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**G.984.4**  
**Amendment 1**  
(06/2005)

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

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

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Gigabit-capable Passive Optical Networks  
(G-PON): ONT management and control interface  
specification

**Amendment 1**

ITU-T Recommendation G.984.4 (2004) – Amendment 1



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# **ITU-T Recommendation G.984.4**

## **Gigabit-capable Passive Optical Networks (G-PON): ONT management and control interface specification**

### **Amendment 1**

#### **Summary**

This amendment proposes modifications to ITU-T Rec. G.984.4, including a Managed Entity relation diagrams for ONT, user traffic, MAC Bridged LAN, structured CES, 1+1 protection, 1:1 protection and clarifications to Managed Entity identification attributes. Moreover, it proposes some new features such as 802.1p priority mapper, GEM traffic descriptor, and support of multicast connection.

#### **Source**

Amendment 1 to ITU-T Recommendation G.984.4 (2004) was approved on 29 June 2005 by ITU-T Study Group 15 (2005-2008) under the ITU-T Recommendation A.8 procedure.

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# ITU-T Recommendation G.984.4

## Gigabit-capable Passive Optical Networks (G-PON): ONT management and control interface specification

### Amendment 1

#### 1) Scope

This amendment provides the following modifications and new features to ITU-T Rec. G.984.4.

- Modification of Managed Entity relation diagrams for better readability;
- Clarification of Managed Entity identification attributes;
- Addition of 802.1p Priority Mapper;
- Addition of Traffic Descriptor for GEM;
- Addition of the Multicast GEM Interworking Termination Point.

#### 2) References

This amendment refers to the following Recommendations.

- [1] ITU-T Recommendation G.984.3 (2004), *Gigabit-capable Passive Optical Networks (G-PON): Transmission convergence layer specification*, plus Amendment 1 (2005).
- [2] ITU-T Recommendation G.983.2 (2005), *ONT management and control interface specification for B-PON*.

#### 3) Abbreviations

Add the following abbreviations alphabetically:

PIR Peak Information Rate

SIR Sustained Information Rate

#### 4) Modification to ITU-T Rec. G.984.4 existing features

##### 4.1) Managed entity list

Replace Table 1 with the following table:

**Table 1/G.984.4 – Managed entities in the OMCI**

Managed entity	Required/ Optional	Description	Recommendation
AAL 1 Profile <sub>B-PON</sub>	CR	Used when the ONT supports CES UNIs	G.983.2 (2005)
AAL 1 Protocol Monitoring History Data <sub>B-PON</sub>	O	Used when AAL 1 layer performance monitoring is supported	G.983.2 (2005)
AAL 2 Profile <sub>B-PON</sub>	CR	Used when the ONT supports AAL 2	G.983.2 (2005)
AAL 2 CPS Protocol Monitoring History Data <sub>B-PON</sub>	O	Used when AAL 2 layer performance monitoring is supported	G.983.2 (2005)
AAL 2 PVC Profile <sub>B-PON</sub>	CR	Used when the ONT supports AAL 2 PVC	G.983.2 (2005)

**Table 1/G.984.4 – Managed entities in the OMCI**

<b>Managed entity</b>	<b>Required/ Optional</b>	<b>Description</b>	<b>Recommendation</b>
AAL 2 SSCS Parameter Profile 1	CR	Used when the ONT supports AAL 2 SSCS	G.983.2 (2005)
AAL 2 SSCS Parameter Profile 2	CR	Used when the ONT supports AAL 2 SSCS	G.983.2 (2005)
AAL 2 SSCS Protocol Monitoring History Data <sub>B-PON</sub>	CR	Used when AAL 2 layer performance monitoring is supported	G.983.2 (2005)
AAL 5 Profile <sub>B-PON</sub>	CR	Used when the ONT supports LAN UNIs	G.983.2 (2005)
AAL 5 Protocol Monitoring History Data <sub>B-PON</sub>	O	Used when AAL 5 layer performance monitoring is supported	G.983.2 (2005)
ADSL ATU-C Channel Performance Monitoring History Data	O	Performance monitoring data for an ADSL ATU-C channel	G.983.2 (2005)
ADSL ATU-C Performance Monitoring History Data	O	Performance monitoring data for an ADSL ATU-C modem path	G.983.2 (2005)
ADSL ATU-R Channel Performance Monitoring History Data	O	Performance monitoring data for an ADSL ATU-R channel	G.983.2 (2005)
ADSL ATU-R Performance Monitoring History Data	O	Performance monitoring data for an ADSL ATU-R modem path	G.983.2 (2005)
ADSL Channel Configuration Profile	CR	Contains configuration for a channel	G.983.2 (2005)
ADSL Channel Downstream Status	CR	Contains status on the downstream channel	G.983.2 (2005)
ADSL Channel Upstream Status	CR	Contains status on the upstream channel	G.983.2 (2005)
ADSL Downstream PSD Mask Profile	CR	Contains masking information for the downstream PSD	G.983.2 (2005)
ADSL Downstream RFI Bands Profile	CR	Contains information on the downstream RFI Bands	G.983.2 (2005)
ADSL Line Configuration Profile Part 1	CR	Contains the line parameters for an ADSL line	G.983.2 (2005)
ADSL Line Configuration Profile Part 2	CR	Contains the line parameters for an ADSL line	G.983.2 (2005)
ADSL Line Configuration Profile Part 3	CR	Contains the line parameters for an ADSL line	G.983.2 (2005)
ADSL Line Inventory and Status Data Part 1	CR	Contains the inventory and status information on the ADSL Line	G.983.2 (2005)
ADSL Line Inventory and Status Data Part 2	CR	Contains the inventory and status information on the ADSL Line	G.983.2 (2005)
ADSL Subcarrier Masking Downstream Profile	CR	Contains masking information for the downstream subcarriers	G.983.2 (2005)
ADSL Subcarrier Masking Upstream Profile	CR	Contains masking information for the upstream subcarriers	G.983.2 (2005)

**Table 1/G.984.4 – Managed entities in the OMCI**

<b>Managed entity</b>	<b>Required/ Optional</b>	<b>Description</b>	<b>Recommendation</b>
ANI-G	R	Used for ANI management	G.984.4
ARP Configuration Data	CR	Used for IP port supported by the ONT	G.983.2 (2005)
ARP Service Profile	CR	Used for IP port supported by the ONT	G.983.2 (2005)
ATM Interworking VCC Termination Point	CR	Used for non-ATM UNIs and for ATM-based connections	G.984.4
ATM VC Cross-Connection	O	Used for VC multiplexing with VCI translation in the ONU	G.983.2 (2005)
ATM VP Cross-Connection	CR	Used for VP multiplexing in the ONT	G.983.2 (2005)
CES Service Profile <sub>B-PON</sub>	CR	Used for CES services supported by the ONT	G.983.2 (2005)
CES Physical Interface Monitoring History Data	O	Used for the CES interface performance monitoring	G.983.2 (2005)
Ethernet Performance Monitoring History Data	O	Used for Ethernet interface performance monitoring	G.983.2 (2005)
Ethernet Performance Monitoring History Data2	O	Used for Ethernet performance monitoring	G.983.2 (2005)
GAL TDM Profile	O	Used when the ONT supports GAL TDM	G.984.4
GAL Ethernet Profile	O	Used when the ONT supports GAL Ethernet	G.984.4
GAL TDM Protocol Monitoring History Data	O	Used when GAL TDM layer performance monitoring is supported	G.984.4
GAL Ethernet Protocol Monitoring History Data	O	Used when GAL Ethernet layer performance monitoring is supported	G.984.4
GEM Interworking Termination Point	CR	Used for non-ATM UNIs and GEM-based connections	G.984.4
GEM Port Network CTP	CR	Used for GEM port termination	G.984.4
GEM port Protocol Monitoring History Data	O	Used for GEM port performance monitoring	G.984.4
GEM Traffic Descriptor	CR	Used for GEM-based connections	G.984.4 Amd1
ICMP PM History Data1	O	Used for ICMP performance monitoring	G.983.2 (2005)
ICMP PM History Data2	O	Used for ICMP performance monitoring	G.983.2 (2005)
IP Port Configuration Data	CR	Used for IP port supported by the ONT	G.983.2 (2005)
IP Router Service Profile	CR	Used for IP router supported by the ONT	G.983.2 (2005)
IP Router Configuration Data	CR	Used for IP router supported by the ONT	G.983.2 (2005)
IP Router PM History Data1	O	Used for IP router performance monitoring	G.983.2 (2005)
IP Router PM History Data2	O	Used for IP router performance monitoring	G.983.2 (2005)
IP Route Table	CR	Used for IP router supported by the ONT	G.983.2 (2005)
IP Static Routes	CR	Used for IP router supported by the ONT	G.983.2 (2005)
LES Service Profile	CR	Used for LES services supported by the ONT	G.983.2 (2005)

**Table 1/G.984.4 – Managed entities in the OMCI**

<b>Managed entity</b>	<b>Required/ Optional</b>	<b>Description</b>	<b>Recommendation</b>
Logical N × 64 kbit/s Sub-port Connection Termination Point	CR	Used as logical interface for structured CES	G.983.2 (2005)
MAC Bridge Configuration Data	CR	Used for MAC bridge supported by the ONT	G.983.2 (2005)
MAC Bridge PM History Data	O	Used for MAC bridge performance monitoring	G.983.2 (2005)
MAC Bridge Port Configuration Data	CR	Used for MAC bridge supported by the ONT	G.983.2 (2005)
MAC Bridge Port Designation Data	CR	Used for MAC bridge supported by the ONT	G.983.2 (2005)
MAC Bridge Port Filter Table Data	CR	Used for MAC bridge supported by the ONT	G.983.2 (2005)
MAC Bridge Port Filter Preassign Table	O	Used for Ethernet type filtering	G.983.2 (2005)
MAC Bridge Port Bridge Table Data	CR	Used for MAC bridge supported by the ONT	G.983.2 (2005)
MAC Bridge Port PM History Data	O	Used for MAC bridge port performance monitoring	G.983.2 (2005)
MAC Bridge Service Profile	CR	Used for MAC bridge supported by the ONT	G.983.2 (2005)
Multicast Interworking VCC Termination Point	CR	Used to manage multicasting support for ATM connection	G.983.2 (2005)
Multicast GEM Interworking Termination Point	CR	Used to manage multicasting support for GEM connection	G.984.4 Amd1
OLT <sub>B-PON</sub>	O	Used for OLT identification for interoperability facilitation	G.983.2 (2005)
ONT-G	R	Used for ONT equipment management	G.984.4
ONT2-G	R	Used for ONT equipment management	G.984.4
ONU-G	R	Used for ONU equipment management	G.984.4
ONU2-G	R	Used for ONU equipment management	G.984.4
ONT Data	R	Used for OMCI MIB management	G.983.2 (2005)
Physical Path Termination Point ADSL UNI Part 1	CR	Used for the physical path termination point at an ADSL CO modem	G.983.2 (2005)
Physical Path Termination Point ADSL UNI Part 2	CR	Used for the physical path termination point at an ADSL CO modem	G.983.2 (2005)
Physical Path Termination Point ATM UNI	CR	Used for physical path termination point at the ATM UNI	G.983.2 (2005)
Physical Path Termination Point CES UNI	CR	Used for physical path termination point at the CES UNI	G.983.2 (2005)
Physical Path Termination Point Ethernet UNI	CR	Used for physical path termination point at the Ethernet UNI	G.983.2 (2005)

**Table 1/G.984.4 – Managed entities in the OMCI**

<b>Managed entity</b>	<b>Required/ Optional</b>	<b>Description</b>	<b>Recommendation</b>
Physical Path Termination Point POTS UNI	CR	Used for physical path trail termination point at the POTS UNI	G.983.2 (2005)
Physical Path Termination Point ISDN UNI	O	Used for ISDN port supported by the ONT	G.983.2 (2005)
Physical Path Termination Point Video UNI	O	Used for video port	G.983.2 (2005)
Physical Path Termination Point Video ANI	O	Used for video input port	G.983.2 (2005)
Physical Path Termination Point VDSL UNI	CR	Used for the physical path termination point at a VDSL connection	G.983.2 (2005)
Physical Path Termination Point LCT UNI	O	Used for local craft terminal port	G.983.2 (2005)
Physical Path Termination Point 802.11 UNI	CR	Used for 802.11 interface supported by the ONT	G.983.2 (2005)
PON IF Line Card-G	R	Used for the PON line card	G.984.4
PON IF Line Cardholder	R	Used for the PON line cardholder	G.984.4
PON Physical Path Termination Point	R	Used for physical path at the ANI, descriptive purpose only, see 7.2/G.983.2 (ANI Management)	G.983.2 (2005)
PON TC Adapter-G	R	Used for TC layer at PON interface	G.984.4
Priority Queue-G	CR	Used for ONTs that support priority queues to multiplex ATM or GEM traffic flows	G.984.4
Protection Data	CR	Used for PON protection	G.984.4
Software Image	R	Used for the software image of the ONT. Software image for the subscriber line cards is optional	G.983.2 (2005)
Subscriber Line Card	R	Used for the UNI line card plug-in	G.983.2 (2005)
Subscriber Line Cardholder	R	Used for the UNI line card plug-in slot	G.983.2 (2005), G.984.4
TC Adapter <sub>TB-PON</sub>	CR	Used for TC layer at the UNI side for the ATM UNI	G.983.2 (2005)
TC Adaptor Performance Monitoring History Data ADSL	O	Performance monitoring data for the ADSL ATM data path	G.983.2 (2005)
TC Adapter Protocol Monitoring History Data	O	Used when TC layer performance monitoring is supported	G.983.2 (2005)
T-CONT	R	Used for DBA	G.984.4
Threshold Data1	CR	Used for the set-up of threshold values	G.984.4
Threshold Data2	CR	Used for the set-up of threshold values	G.984.4

**Table 1/G.984.4 – Managed entities in the OMCI**

<b>Managed entity</b>	<b>Required/ Optional</b>	<b>Description</b>	<b>Recommendation</b>
Traffic Descriptors	CR	Used for the ONT that supports traffic shaper to specify ATM layer traffic characteristics in the case of accommodation of non-ATM UNI. Moreover, in the case of accommodation of ATM UNI, Traffic Descriptors may be used for the UPC function in the ONT, if it is required.	G.983.2 (2005)
Traffic Scheduler-G	CR	Used for DBA	G.984.4
UNI <sub>B-PON</sub>	CR	Used for user network interface for ATM service	G.983.2 (2005)
UNI-G	CR	Used for user network interface for GEM service	G.984.4
UPC Disagreement Monitoring History Data <sub>B-PON</sub>	CR	Used for the ONT that supports UPC	G.983.2 (2005)
VC Network CTP-G	CR	Used for VC link termination in the VC MUX	G.984.4
VC PM History Data	O	Used for VC performance monitoring	G.983.2 (2005)
VDSL Band Plan Configuration Profile	CR	Parameters used to configure a VDSL band plan configuration profile.	G.983.2 (2005)
VDSL Channel Configuration Profile	CR	Parameters used to configure a VDSL channel configuration profile	G.983.2 (2005)
VDSL Channel Data	CR	Contains the channel parameters for VDSL fast and slow channels	G.983.2 (2005)
VDSL Line Configuration Profile	CR	Parameters used to configure a VDSL line configuration profile	G.983.2 (2005)
VDSL VTU-O Channel Performance Monitoring History Data	O	Performance monitoring data for a VDSL VTU-O channel	G.983.2 (2005)
VDSL VTU-O Physical Data	CR	Contains the physical layer parameters for a VTU-O	G.983.2 (2005)
VDSL VTU-O Physical Interface Monitoring History Data	O	Monitoring data for a VDSL VTU-O physical interface	G.983.2 (2005)
VDSL VTU-R Channel Performance Monitoring History Data	O	Performance monitoring data for an VDSL VTU-R channel	G.983.2 (2005)
VDSL VTU-R Physical Data	CR	Contains the physical layer parameters for a VTU-R	G.983.2 (2005)
VDSL VTU-R Physical Interface Monitoring History Data	O	Monitoring Data for a VDSL VTU-R physical interface	G.983.2 (2005)
Video Return Path Service Profile	CR	Used for video return path service supported by the ONT	G.983.2 (2005)

**Table 1/G.984.4 – Managed entities in the OMCI**

<b>Managed entity</b>	<b>Required/ Optional</b>	<b>Description</b>	<b>Recommendation</b>
Video Return Path Statistics	O	Used for video return path service supported by the ONT	G.983.2 (2005)
VLAN Tagging Filter Data	O	Used for VLAN tagging	G.983.2 (2005)
VLAN Tagging Operation Configuration Data	O	Used for VLAN tagging	G.983.2 (2005)
Voice PM History Data	O	Used for voice performance monitoring	G.983.2 (2005)
Voice Service Profile AAL	CR	Used for voice over AAL 1/2 supported by the ONT	G.983.2 (2005)
Voice CTP	CR	Used for voice termination point supported by the ONT	G.983.2 (2005)
VP Network CTP-G	CR	Used for VP link termination in the VP mux	G.984.4
VP PM History Data	O	Used for VP performance monitoring	G.983.2 (2005)
802.1p Mapper Service Profile	CR	Used for 802.1p priority Ethernet UNI	G.983.2 (2005)
802.11 Station Management Data1	CR	Used for 802.11 interface supported by the ONT	G.983.2 (2005)
802.11 Station Management Data2	CR	Used for 802.11 interface supported by the ONT	G.983.2 (2005)
802.11 General Purpose Object	CR	Used for 802.11 interface supported by the ONT	G.983.2 (2005)
802.11 MAC&PHY Operation and Antenna Data	CR	Used for 802.11 interface supported by the ONT	G.983.2 (2005)
802.11 PHY FHSS DSSS IR Tables	CR	Used for 802.11 interface supported by the ONT	G.983.2 (2005)
802.11 Counters	O	Used for 802.11 interface supported by the ONT	G.983.2 (2005)

4.2) ME relation diagrams

i) Replace Figure 5 as follows:

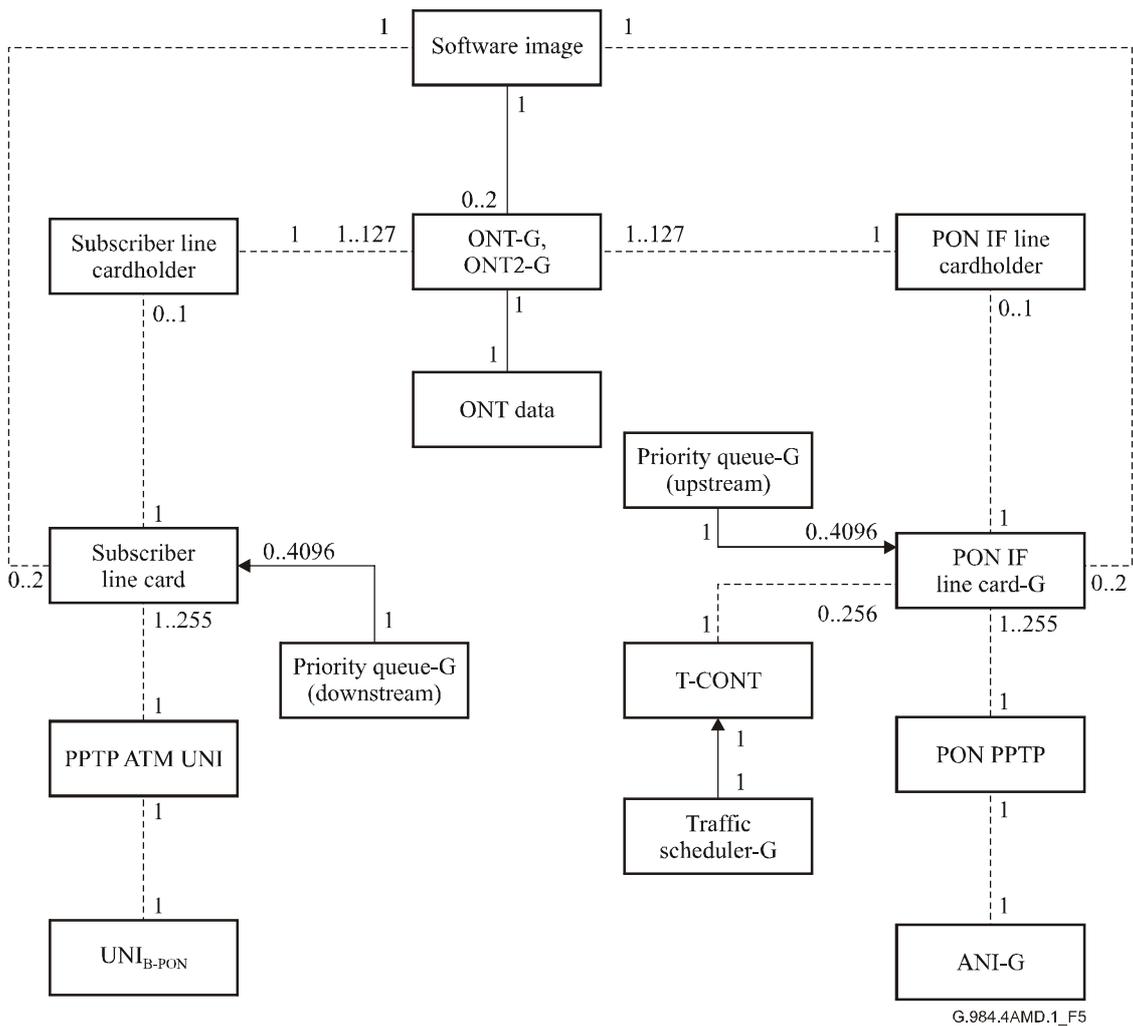
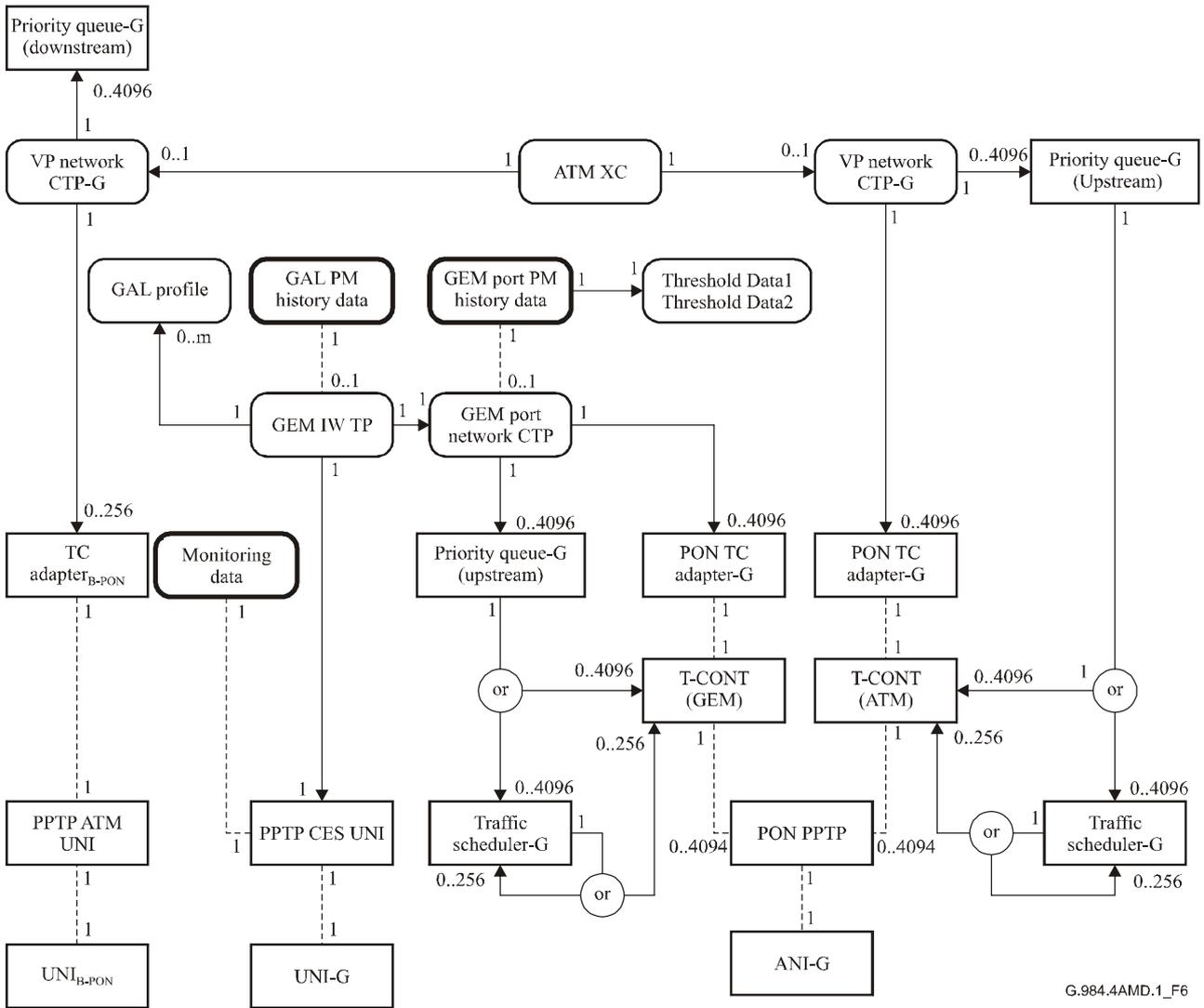


Figure 5/G.984.4 – ME relation diagram for ONT

ii) Replace Figure 6 as follows:



G.984.4AMD.1\_F6

Figure 6/G.984.4 – ME relation diagram for user traffic

iii) Replace Figure 7 with new Figures 7a and 7b as follows:

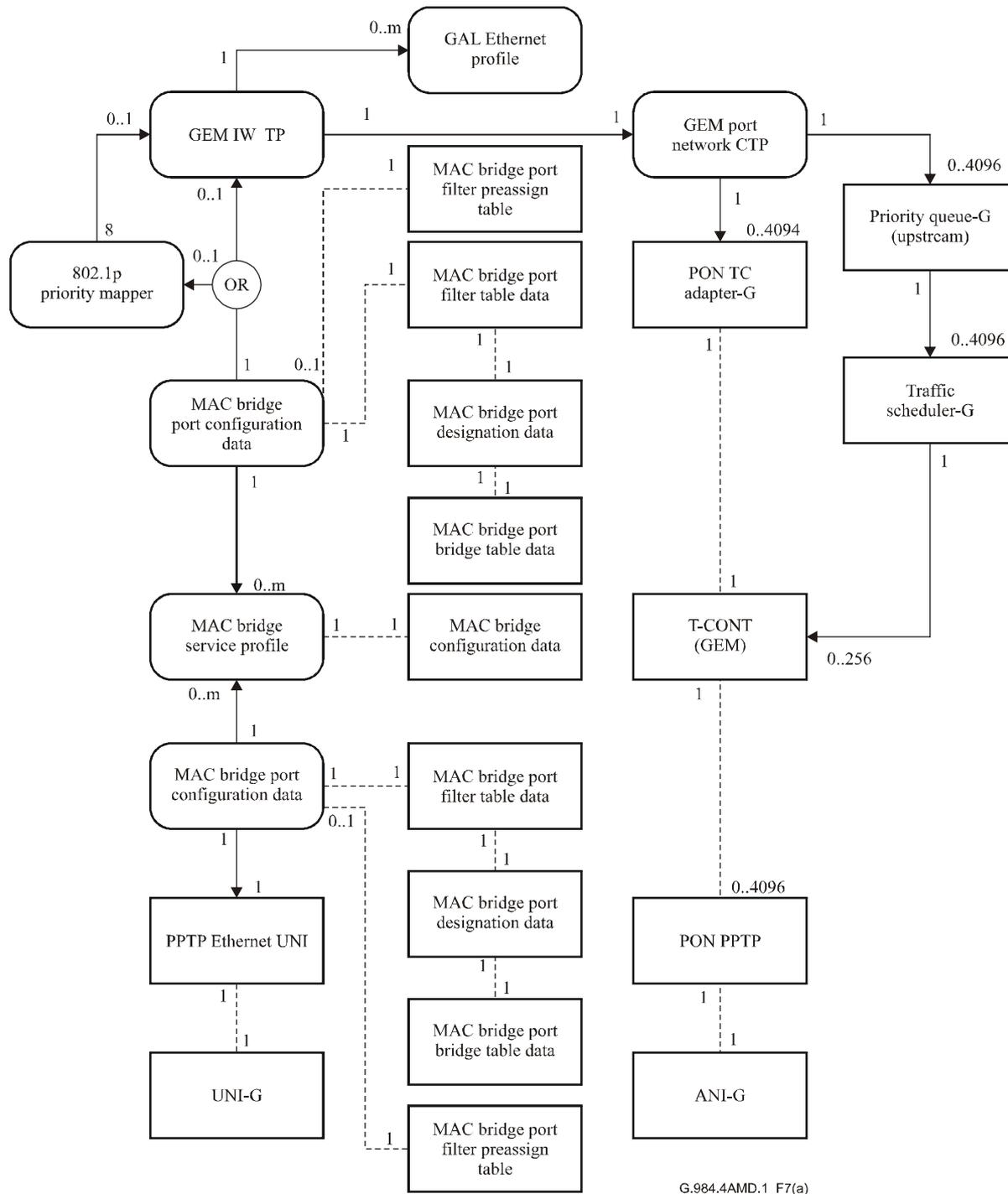
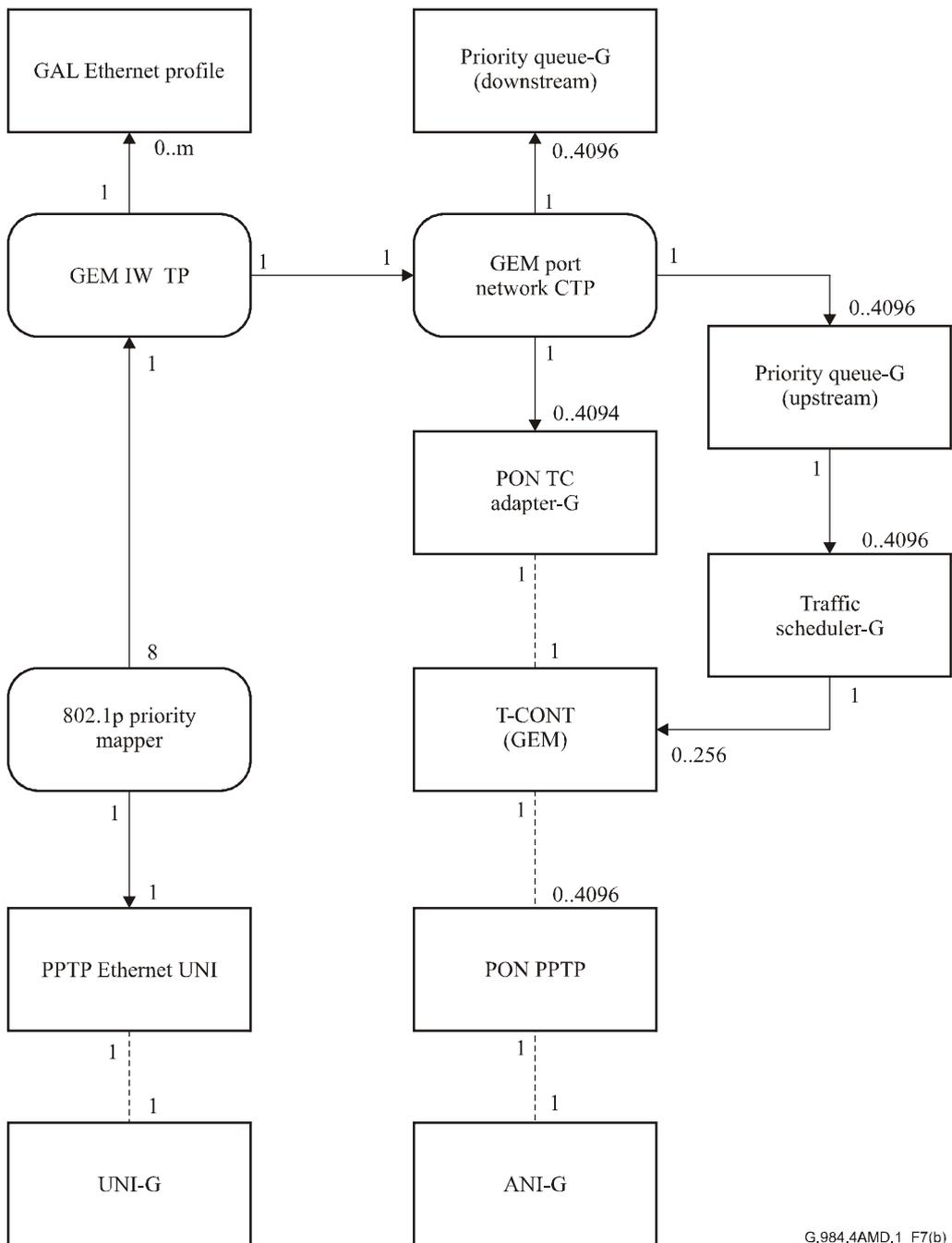


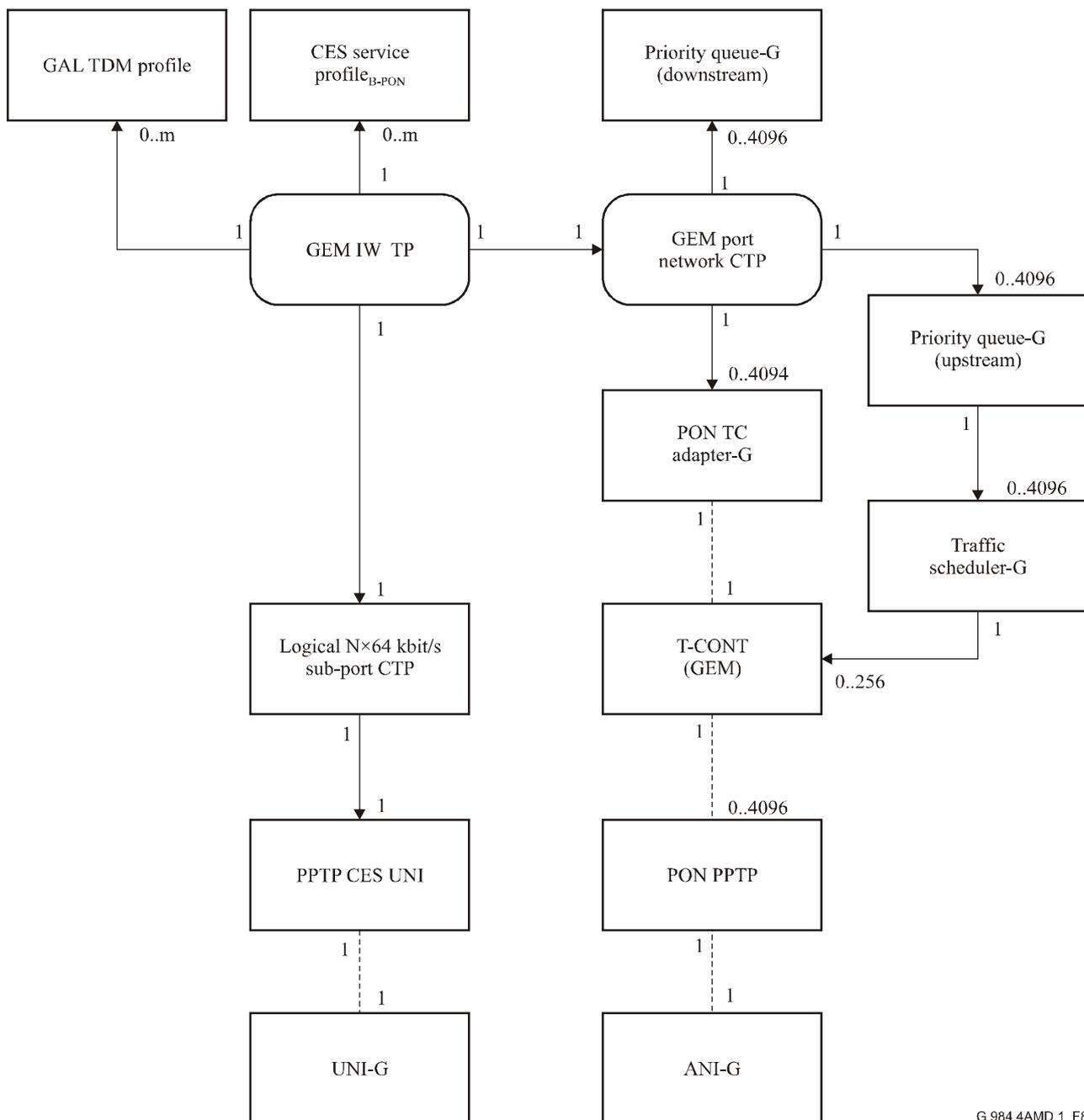
Figure 7a/G.984.4 – ME relation diagram for MAC bridged LAN



G.984.4AMD.1\_F7(b)

**Figure 7b/G.984.4 – ME relation diagram for 802.1p Ethernet UNI**

iv) Replace Figure 8 as follows:



G.984.4AMD.1\_F8

**Figure 8/G.984.4 – ME relation diagram for structured CES**

v) In clause 8.2, replace the following (5th) paragraph:

Figure 9 shows a part of ME relation diagram in that an ONT supports 1+1 protection function. In this figure, the dashed line means that the PON TC Adapter-G ME is implicitly associated with T-CONT ME in protection side. One instance of PON TC Adapter-G ME is associated with two instances of T-CONT ME by Protection Data ME.

with:

Figure 9 shows a part of the ME relation diagram in that an ONT supports the 1+1 protection function. In this figure, the PON TC Adapter-G ME is implicitly associated with T-CONT ME in

the protection side. One instance of PON TC Adapter-G ME is associated with two instances of T-CONT ME by an instance of Protection Data ME.

vi) Replace Figure 9 as follows:

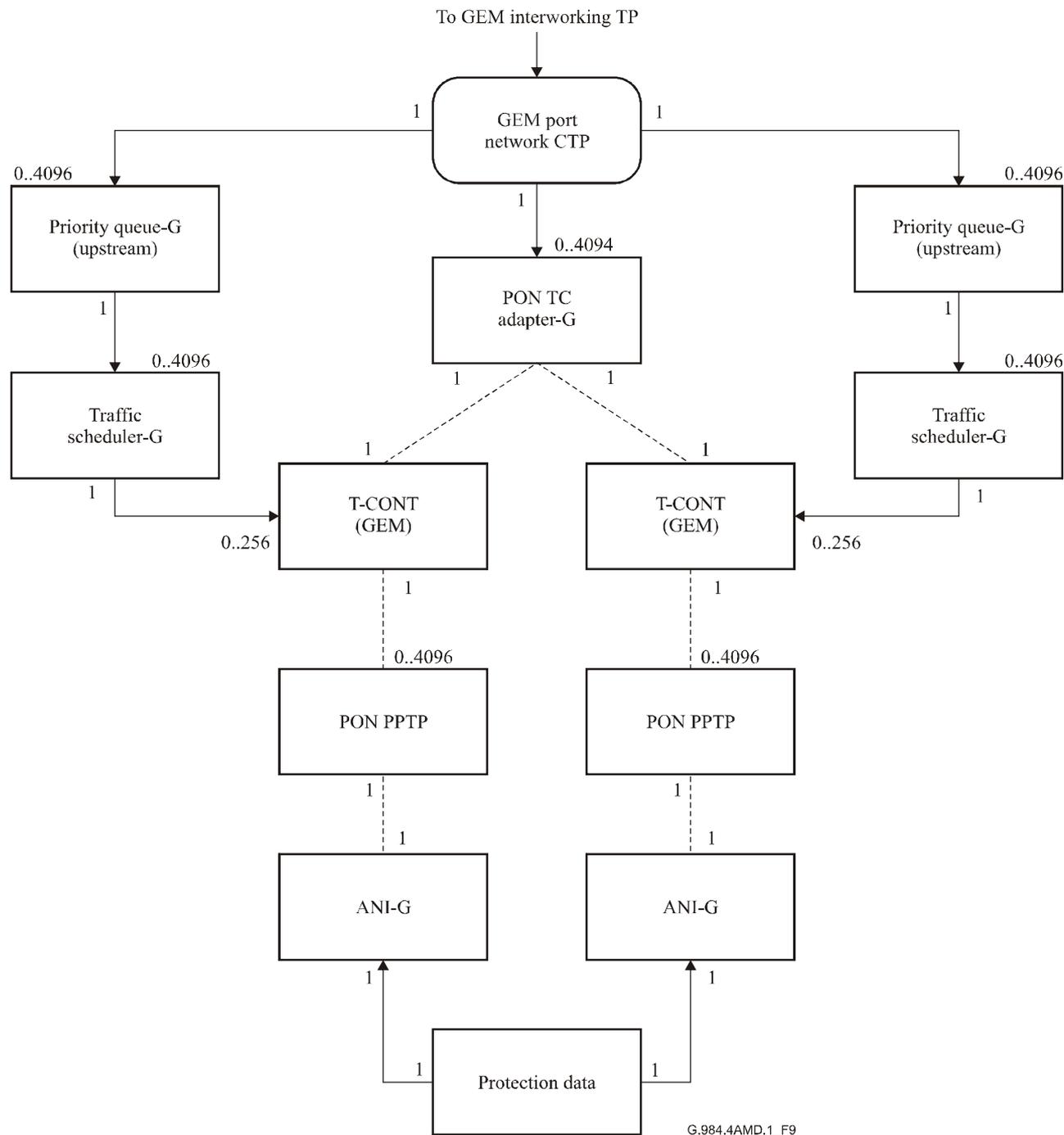


Figure 9/G.984.4 – Part of ME relation diagram for 1+1 protection

vii) In clause 8.2, replace the following (6th) paragraph:

Figure 10 shows a part of ME relation diagram in that an ONT supports 1:1 protection function. In this figure, the dashed line means that the PON TC Adapter-G ME is implicitly associated with T-CONT ME in protection side by Protection Data ME. The PON TC Adapter-G ME for normal traffic is explicitly associated with T-CONT ME in working side. The PON TC Adapter-G ME for

extra traffic is explicitly associated with T-CONT ME in protection side. Moreover, the PON TC Adapter-G ME for normal traffic is implicitly associated with T-CONT ME in protection side.

*with:*

Figure 10 shows a part of the ME relation diagram in that an ONT supports 1:1 protection function. In this figure, the PON TC Adapter-G ME for normal traffic is implicitly associated with T-CONT ME in the protection side by Protection Data ME. The PON TC Adapter-G ME for normal traffic is explicitly associated with T-CONT ME in the working side. The PON TC Adapter-G ME for extra traffic is explicitly associated with T-CONT ME in the protection side. Moreover, the PON TC Adapter-G ME for normal traffic is implicitly associated with T-CONT ME in the protection side.

viii) Replace Figure 10 as follows:

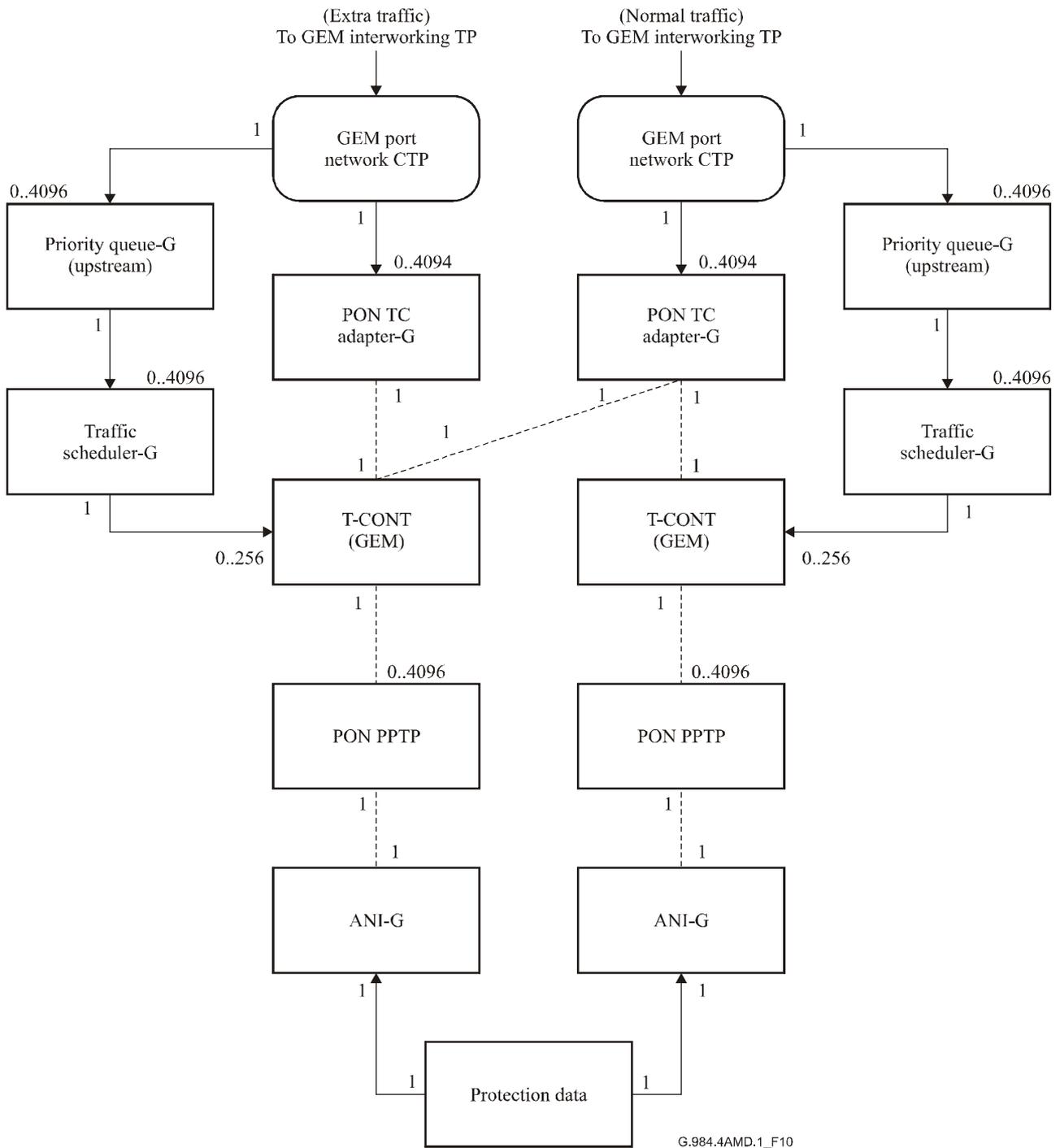


Figure 10/G.984.4 – Part of ME relation diagram for 1:1 protection

**4.3) New text into VP/VC Cross-connection Function Option attribute in ONT-G ME**

In clause 9.1.1, replace the description of the VP/VC Cross-connection Function Option attribute:

This attribute identifies the support of ATM VP or VC cross-connection management functions for the interworking connections to non-ATM UNIs. The value is set to 0x00 if no cross-connection management functions are modelled. The value is set to 0x01 if ATM VP cross-connection management functions are modelled. The value is set to 0x02 if ATM VP and VC cross-connection

management functions are modelled. The default value of this attribute is 0x01. (R) (mandatory for ONTs that support ATM mode) (1 byte).

*with:*

This attribute identifies the support of ATM VP or VC cross-connection management functions for the interworking connections to non-ATM UNIs. The value is according to Table 0/G.983.2 in ATM mode. However, there is no code point in GEM mode because GEM does not need a cross-connection function. The value is 0x00 in GEM mode and this means null code. The default value of this attribute is 0x01 in ATM mode. (R) (mandatory for ONTs that support ATM mode) (1 byte).

#### **4.4) BER threshold attributes in ANI-G**

*In clause 9.2.1, add two new attributes of the BER threshold after the **Whole ONU DBA Reporting** attribute as follows:*

**SF threshold:** This attribute represents the upstream/downstream BER threshold to detect SFi/SF alarm. When this value is y in decimal, the BER threshold for SFi/SF is  $10^{(-y)}$ . The valid values are from 0x3 to 0x8 inclusive. Upon autonomous instantiation, this attribute consists of 0x5. (R, W) (mandatory) (1 byte).

**SD threshold:** This attribute represents the upstream/downstream BER threshold to detect SDi/SD alarm. When this value is x in decimal, the BER threshold for SDi/SD is  $10^{(-x)}$ . The valid values are from 0x4 to 0x10 inclusive. Please note that the SD threshold shall be smaller than the SF threshold. This means that the value of x shall be larger than the value of y. Upon autonomous instantiation, this attribute consists of 0x9. (R, W) (mandatory) (1 byte).

#### **4.5) Managed Entity id attribute in ATM Interworking VCC Termination Point**

*In clause 9.3.2, replace the description of the **Managed Entity id** attribute:*

This attribute provides a unique number for each instance of this managed entity. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

This attribute provides a number for each instance of this managed entity that is unique over all ATM Interworking VCC Termination Point and GEM Interworking Termination Point MEs. (R, Set-by-create) (mandatory) (2 bytes).

#### **4.6) Interworking Termination Point Pointer attribute in ATM Interworking VCC Termination Point**

*In clause 9.3.2, replace the description of the **Interworking Termination Point Pointer** attribute:*

This attribute provides a pointer to the associated instance(s) of the following managed entities (depending on the service provided):

- Physical Path Termination Point Ethernet UNI.
- Physical Path Termination Point POTS UNI.
- Physical Path Termination Point CES UNI.
- Logical  $N \times 64$  kbit/s sub-port Connection Termination Point.
- Physical Path Termination Point ISDN UNI.
- Physical Path Termination Point 802.11 UNI.

NOTE – For the case utilizing the multiplexing function of AAL 2, this attribute is assigned a special value:

- 0x00XX will be used for pseudo slotIDs;
- 0xXX00 will be used for pseudo portIDs.

Therefore, 0x0000 will be used only if the integrated interfaces (integrated type of ONT) support AAL 2 multiple functions. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

This attribute is used in the case of Circuit Emulation Services and 802.1p mapper service (without MAC Bridge). It provides a pointer to the associated instance(s) of the following managed entities (depending on the service provided):

- Physical Path Termination Point CES UNI;
- Logical  $N \times 64$  kbit/s sub-port Connection Termination Point;
- Physical Path Termination Point Ethernet UNI.

In all other non-ATM services, the relationship between the Interworking Termination Point and the IW VCC Termination point is derived from other managed entity relations, and this attribute is set to 0x0000, and not used. (R, Set-by-create) (mandatory) (2 bytes).

#### **4.7) Managed Entity id attribute in GEM Port Network CTP**

*In clause 9.4.1, replace the description of the **Managed Entity id** attribute:*

This attribute provides a unique number for each instance of this managed entity. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

This attribute provides a number for each instance of this managed entity that is unique over all GEM Port Network CTP and VP/VC Network CTP-G MEs. (R, Set-by-create) (mandatory) (2 bytes).

#### **4.8) Priority Queue Pointer for Upstream attribute in GEM Port Network CTP**

*In clause 9.4.1, replace the **Priority Queue Pointer for Upstream** attribute:*

**Priority Queue Pointer for Upstream:** This attribute points to the instance of the Priority Queue-G ME used for this GEM Port Network CTP ME in the upstream direction. It is used when the **Traffic Management Option** attribute in ONT-G ME is 0x00; this pointer is null otherwise. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

**Traffic Management Pointer for Upstream:** This attribute points to the instance of the Priority Queue-G or T-CONT ME used for this GEM Port Network CTP ME in the upstream direction. If the Traffic Management Option attribute in ONT-G ME is 0x00, this pointer indicates the Priority Queue-G ME serving this GEM Port Network CTP. If the Traffic Management Option attribute in ONT-G ME is 0x01, then this pointer indicates the T-CONT serving this GEM Port Network CTP. (R, Set-by-create) (mandatory) (2 bytes).

#### **4.9) Priority Queue Pointer for Downstream attribute in GEM Port Network CTP**

*In clause 9.4.1, add a new **Priority Queue Pointer for Downstream** attribute after the **UNI Counter** attribute, as follows:*

**Priority Queue Pointer for Downstream:** This attribute points to the instance of the Priority Queue-G used for this GEM Port Network CTP in the downstream direction. It is used when the **Traffic Management Option** attribute in ONT-G is 0x00; this pointer is null otherwise. (R, Set-by-create) (mandatory) (2 bytes).

#### 4.10) Managed Entity id attribute in VP Network CTP-G

*In clause 9.4.3, replace the description of the **Managed Entity id** attribute:*

This attribute provides a unique number for each instance of this managed entity. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

This attribute provides a number for each instance of this managed entity that is unique over all GEM Port Network CTP and VP/VC Network CTP-G MEs. (R, Set-by-create) (mandatory) (2 bytes).

#### 4.11) Priority Queue Pointer for Upstream attribute in VP Network CTP-G

*In clause 9.4.3, replace the **Priority Queue Pointer for Upstream** attribute:*

**Priority Queue Pointer for Upstream:** This attribute points to the instance of the Priority Queue-G ME used for this VP Network CTP-G ME in the upstream direction. It is used when the UNI/PON TC Adapter-G pointer attribute indicates a PON TC Adapter-G instance id and the **Traffic Management Option** attribute in ONT-G ME is 0x00; this pointer is null otherwise. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

**Traffic Management Pointer for Upstream:** This attribute points to the instance of the Priority Queue-G or T-CONT ME used for this VP Network CTP-G ME in the upstream direction. If the Traffic Management Option attribute in ONT-G ME is 0x00, this pointer indicates the Priority Queue-G ME serving this VP Network CTP-G. If the Traffic Management Option attribute in ONT-G ME is 0x01, then this pointer indicates the T-CONT serving this VP Network CTP-G ME. (R, Set-by-create) (mandatory) (2 bytes).

#### 4.12) Managed Entity id attribute in VC Network CTP-G

*In clause 9.4.4, replace the description of **Managed Entity id** attribute:*

This attribute provides a unique number for each instance of this managed entity. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

This attribute provides a number for each instance of this managed entity that is unique over all GEM Port Network CTP and VP/VC Network CTP-G MEs. (R, Set-by-create) (mandatory) (2-bytes).

#### 4.13) Priority Queue Pointer for Upstream attribute in VC Network CTP-G

*In clause 9.4.4, replace the **Priority Queue Pointer for Upstream** attribute:*

**Priority Queue Pointer for Upstream:** This attribute points to the instance of the Priority Queue-G ME used for this VC Network CTP-G ME in the upstream direction. It is used when the UNI/PON TC Adapter-G pointer attribute indicates a PON TC Adapter-G instance id and the **Traffic Management Option** attribute in ONT-G ME is 0x00; this pointer is null otherwise. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

**Traffic Management Pointer for Upstream:** This attribute points to the instance of the Priority Queue-G ME used for this VC Network CTP-G ME in the upstream direction. If the Traffic Management Option attribute in ONT-G ME is 0x00, this pointer indicates the Priority Queue-G ME serving this VC Network CTP-G. If the Traffic Management Option attribute in ONT-G ME is

0x01, then this pointer indicates the T-CONT serving this VC Network CTP-G. (R, Set-by-create) (mandatory) (2 bytes).

## 5) New ITU-T Rec. G.984.4 features

### 5.1) 802.1p Priority Mapper Service Profile

A new managed entity 802.1p Priority Mapper Service Profile ME is added to this Recommendation. Since the 802.1p Priority Mapper Service Profile ME that is specified in ITU-T Rec. G.983.2 (2005) is re-used in G.984.4, this new ME is only described in Table 1/G.984.4. GEM Interworking Termination Point ME and ATM Interworking VCC Termination Point ME are modified in line with this new ME. Modified GEM Interworking Termination point ME is described in clause 5.1.4. Modified ATM Interworking VCC Termination Point ME is described in this clause.

#### 5.1.1) Interworking Option attribute in ATM Interworking VCC Termination Point ME

*In clause 9.3.2, replace the description of the **Interworking Option** attribute:*

This attribute identifies the type of non-ATM function that is being interworked; the option can be CES (0x00), MAC Bridge LAN (0x01), or Voice (0x02) service. (R, Set-by-create) (mandatory) (1 byte).

*with:*

This attribute identifies the type of non-ATM function that is being interworked; the option can be CES (0x00), MAC Bridge LAN (0x01), Voice (0x02), IP Router (0x03), Video Return Path (0x04), or 802.1p mapper (0x05) services. (R, Set-by-create) (mandatory) (1 byte).

#### 5.1.2) Service Profile Pointer attribute in ATM Interworking VCC Termination Point ME

*In clause 9.3.2, replace the description of the **Service Profile Pointer** attribute:*

This attribute provides the service profile type and a pointer to the instance of a service profile, such as the CES Service Profile<sub>B-PON</sub> (if the interworking option = 0x00), MAC Bridge Service Profile (if the interworking option = 0x01), or Voice Service Profile AAL (if the interworking option = 0x02). (R, Set-by-create) (mandatory) (2 bytes).

*with:*

This attribute provides the service profile type and a pointer to the instance of a service profile, such as the CES Service Profile<sub>B-PON</sub> (if the interworking option = 0x00), MAC Bridge Service Profile (if the interworking option = 0x01), Voice Service Profile AAL (if the interworking option = 0x02), IP Router Service Profile (if the interworking option = 0x03), Video Return Path Service Profile (if the interworking option = 0x04), or 802.1p Mapper Service Profile (if interworking option = 0x05). (R, Set-by-create) (mandatory) (2 bytes).

#### 5.1.3) AAL Profile Pointer attribute in ATM Interworking VCC Termination Point ME

*In clause 9.3.2, replace the description of the **AAL Profile Pointer** attribute:*

This attribute provides the AAL profile type and a pointer to an instance of AAL Profile such as AAL 1 Profile<sub>B-PON</sub> if the interworking option = 0x00, AAL 1 Profile<sub>B-PON</sub> or AAL 2 Profile<sub>B-PON</sub> if the interworking option = 0x02, or AAL 5 Profile<sub>B-PON</sub> if the interworking option = 0x01. (R, Set-by-create) (mandatory) (2 bytes).

*with:*

This attribute provides the AAL profile type and a pointer to an instance of AAL Profile such as AAL 1 Profile<sub>B-PON</sub> if the interworking option = 0x00, AAL 1 Profile<sub>B-PON</sub> or AAL 2 Profile<sub>B-PON</sub> if

the interworking option = 0x02, or AAL 5 Profile<sub>B-PON</sub> if the interworking option = 0x01, 0x03, 0x05, or 0x04 mode 1. If the interworking option is 0x04 mode 2, then this pointer is not used. (R, Set-by-create) (mandatory) (2 bytes).

#### 5.1.4) GEM Interworking Termination Point ME

*Replace the whole of clause 9.3.3 with the following:*

#### 9.3.3 GEM Interworking Termination Point

An instance of this managed entity represents a point in the ONT where the interworking of a service (e.g., CES, IP) or underlying physical infrastructure (e.g., nxDS0/DS1/DS3/E3/Ethernet) to GEM layer takes place. At this point, GEM packets are generated from a bit stream (e.g., nxDS0/DS1/DS3/E3/Frame Relay/Ethernet) or a bit stream is reconstructed from GEM packets.

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

#### Establishment of a "CES interworking connection"

Since it is more complicated to introduce the "pointer list" as an attribute, the following mechanism will be used to create a CES interworking connection:

- for structured service: Create first a GEM Port Network CTP instance *and* a Logical  $N \times 64$  kbit/s Sub-port Connection Termination Point instance, and then create a GEM Interworking Termination Point; the latter would contain a reference to the GEM Port Network CTP instance on one hand and the Logical  $N \times 64$  kbit/s Sub-port Connection Termination Point instance on the other hand; or
- for unstructured service: Create first a GEM Port Network CTP instance, and then create a GEM Interworking Termination Point; the latter would contain a reference to the GEM Port Network CTP instance on one hand and to the Physical Path Termination Point CES UNI instance on the other hand.

#### Establishment of an "Ethernet interworking connection"

Create first a GEM Port Network CTP instance, and then create a GEM Interworking Termination Point. The latter would contain a reference to the GEM Port Network CTP instance on one hand and to the Physical Path Termination Point Ethernet UNI instance on the other hand.

#### *Relationships*

One instance of this managed entity exists for each occurrence of transformation of a data stream into GEM packets and vice versa. Note that the attributes "GEM Profile pointer", and "Service Profile pointer" imply relationships to these managed entities.

#### *Attributes*

**Managed Entity id:** This attribute provides a number for each instance of this managed entity that is unique over all ATM Interworking VCC Termination Point and GEM Interworking Termination Point MEs. (R, Set-by-create) (mandatory) (2 bytes).

**GEM Port Network CTP Connectivity Pointer:** This attribute provides an instance identifier of the GEM Port Network CTP that is associated with this GEM Interworking Termination Point. (R, Set-by-create) (mandatory) (2 bytes).

**Interworking Option:** This attribute identifies the type of non-GEM function that is being interworked; the options can be:

- 0x00 for Unstructured TDM;
- 0x01 for MAC Bridge LAN;

- 0x02 Reserved for future use;
- 0x03 for IP Data Service;
- 0x04 for Video Return Path;
- 0x05 for 802.1p Mapper.

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

**Service Profile Pointer:** This attribute provides the service profile type and a pointer to the instance of a service profile, such as the CES Service Profile<sub>B-PON</sub> (if the interworking option = 0x00 and 0x02), MAC Bridge Service Profile (if the interworking option = 0x01), Video Return Path (if the interworking option = 0x04), 802.1p mapper service profile (if interworking option = 0x05). (R, Set-by-create) (mandatory) (2 bytes).

**Interworking Termination Point Pointer:** This attribute is used for in the case of Circuit Emulation Services and 802.1p mapper service (without MAC Bridge). It provides a pointer to the associated instance(s) of the following managed entities (depending on the service provided):

- Physical Path Termination Point CES UNI;
- Logical  $N \times 64$  kbit/s sub-port Connection Termination Point;
- Physical Path Termination Point Ethernet UNI.

In all other GEM services, the relationship between the related Interworking Termination Point and this GEM IW Termination point is derived from other managed entity relations, and this attribute is set to 0x0000, and not used. (R, 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 GEM Interworking Termination Point managed entity. If only one instance of a PPTP managed entity is associated with this instance of the GEM Interworking Termination Point managed entity, this attribute is set to 0x01. If multiple instances of PPTP managed entities are associated with this instance of the GEM Interworking Termination Point managed entity, this attribute is set to 0xZZ, where ZZ represents the number of associated PPTP instances. (R) (optional) (1 byte).

**Operational State:** This attribute indicates whether or not this managed entity is capable of performing its task. The operational state reflects the perceived ability to receive or to generate a valid signal. Valid values are enabled (0x00) and disabled (0x01). (R) (optional) (1 byte).

**GAL Profile Pointer:** This attribute provides a pointer to the instance of the GAL Profile used for this service. The following pointer values are supported:

- 0x00 GAL TDM Profile;
- 0x01 GAL Ethernet Profile;
- 0x02 Reserved for future use;
- 0x03 GAL Ethernet Profile for Data Service;
- 0x04 GAL Ethernet Profile for Video Return Path;
- 0x05 GAL Ethernet Profile for 802.1p Mapper.

(R, Set-by-create) (mandatory) (2 bytes).

**GAL Loopback Configuration:** This attribute is used to set the loopback configuration when using GEM mode: No loopback (value 0x00), Loopback of downstream traffic after GAL (value 0x01). Upon autonomous instantiation, the value 0x00 is used. (R, W) (mandatory) (1 byte).

## Actions

**Create:** Create an instance of this managed entity.

**Delete:** Delete an instance of this managed entity.

**Get:** Get one or more attributes.

**Set:** Set one or more attributes.

## Notifications

**Attribute value change:** This notification is used to report autonomous changes of attributes of this managed entity. The notification should identify the attribute and its new value. The list of AVCs for this managed entity is given in Table 9a.

**Alarm:** This notification is used to notify the management system when a failure has been detected or cleared. Both ONT and OLT should know the alarm list used by this entity. The alarm list for this entity is given in Table 9b.

**Table 9a/G.984.4 – AVC list for GEM Interworking Termination Point**

Number	Attribute value change	Description
1-5	N/A	
6	OpState	Operational state of GEM Interworking Termination Point
7-8	N/A	
9-16	Reserved	

**Table 9b/G.984.4 – Alarm list for GEM Interworking Termination Point**

Number	Alarm	Description
0	GFSA	GEM frame starvation alarm
1-223	Reserved	

## 5.2) Traffic descriptor for GEM

Replace the whole of clause 9.5.3 with the following:

### 9.5.3 GEM traffic descriptor

This traffic descriptor set is applied to traffic regulation for upstream flows identified by GEM Port-ID. If these flows are not regulated, this set is not used.

#### Relationships

This ME is associated with a GEM Port Network CTP. Upstream traffic flow identified by Port-ID is characterized by this ME. The detailed definition is described in [1].

#### Attributes

**Managed Entity id:** This attribute provides a unique number for each instance of this managed entity. (R, Set-by-create) (mandatory) (2 bytes).

**SIR:** This attribute is SIR (Sustained Information Rate). The unit of this attribute is "Byte/s". (R, Set-by-create) (optional) (4 bytes).

**PIR:** This attribute is PIR (Peak Information Rate). The unit of this attribute is "Byte/s". (R, Set-by-create) (optional) (4 bytes).

## *Actions*

**Create:** Create an instance of this managed entity.

**Delete:** Delete an instance of this managed entity.

**Get:** Get one or more attributes.

## *Notifications*

None.

### **5.3) Support of Multicast Connection**

*Add the following new clause 9.3.8:*

#### **9.3.8 Multicast GEM Interworking Termination Point**

An instance of this managed entity represents a point in the ONT where the interworking of a service (e.g., IP) or underlying physical infrastructure (e.g., Ethernet) to GEM layer takes place. At this point, a bit stream is reconstructed from GEM packets.

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

Please refer to Multicast Interworking VCC TP ME in ITU-T Rec. G.983.2 (2005) for more detailed explanation.

## *Relationships*

One instance of this managed entity shall exist for each occurrence of transformation of GEM packets into a data stream where multicast interworking is desired. Note that the attributes "GEM Profile pointer", and "Service Profile pointer" imply relationships to these managed entities.

## *Attributes*

**Managed Entity id:** This attribute provides a unique number for 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 provides an instance identifier of the GEM Port Network CTP that is associated with this Multicast GEM Interworking Termination Point. (R, 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 MAC Bridge LAN (0x01), IP Router (0x03), or 802.1p mapper (0x05). (R, Set-by-create) (mandatory) (1 byte).

**Service Profile Pointer:** This attribute provides the service profile type and a pointer to the instance of a service profile, such as the MAC Bridge Service Profile (if the interworking option = 0x01), IP Router Service Profile (if the interworking option = 0x03), or 802.1p Mapper Service Profile (if interworking option = 0x05). (R, Set-by-create) (mandatory) (2 bytes).

**Interworking Termination Point Pointer:** This attribute is set to 0x0000, and not used. (R, 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 GEM Interworking Termination Point managed entity. If only one instance of a PPTP managed entity is associated with this instance of the GEM Interworking Termination Point managed entity, this attribute is set to 0x01. If multiple instances of PPTP managed entities are associated with this instance of the Multicast GEM Interworking Termination Point managed entity, this attribute is set to

0xZZ, where ZZ represents the number of associated PPTP instances. (R) (optional) (1 byte).

**Operational State:** This attribute indicates whether or not this managed entity is capable of performing its task. The operational state reflects the perceived ability to receive or to generate a valid signal. Valid values are enabled (0x00) and disabled (0x01). (R) (optional) (1 byte).

**GAL Profile Pointer:** For GEM mode, this attribute provides the GAL profile type and a pointer to an instance of a GAL Profile such as GAL Ethernet Profile if the interworking option = 0x01, 0x03 or 0x05. (R, Set-by-create) (mandatory) (2 bytes).

**GAL Loopback Configuration:** This attribute is set to 0x0000 and not used. (R, Set-by-create) (mandatory) (1 byte).

**MulticastAddressTable:** This attribute contains the mapping of IP multicast addresses to PON layer addresses. One entry provides the VPI/Port-ID value (2 bytes, right justified), VCI/spare value (2 bytes), IP multicast address start (4 bytes), and IP multicast address stop (4 bytes). An OMCI set message can carry a maximum of 2 entries at the same time. The first four bytes of each entry are treated as the index of the list, and a Set to a particular (VPI/Port-ID – VCI/spare) value will overwrite any existing entry with the same first four bytes. If the last eight bytes of a Set command are all zero, then that entry will be deleted from the list, as all-zero IP addresses are not valid multicast addresses. (R, W) (mandatory for one entry, optional for multiple entries) (N \* 12 bytes, N is the number of entries in the list.)

#### Actions

**Create:** Create an instance of this managed entity.

**Delete:** Delete an instance of this managed entity.

**Get:** Get one or more attributes.

**Set:** Set one or more attributes.

#### Notifications

**Attribute value change:** This notification is used to report autonomous changes of attributes of this managed entity. The notification should identify the attribute and its new value. The list of AVCs for this managed entity is given in Table 11-1a.

**Alarm:** This notification is used to notify the management system when a failure has been detected or cleared. Both ONT and OLT should know the alarm list used by this entity. The alarm list for this entity is given in Table 11-1b.

**Table 11-1a/G.984.4 – AVC list for GEM Interworking Termination Point**

Number	Attribute value change	Description
1-5	N/A	
6	OpState	Operational state of GEM Interworking Termination Point
7-8	N/A	
9-16	Reserved	

**Table 11-1b/G.984.4 – Alarm list for GEM Interworking Termination Point**

Number	Alarm	Description
0	GFSA	GEM frame starvation alarm
1-223	Reserved	

**6) Class values for new managed entities**

Add the following items into Table 18:

Managed entity class value	Managed entity
128	Video Return Path Service Profile
129	Video Return Path Statistics
130	802.1p Mapper Service Profile
131	OLT <sub>B-PON</sub>
132	Multicast Interworking VCC Termination Point
133..255	Reserved for future B-PON managed entities
...	
280	GEM Traffic Descriptor
281	Multicast GEM Interworking Termination Point
282..65535	Reserved

**7) Modify Appendix I – OMCI Common Mechanisms and Services**

Delete the following two items from clause I.2:

- j) Ethernet connection set-up;
- k) Ethernet connection tear-down;

**8) Modify Appendix II – OMCI message set**

Test message format that is depicted in II.2.27, test response message format depicted in II.2.28, and test result message format depicted in II.2.45 are replaced as follows:

**II.2.27 Test**

The format of the test message is specific to the target entity class. At present, two formats are defined. Future test extensions for a given entity class can be supported by adding additional encodings to presently unused bits or bytes. Future specification of tests for other entity classes may use an existing format or may define new formats for the test message. These extension mechanisms allow future tests to be supported without changing the principle of operation.

**Format for ONT-G, ONU-G, Subscriber Line Card, PON IF Line Card-G entity classes**

Field	Byte	8	7	6	5	4	3	2	1	Comments
Transaction identifier	6-7									
Message type	8	0	1	0						DB = 0, AR = 1, AK = 0 bits 5-1: action = test
Device identifier type	9	0	0	0	0	1	0	1	0	OMCI = 0x0A
Message identifier	10-11									Entity class. NOTE – This format applies to entity classes ONT-G, ONU-G, Subscriber Line Card, PON IF Line Card-G.
	12									MSB entity instance
	13									LSB entity instance
Message contents	14	0	0	0	0	x	x	x	x	xxxx = select test 0111 = self test
	15-45	0	0	0	0	0	0	0	0	Padding

**Format for POTS UNI and PPTP ISDN UNI entity classes**

Note that a single message can be used to initiate multiple tests on a given ME if desired.

Bytes 15-28 are used by the dial tone make-break test. A zero value for a timer causes the ONT to use its built-in defaults. As many as three dial tone frequencies can be specified, or omitted by setting their values to 0. Other fields are also omitted with the value 0, or controlled by flags. An ONT can support the dial tone test with internal defaults only, and is not required to support any of the attributes of bytes 15-28. Likewise, an ONT can use internal defaults for drop test, rather than the values given in bytes 29-38. The capabilities of an ONT are documented by the vendor and known through the administration's practices.

Field	Byte	8	7	6	5	4	3	2	1	Comments
Transaction identifier	6-7									
Message type	8	0	1	0						DB = 0, AR = 1, AK = 0 Bits 5-1: action = test
Device identifier type	9	0	0	0	0	1	0	1	0	OMCI = 0x0A
Message identifier	10-11									Entity class. NOTE – This format applies to entity classes PPTP POTS UNI and PPTP ISDN UNI.
	12									MSB entity instance
	13									LSB entity instance

Field	Byte	8	7	6	5	4	3	2	1	Comments
	14	a	0	0	0	x	x	x	x	a – test mode 0 = normal; deny test if line busy 1 = forced mode xxxx = select test 0000 = all MLT tests 0001 = hazardous potential 0010 = foreign EMF 0011 = resistive faults 0100 = receiver off-hook 0101 = ringer 0110 = NT1 dc signature test 0111 = self test 1000 = dial tone make-break test
	15									DBDT timer T1 (slow dial tone threshold), in units of 0.1 seconds. Range 0.1 to 6.0 seconds.
	16									DBDT timer T2 (no dial tone threshold), in units of 0.1 seconds. Range 1.0 to 10.0 seconds.
	17									DBDT timer T3 (slow break dial tone threshold), in units of 0.1 seconds. Range 0.1 to 3.0 seconds.
	18									DBDT timer T4 (no break dial tone threshold), in units of 0.1 seconds. Range 1.0 to 3.0 seconds.
	19							d	p	DBDT control byte d: dialled digit 1 = dialled digit specified in byte 20 0 = use default digit p = pulse (1) or tone (0) dialling
	20									Digit to be dialled, ASCII character in range "0"-"9", "*", "#".
	21-22									Dial tone frequency 1, in units of Hz
	23-24									Dial tone frequency 2, in units of Hz. 0 = unused (i.e., if only one tone is specified).
	25-26									Dial tone frequency 3, in units of Hz. 0 = unused (i.e., if only one or two tones are specified).
	27									Dial tone power threshold, absolute value, 0.1 dB resolution, range [–]0.1 to [–]25.3 dBm0. E.g., –13 dBm0 = 0x82. 0x00 = unspecified.
	28									Idle channel power threshold, absolute value, 1 dB resolution, range [–]1 to [–]90 dBm0. 0x00 = unspecified.
	29									DC hazardous voltage threshold, absolute value, volts 0x00 = unspecified.

Field	Byte	8	7	6	5	4	3	2	1	Comments
	30									AC hazardous voltage threshold, volts RMS 0x00 = unspecified.
	31									DC foreign voltage threshold, absolute value, volts 0x00 = unspecified.
	32									AC foreign voltage threshold, volts RMS 0x00 = unspecified.
	33									Tip-ground and ring-ground resistance threshold, k $\Omega$ 0x00 = unspecified.
	34									Tip-ring resistance threshold, k $\Omega$ 0x00 = unspecified.
	35-36									Ringer equivalence minimum threshold, in 0.01 REN units 0x00 = unspecified.
	37-38									Ringer equivalence maximum threshold, in 0.01 REN units 0x00 = unspecified.
	39-45	0	0	0	0	0	0	0	0	Padding

## II.2.28 Test response

If an ONT does not support all tests requested in byte 14 of the test message, it should not execute any test and should respond with result 0010, command not supported. If an ONT supports all of the requested tests but cannot support one or more of the explicitly specified threshold attributes, it should not execute any test and should respond with result 0011, parameter error. The test command could be re-issued with different thresholds or default thresholds, and would be expected to succeed.

Field	Byte	8	7	6	5	4	3	2	1	Comments
Transaction identifier	6-7									
Message type	8	0	0	1						DB = 0, AR = 0, AK = 1 bits 5-1: action = test
Device identifier type	9	0	0	0	0	1	0	1	0	OMCI = 0x0A
Message identifier	10-11									Entity class.
	12									MSB entity instance
	13									LSB entity instance
Message contents	14	0	0	0	0	x	x	x	x	result, reason 0000 = command processed successfully 0001 = command processing error 0010 = command not supported 0011 = parameter error 0100 = unknown managed entity 0101 = unknown managed entity instance 0110 = device busy
	15-45	0	0	0	0	0	0	0	0	Padding

The Test response message is an indication to the OLT that the test request is received and is being processed.

### II.2.45 Test result

The test result message is used to report the result of a test. The transaction identifier of the test result message is identical to the transaction identifier of the test message that initiated the corresponding test.

Two formats are currently defined, one of which reports the result of a self test (any ME that supports self test), the other of which reports the results of a dial tone draw-break test (PPTP POTS UNI) or an MLT test (PPTP POTS UNI or PPTP ISDN UNI). If a new test for the presently-supported entities is defined in the future, the corresponding test results can be reported by extending the test result message layout. If a new test for other managed entity classes is defined in the future, a new test result message layout may be defined.

#### *Format for ONT-G, ONU-G, subscriber line card, PON line card entity classes*

Field	Byte	8	7	6	5	4	3	2	1	Comments
Transaction identifier	6-7									
Message type	8	0	0	0						DB = 0, AR = 0, AK = 0 bits 5-1: action = test result
Device identifier type	9	0	0	0	0	1	0	1	0	OMCI = 0x0A
Message identifier	10-11									Entity class. NOTE – This format applies to entity classes ONT-G, ONU-G, Subscriber Line Card, PON IF Line Card-G.
	12									MSB entity instance
	13									LSB entity instance
Message contents	14	0	0	0	0	0	0	0	0	Unused.
	15	0	0	0	0	0	0	x	x	Self test result: xx = 00: failed xx = 01: passed xx = 10: not completed
	16-45	0	0	0	0	0	0	0	0	Padding

#### *Format for POTS UNI and PPTP ISDN UNI entity classes*

Byte 14 reports a summary MLT test result. The result for each test category is limited to the two values "test passed or was not executed" or "test failed". Bytes 16 and 17 report the results of a dial tone test.

Byte 15 reports the result of a self test. At present, self test is not supported for the POTS UNI and PPTP ISDN UNI entity classes, and this byte should be set to 0.

There are four possible outcomes for a given test: it can pass, fail, not be run, or not be recognized by the ONT. If an ONT does not support or recognize a given test, it is expected to deny the test request message. To avoid physical damage, an ONT may cease testing if a test fails, and thus some subsequent tests will not be run. In addition, the ONT may support some but not all tests of a given suite, such as power measurements in the dial tone test sequence. The category summary in byte 14 includes two values. The value 1 indicates either that all tests in a category passed, or that nothing in the category was tested, while 0 indicates that at least one test in the category failed. Further information appears in flags specific to each test results attribute to indicate whether each detailed test was run or not, whether it passed or failed and whether a measured result is reported or not.

Field	Byte	8	7	6	5	4	3	2	1	Comments
Transaction identifier	6-7									
Message type	8	0	0	1						DB = 0, AR = 0, AK = 1 bits 5-1: action = test result
Device identifier type	9	0	0	0	0	1	0	1	0	OMCI = 0x0A
Message identifier	10-11									Entity class. NOTE – This message format pertains to PPTP POTS UNI and PPTP ISDN UNI entity classes.
	12									MSB entity instance
	13									LSB entity instance
Message contents	14	0	0	a	b	c	d	e	F	MLT drop test result: 0 = fail test a/b/c/d/e/f 1 = pass test, or test not run a/b/c/d/e/f a = hazardous potential b = foreign EMF c = resistive faults d = receiver off-hook e = ringer f = NT 1 dc signature test
	15	0	0	0	0	0	0	x	x	self test result: xx = 00: failed xx = 01: passed xx = 10: not completed
	16			b	b	b	d	d	d	Dial tone make-break flags: ddd – Dial tone draw = 000 test not run = 01 m failed, could not draw = 10 m slow draw = 11 m passed  bbb – Dial tone break = 000 test not run = 01 m failed, could not break = 10 m slow break = 11 m passed  m – measured value flag = 0 measurement not reported = 1 measurement reported

Field	Byte	8	7	6	5	4	3	2	1	Comments
	17			a	a	a	b	b	b	Dial tone power flags: aaa – Quiet channel power bbb – Dial tone power See Note.
	18			a	a	a	b	b	b	Loop test DC voltage flags aaa – VDC, tip-ground bbb – VDC, ring-ground See Note.
	19			a	a	a	b	b	b	Loop test AC voltage flags aaa – VAC, tip-ground bbb – VAC, ring-ground See Note.
	20			a	a	a	b	b	b	Loop test resistance flags 1 aaa – Resistance, tip-ground bbb – Resistance, ring-ground See Note.
	21			a	a	a	b	b	b	Loop test resistance flags 2 aaa – Resistance, tip-ring bbb – Ringer load test See Note.
	22									Time to draw dial tone, in 0.1 second units. Valid only if byte 16 ddd = xx1.
	23									Time to break dial tone, in 0.1 second units. Valid only if byte 16 bbb = xx1.
	24									Total dial tone power measurement, unsigned absolute value, 0.1 dB resolution, range 0 to [–] 25.5 dBm0. Values above 0 dBm0 are reported as 0. Valid only if byte 17 aaa = xx1.
	25									Quiet channel power measurement, unsigned absolute value, 1 dB resolution, range 0 to [–]90 dBm0. Valid only if byte 17 bbb = xx1.
	26-27									Tip-ground DC voltage, 2 s complement, resolution 1V. Valid only if byte 18 aaa = xx1.
	28-29									Ring-ground DC voltage, 2 s complement, resolution 1V. Valid only if byte 18 bbb = xx1.
	30									Tip-ground AC voltage, Vrms. Valid only if byte 19 aaa = xx1.
	31									Ring-ground AC voltage, Vrms. Valid only if byte 19 bbb = xx1.

Field	Byte	8	7	6	5	4	3	2	1	Comments
	32-33									Tip-ground DC resistance, k $\Omega$ . Infinite resistance: 0xffff. Valid only if byte 20 aaa = xx1.
	34-35									Ring-ground DC resistance, k $\Omega$ . Infinite resistance: 0xffff. Valid only if byte 20 bbb = xx1.
	36-37									Tip-ring DC resistance, k $\Omega$ . Infinite resistance: 0xffff. Valid only if byte 21 aaa = xx1.
	38									Ringer equivalence, in 0.1 REN units. Valid only if byte 21 bbb = xx1.
	39-45	0	0	0	0	0	0	0	0	padding
<p>NOTE – Coding for 3 bit flag sets is as follows:</p> <ul style="list-style-type: none"> <li>= 000 test not run;</li> <li>= 010 fail, measurement not reported;</li> <li>= 011 fail, measurement reported;</li> <li>= 110 pass, measurement not reported;</li> <li>= 111 pass, measurement reported.</li> </ul>										



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