

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.984.4

Amendment 1

(06/2009)

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

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

Gigabit-capable passive optical networks (G-PON):
ONT management and control interface
specification

Amendment 1

Recommendation ITU-T G.984.4 (2008) –
Amendment 1

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Recommendation ITU-T G.984.4

Gigabit-capable passive optical networks (G-PON): ONT management and control interface specification

Amendment 1

Summary

Amendment 1 to Recommendation ITU-T G.984.4 contains various updates to ITU-T G.984.4 (2008). A number of editorial corrections and clarifications are included, along with the following substantive changes and extensions to G-PON OMCI.

- OMCI for reach extenders
- PM extensions for Ethernet bridge ports and circuit emulation services (pseudowires)
- Update of OMCI to align with Recommendation ITU-T G.997.1 (2009)
- Revision of the VLAN tagging filter data managed entity
- A managed entity to control out-of-band file transfer through OMCI
- Extended descriptions and OMCI extensions on traffic management and quality of service
- A number of additional minor extensions to OMCI

Source

Amendment 1 to Recommendation ITU-T G.984.4 (2008) was approved on 6 June 2009 by ITU-T Study Group 15 (2009-2012) under Recommendation ITU-T A.8 procedures.

FOREWORD

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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.

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Recommendation ITU-T G.984.4

Gigabit-capable passive optical networks (G-PON): ONT management and control interface specification

Amendment 1

1) Clause 2, References

a) *Modify the following reference as shown:*

[ITU-T G.997.1] Recommendation ITU-T G.997.1 (2009), *Physical layer management for digital subscriber line (DSL) transceivers*.

b) *Add the following references:*

[ITU-T G.704] Recommendation ITU-T G.704 (1998), *Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels*.

[ITU-T G.826] Recommendation ITU-T G.826 (2002), *End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections*.

[ITU-T G.984.6] Recommendation ITU-T G.984.6 (2008), *Gigabit-capable passive optical networks (GPON): Reach extension*.

2) Clause 3, Definitions

Add the following clause:

3.5 shaping and policing: A shaper causes a flow of input packets to conform to a given PIR/PBS by controlling the release rate/burst size of output packets. This typically results in queuing delay; packets may be dropped if there is a queue overflow because the input rate or burst size is too great.

A policer causes a flow of input packets to conform to a given PIR/PBS by immediately dropping packets that exceed PIR/PBS. This typically results in packet loss; packets may be further marked as drop eligible if they exceed CIR/CBS.

3) Clause 4, Abbreviations

Add the following acronyms in alphabetic order:

ACL	Access Control List
CBS	Committed Block Size
DMT	Discrete Multitone
FDL	Facility Data Link
LBO	Line Buildout
PBS	Peak Block Size
PCP	Priority Code Point
R'/S'	Reach extender interface to optical trunk line
RAD	Rate Adaptation Downshift

RAU	Rate Adaptation Upshift
RE	Reach Extender
S'/R'	Reach extender interface to optical distribution network
SRA	Seamless Rate Adaptation

4) Clause 8.1, Managed entities

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

Table 8-1 – Managed entities of the OMCI

Managed entity	Required/ Optional	Description	Clause
RE ANI-G	CR	Used for mid-span PON reach extender ANI	9.14.1
Physical path termination point RE UNI	CR	Used for mid-span PON reach extender UNI	9.14.2
RE upstream amplifier	CR	Used for mid-span PON reach extender upstream optical amplifier	9.14.3
RE downstream amplifier	CR	Used for mid-span PON reach extender downstream optical amplifier	9.14.4
RE config portal	CR	Used for non-OMCI configuration method on mid-span PON reach extenders	9.14.5
RE common amplifier parameters	CR	Used for monitoring and maintenance of PON reach extender optical amplifiers	9.14.6
File transfer controller	O	Used to control out-of-band file transfers	9.12.13
CES physical interface performance monitoring history data 2	O	Used for PM of DS1, E1 and similar CESs	9.8.12
CES physical interface performance monitoring history data 3	O	Used for PM of DS1, E1 and similar CESs	9.8.13
Ethernet frame performance monitoring history data upstream	O	Used for PM of upstream Ethernet flows on a bridge port	9.3.30
Ethernet frame performance monitoring history data downstream	O	Used for PM of downstream Ethernet flows on a bridge port	9.3.31
VDSL2 line configuration extensions 2	O	Used to configure additional VDSL2 parameters	9.7.26
xDSL impulse noise monitor performance monitoring history data	O	Used for impulse noise monitoring PM	9.7.27
xDSL line inventory and status data part 5	CR	Additional xDSL test parameters for G.992.3, G.992.5 Annex C	9.7.28
xDSL line inventory and status data part 6	CR	Additional xDSL test parameters for G.992.3, G.992.5 Annex C	9.7.29
xDSL line inventory and status data part 7	CR	Additional xDSL test parameters for G.992.3, G.992.5 Annex C	9.7.30

5) **Clause 8.2, Managed entity relation diagrams**

a) *Throughout clause 8.2, replace the indicated figures with the following:*

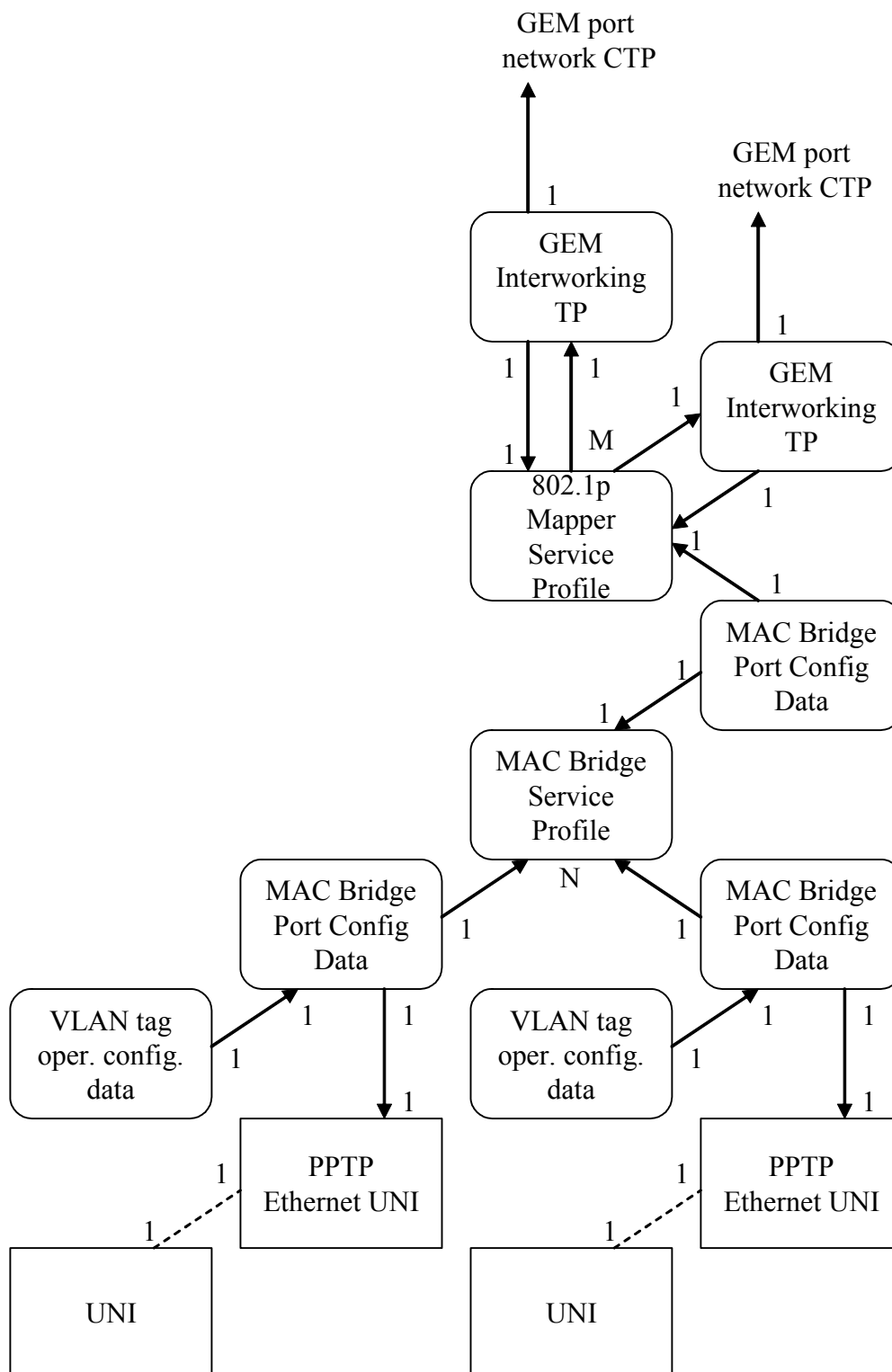


Figure 8.2.2-6 – Illustration of N:M bridge-mapping

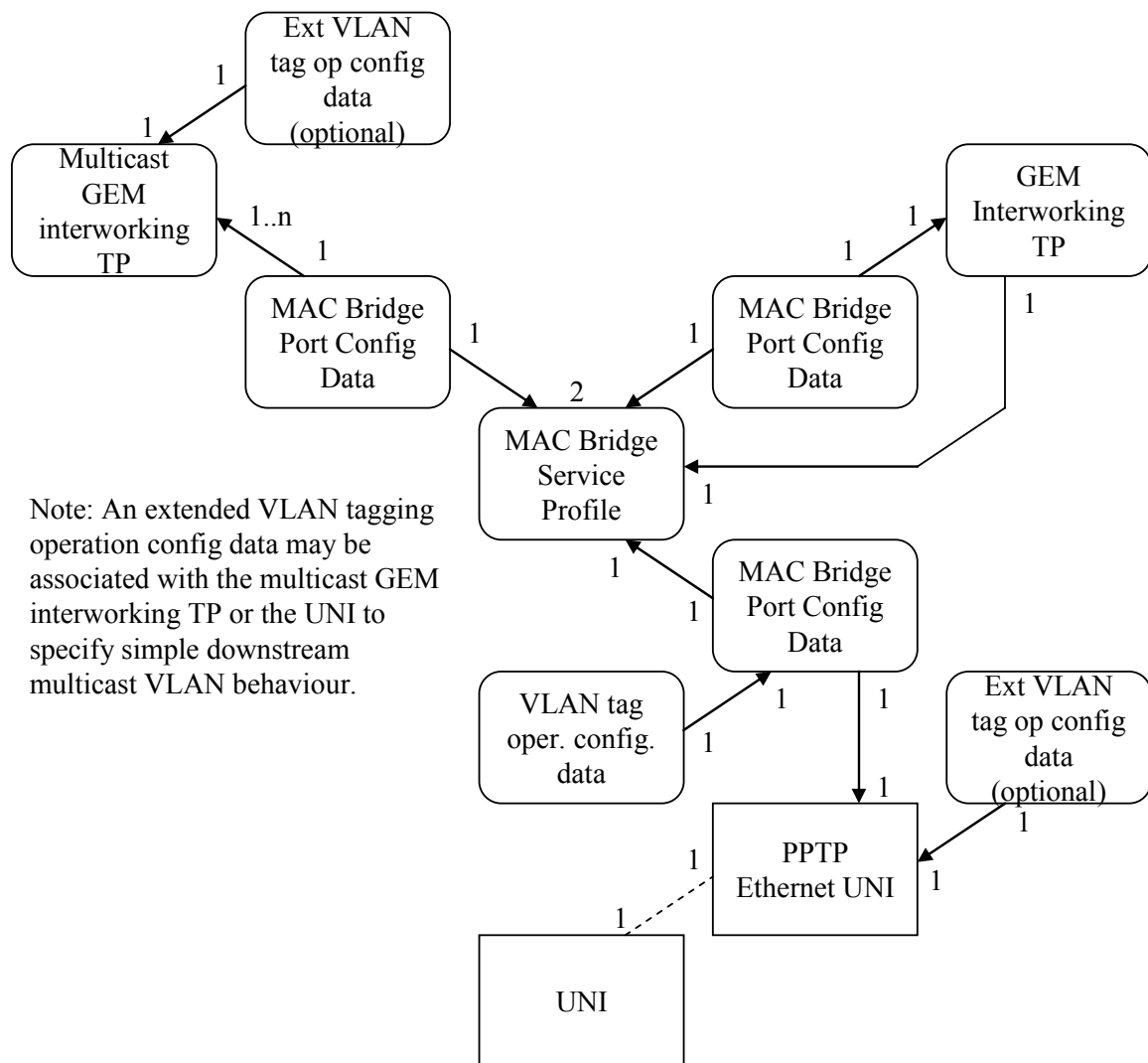


Figure 8.2.2-10 – Illustration of multicast service

b) Add the following figure at the end of clause 8.2.2:

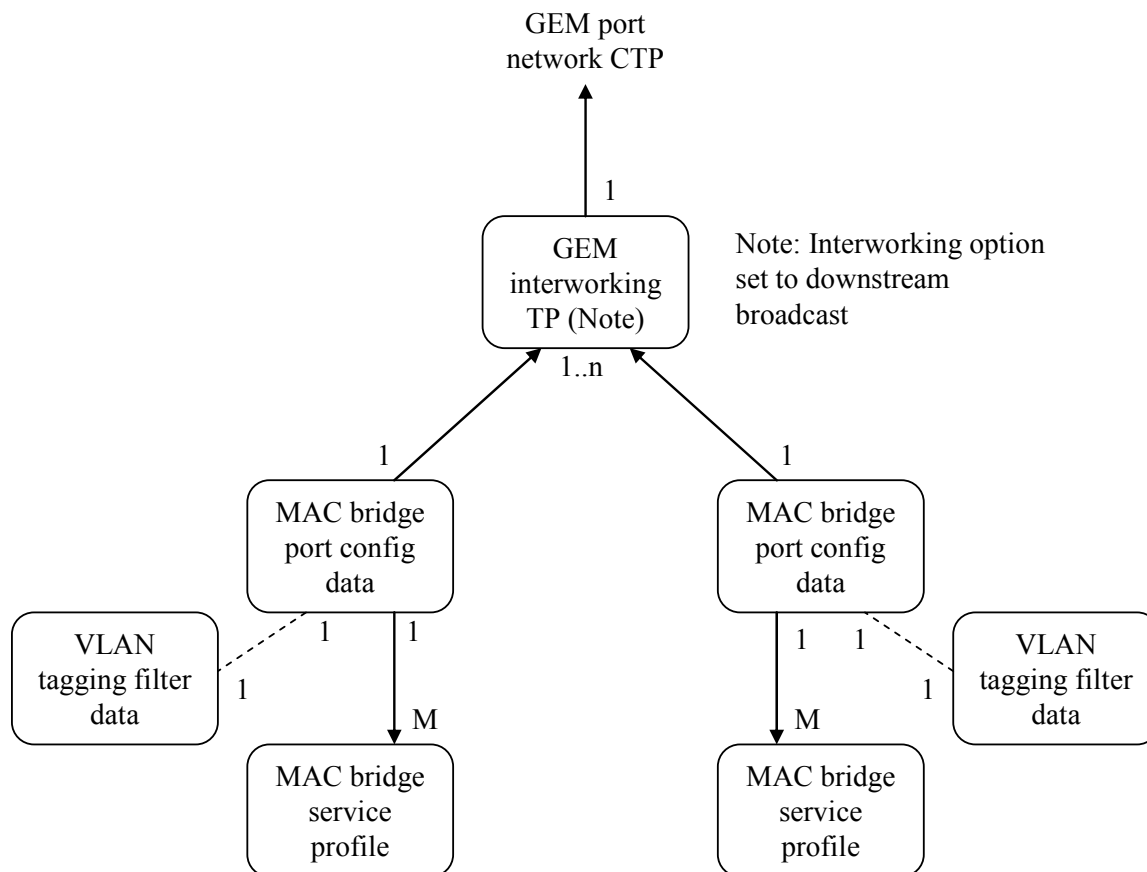
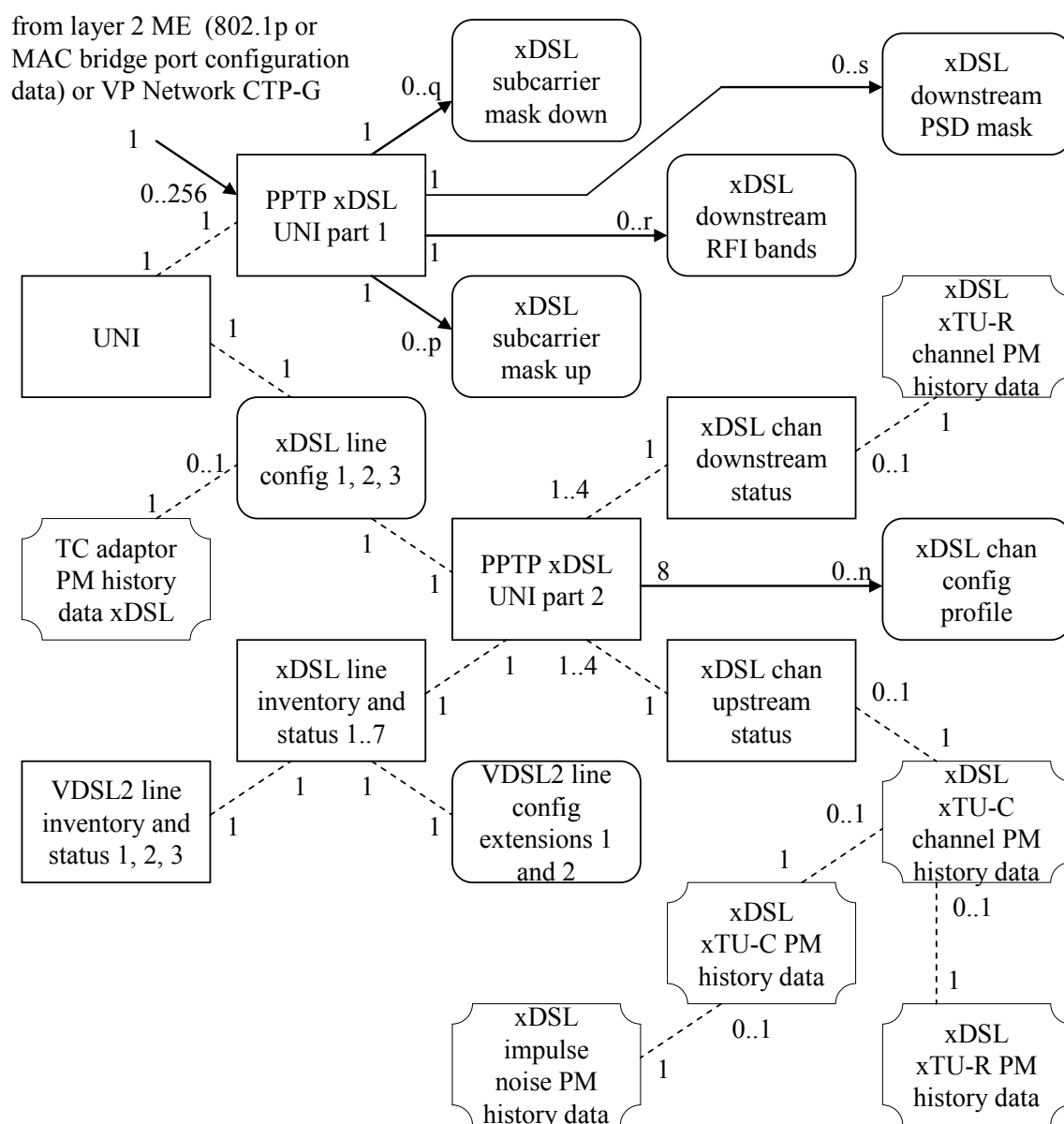


Figure 8.2.2-11 – Illustration of downstream broadcast configuration

6) Clause 8.2.4, xDSL service

Replace Figure 8.2.4-1 with the following:



7) New clause 8.2.10

Add the following new clause at the end of clause 8.2:

8.2.10 Mid-span PON reach extenders

The PON reach extender is modelled as an ONT (the management entity) containing cardholders and circuit packs whose functions are to extend the reach of one or more PONs. The PON reach extender's own management ONT is understood to exist as a member of one of the extended PONs.

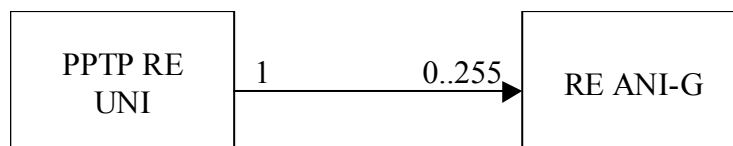


Figure 8.2.10-1 – Mid-span PON reach extender core (repeater)

NOTE 1 – In many cases, the RE ANI-G and PPTP RE UNI will be implemented on the same circuit pack. If so, the port mapping package can be used to create the hybrid line card.

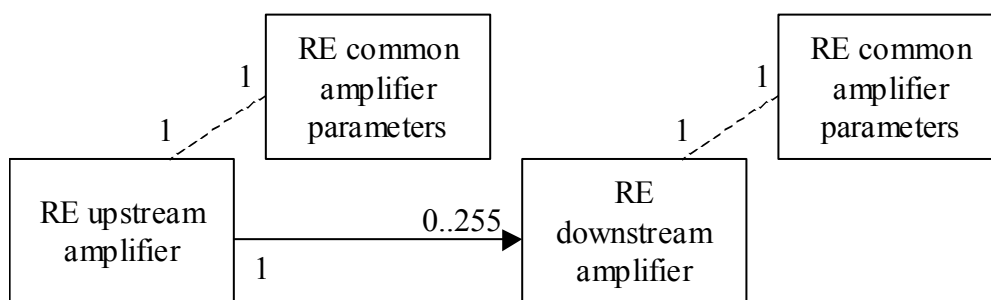


Figure 8.2.10-2 – Mid-span PON reach extender core (optical amplifier)

NOTE 2 – In many cases, the RE upstream amplifier and RE downstream amplifier will be implemented on the same circuit pack. If so, the port mapping package can be used to create the hybrid line card.

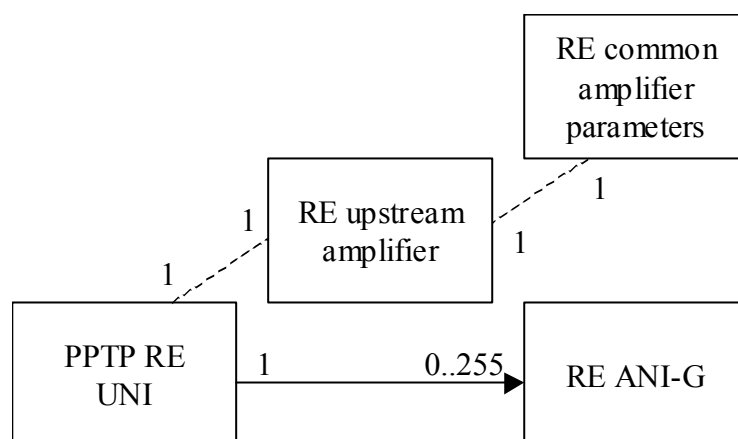


Figure 8.2.10-3 – Mid-span PON reach extender core (hybrid)

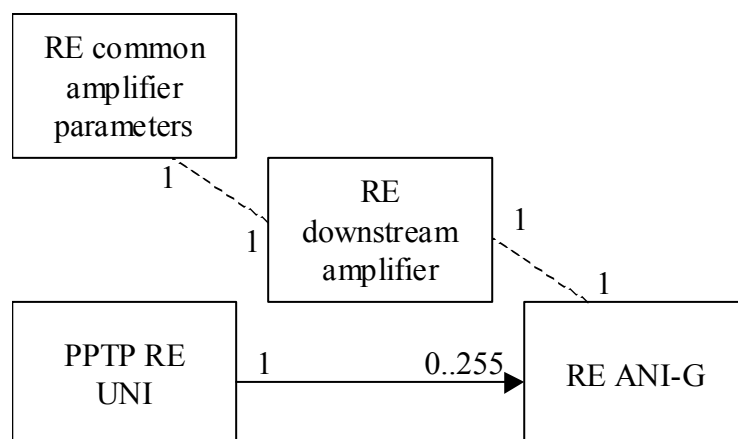


Figure 8.2.10-4 – Mid-span PON reach extender core (hybrid)

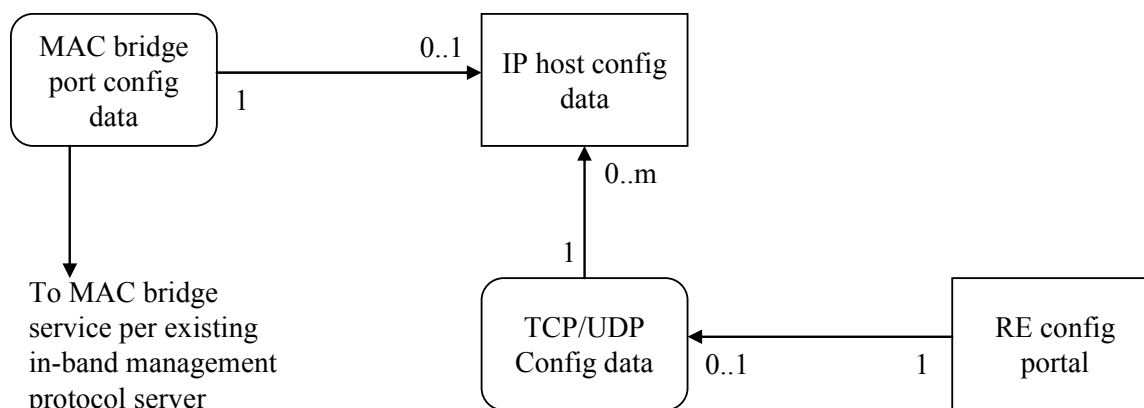


Figure 8.2.10-5 – In-band management for mid-span PON reach extender

8) Clause 9.1.1, ONT-G

a) Replace:

Traffic management option:

This attribute identifies the upstream traffic management function implemented in the ONT. There are two options:

- 0 Priority controlled and flexibly scheduled upstream traffic. The traffic scheduler and priority queue mechanism are used for upstream traffic.
- 1 Rate controlled upstream traffic. The maximum upstream traffic of each individual connection is guaranteed.

With:

Traffic management option:

This attribute identifies the upstream traffic management function implemented in the ONT. There are three options:

- 0 Priority controlled and flexibly scheduled upstream traffic. The traffic scheduler and priority queue mechanism are used for upstream traffic.
- 1 Rate controlled upstream traffic. The maximum upstream traffic of each individual connection is guaranteed by shaping.
- 2 Priority and rate controlled. The traffic scheduler and priority queue mechanism are used for upstream traffic. The maximum upstream traffic of each individual connection is guaranteed by shaping.

b) Add the following new attribute:

ONT survival time: This attribute indicates the minimum guaranteed time in milliseconds between the loss of external power and the silence of the ONT. This does not include survival time attributable to a backup battery. The value zero implies that the actual time is not known. (R) (optional) (1 byte)

9) Clause 9.1.2, ONT2-G

Replace:

OMCC version: This attribute identifies the version of the OMCC protocol being used by the ONT. This allows the OLT to manage a network with ONTs that support different OMCC versions. Release levels of this Recommendation may be supported with the following code points:

0x80 G.984.4 (06/04).

NOTE – For historic reasons, this codepoint may also appear in ONTs that support later versions of G.984.4.

0x81 G.984.4 Amd.1 (06/05)

0x82 G.984.4 Amd.2 (03/06)

0x83 G.984.4 Amd.3 (12/06)

0x84 G.984.4 (02/2008)

(R) (mandatory) (1 byte)

With:

OMCC version: This attribute identifies the version of the OMCC protocol being used by the ONT. This allows the OLT to manage a network with ONTs that support different OMCC versions. Release levels of this Recommendation may be supported with the following code points:

0x80 G.984.4 (06/04).

NOTE – For historic reasons, this codepoint may also appear in ONTs that support later versions of G.984.4.

0x81 G.984.4 Amd.1 (06/05)

0x82 G.984.4 Amd.2 (03/06)

0x83 G.984.4 Amd.3 (12/06)

0x84 G.984.4 (02/08)

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

(R) (mandatory) (1 byte)

10) Clause 9.1.5, Cardholder

Where Table 9.1.5-1 presently reads:

Table 9.1.5-1 – Circuit pack types

Coding	Content	Description
224..242	Reserved	

Modify it to read:

Table 9.1.5-1 – Circuit pack types

Coding	Content	Description
224..238	Reserved	
239	Mid-span PON reach extender UNI	The UNI of a mid-span PON reach extender, 2488 Mbit/s downstream and 1244 Mbit/s upstream
240	Mid-span PON reach extender ANI	The ANI of a mid-span PON reach extender, 2488 Mbit/s downstream and 1244 Mbit/s upstream
241	Mid-span PON reach extender upstream optical amplifier	The 1310 nm wavelength optical amplifier
242	Mid-span PON reach extender downstream optical amplifier	The 1490 nm wavelength optical amplifier

11) Clause 9.1.10, Protection data

Modify the description of this managed entity to read as follows:

This managed entity models the capability and parameters of PON protection. An ONT that supports PON protection automatically creates an instance of this managed entity.

NOTE 1 – Equipment protection is modelled with the equipment protection profile and cardholder managed entities.

NOTE 2 – For ONTs that implement reach extender functions, this ME can be used to describe OMCI protection, reach extender R/S' protection, or both. For reach extender R/S' protection, the protection type must be 1:1 without extra traffic, because the switching is done on a link-by-link basis, and the protection link is in cold stand-by mode. The instance that pertains to OMCI protection has ME ID = 0.

Relationships

One instance of this managed entity is associated with two instances of the ANI-G, RE ANI-G or RE upstream amplifier. One of the ANI managed entities represents the working side; the other represents the protection side.

Attributes

Managed entity id: This attribute uniquely identifies each instance of this managed entity. This ME is numbered in ascending order from 0. (R) (mandatory) (2 bytes)

Working ANI-G pointer: This attribute points to the ANI-G, RE ANI-G or RE upstream amplifier managed entity that represents the working side of PON protection. (R) (mandatory) (2 bytes)

Protection ANI-G pointer: This attribute points to the ANI-G, RE ANI-G or RE upstream amplifier managed entity that represents the protection side of PON protection. (R) (mandatory) (2 bytes)

(Remainder of description remains unchanged)

12) Clause 9.2.1, ANI-G

Replace:

Piggyback DBA reporting:

This attribute indicates the ONT's piggyback DBA reporting format capabilities. [ITU-T G.984.3] defines three possible piggyback reporting modes. For reporting mode 0, the single field is the entire report. For reporting mode 1, the DBA report is two fields long. For reporting mode 2, the DBA report is four fields long. Mode 0 is mandatory for ONTs that utilize the piggyback DBA reporting method; modes 1 and 2 are optional. The following coding indicates the ONT's piggyback DBA reporting mode capabilities:

- 0 Mode 0 only
- 1 Modes 0 and 1
- 2 Modes 0 and 2
- 3 Modes 0, 1 and 2
- 4 Piggyback DBA reporting not supported

(R) (mandatory) (1 byte)

Whole ONT DBA reporting:

This attribute indicates that the ONT supports whole ONT DBA reporting (1) as specified in [ITU-T G.984.3], or that it does not (0). (R) (mandatory) (1 byte)

With:

Piggyback DBA reporting:

This attribute indicates the ONT's piggyback DBA reporting format capabilities. [ITU-T G.984.3] defines two possible piggyback reporting modes. For reporting mode 0, the single field is the entire report. For reporting mode 1, the DBA report is two fields long. Mode 0 is mandatory for ONTs that utilize the piggyback DBA reporting method; mode 1 is optional. The following coding indicates the ONT's piggyback DBA reporting mode capabilities:

- 0 Mode 0 only
- 1 Modes 0 and 1
- 2 Deprecated
- 3 Deprecated
- 4 Piggyback DBA reporting not supported

(R) (mandatory) (1 byte)

Whole ONT DBA reporting:

This attribute is deprecated. It should be set to 0 by the ONT and ignored by the OLT. (R) (mandatory) (1 byte)

13) Clause 9.2.3, GEM port network CTP

a) Replace:

Port id value:

This attribute is the port ID of the GEM port associated with this CTP. (R, W, Set-by-create) (mandatory) (2 bytes)

With:

Port id value: This attribute is the port ID of the GEM port associated with this CTP.

NOTE 1 – While nothing forbids the existence of several GEM port network CTPs with the same port id value, downstream traffic is modelled as being delivered to all such GEM port network CTPs. Be aware of potential difficulties associated with defining downstream flows and aggregating PM statistics.

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

b) Replace:

Traffic management pointer for upstream: If the traffic management option attribute in the ONT-G ME is 0 (priority controlled), this pointer specifies the priority queue-G ME serving this GEM port network CTP. If the traffic management option attribute is 1 (rate controlled), this attribute redundantly points to the T-CONT serving this GEM port network CTP. (R, W, Set-by-create) (mandatory) (2 bytes)

Traffic descriptor profile pointer: This attribute points to the instance of the GEM traffic descriptor managed entity that contains the traffic parameters used for this GEM port network CTP ME. This attribute is used when the traffic management option attribute in the ONT-G ME is 1 (rate controlled). (R, W, Set-by-create) (optional) (2 bytes)

See also Appendix III.

With:

Traffic management pointer for upstream: If the traffic management option attribute in the ONT-G ME is 0 (priority controlled) or 2 (priority and rate controlled), this pointer specifies the priority queue-G ME serving this GEM port network CTP. If the traffic management option attribute is 1 (rate controlled), this attribute redundantly points to the T-CONT serving this GEM port network CTP. (R, W, Set-by-create) (mandatory) (2 bytes)

Traffic descriptor profile pointer for upstream: This attribute points to the instance of the GEM traffic descriptor managed entity that contains the upstream traffic parameters used for this GEM port network CTP ME. This attribute is used when the traffic management option attribute in the ONT-G ME is 1 (rate controlled), specifying the PIR/PBS to which the upstream traffic is shaped. This attribute is also used when the traffic management option attribute in the ONT-G ME is 2 (priority and rate controlled), specifying the CIR/CBS/PIR/PBS to which the upstream traffic is policed. (R, W, Set-by-create) (optional) (2 bytes)

See also Appendix III.

c) Replace:

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

With:

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 the responsibility of the OLT to provision the downstream pointer in a way that is consistent with bridge and mapper connectivity. If the pointer is undefined, downstream queueing is determined by other mechanisms in the ONT. (R, W, Set-by-create) (mandatory) (2 bytes)

NOTE 3 – If the GEM port network CTP is associated with more than one UNI (downstream multicast), the downstream priority queue pointer defines a pattern (e.g., queue number 3 for a given UNI) to be replicated (i.e., to queue number 3) at the other affected UNIs.

d) *Add the following additional attribute:*

Traffic descriptor profile pointer for downstream: This attribute points to the instance of the GEM traffic descriptor managed entity that contains the downstream traffic parameters used for this GEM port network CTP ME. This attribute is used when the traffic management option attribute in the ONT-G ME is 2 (priority and rate controlled), specifying the CIR/CBS/PIR/PBS to which the downstream traffic is policed. (R, W, Set-by-create) (optional) (2 bytes)

See also Appendix III.

14) Clause 9.2.4, GEM interworking termination point

a) *Replace:*

Interworking option: This attribute identifies the type of non-GEM function that is being interworked. The options are:

- 0 Unstructured TDM
- 1 MAC bridge LAN
- 2 Reserved for future use
- 3 IP data service
- 4 Video return path
- 5 802.1p mapper

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

Service profile pointer: This attribute points to an instance of a service profile, such as:

- CES service profile-G if interworking option = 0
- MAC bridge service profile if interworking option = 1
- IP router service profile if interworking option = 3
- Video return path service profile if interworking option = 4
- 802.1p mapper service profile if interworking option = 5

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

14

With:

Interworking option: This attribute identifies the type of non-GEM function that is being interworked. The options are:

- 0 Unstructured TDM
- 1 MAC bridge LAN
- 2 Reserved for future use
- 3 IP data service
- 4 Video return path
- 5 802.1p mapper
- 6 Downstream broadcast

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

Service profile pointer: This attribute points to an instance of a service profile, such as:

- CES service profile-G if interworking option = 0
- MAC bridge service profile if interworking option = 1
- IP router service profile if interworking option = 3
- Video return path service profile if interworking option = 4
- 802.1p mapper service profile if interworking option = 5
- Null pointer if interworking option = 6

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

b) Replace:

GAL profile pointer: This attribute points to an instance of the GAL profile. The relationship between the interworking option and the related GAL profile is:

Interworking option	GAL profile type
0	GAL TDM profile
1	GAL Ethernet profile
2	Reserved for future use
3	GAL Ethernet profile for data service
4	GAL Ethernet profile for video return path
5	GAL Ethernet profile for 802.1p mapper

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

GAL loopback configuration:

This attribute sets the loopback configuration when using GEM mode:

- 0 No loopback.
- 1 Loopback of downstream traffic after GAL.

The default value of this attribute is 0. (R, W) (mandatory) (1 byte)

With:

GAL profile pointer: This attribute points to an instance of the GAL profile. The relationship between the interworking option and the related GAL profile is:

Interworking option	GAL profile type
0	GAL TDM profile
1	GAL Ethernet profile
2	Reserved for future use
3	GAL Ethernet profile for data service
4	GAL Ethernet profile for video return path
5	GAL Ethernet profile for 802.1p mapper
6	Null pointer

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

GAL loopback configuration:

This attribute sets the loopback configuration when using GEM mode:

- 0 No loopback
- 1 Loopback of downstream traffic after GAL

The default value of this attribute is 0. When the interworking option is 6 (downstream broadcast), this attribute is not used. (R, W) (mandatory) (1 byte)

15) Clause 9.2.6, GEM port performance monitoring history data

Replace:

- Lost packets:** This attribute counts background GEM frame loss. It does not distinguish between packets lost because of header bit errors or buffer overflows; it records only loss of information. (R) (mandatory) (4 bytes)
- Misinserted packets:** This attribute counts GEM frames misrouted to this GEM port. (R) (mandatory) (4 bytes)
- Received packets:** This attribute counts GEM frames that were received correctly at the monitored GEM port. (R) (mandatory) (5 bytes)
- Received blocks:** This attribute counts GEM blocks that were received correctly at the monitored GEM port. (R) (mandatory) (5 bytes)
- Transmitted blocks:** This attribute counts GEM blocks originated by the transmitting end point (i.e., backward reporting is assumed). (R) (mandatory) (5 bytes)
- Impaired blocks:** This severely errored data block counter is incremented whenever one of the following events takes place: the number of misinserted packets reaches its threshold, the number of bipolar violations reaches its threshold, or the number of lost packets reaches its threshold. Threshold values are based on vendor-operator negotiation. (R) (mandatory) (4 bytes)

With:

Lost packets:	This attribute counts downstream GEM frame loss. It does not distinguish between GEM frames lost because of header bit errors or buffer overflows; it records only loss of information. (R) (mandatory) (4 bytes)
Misinserted packets:	<no change>
Received packets:	This attribute counts downstream GEM frames that were received correctly at the monitored GEM port. (R) (mandatory) (5 bytes)
Received blocks:	This attribute counts downstream GEM blocks or partial blocks that were received correctly at the monitored GEM port. (R) (mandatory) (5 bytes)
Transmitted blocks:	This attribute counts upstream GEM blocks or partial blocks originated by the transmitting end point. (R) (mandatory) (5 bytes)
Impaired blocks:	This severely errored data block counter is incremented whenever the number of misinserted packets reaches its threshold or the number of lost packets reaches its threshold. Threshold values are based on vendor-operator negotiation. (R) (mandatory) (4 bytes)

16) Clause 9.3, Layer 2 data services

Replace Figure 9.3-1 with the following:

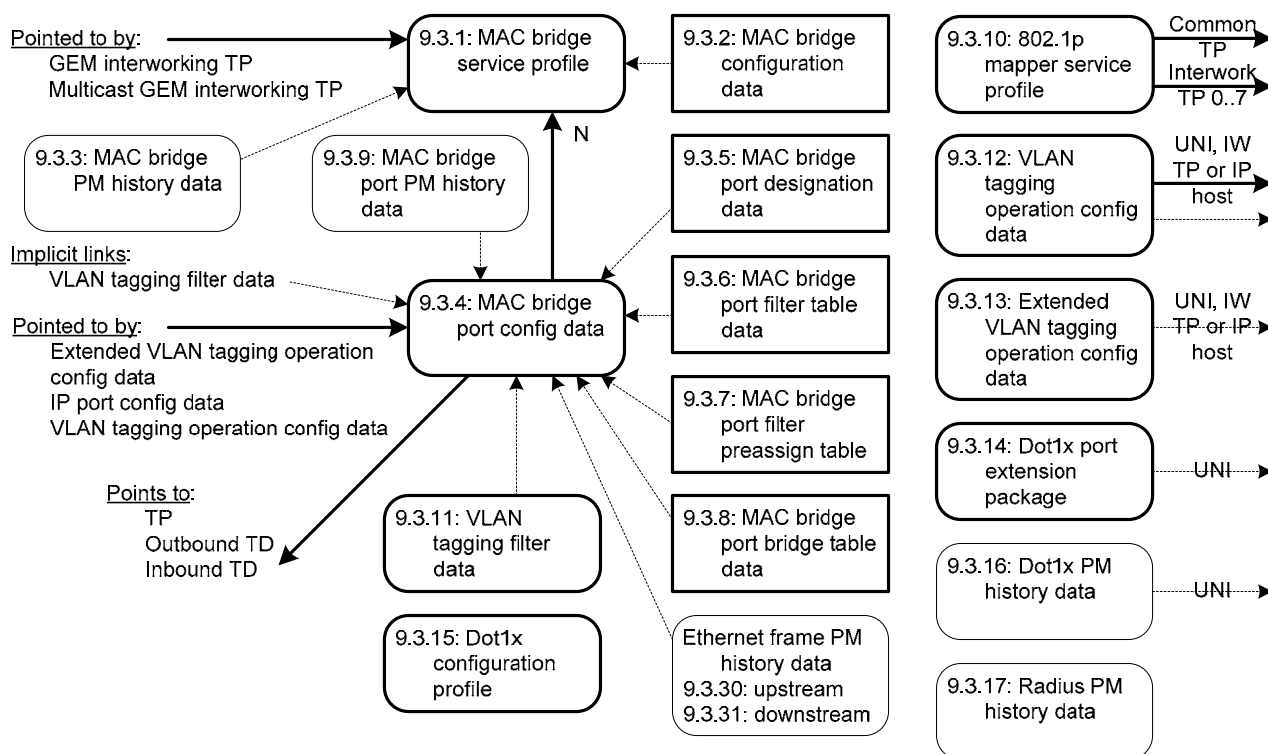


Figure 9.3-1 – Managed entities that support layer 2

17) Clause 9.3.10, 802.1p mapper service profile

a) *Replace:*

This managed entity associates the priorities of 802.1P priority tagged frames with specific connections. Instances of this managed entity are created and deleted by the OLT.

With:

This managed entity associates the priorities of 802.1P priority tagged frames with specific connections. The operation of this managed entity affects only upstream traffic. Instances of this managed entity are created and deleted by the OLT.

b) *Replace:*

Unmarked frame option: This attribute specifies how the ONT should handle untagged Ethernet frames received across the associated interface. Valid values include:

0 Convert from DSCP to 802.1p

1 Tag frame to a certain value

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

DSCP to P-bit mapping: This attribute is valid when the unmarked frame option attribute is set to 0. The DSCP to P-bit attribute can be considered a bit string sequence of 64 3-bit groupings. The 64 sequence entries represent the possible values of the 6-bit DSCP field. Each 3-bit grouping specifies the P-bit value to which the associated DSCP value should be mapped. Once marked, the P-bit marked frame is then directed to the GEM interworking termination point indicated by the interwork TP pointer mappings. (R, W) (mandatory) (24 bytes)

NOTE 2 – If certain bits in the DSCP field are to be ignored in the mapping process, the attribute should be provisioned such that all possible values of those bits produce the same P-bit mapping. This can be applied to the case where the operator wishes to adopt the priority mechanism based on IP precedence instead of full DSCP, which needs only the three MSBs of the DSCP field.

Default P-bit marking: This attribute is valid when the unmarked frame option attribute is set to 1. The default P-bit marking attribute contains the default P-bit priority setting to be applied. The P-bit marked frame is then directed to the GEM interworking termination point indicated by the interwork TP pointer mappings. (R, W, Set-by-create) (mandatory) (1 byte)

With:

Unmarked frame option: This attribute specifies how the ONT should handle untagged Ethernet frames received across the associated interface. Although it does not alter the frame in any way, the ONT routes the frame as if it were tagged with P bits (PCP field) according to the following code points.

0 Derive implied PCP field from DSCP bits of received frame

1 Set implied PCP field to fixed value specified by default P-bit marking attribute

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

Untagged downstream frames are passed through the mapper transparently.

DSCP to P-bit mapping: This attribute is valid when the unmarked frame option attribute is set to 0. The DSCP to P-bit attribute can be considered a bit string sequence of 64 3-bit groupings. The 64 sequence entries represent the possible values of the 6-bit DSCP field. Each 3-bit grouping specifies the P-bit value to which the associated DSCP value should be mapped. The unmarked frame is then directed to the GEM interworking termination point indicated by the interwork TP pointer mappings. (R, W) (mandatory) (24 bytes)

NOTE 2 – If certain bits in the DSCP field are to be ignored in the mapping process, the attribute should be provisioned such that all possible values of those bits produce the same P-bit mapping. This can be applied to the case where instead of full DSCP, the operator wishes to adopt the priority mechanism based on IP precedence, which needs only the three MSBs of the DSCP field.

Default P-bit marking: This attribute is valid when the unmarked frame option attribute is set to 1. In its least significant bits, the default P-bit marking attribute contains the default PCP field to be assumed. The unmodified frame is then directed to the GEM interworking termination point indicated by the interwork TP pointer mappings. (R, W, Set-by-create) (mandatory) (1 byte)

18) Clause 9.3.11, VLAN tagging filter data

a) *Replace the description of the "Forward operation" attribute with the following text:*

Forward operation: When a frame passes through the MAC bridge port, it is processed according to the operation specified by the forward operation table. Figure 9.3.11-2 illustrates the treatment of frames according to the provisioned action possibilities. Tagged and untagged frames are treated separately, but both in accordance with the figure. While all forwarding operations are plausible, only actions 0x10 and 0x12 are necessary to construct a VLAN mapper and an 802.1p mapper, respectively. (R, W, Set-by-create) (mandatory) (1 byte)

Forward operation	Type of received frame	
	Tagged	Untagged
0x00	Bridging (a) (no investigation)	Bridging (a)
0x01	Discarding (c)	Bridging (a)
0x02	Bridging (a) (no investigation)	Discarding (c)
0x03	Action (h) (VID investigation)	Bridging (a)
0x04	Action (h) (VID investigation)	Discarding (c)
0x05	Action (g) (VID investigation)	Bridging (a)
0x06	Action (g) (VID investigation)	Discarding (c)
0x07	Action (h) (user priority investigation)	Bridging (a)
0x08	Action (h) (user priority investigation)	Discarding (c)
0x09	Action (g) (user priority investigation)	Bridging (a)
0x0A	Action (g) (user priority investigation)	Discarding (c)
0x0B	Action (h) (TCI investigation)	Bridging (a)
0x0C	Action (h) (TCI investigation)	Discarding (c)

Forward operation	Type of received frame	
	Tagged	Untagged
0x0D	Action (g) (TCI investigation)	Bridging (a)
0x0E	Action (g) (TCI investigation)	Discarding (c)
0x0F	Action (h) (VID investigation)	Bridging (a)
0x10	Action (h) (VID investigation)	Discarding (c)
0x11	Action (h) (user priority investigation)	Bridging (a)
0x12	Action (h) (user priority investigation)	Discarding (c)
0x13	Action (h) (TCI investigation)	Bridging (a)
0x14	Action (h) (TCI investigation)	Discarding (c)
0x15	Bridging (a) (no investigation)	Discarding (c)
0x16	Action (j) (VID investigation)	Bridging (a)
0x17	Action (j) (VID investigation)	Discarding (c)
0x18	Action (j) (user priority investigation)	Bridging (a)
0x19	Action (j) (user priority investigation)	Discarding (c)
0x1A	Action (j) (TCI investigation)	Bridging (a)
0x1B	Action (j) (TCI investigation)	Discarding (c)
0x1C	Action (k) (VID investigation)	Bridging (a)
0x1D	Action (k) (VID investigation)	Discarding (c)
0x1E	Action (k) (user priority investigation)	Bridging (a)
0x1F	Action (k) (user priority investigation)	Discarding (c)
0x20	Action (k) (TCI investigation)	Bridging (a)
0x21	Action (k) (TCI investigation)	Discarding (c)

The table contains duplicate entries due to simplification of the original set of actions.

This table and the actions are discussed in detail below.

b) Replace the **"Supplementary explanation"** with the following text:

Supplementary explanation

This clause explains the actions specified in the forward operation attribute.

The format of an Ethernet frame for VLAN services is described in [IEEE 802.1Q]:

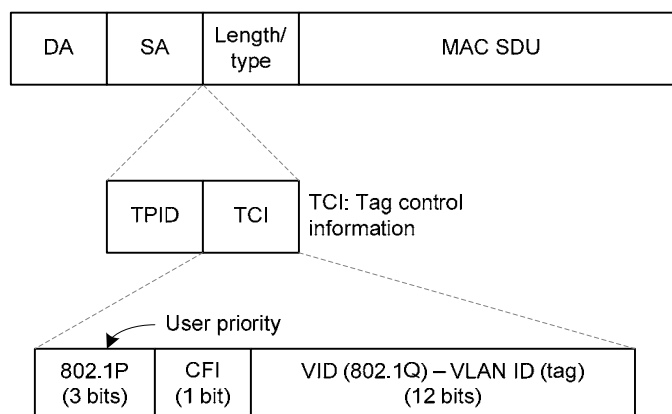


Figure 9.3.11-1 – Format of an Ethernet frame for VLAN services

a) **Basic MAC bridge operation:**

All frames are accepted into the MAC bridging entity. Egress frames are forwarded from this port if either: a) the frame's MAC destination address (DA) is listed in the MAC bridge port bridge table data for this port; or b) the frame's DA does not appear in the MAC bridge port bridge table data for any port (flooding). The content of the VLAN filter list attribute is not meaningful.

NOTE – Action (a) on a given port may imply egress flooding of a frame from other ports of the bridge. The possible VLAN tagging filter data MEs attached to the other ports override this action; however, so the frame is only transmitted from some other port if it also satisfies the forward operation attribute value established on that port.

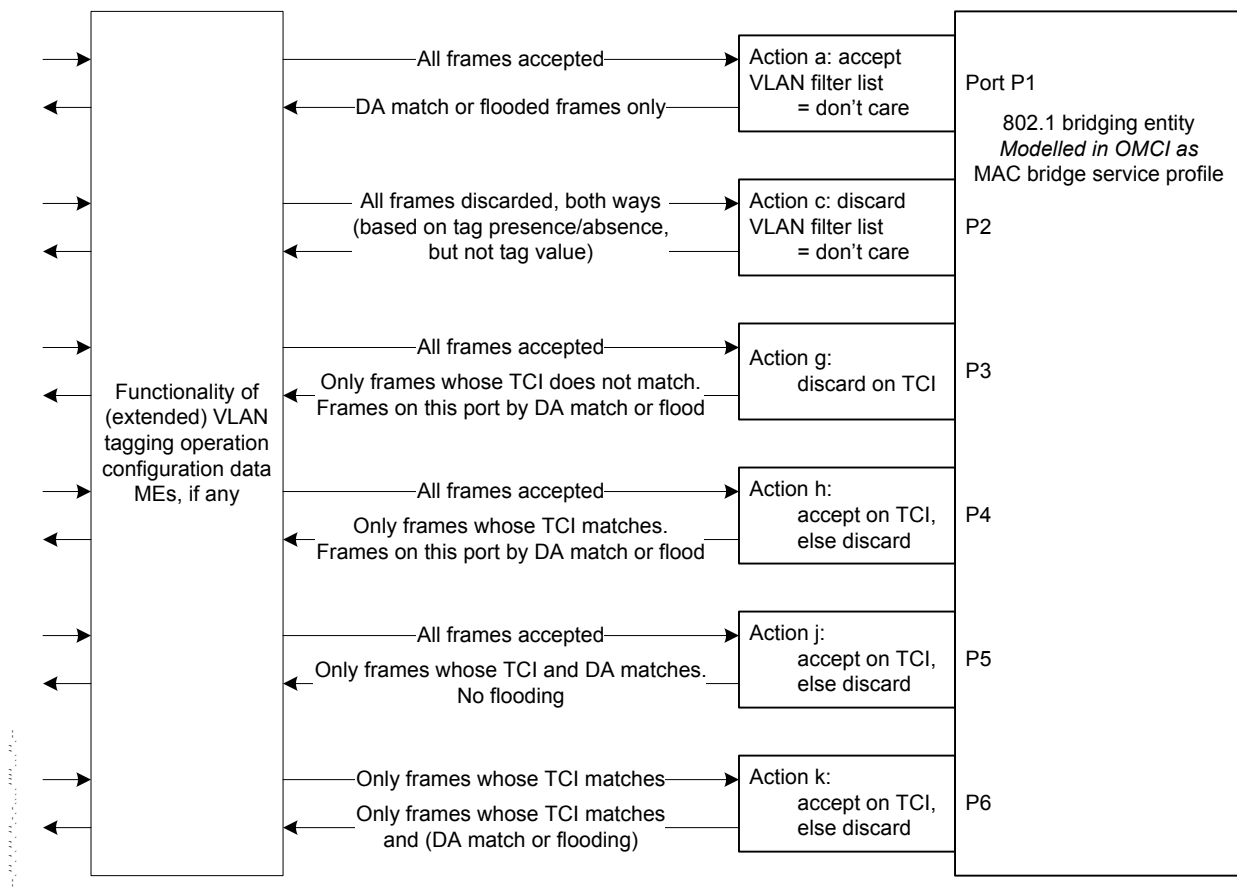


Figure 9.3.11-2 – Forwarding behaviour

Other possible actions are as follows:

c) **Unconditional discarding:**

Frames in both directions are unconditionally discarded without investigation of TCI or MAC address. This action can be used to discard all tagged traffic or all untagged traffic at the port of attachment, depending on the code point in the table. The content of the VLAN filter list attribute is not meaningful.

g) **Negative filtering by TCI:**

All frames are admitted into the bridging entity. If the specified fields in the TCI of a candidate egress frame match any entry in the VLAN filter list, the frame is not forwarded by this port. Otherwise, the frame is forwarded based on destination MAC address, according to action (a).

- h) **Positive filtering by TCI and dropping for no match:** All frames are admitted into the bridging entity. If the specified fields in the TCI of a candidate egress frame match any entry in the VLAN filter list, the frame is forwarded based on destination MAC address, according to action (a). If there is no match of the specified TCI fields, the frame is discarded.
- j) **Positive filtering by TCI and DA:** All frames are admitted into the bridging entity. If the specified fields in the TCI of a candidate egress frame match any entry in the VLAN filter list, the frame is forwarded based on destination MAC address. The frame is never flooded to this or other ports. If the specified TCI fields and DA do not both match, the frame is discarded.
- k) **Bidirectional positive filtering by TCI and dropping for no match:** Both ingress and egress frames are filtered on investigation of TCI fields. If the specified fields in the TCI of a candidate ingress/egress frames match any entry in the VLAN filter list, the frame is forwarded based on destination MAC address, according to action (a). If there is no match of the specified TCI fields, the frame is discarded.

(Action codes b, d, e, f are not used.)

19) Clause 9.3.12, VLAN tagging operation configuration data

Replace:

Relationships

Zero or one instance of this managed entity may exist for an instance of any managed entity that can terminate or modify an Ethernet stream. By definition, tagging operation occurs farther away from the MAC bridge than filtering.

With:

Relationships

Zero or one instance of this managed entity may exist for an instance of any managed entity that can terminate or modify an Ethernet stream.

When this managed entity is associated with a UNI-side termination point, it performs its upstream classification and tagging operations before offering the upstream frame to other filtering, bridging or switching functions. In the downstream direction, the defined inverse operation is the last operation performed on the frame before offering it to the UNI-side termination.

When this managed entity is associated with an ANI-side termination point, it performs its upstream classification and tagging operations as the last step before queuing for transmission to the OLT, after having received the upstream frame from other filtering, bridging or switching functions. In the downstream direction, the defined inverse operation is the first operation performed on the frame before offering it to possible filter, bridge or switch functions.

20) Clause 9.3.13, Extended VLAN tagging operation configuration data

a) Replace:

Relationships

Zero or one instance of this managed entity may exist for an instance of any managed entity that can terminate or modify an Ethernet stream. By definition, tagging operation occurs farther away from the MAC bridge than filtering.