set-by-create) (mandatory) (2 bytes)

Vectoring frequency-band control upstream (VECTOR_BAND_CONTROLus) table: This configuration parameter is an array of pairs of sub-carrier indices (a(i), b(i)). Up to eight frequency bands may be configured. The same value of this parameter shall be set for all lines of the same vector group. See clause 7.3.1.13.1 of [ITU-T G.997.1].

This attribute is a table where each entry comprises:
– band number field, i (1 byte, range 1-8)
– band start subcarrier index, a(i) (2 bytes)
– band stop subcarrier index, b(i) (2 bytes).

The band number field is the table index. By default, the table is empty. Setting a table entry with non-zero subcarrier indices implies insertion into

the table. Setting an entry's subcarrier indices to zero implies deletion from the table, if present.

The maximum number of bands is eight, so the maximum size of the table is 40 bytes. (R, W) (mandatory) (N x 5 bytes)

Vectoring frequency-band control downstream (VECTOR_BAND_CONTROLds) table: This configuration parameter is an array of pairs of sub-carrier indices (a(i), b(i)). Up to eight frequency bands may be configured. The same value of this parameter shall be set for all lines of the same vector group. See clause 7.3.1.13.2 of [ITU-T G.997.1]. The format of this attribute is the same as VECTOR_BAND_CONTROLus. The maximum number of bands is eight, so the maximum size of the table is 40 bytes. (R, W) (mandatory) (N x 5 bytes)

FEXT cancellation line priorities upstream (FEXT_CANCEL_PRIORITYus): This attribute specifies line priority for the line in the vectored group in the upstream direction. Allowed values are 0 (LOW) and 1 (HIGH). See clause 7.3.1.13.3 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

FEXT cancellation line priorities downstream (FEXT_CANCEL_PRIORITYds): This attribute specifies line priority for the line in the vectored group in the downstream direction. Allowed values are 0 (LOW) and 1 (HIGH). See clause 7.3.1.13.4 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

FEXT cancellation enabling/disabling upstream (FEXT_CANCEL_ENABLEus): A value of 1 enables and a value of 0 disables FEXT cancellation in the upstream direction from all the other vectored lines into the line in the vectored group. See clause 7.3.1.13.5 of [ITU-T G.997.1]. (R, W) (mandatory) (1 byte)

FEXT cancellation enabling/disabling downstream (FEXT_CANCEL_ENABLEds): A value of 1 enables and a value of 0 disables FEXT cancellation in the downstream direction from all the other vectored lines into the line in the vectored group. See clause 7.3.1.13.6 of [ITU-T G.997.1]. (R, W) (mandatory) (1 byte)

Downstream requested XLIN subcarrier group size (XLINGREQds): This attribute is the requested value of XLINGds. Valid values are given in clause 7.3.1.13.7 of [ITU-T G.997.1]. (R, W) (mandatory) (1 byte)

Upstream requested XLIN subcarrier group size (XLINGREQus): This attribute is the requested value of XLINGus. Valid values are given in clause 7.3.1.13.8 of [ITU-T G.997.1]. (R, W) (mandatory) (1 byte)

Vectoring mode enable (VECTORMODE_ENABLE): This attribute defines the vectoring initialization type to be allowed by the VTU-O on the line. It is coded in a bit-map representation as defined in clause 7.3.1.13.9 of [ITU-T G.997.1]. (R, W) (optional) (1 byte)

VCE ID (VCE_ID): For the line in a vectored group, the VCE ID uniquely identifies the VCE that manages and controls the vectored group to which the line belongs. The valid range of values is given in clause 7.4.13.1 of [ITU-T G.997.1]. (R) (mandatory) (1 byte)

VCE port index (VCE_port_index): For the line in a vectored group, the VCE port index is the physical index that uniquely identifies the VCE port to which the line is

connected. The valid range of values is given in clause 7.4.13.2 of
[ITU-T G.997.1]. (R) (mandatory) (2 bytes)

Actions

Create, delete, get, get next, set

Set table (optional)

Notifications

None.

2.29)   Clause 9.7.35, xDSL channel configuration profile part 2

Add clause 9.7.35 as follows:

This managed entity contains the channel configuration profile for an xDSL UNI. An instance of this managed entity is created and deleted by the OLT.

NOTE – If [ITU-T G.997.1] compatibility is required, bit rates should only be set to integer multiples of 1000 bits/s. The ONU may reject attempts to set other values for bit rate attributes.

Relationships

An instance of this managed entity may be associated with zero or more instances of the physical path termination point xDSL UNI part 1.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the xDSL channel configuration profile. (R, Set-by-create) (mandatory) (2 bytes)

Minimum expected throughput for retransmission (MINETR_RTX): If retransmission is used in a given transmit direction, this attribute specifies the minimum expected throughput for the bearer channel, in bits/sec. See clause 7.3.2.1.8 of [ITU-T G.997.1]. (R, W) (mandatory) (4 bytes)

Maximum expected throughput for retransmission (MAXETR_RTX): If retransmission is used in a given transmit direction, this parameter specifies the maximum expected throughput for the bearer channel, in bits/sec. See clause 7.3.2.1.9 of [ITU-T G.997.1]. (R, W) (mandatory) (4 bytes)

Maximum net data rate for retransmission (MAXNDR_RTX): If retransmission is used in a given transmit direction, this parameter specifies the maximum net data rate for the bearer channel, in bits/s. See clause 7.3.2.1.10 of [ITU-T G.997.1]. (R, W) (mandatory) (4 bytes)

Maximum delay for retransmission (DELAYMAX_RTX): If retransmission is used in a given transmit direction, this parameter specifies the maximum for the instantaneous delay due to the effect of retransmission only. This delay is defined as the integer value of this attribute multiplied by 1 ms. The valid delay values are given in clause 7.3.2.11 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

Minimum delay for retransmission (DELAYMIN_RTX): If retransmission is used in a given transmit direction, this parameter specifies the minimum for the instantaneous delay due to the effect of retransmission only. This delay is defined as the integer value of this attribute multiplied by 1 ms. The valid

delay values are given in clause 7.3.2.12 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

Minimum impulse noise protection against SHINE for retransmission (INPMIN_SHINE_RTX): If retransmission is used in a given transmit direction, this parameter specifies the minimum impulse noise protection against single high impulse noise event (SHINE) for the bearer channel if it is transported over DMT symbols with a subcarrier spacing of 4.3125 kHz. The valid range of values is given in clause 7.3.2.13 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

Minimum impulse noise protection against SHINE for retransmission for systems using 8.625 kHz subcarrier spacing (INPMIN8_SHINE_RTX): If retransmission is used in a given transmit direction, this parameter specifies the minimum impulse noise protection against SHINE for the bearer channel if it is transported over DMT symbols with a subcarrier spacing of 8.625 kHz. The valid range of values is given in clause 7.3.2.14 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

SHINERATIO_RTX: If retransmission is used in a given transmit direction, this parameter specifies the SHINE ratio. This ratio is defined as the integer value of this attribute multiplied by 0.001. The valid range of values is given in clause 7.3.2.15 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

Minimum impulse noise protection against REIN for retransmission (INPMIN_REIN_RTX): If retransmission is used in a given transmit direction, this parameter specifies the minimum impulse noise protection against REIN for the bearer channel if it is transported over DMT symbols with a subcarrier spacing of 4.3125 kHz. The valid range of values is given in clause 7.3.2.16 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

Minimum impulse noise protection against REIN for retransmission for systems using 8.625 kHz subcarrier spacing (INPMIN8_REIN_RTX): If retransmission is used in a given transmit direction, this parameter specifies the minimum impulse noise protection against REIN for the bearer channel if it is transported over DMT symbols with a subcarrier spacing of 8.625 kHz. The valid range of values is given in clause 7.3.2.17 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

REIN inter-arrival time for retransmission (IAT_REIN_RTX): If retransmission is used in a given transmit direction, this parameter specifies the inter-arrival time that shall be assumed for REIN protection. The valid range of values is given in clause 7.3.2.18 of [ITU-T G.997.1]. (R, W) (mandatory) (1 bytes)

Target net data rate (TARGET_NDR): If retransmission is not used in a given transmit direction, this parameter specifies the target net data of the bearer channel, in bits/s. See clause 7.3.2.19.1 of [ITU-T G.997.1]. (R, W) (mandatory) (4 bytes)

Target expected throughput for retransmission (TARGET_ETR): If retransmission is used in a given transmit direction, this parameter specifies the target expected throughput for the bearer channel, in bits/sec. See clause 7.3.2.19.2 of [ITU-T G.997.1]. (R, W) (mandatory) (4 bytes)

Actions

Create, delete, get, set

Notifications

> None.

2.30)   Clause 9.7.36, xTU Data Gathering Configuration

Add clause 9.7.36 as follows:

This managed entity defines configurations specific to data gathering.

An instance of this managed entity is created and deleted by the OLT.

Relationships

> An instance of this managed entity may be associated with zero or more instances of the physical path termination point xDSL UNI part 1.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the physical path termination point xDSL UNI part 1 managed entity. (R, Set-by-create) (mandatory) (2 bytes)
>
> **Logging depth event percentage per event – VTU-O (LOGGING_DEPTH_EVENT_PERCENTAGE_Oi) table**: This parameter is the percentage of the data gathering event buffer assigned to event type i at the VTU-O. See clause 7.3.6.1 of [ITU-T G.997.1]. Each element in the table consists of two bytes, where the first byte is event type i, and the second byte is the percentage of event type i defined as the integer value multiplied by 1%. (R, W) (optional) (2 x N bytes for N event types)
>
> **Logging depth event percentage per event – VTU-R (LOGGING_DEPTH_EVENT_PERCENTAGE_Ri) table**: This parameter is the percentage of the data gathering event buffer assigned to event type i at the VTU-R. See clause 7.3.6.2 of [ITU-T G.997.1]. Each element in the table consists of two bytes, where the first byte is event type i, and the second byte is the percentage of event type i defined as the integer value multiplied by 1%. (R, W) (optional) (2 x N bytes for N event types)
>
> **Logging depth for VTU-O reporting – VTU-R (LOGGING_DEPTH_REPORTING_O)**: This parameter is the logging depth that is requested for reporting the VTU-O event trace buffer in the CO-MIB, in number of 6-byte data gathering records. See clause 7.3.6.3 of [ITU-T G.997.1]. (R, W) (optional) (2 bytes)
>
> **Logging depth for VTU-R reporting – VTU-R (LOGGING_DEPTH_REPORTING_R)**: This parameter is the logging depth that is requested for reporting the VTU-R event trace buffer over the eoc channel, in number of 6-byte data gathering records. See clause 7.3.6.4 of [ITU-T G.997.1]. (R, W) (optional) (2 bytes)
>
> **Logging data report newer events first – VTU-R (LOGGING_REPORT_NEWER_FIRST)**: This parameter determines whether the VTU-R to reports newer events first or older events first. See clause 7.3.6.4 of [ITU-T G.997.1]. False is mapped to 0, true is mapped to 1. (R, W) (optional) (1 byte)

Actions

  Create, delete, get, get next, set

  Set table (optional)

Notifications

None.

2.31) Clause 9.7.37, xDSL line inventory and status data part 8

Add clause 9.7.37 as follows:

This managed entity extends the attributes defined in the xDSL line inventory and status data parts 1..4.

Relationships

  This is one of the status data MEs associated with an xDSL UNI. The ONU automatically creates or deletes an instance of this managed entity upon creation or deletion of a physical path termination point xDSL UNI part 1 that supports these attributes.

Attributes

  Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the physical path termination point xDSL UNI part 1 managed entity. (R) (mandatory) (2 bytes)

  Retransmission used downstream (RTX_USEDds): This parameter specifies whether [ITU-T G.998.4] retransmission is used (i.e., active in showtime) in the downstream transmit direction. The valid range of values is given in clause 7.5.1.38 of [ITU-T G.997.1]. (R) (mandatory) (1 byte)

  Retransmission used upstream (RTX_USEDus): This parameter specifies whether [ITU-T G.998.4] retransmission is used (i.e., active in showtime) in the upstream transmit direction. The valid range of values is given in clause 7.5.1.38 of [ITU-T G.997.1]. (R) (mandatory) (1 byte)

  Date/time-stamping of near-end test parameters (STAMP-TEST-NE): This parameter indicates the date/time when the near-end test parameters that can change during showtime were last updated. See clause 7.5.1.36.3 of [ITU-T G.997.1]. The format of this parameter is as follows:

Year	2 bytes
Month	1 byte (1..12)
Day	1 byte (1..31)
Hour	1 byte (0..23)
Minute	1 byte (0..59)
Second	1 byte (0..59)

  (R) (optional) (7 bytes)

  Date/time-stamping of far-end test parameters (STAMP-TEST-FE): This parameter indicates the date/time when the far-end test parameters that can change during showtime were last updated. See clause 7.5.1.36.4 of

[ITU-T G.997.1]. The format of this parameter is the same as STAMP-TEST-NE. (R) (optional) (7 bytes)

Date/time-stamping of last successful downstream OLR operation (STAMP-OLR-ds):
This parameter indicates the date/time of the last successful OLR execution in the downstream direction that has modified the bits or gains. See clause 7.5.1.37.1 of [ITU-T G.997.1]. The format of this parameter is the same as STAMP-TEST-NE. (R) (optional) (7 bytes)

Date/time-stamping of last successful upstream OLR operation (STAMP-OLR-us):
This parameter indicates the date/time of the last successful OLR execution in the upstream direction that has modified the bits or gains. See clause 7.5.1.37.2 of [ITU-T G.997.1]. The format of this parameter is the same as STAMP-TEST-NE. (R) (optional) (7 bytes)

Actions

Get, get next

Notifications

None.

2.32) Clause 9.7.38, VDSL2 line inventory and status data part 4

Add clause 9.7.38 as follows:

This managed entity extends the other xDSL line inventory and status data MEs with attributes specific to VDSL2.

Relationships

This is one of the status data MEs associated with an xDSL UNI. It is required only if VDSL2 is supported by the PPTP. The ONU automatically creates or deletes an instance of this managed entity upon creation or deletion of a PPTP xDSL UNI part 1 that supports these attributes.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the physical path termination point xDSL UNI part 1 managed entity. (R) (mandatory) (2 bytes)

VTU-O estimated upstream power back-off electrical length per band (UPBOKLE-pb):
This parameter is a vector of UPBO electrical length per-band estimates for each supported upstream band except US0, calculated by the VTU-O, based on separate measurements in the supported upstream bands excluding US0. This parameter is required for the alternative electrical length estimation method (ELE-M1). Each per-band estimate is represented by two bytes, where the estimate is defined as the integer value multiplied by 0.1dB. The valid range of values is given in clause 7.5.1.23.3 of [ITU-T G.997.1] (R) (optional) (4 bands x 2 bytes)

VTU-R estimated upstream power back-off electrical length per band (UPBOKLE-R-pb): This parameter is a vector of UPBO electrical length per-band estimates for each supported downstream band, calculated by the VTU-R, based on separate measurements in the supported downstream bands. This parameter is required for the alternative electrical length estimation method (ELE-M1). Each per-band estimate is represented by two bytes, where the estimate is

defined as the integer value multiplied by 0.1dB. The valid range of values is given in clause 7.5.1.23.4 of [ITU-T G.997.1] (R) (optional) (3 bands x 2 bytes)

UPBO downstream receiver signal level threshold (RXTHRSHds): This parameter reports the downstream received signal level threshold value used in the alternative electrical length estimation method (ELE-M1). Valid values range from 0 (–64 dB) to 64 (0 dB). See clause 7.5.1.23.5 of [ITU-T G.997.1] (R) (optional) (1 byte)

UPBO upstream receiver signal level threshold (RXTHRSHus): This parameter reports the upstream received signal level threshold value used in the alternative electrical length estimation method. Valid values range from 0 (–64 dB) to 64 (0 dB). See clause 7.5.1.23.6 of [ITU-T G.997.1] (R) (optional) (1 byte)

Actual Alternative Electrical Length Estimation Mode (ACT-AELE-MODE): This parameter reports the actual AELE-MODE. Valid values are given in clause 7.5.1.23.7 of [ITU-T G.997.1] (R) (optional) (1 byte)

Actual downstream RIPOLICY (ACTRIPOLICYds): This parameter indicates the actual re-initialization policy in use in the downstream direction. Valid values are given in clause 7.5.1.40.1 of [ITU-T G.997.1] (R) (optional) (1 byte)

Actual upstream RIPOLICY (ACTRIPOLICYus): This parameter indicates the actual re-initialization policy in use in the upstream direction. Valid values are given in clause 7.5.1.40.2 of [ITU-T G.997.1] (R) (optional) (1 byte)

ATTNDR Actual Method (ATTNDR_ACTMETHOD): This parameter indicates the actual ATTNDR Method used for calculation of the ATTNDR in the downstream and upstream direction. Valid values are given in clause 7.5.1.41.1 of [ITU-T G.997.1] (R) (optional) (1 byte)

ATTNDR Downstream Actual impulse noise protection (ATTNDR_ACTINPds): If retransmission is not used in the downstream direction, this parameter indicates the actual impulse noise protection used in the improved calculation of the ATTNDR in the downstream direction. If retransmission is used in the downstream direction, this parameter indicates the actual impulse noise protection against SHINE used in the improved calculation of the ATTNDR in the downstream direction. The format and usage is identical to that of the ACTINP attribute defined in the xDSL channel downstream status data ME. See clause 7.5.1.41.2 of [ITU-T G.997.1] (R) (optional) (1 byte)

ATTNDR Upstream Actual impulse noise protection (ATTNDR_ACTINPus): If retransmission is not used in the upstream direction, this parameter indicates the actual impulse noise protection used in the improved calculation of the ATTNDR in the upstream direction. If retransmission is used in the upstream direction, this parameter indicates the actual impulse noise protection against SHINE used in the improved calculation of the ATTNDR in the upstream direction. The format and usage is identical to that of the ACTINP attribute defined in the xDSL channel downstream status data ME. See clause 7.5.1.41.3 of [ITU-T G.997.1] (R) (optional) (1 byte)

ATTNDR Downstream Actual impulse noise protection against REIN (ATTNDR_ACTINP_REINds): If retransmission is used in the downstream direction, this parameter reports the actual INP against REIN used in the improved calculation of the ATTNDR in the downstream direction. The format and usage is identical to that of the ACTINP_REIN attribute defined in the

xDSL channel downstream status data ME. See clause 7.5.1.41.4 of [ITU-T G.997.1] (R) (optional) (1 byte)

ATTNDR Downstream Actual impulse noise protection against REIN (ATTNDR_ACTINP_REINus): If retransmission is used in the upstream direction, this parameter reports the actual INP against REIN used in the improved calculation of the ATTNDR in the upstream direction. The format and usage is identical to that of the ACTINP_REIN attribute defined in the xDSL channel downstream status data ME. See clause 7.5.1.41.5 of [ITU-T G.997.1] (R) (optional) (1 byte)

ATTNDR Downstream Actual delay (ATTNDR_ACTDELAYds): This parameter indicates the actual delay used in the improved calculation of the ATTNDR in the downstream direction. The delay of this attribute is equal to the integer value multiplied by 0.1 ms. Valid values are given in clause 7.5.1.41.6 of [ITU-T G.997.1] (R) (optional) (1 byte)

ATTNDR Upstream Actual delay (ATTNDR_ACTDELAYus): This parameter indicates the actual delay used in the improved calculation of the ATTNDR in the upstream direction. The delay of this attribute is equal to the integer value multiplied by 0.1 ms. Valid values are given in clause 7.5.1.41.7 of [ITU-T G.997.1] (R) (optional) (1 byte)

Near-end Aggregate achievable net data rate (AGGACHNDR_NE): This parameter reports the aggregate achievable net data rate of the VTU-O, in bits/s. See clause 7.5.1.42.1 of [ITU-T G.997.1] (R) (optional) (4 bytes)

Far-end aggregate achievable net data rate (AGGACHNDR_FE): This parameter reports the aggregate achievable net data rate of the VTU-R, in bits/s. See clause 7.5.1.42.2 of [ITU-T G.997.1] (R) (optional) (4 bytes)

Actions

Get

Notifications

None.

2.33) Clause 9.7.39, Vectoring line inventory and status data

Add clause 9.7.39 as follows:

This managed entity contains line inventory and status attributes specific to vectoring.

Relationships

This is one of the status data MEs associated with an xDSL UNI. It is meaningful if the PPTP supports [ITU-T G.993.5]. The ONU automatically creates or deletes an instance of this managed entity upon creation and deletion of a physical path termination point xDSL UNI part 1 that supports these attributes.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the physical path termination point xDSL UNI part 1 managed entity. (R) (mandatory) (2 bytes)

Downstream XLIN scale (XLINSCds): This parameter is the scale factor to be applied to the downstream Xlinpsds values. Valid values are given in clause 7.5.1.39.1 of [ITU-T G.997.1] (R) (mandatory) (2 bytes)

Downstream XLIN subcarrier group size (XLINGds): This parameter is the number of subcarriers per group used to report Xlinpsds. Valid values are given in clause 7.5.1.39.2 of [ITU-T G.997.1] (R) (mandatory) (1 bytes)

Downstream XLIN bandedges (XLINBANDSds) table: XLINBANDSds contains pairs of indices (start_subcarrier_index, stop_subcarrier_index) for every band in which XLINpsds is reported. Each index is two bytes. This attribute is organized as a table, so the number of bands can be determined from the table's size. See clause 7.5.1.39.3 of [ITU-T G.997.1] (R) (mandatory) (N bands x 4 bytes)

Downstream FEXT coupling (XLINpsds) table: For each given VCE port index k, this parameter is a one-dimensional array of complex values in linear scale for downstream FEXT coupling coefficients Xlinds(f) originating from the loop connected to the VCE port k into the loop for which Xlinds(f) is being reported. Each complex value (a(n) + j x b(n)) is represented by a two-byte signed two's complement value (a(n)), followed by a two-byte signed two's complement value (b(n)). This attribute is organized as a table, so the number of complex values in the array can be determined from the table's size. See clause 7.5.1.39.4 of [ITU-T G.997.1] (R) (mandatory) (N complex values x 4 bytes)

Upstream XLIN scale (XLINSCus): This parameter is the scale factor to be applied to the upstream Xlinpsus values. Valid values are given in clause 7.5.1.39.5 of [ITU-T G.997.1] (R) (mandatory) (2 bytes)

Upstream XLIN subcarrier group size (XLINGus): This parameter is the number of subcarriers per group used to report Xlinpsus. Valid values are given in clause 7.5.1.39.6 of [ITU-T G.997.1] (R) (mandatory) (1 bytes)

Upstream XLIN bandedges (XLINBANDSus) table: XLINBANDSus contains pairs of indices (start_subcarrier_index, stop_subcarrier_index) for every band in which XLINpsus is reported. Each index is two bytes. This attribute is organized as a table, so the number of bands can be determined from the table's size. See clause 7.5.1.39.7 of [ITU-T G.997.1] (R) (mandatory) (N bands x 4 bytes)

Upstream FEXT coupling (XLINpsus) table: For each given VCE port index k, this parameter is a one-dimensional array of complex values in linear scale for upstream FEXT coupling coefficients Xlinus(f) originating from the loop connected to the VCE port k into the loop for which Xlinus(f) is being reported. Each complex value (a(n) + j x b(n)) is represented by a two-byte signed two's complement value (a(n)), followed by a two-byte signed two's complement value (b(n)). This attribute is organized as a table, so the number of complex values in the array can be determined from the table's size. See clause 7.5.1.39.8 of [ITU-T G.997.1] (R) (mandatory) (N complex values x 4 bytes)

Actual vectoring mode (ACTVECTORMODE): This parameter reports the vectoring initialization type of the line. Valid values are given in clause 7.5.1.43.1 of [ITU-T G.997.1] (R) (optional) (1 byte)

Actions

> Get, get next

Notifications

> None.

2.34)   Clause 9.7.40, Data gathering line test, diagnostic and status

Add clause 9.7.40 as follows:

This managed entity contains xDSL data gathering line test, diagnostic and status parameters.

An instance of this managed entity is created and deleted by the OLT.

Relationships

> An instance of this managed entity may be associated with zero or more instances of the physical path termination point xDSL UNI part 1.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the physical path termination point xDSL UNI part 1 managed entity. (R, Set-by-create) (mandatory) (2 bytes)

> **Logging depth – VTU-O (LOGGING_DEPTH_O)**: This parameter is the maximum depth of the entire data gathering event buffer at the VTU-O, in number of 6-byte data gathering records. See clause 7.5.3.1 of [ITU-T G.997.1] (R) (optional) (4 bytes)

> **Logging depth – VTU-R (LOGGING_DEPTH_R)**: This parameter is the maximum depth of the entire data gathering event buffer at the VTU-R, in number of 6-byte data gathering records. See clause 7.5.3.2 of [ITU-T G.997.1] (R) (optional) (4 bytes)

> **Actual logging depth for reporting – VTU-O (ACT_logging_depth_reporting_O)**: This parameter is the actual logging depth that is used for reporting the VTU-O event trace buffer in the CO-MIB, in number of 6-byte data gathering records. See clause 7.5.3.3 of [ITU-T G.997.1] (R) (optional) (4 bytes)

> **Actual logging depth for reporting – VTU-R (ACT_logging_depth_reporting_R)**: This parameter is actual logging depth that is used for reporting the VTU-R event trace buffer over the eoc channel, in number of 6-byte data gathering records. See clause 7.5.3.4 of [ITU-T G.997.1] (R) (optional) (4 bytes)

> **Event trace buffer – VTU-O (EVENT_TRACE_BUFFER_O) table**: This parameter is the event trace buffer containing the event records that originated at the VTU-O. See clause 7.5.3.5 of [ITU-T G.997.1] (R) (optional) (N bytes)

> **Event trace buffer – VTU-R (EVENT_TRACE_BUFFER_R) table**: This parameter is the event trace buffer containing the event records that originated at the VTU-R. See clause 7.5.3.6 of [ITU-T G.997.1] (R) (optional) (N bytes)

Actions

> Get, get next

Notifications

> None.

2.35) Clause 9.7.41, EFM bonding group

Add clause 9.7.41 as follows:

The EFM bonding group represents a group of links that are bonded. In [IEEE 802.3], a bonding group is known as a PAF (physical medium entity (PME) aggregation function) and a link is known as a PME instance of this managed entity are created and deleted by the OLT.

Relationships

> An instance of this managed entity may be associated with zero or more instances of an EFM bonding link.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. The value 0 is reserved. (R, Set-by-create) (mandatory) (2 bytes)

> **Group ID**: This attribute is the unique number representing this bonding group. See clause C.3.1.1 of [ITU-T G.998.2]. (R, W, Set-by-create) (mandatory) (6 bytes)

> **Minimum upstream group rate**: This attribute sets the minimum upstream group rate, in bits/s, for this EFM Group. This attribute is used to determine the "Group US rate low" alarm status. The "Group US rate low" alarm means that the aggregate upstream rate of all active links associated with this group is less than the "Minimum upstream group rate". The default value for this rate is zero. (R, W) (mandatory, Set-by-create) (4 bytes)

> **Minimum downstream group rate**: This attribute sets the minimum downstream group rate, in bits/s, for this EFM Group. This attribute is used to determine the "Group DS rate low" alarm status. The "Group DS rate low" alarm means that the aggregate downstream rate of all active links associated with this group is less than the "Minimum downstream group rate". The default value for this rate is zero. (R, W) (mandatory) (4 bytes, Set-by-create)

> **Group alarm enable**: This bit mapped attribute enables the various group alarms. A bit value of 1 means "enable".

> | **Bit** | **Meaning** |
> | --- | --- |
> | 1 (LSB) | Group down |
> | 2 | Group partial |
> | 3 | Group US rate low |
> | 4 | Group DS rate low |
> | 5 | 4x rate ratio |
> | 6-8 | Reserved |

> (R, W, Set-by-create) (mandatory) (1 bytes)

Actions

> Create, delete, get, set

Alarm

Alarm number	Alarm	Description
0	Group down	No links associated with this group are active
1	Group partial	Not all links associated with this group are active
2	Group US rate low	Aggregate upstream rate is less than the minimum upstream group rate
3	Group DS rate low	Aggregate downstream rate is less than the minimum downstream group rate
4	4x rate ratio	In this group, ratio of max link rate to min link rate > 4
5..207	Reserved	
NOTE – An "active" link means that the port is trained and fragments can flow across the link in both directions.		

2.36) Clause 9.7.42, EFM bonding link

Add clause 9.7.42 as follows:

The EFM bonding link represents a link that can be bonded with other links to form a group. In [IEEE 802.3], a bonding group is known as a PAF (PME aggregation function) and a link is known as a PME (physical medium entity). Instances of this managed entity are created and deleted by the OLT.

Relationships

An instance of this managed entity may be associated with zero or one instance of an EFM bonding group.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. The two most significant bits of the first byte are the bearer channel ID. Excluding the first two bits of the first byte, the remaining part of the managed entity ID is identical to that of this ME's parent physical path termination point xDSL UNI part 1.

NOTE – This attribute has the same meaning as the Stream ID in clause C.3.1.2 of [ITU-T G.998.2], except that it cannot be changed. (R, Set-by-create) (mandatory) (2 bytes)

Associated group ME ID: This attribute is the ME ID of the bonding group to which this link is associated. Changing this attribute moves the link from one group to another. Setting this attribute to an ME ID that has not yet been provisioned will result in this link being placed in a single-link group that contains only this link. The default value for this attribute is the null pointer, 0xFFFF. (R, W, Set-by-create) (mandatory) (2 bytes)

Link alarm enable: This bit mapped attribute enables the group down and group partial alarms. A bit value of 1 means "enable".

Bit	**Meaning**
1 (LSB)	Link Down
2-8	Reserved

(R, W, Set-by-create) (mandatory) (1 bytes)

Actions

> Create, delete, get, set

Notifications

Alarm

Alarm number	Alarm	Description
0	Link down	Link not active. See definition in EFM bonding group ME
1..207	Reserved	

2.37) Clause 9.7.43, EFM bonding group performance monitoring history data

Add clause 9.7.43 as follows:

This managed entity collects performance monitoring data as seen at the xTU-C. Instances of this managed entity are created and deleted by the OLT.

Relationships

> An instance of this managed entity is associated with an xDSL UNI.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the EFM bonding group. (R, Set-by-create) (mandatory) (2 bytes)

> **Interval end time**: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

> **Threshold data 1/2 ID**: This attribute points to an instance of the threshold data 1 and 2 managed entities that contain PM threshold values. (R, W, Set-by-create) (mandatory) (2 bytes)

> **Rx bad fragments**: Clause 45.2.3.33 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

> **Rx lost fragments**: Clause 45.2.3.34 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

> **Rx lost starts**: Clause 45.2.3.35 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

> **Rx lost ends**: Clause 45.2.3.36 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

> **Rx frames**: Number of Ethernet frames received over this group. (R) (mandatory) (4 bytes)

> **Tx frames**: Number of Ethernet frames transmitted over this group. (R) (mandatory) (4 bytes)

> **Rx bytes**: Number of bytes contained in the Ethernet frames received over this group. (R) (mandatory) (8 bytes)

> **Tx bytes**: Number of bytes contained in the Ethernet frames transmitted over this group. (R) (mandatory) (8 bytes)

> **Tx discarded frames**: Number of Ethernet frames discarded by the group transmit function. (R) (mandatory) (4 bytes)

> **Tx discarded bytes**: Number of bytes contained in the Ethernet frames discarded by the group transmit function. (R) (mandatory) (4 bytes)

Actions

> Create, delete, get, set

Get current data (optional)

Notifications

Threshold crossing alert

Alarm number	Threshold crossing alert	Threshold value attribute # (Note)
0	Rx bad fragments	1
1	Rx lost fragments	2
2	Rx lost starts	3
3	Rx lost ends	4
4..207	Reserved	
NOTE – This number associates the TCA with the specified threshold value attribute of the threshold data 1/2 managed entities.		

2.38) Clause 9.7.44, EFM bonding group performance monitoring history data part 2

Add clause 9.7.44 as follows:

This managed entity collects performance monitoring data as seen at the xTU-C. Instances of this managed entity are created and deleted by the OLT.

Relationships

An instance of this managed entity is associated with an xDSL UNI.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the EFM bonding group. (R, Set-by-create) (mandatory) (2 bytes)

Interval end time: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

Threshold data 1/2 ID: This attribute points to an instance of the threshold data 1 and 2 managed entities that contain PM threshold values. (R, W, Set-by-create) (mandatory) (2 bytes)

Rx unicast frames: Number of unicast Ethernet frames received over this group. (R) (mandatory) (4 bytes)

Tx unicast frames: Number of unicast Ethernet frames transmitted over this group. (R) (mandatory) (4 bytes)

Rx unicast bytes: Number of bytes contained in the unicast Ethernet frames received over this group. (R) (mandatory) (8 bytes)

Tx unicast bytes: Number of bytes contained in the unicast Ethernet frames transmitted over this group. (R) (mandatory) (8 bytes)

Rx broadcast frames: Number of broadcast Ethernet frames received over this group. (R) (mandatory) (4 bytes)

Tx broadcast frames: Number of broadcast Ethernet frames transmitted over this group. (R) (mandatory) (4 bytes)

Rx broadcast bytes: Number of bytes contained in the broadcast Ethernet frames received over this group. (R) (mandatory) (8 bytes)

Tx broadcast bytes: Number of bytes contained in the broadcast Ethernet frames transmitted over this group. (R) (mandatory) (8 bytes)

Rx multicast frames: Number of multicast Ethernet frames received over this group. (R) (mandatory) (4 bytes)

Tx multicast frames: Number of multicast Ethernet frames transmitted over this group. (R) (mandatory) (4 bytes)

Rx multicast bytes: Number of bytes contained in the multicast Ethernet frames received over this group. (R) (mandatory) (8 bytes)

Tx multicast bytes: Number of bytes contained in the multicast Ethernet frames transmitted over this group. (R) (mandatory) (8 bytes)

Actions

Create, delete, get, set

Get current data (optional)

Notifications

None.

2.39) Clause 9.7.45, EFM bonding link performance monitoring history data

Add clause 9.7.45 as follows:

This managed entity collects performance monitoring data as seen at the xTU-C. Instances of this managed entity are created and deleted by the OLT.

Relationships

An instance of this managed entity is associated with an xDSL UNI.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the EFM bonding link. (R, Set-by-create) (mandatory) (2 bytes)

Interval end time: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

Threshold data 1/2 ID: This attribute points to an instance of the threshold data 1 and 2 managed entities that contain PM threshold values. (R, W, Set-by-create) (mandatory) (2 bytes)

Rx errored fragments: Clause 45.2.3.29 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

Rx small fragments: Clause 45.2.3.30 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

Rx large fragments: Clause 45.2.3.31 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

Rx discarded fragments: Clause 45.2.3.32 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

Rx FCS errors: Clause 45.2.6.11 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

Rx coding errors: Clause 45.2.6.12 of [IEEE 802.3]. (R) (mandatory) (4 bytes)

Rx fragments: Number of fragments received over this link. (R) (mandatory) (4 bytes)

Tx fragments: Number of fragments transmitted over this link. (R) (mandatory) (4 bytes)

Actions

> Create, delete, get, set
>
> Get current data (optional)

Notifications

> **Threshold crossing alert**

Alarm number	Threshold crossing alert	Threshold value attribute # (Note)
0	Rx errored fragments	1
1	Rx small fragments	2
2	Rx large fragments	3
3	Rx discarded fragments	4
4	Rx FCS errors	5
5	Rx coding errors	6
6-207	Reserved	
NOTE – This number associates the TCA with the specified threshold value attribute of the threshold data 1/2 managed entities.		

2.40) Clause 9.7.46, EFM bonding port performance monitoring history data

Add clause 9.7.46 as follows:

This managed entity collects performance monitoring data as seen at the xTU-C. Instances of this managed entity are created and deleted by the OLT.

Relationships

> An instance of this managed entity is associated with an xDSL UNI.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. The two most significant bits of the first byte are the bearer channel ID. Excluding the first two bits of the first byte, the remaining part of the managed entity ID is identical to that of this ME's parent physical path termination point xDSL UNI part 1. (R, Set-by-create) (mandatory) (2 bytes)
>
> **Interval end time**: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)
>
> **Threshold data 1/2 ID**: This attribute points to an instance of the threshold data 1 and 2 managed entities that contain PM threshold values. (R, W, Set-by-create) (mandatory) (2 bytes)
>
> **Rx frames**: Number of Ethernet frames received over this port. (R) (mandatory) (4 bytes)
>
> **Tx frames**: Number of Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)
>
> **Rx bytes**: Number of bytes contained in the Ethernet frames received over this port. (R) (mandatory) (4 bytes)
>
> **Tx bytes**: Number of bytes contained in the Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)
>
> **Tx discarded frames**: Number of Ethernet frames discarded by the port transmit function. (R) (mandatory) (4 bytes)

Tx discarded bytes: Number of bytes contained in the Ethernet frames discarded by the port transmit function. (R) (mandatory) (4 bytes)

Actions

Create, delete, get, set

Get current data (optional)

Notifications

Threshold crossing alert

Alarm number	Threshold crossing alert	Threshold value attribute # (Note)
0	Bad fragments	1
1	Lost fragments	2
2	Lost starts	3
3	Lost ends	4
4-207	Reserved	
NOTE – This number associates the TCA with the specified threshold value attribute of the threshold data 1/2 managed entities.		

2.41) Clause 9.7.47, EFM bonding port performance monitoring history data part 2

Add clause 9.7.47 as follows:

This managed entity collects performance monitoring data as seen at the xTU-C. Instances of this managed entity are created and deleted by the OLT.

Relationships

An instance of this managed entity is associated with an xDSL UNI.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. The two most significant bits of the first byte are the bearer channel ID. Excluding the first two bits of the first byte, the remaining part of the managed entity ID is identical to that of this ME's parent physical path termination point xDSL UNI part 1. (R, Set-by-create) (mandatory) (2 bytes)

Interval end time: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

Threshold data 1/2 ID: This attribute points to an instance of the threshold data 1 and 2 managed entities that contain PM threshold values. (R, W, Set-by-create) (mandatory) (2 bytes)

Rx unicast frames: Number of unicast Ethernet frames received over this port. (R) (mandatory) (4 bytes)

Tx unicast frames: Number of unicast Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)

Rx unicast bytes: Number of bytes contained in the unicast Ethernet frames received over this port. (R) (mandatory) (4 bytes)

Tx unicast bytes: Number of bytes contained in the unicast Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)

Rx broadcast frames: Number of broadcast Ethernet frames received over this port. (R) (mandatory) (4 bytes)

Tx broadcast frames: Number of broadcast Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)

Rx broadcast bytes: Number of bytes contained in the broadcast Ethernet frames received over this port. (R) (mandatory) (4 bytes)

Tx broadcast bytes: Number of bytes contained in the broadcast Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)

Rx multicast frames: Number of multicast Ethernet frames received over this port. (R) (mandatory) (4 bytes)

Tx multicast frames: Number of multicast Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)

Rx multicast bytes: Number of bytes contained in the multicast Ethernet frames received over this port. (R) (mandatory) (4 bytes)

Tx multicast bytes: Number of bytes contained in the multicast Ethernet frames transmitted over this port. (R) (mandatory) (4 bytes)

Actions

Create, delete, get, set

Get current data (optional)

Notifications

None.

2.42)   Clause 9.9.2, SIP user data

Add the following attribute to clause 9.9.2:

Malicious communication identification feature: This attribute enables/disables the Malicious communication identification feature for the associated SIP user. The default value of this attribute is 0 (disable). (R,W) (optional) (1 byte)
0   disable
1   enable.

2.43)   Clause 9.9.8, VoIP application service profile

Add the following attribute to clause 9.9.8:

Dial tone feature delay/Warmline timer (new): This attribute defines the warmline timer/dial tone feature delay timer (seconds). The default value 0 specifies vendor-specific implementation. (R, W) (optional) (2 bytes)

2.44)   Clause 9.9.21, SIP agent config data 2

Add clause 9.9.21 as follows:

This managed entity supplements SIP agent config data ME. Instances of this managed entity are created and deleted by the OLT.

Relationships

An instance of this managed entity is associated with a SIP agent config data.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the corresponding SIP agent config data. Note that this entity is associated with the primary SIP agent config data (if SIP agent is involved in protection). (R, Set-by-create) (mandatory) (2 bytes)

> **In-Use-Options-Timer**: This attribute defines the frequency that a SIP options packet is sent to the SIP proxy in-use. When a SIP options packet is not responded to by the SIP proxy, it is marked as unavailable. Otherwise, it is marked as available. Units are seconds. The default value 0 specifies vendor-specific implementation. (R, W, Set-by-create) (mandatory) (2 byte)

> **Alternate-Options-Timer**: This attribute defines the frequency that a SIP options packet is sent to the standby SIP proxy. When a SIP options packet is not responded to by the standby SIP proxy, it is marked as unavailable. Otherwise, it is marked as available. Units are seconds. The default value 0 specifies vendor-specific implementation. (R, W, Set-by-create) (mandatory) (2 byte)

> **Revertive**: This Boolean attribute specifies whether the SIP user agent is involved in revertive (true) or non-revertive (false) switching. The default value is recommended to be false. (R, W, Set-by-create) (mandatory) (1 byte)

> **Current proxy server resolved address**: This attribute contains the resolved IP address of the in-use SIP proxy. If the value is 0.0.x.y, where x and y are not both 0, then x.y is to be interpreted as a pointer to a large string managed entity that represents an IPv6 address. Otherwise, the address is an IPv4 address (R) (optional) (4 bytes)

> **Current proxy server resolved name**: This attribute contains a pointer to the large string ME that contains the resolved name of the SIP proxy in-use. (R) (optional) (2 bytes)

> **Alternate proxy server resolved address**: This attribute contains the resolved IP address of the alternate SIP proxy. If the value is 0.0.x.y, where x and y are not both 0, then x.y is to be interpreted as a pointer to a large string managed entity that represents an IPv6 address. Otherwise, the address is an IPv4 address (R) (optional) (4 bytes)

> **Alternate proxy server resolved name**: This attribute contains a pointer to the large string ME that contains the resolved name of the alternate SIP proxy. (R) (optional) (2 bytes)

Actions

> Create, delete, get, set

> Get current data (optional)

Notifications

> None

2.45) Clause 9.12.17, Threshold data 64-Bit

Add clause 9.12.17 as follows:

An instance of this managed entity contains threshold values for counters in performance monitoring history data managed entities.

Instances of this managed entity are created and deleted by the OLT.

Relationships

> An instance of this managed entity may be related to multiple instances of performance monitoring history data type managed entities.

Attributes

> **Managed entity ID**: This attribute uniquely identifies each instance of this managed entity. (R, Set-by-create) (mandatory) (2 bytes)

The following attributes specify threshold values for thresholded counters in associated PM history data MEs. The definition of each PM history ME includes a table that links each thresholded counter to one of these threshold value attributes.

> **Threshold value 1**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 2**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 3**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 4**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 5**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 6**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 8**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 9**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 10**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 11**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 12**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 13**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 14**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> **Threshold value 15**: the value is a pointer to the octet string managed entity that contains the threshold values. (R, W, Set-by-create) (mandatory) (8 bytes)

> Actions

> Create, delete, get, set

Notifications

> None

2.46)   Clause 9.15, RS232/RS485 interface service

Add clause 9.15 as follows:

This clause defines managed entities associated with RS232/RS485 UNI, as shown in Figure 9.15-1.
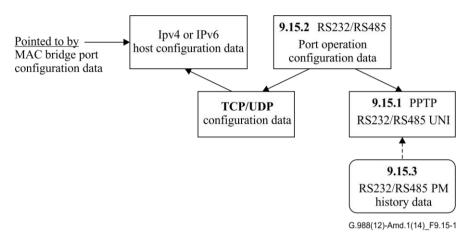

G.988(12)-Amd.1(14)_F9.15-1

Figure 9.15-1 – Managed entities associated with RS232/RS485 UNI

2.47)   Clause 9.15.1, Physical path termination point RS232/RS485 UNI

Add clause 9.15.1 as follows:

This managed entity represents an RS232/RS485 UNI in the ONU, where physical paths terminate and physical path level functions are performed.

The ONU automatically creates an instance of this managed entity per port:

•   When the ONU has RS232/RS485 ports built into its factory configuration.

•   When a cardholder is provisioned to expect a circuit pack of RS232/RS485 type.

•   When a cardholder provisioned for plug and play is equipped with a circuit pack of RS232/RS485 type. Note that the installation of a plug and play card may indicate the presence of RS232/RS485 ports via equipment ID as well as its type, and indeed may cause the ONU to instantiate a port mapping package that specifies RS232/RS485 ports.

The ONU automatically deletes instances of this managed entity when a cardholder is neither provisioned to expect a RS232/RS485 circuit pack, nor is equipped with a RS232/RS485 circuit pack.

Relationships

        An instance of this managed entity is associated with each real RS232/RS485 port.

Attributes

        Managed entity ID: This attribute uniquely identifies each instance of this managed entity. This two-byte number is directly associated with the physical position of the UNI. The first byte is the slot ID (defined in clause 9.1.5). The second byte is the port ID, with range 1..255. (R) (mandatory) (2 bytes)

        Administrative state: This attribute locks (1) and unlocks (0) the functions performed by this managed entity. Administrative state is further described in clause A.1.6. (R, W) (mandatory) (1 byte)

        Operational state: This attribute indicates whether or not the managed entity is capable of performing its function. Valid values are enabled (0) and disabled (1). (R) (optional) (1 byte)

Port mode: This attribute indicates the working mode of the RS232/RS485 controller chipset. Valid values are:

> 0 half-duplex
>
> 1 full duplex

(mandatory) (1 byte)

Baud_rate: This attribute specifies the working baud rate of RS232/RS485 port. Valid values are:

> 0 300 bit/s
>
> 1 600 bit/s
>
> 2 1200 bit/s
>
> 3 2400 bit/s
>
> 4 4800 bit/s
>
> 5 9600 bit/s
>
> 6 19200 bit/s
>
> 7 38400 bit/s
>
> 8 43000 bit/s
>
> 9 56000 bit/s
>
> 10 57600 bit/s
>
> 11 115200 bit/s

(R, W, Set-by-create) (mandatory) (1 byte)

Data_bits: This attribute specifies the bits of the data. Valid values are:

> 5 5 bits
>
> 6 6 bits
>
> 7 7 bits
>
> 8 8 bits

(R, W, Set-by-create) (mandatory) (1 byte)

Parity: This attribute specifies the parity of the data. Valid values are:

> 0 no parity
>
> 1 odd parity
>
> 2 even parity

(R, W, Set-by-create) (mandatory) (1 byte)

Stop_bits: This attribute specifies the number of stop bits of the data. Valid values are:

> 1 1 bit
>
> 2 2 bits

(R, W, Set-by-create) (mandatory) (1 byte)

Flow_control: This attribute specifies the flow control of the data. Valid values are:

> 0 no flow control

1 hardware flow control (RTS/CTS)

2 software flow control（Xon/Xoff）

(R, W, Set-by-create) (mandatory) (1 byte)

Min_send_payload: This attribute specifies the length of serial data acquisition by RS232/RS485 controller chipset in the fixed length mode. (R) (mandatory) (4 bytes)

Min_send_time: This attribute specifies the time of serial data acquisition by `RS232/RS485` controller chipset in the timing mode. (R) (mandatory) (4 bytes)

Reserve: This attribute is reserved for future use.

Actions

Get, set

2.48) Clause 9.15.2, RS232/RS485 port operation configuration data

Add clause 9.15.2 as follows:

This managed entity specifies the RS232/RS485 port operation mode. The ONU automatically creates instances of this managed entity if RS232/RS485 data acquisition services are available.

Relationships

An instance of this managed entity is associated with a TCP/UDP config data managed entity and a PPTP RS232/RS485 UNI.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. (R, Set-by-create) (mandatory) (2 bytes)

Socket mode: This attribute identifies the RS232/RS485 port operation mode.

0x00 TCP/server mode,

0x01 TCP/client mode,

0x02 UDP mode,

Other values are reserved.

(R) (mandatory) (1 byte)

TCP/UDP pointer: This pointer associates the RS232/RS485 port operation configuration with the TCP/UDP config data ME to be used for communication with the serial server. The default value is 0xFFFF, a null pointer. (R, W) (mandatory) (2 bytes)

PPTP pointer: This attribute points to the PPTP RS232/RS485 UNI managed entity that serves the serial data acquisition function. (R, W, Set-by-create) (mandatory) (2 bytes)

2.49) Clause 9.15.3, RS232/RS485 performance monitoring history data

Add clause 9.15.3 as follows:

This managed entity collects performance monitoring data for a RS232/RS485 interface. Instances of this managed entity are created and deleted by the OLT.

Relationships

An instance of this managed entity is associated with an instance of the PPTP RS232/RS485 UNI managed entity.

Attributes

Managed entity ID: This attribute uniquely identifies each instance of this managed entity. Through an identical ID, this managed entity is implicitly linked to an instance of the physical path termination point RS232/RS485 UNI. (R, Set-by-create) (mandatory) (2 bytes)

Interval end time: This attribute identifies the most recently finished 15-minute interval. (R) (mandatory) (1 byte)

Threshold data 1/2 id: This attribute points to an instance of the threshold data 1 and 2 managed entities that contains PM threshold values. (R, W, Set-by-create) (mandatory) (2 bytes)

Incoming bytes from PON port: (R) (optional) (4 bytes)

Outgoing bytes from PON port: (R) (optional) (4 bytes)

Incoming bytes from RS232/RS485 controller chipset: (R) (optional) (4 bytes)

Outgoing bytes from RS232/RS485 controller chipset: (R) (optional) (4 bytes)

Actions

Create, delete, get, set

Notifications

Threshold crossing alert

Number	Threshold crossing alert	Threshold value attribute # (Note)
1	Incoming packets	1
2	Incoming bits	2
3	Outgoing packets	3
4	Outgoing bits	4
NOTE – This number associates the TCA with the specified threshold value attribute of the threshold data 1/2 managed entities.		

2.50)   Clause 11.2.4, Managed entity identifier

1)   Remove the following row from table 11.2.4-1.

Table 11.2.4-1 – Managed entity identifiers

Managed entity class value	Managed entity
401-65279	Reserved for future standardization

2)   *Add the following new entries to table 11.2.4-1.*

Table 11.2.4-1 – Managed entity identifiers

Managed entity class value	Managed entity
401	Physical path termination point RS232/RS485 UNI
402	RS232/RS485 port operation configuration data
403	RS232/RS485 performance monitoring history data
404	L2 multicast GEM interworking termination point
405	ANI-E
406	EPON downstream performance monitoring configuration
407	SIP agent config data 2
408	xDSL xTU-C performance monitoring history data part 2
409	PTM performance monitoring history data xDSL
410	VDSL2 line configuration extensions 3
411	Vectoring line configuration extensions
412	xDSL channel configuration profile part 2
413	xTU data gathering configuration
414	xDSL line inventory and status data part 8
415	VDSL2 line inventory and status data part 4
416	Vectoring line inventory and status data
417	Data gathering line test, diagnostic and status
418	EFM bonding group
419	EFM bonding link
420	EFM bonding group performance monitoring history data
421	EFM bonding group performance monitoring history data part 2
422	EFM bonding link performance monitoring history data
423	EFM bonding port performance monitoring history data
424	EFM bonding port performance monitoring history data part 2
425	Ethernet frame extended PM 64-Bit
426	Threshold data 64-Bit
427-65279	Reserved for future standardization
65280-65535	Reserved for vendor specific use

2.51) Bibliography

Delete the entry for IEEE P1904.1 from the Bibliography as it was moved to clause 2.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	**Transmission systems and media, digital systems and networks**
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Terminals and subjective and objective assessment methods
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks
Series Z	Languages and general software aspects for telecommunication systems