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TELECOMMUNICATION
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G.8010/Y.1306

Amendment 1
(05/2006)

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

Ethernet over Transport aspects – General aspects

SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS

Internet protocol aspects – Transport

Architecture of Ethernet layer networks

Amendment 1

ITU-T Recommendation G.8010/Y.1306 (2004) –
Amendment 1



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ITU-T Recommendation G.8010/Y.1306

Architecture of Ethernet layer networks

Amendment 1

Summary

This amendment contains additional material to be incorporated into ITU-T Recommendation G.8010/Y.1306. It presents the architectural aspects of Ethernet OAM.

Source

Amendment 1 to ITU-T Recommendation G.8010/Y.1306 (2004) was approved on 22 May 2006 by ITU-T Study Group 15 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation G.8010/Y.1306

Architecture of Ethernet layer networks

Amendment 1

1 Scope

This amendment provides updated material pertaining to the architecture of the Architecture for Ethernet Layer Networks as described in ITU-T Rec. G.8010/Y.1306. It presents the architectural aspects of Ethernet OAM.

2 References

- ITU-T Recommendation G.8010/Y.1306 (2004), *Architecture for Ethernet layer networks*.

3 Conventions

This amendment contains changes to ITU-T Rec. G.8010/Y.1306.

Some of this material is new material, while some represents modifications to existing material in the original Recommendation.

4 Changes to ITU-T Rec. G.8010/Y.1306

The following clauses contain changes to be made to G.8010/Y.1306.

4.1 Clause 1, Scope

Delete the last paragraph in this clause.

4.2 Clause 2, References

Add the following references:

- ITU-T Recommendation G.7710/Y.1701 (2001), *Common equipment management function requirements*.
- ITU-T Recommendation G.8001/Y.1354 (2006), *Terms and definitions for Ethernet frames over Transport(EoT)*.
- ITU-T Recommendation G.8011/Y.1307 (2004), *Ethernet over Transport – Ethernet services framework*.
- ITU-T Recommendation G.8021/Y.1341 (2004), *Characteristics of Ethernet transport network equipment functional blocks*.
- ITU-T Recommendation X.731 (1992), *Information technology – Open Systems Interconnection – Systems management: State management function*.
- ITU-T Recommendation Y.1731 (2006), *OAM functions and mechanisms for Ethernet based networks*.

4.3 Clause 3, Definitions

Add the following definitions:

3.3.2 maintenance entity group: A maintenance entity group is defined, for the purpose of fragment/connection monitoring, between a set of flow/connection points within a fragment/connection. This set of flow/connection points may be located at the boundary of one administrative domain or a protection domain, or at the boundaries of two adjacent administrative domains. The maintenance entity group consists of one or more maintenance entities.

3.3.3 maintenance entity: The entity between two of the flow/connection points in a maintenance entity group.

3.3.4 maintenance entity group end point compound sink function: A compound transport processing function which accepts the characteristic information of the layer network at its input, extracts and processes the OAM information related to the maintenance entity group's monitoring, filters the OAM information from within to the maintenance entity group, adapts the information and presents it as the characteristic information of the layer or a client layer at its output, potentially as a (client) layer maintenance signal (e.g., AIS).

3.3.5 maintenance entity group end point compound source function: A compound transport processing function which accepts the characteristic information of the layer or a client layer network at its input, adapts that information, filters it for OAM information interfering with its own OAM information, adds OAM information to allow the maintenance entity group to be monitored and presents the resulting information at its output.

3.3.6 maintenance entity group intermediate point compound function: A compound transport processing function which accepts the characteristic information of the layer network at its input, reacts to OAM information related to the maintenance entity group's on-demand monitoring and presents the characteristic information without the OAM it reacted to at its output.

3.3.7 proactive monitoring: A method to continuously infer the status and performance of a maintenance entity group with the purpose to detect disturbances, faults and degradations immediately after their occurrence in order to verify the service level agreement and/or initiate recovery actions to restore the service to the guaranteed level.

3.3.8 on-demand monitoring: A method to infer a specific status or performance characteristic of a maintenance entity or a set of maintenance entities within a maintenance entity group at a specific point in time with the purpose to obtain a snapshot of the performance, or to diagnose an identified fault condition or performance degradation.

3.3.9 ETH_CI group: A group of ETH_CI signals that is monitored as a single MEG. For this purpose, ETH OAM is added to one of the ETH_CI signals in the group.

3.3.10 ETH path: The highest ETH MEG level in a set of eight MEG levels.

3.3.11 ETH tandem connection: An intermediate ETH MEG level in a set of eight MEG levels.

3.3.12 ETH section: The lowest ETH MEG level in a set of eight MEG levels.

4.4 Clause 4, Abbreviations

a) Modify the following abbreviation:

ETH Ethernet ~~MAC~~-layer network

b) Add the following new abbreviations alphabetically:

1DM One-way delay measurement

AIS Alarm Indication Signal

APS Automatic Protection Switching

CCM	Connectivity Check Message
DA	Destination MAC address
DMM	Delay Measurement Message
DMR	Delay Measurement Reply
EC	Ethernet Connection
ETHDe	ETH Diagnostic function within ETH _x MEP
ETHDi	ETH Diagnostic function within ETH _x MIP
ETHG	ETH Group
ETH _x	ETH at level x (x = path, tandem connection, section)
LBM	Loopback Message
LBR	Loopback Reply
LCK	Locked
LMM	Loss Measurement Message
LMR	Loss Measurement Reply
LTM	Link Trace Message
LTR	Link Trace Reply
MEG	Maintenance Entity Group
MEL	Maintenance Entity Group Level
MEP	Maintenance entity group End Point
MIP	Maintenance entity group Intermediate Point
PDU	Protocol Data Unit
SA	Source MAC Address
TCS	Traffic Conditioning and Shaping
TST	Test PDU

4.5 Clause 5, Conventions

- a) *Change the numbers of Figures 1 and 2 to 5-1 and 5-2.*
- b) *Change the number and the symbol of the unidirectional traffic conditioning function in Figure 3 to a traffic conditioning and shaping function as follows:*

The diagrammatic convention for a unidirectional traffic conditioning and shaping function is shown in Figure 5-3. The TCS sink function provides the traffic conditioning process. The TCS source function provides the shaping process.

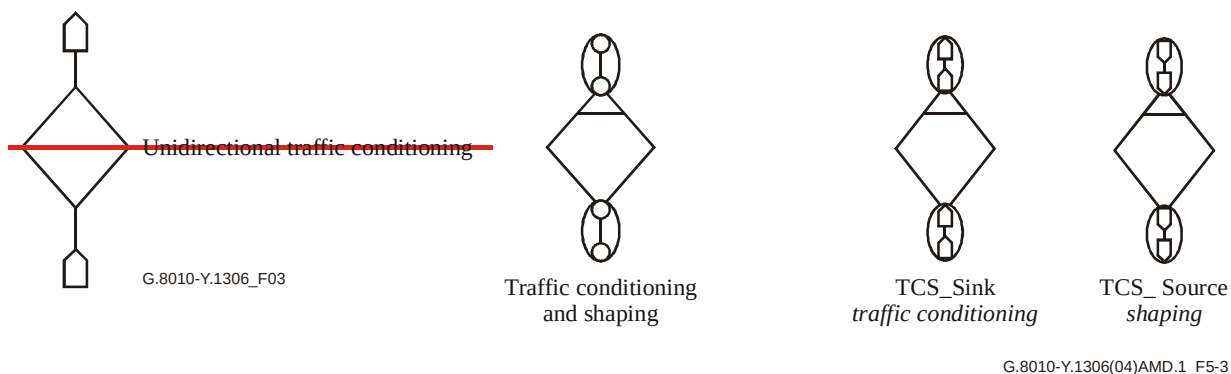


Figure 5-3 – Diagrammatic convention for ~~unidirectional~~ traffic conditioning and shaping function

c) Add the following new conventions:

The diagrammatic convention for a MEG end point (MEP) compound function is shown in Figure 5-4.

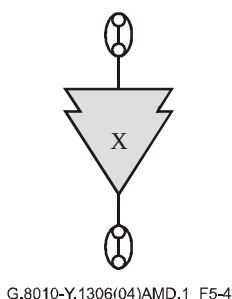


Figure 5-4 – Diagrammatic convention for MEG end point (MEP) compound function

The diagrammatic convention for a MEG intermediate point (MIP) compound function is shown in Figure 5-5.

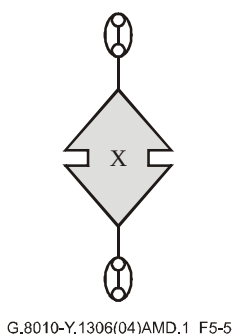


Figure 5-5 – Diagrammatic convention for MEG intermediate point (MIP) compound function

4.6 Clause 6, Functional architecture of Ethernet transport networks

- a) Delete the word "MAC" from the text in 6.2 and from the heading of 6.3.
- b) Modify the second and third paragraphs in 6.3.1 as follows:

~~The ETH_CI traffic unit consists of the following set of signals: Destination Address (DA), Source Address (SA), MAC Service Data Unit (M_SDU) with optional Priority (P).~~

The ETH CI consists of the following set of signals: ETH CI Data (D), ETH CI Priority (P), ETH CI Drop Eligibility (DE), ETH CI Server Signal Fail (SSF) and optionally ETH CI Automatic Protection Switching (APS). The ETH CI D signal carries the traffic unit that consists of the following fields: Destination Address (DA), Source Address (SA) and MAC Service Data Unit (M SDU).

The ETH_CI traffic unit is transported over an ETH FPP Link within a link-specific frame or packet, of which the generic format is depicted in Figure 5. The Priority and Drop Eligibility signals may be transported implicitly or explicitly.

Refer to Appendix IV for further considerations on ETH_CI.

- c) Add the following new text at the end of clause 6.3.2.2 ETH flow domain:

NOTE – The description of split-horizon functionality in an ETH flow domain is for further study.

- d) Delete in Figure 8 in clause 6.3.2.5.2 and in Figure 9 in clause 6.3.2.5.3 the second ETH_TFP input and output ports on the two top left ETH_FT_So/Sk functions. Each ETH_FT function can have only one ETH_TFP.
- e) Replace the text in clause 6.3.4.1 ETH flow termination function by a reference to clause 7.5.1.
- f) Modify the text in and title of clause 6.3.4.2 "ETH traffic conditioning function" as follows:

6.3.4.2 ETH traffic conditioning and shaping function

The bidirectional ETH traffic conditioning and shaping (ETH_TCS) function is performed by a co-located pair of ETH traffic conditioning and shaping source (ETH TCS So) and sink (ETH TCS Sk) functions.

The ETH TCS So function performs the following shaping processes:

- For further study.

The ETH TCS Sk function performs the following traffic conditioning processes:

- Classification: This process classifies each ETH_CI traffic unit.
- Metering: This process meters every ETH_CI traffic unit within its class in order to determine the eligibility of the ETH_CI traffic unit.
- Marking: This process ~~and~~ sets the ~~drop precedence~~ drop precedence eligibility if applicable.
- Policing: This process disposes of the ETH_CI traffic unit according to the result from the metering process. There are only two dispositions for an ETH_CI traffic unit, passing to the ETH_FP or discarding.

~~The ETH_TCS traffic conditioning function is assigned on a per ETH_FPP basis, as shown in Figure 277-16. The ETH_FPP may include a single ETH_FP or multiple ETH_FPs.~~

~~The ETH traffic conditioning function may also be assigned to a group of ETH_FPs. This configuration allows the possibility of traffic conditioning based on the ETH_CI traffic units of multiple ETH_FPs. This is for further study.~~

- a) Add ", source address" to the second dash item in 6.5.1.1 between "protocol ID" and "and destination". Add "– Generate the Priority and Drop Eligibility signals." between the second and third dash items.
- b) Add two extra dash items "– Insert the source address and destination address." and "– Generate the Priority and Drop Eligibility signals." between the first and second dash item in 6.5.1.2.
- c) Add a new clause 6.5.1.3 as follows:

6.5.1.3 ETH/MPLS and ETH/T-MPLS

The bidirectional ETH/MPLS adaptation (ETHP/MPLS_A) function is performed by a co-located pair of ETH/MPLS adaptation source (ETHP/MPLS_A_So) and sink (ETHP/MPLS_A_Sk) functions.

The bidirectional ETH/T-MPLS adaptation (ETHP/TM_A) function is performed by a co-located pair of ETH/T-MPLS adaptation source (ETHP/TM_A_So) and sink (ETHP/TM_A_Sk) functions.

NOTE – The server-specific processes for both functions are the same. The client-specific processes differ.

The ETHP/MPLS_A_So and ETHP/TM_A_So perform the following server-specific processes between its input and output:

- Type field encapsulation (0x8847 for unicast, per RFC 3032).
- Insert the source address and destination address.
- Generate the priority and drop eligibility signals.
- Output the frame towards the ETH_FT.

The ETHP/MPLS_A_Sk and ETHP/TM_A_Sk perform the following server-specific processes between its input and output:

- Verify that the DA field within a traffic unit contains the value of the local MAC address; otherwise discard the traffic unit.
- Remove the type field encapsulation.

6.5.2 Server/ETH adaptation

Modify the text in clause 6.5.2, **Server/ETH adaptation**, function as follows:

- a) Add the following sentence at the end of the second paragraph:

The server-specific processes are associated with the aggregate stream of traffic units.

- b) Extend the last sentence of the first paragraph after Figure 15 as follows:

. . . or an ETH_x ($x = P, T, S$) flow termination or adaptation function as introduced in 7.5 and specified in ITU-T Rec. G.8021/Y.1341.

- c) After Figure 16, add the following new paragraph:

NOTE – The SRV/ETH-m_A function may be expanded into a SRV/ETH_A, ETH_x_FT and ETH_x/ETH-m_A function when the aggregate (all-to-one) signal requires fragment/connection monitoring. An SRV/ETH-m adaptation function is *not* capable of originating and terminating proactive ETH OAM signals and of originating, responding to and terminating on-demand ETH OAM signals. It is deployed for the case where all-to-one fragment/connection monitoring is not applicable.

- d) Add between the first and second bullet item in 6.5.2, the following additional bullet item:
 - For the case of the Srv/ETH_A_So function, insert a Priority-Tag to encode the ETH_CI_P and ETH_CI_DE information as appropriate.
- e) Delete the bullet item "• Optionally generate and insert IEEE 802.3 protocol (e.g., PAUSE) ETH_CI traffic units."

f) *Add the following sentence at the end of the fifth bullet item in 6.5.2:*

This may include the optional generation and insertion of IEEE 802.3 protocol (e.g., PAUSE) ETH_CI traffic units.

g) *Add the following sentence at the end of the sixth bullet item in 6.5.2:*

"This may include the optional termination and processing of IEEE 802.3 protocol ETH_CI traffic units (e.g., PAUSE)."

h) *Delete the bullet item "• Optionally terminate IEEE 802.3 protocol ETH_CI traffic units. (e.g., PAUSE)".*

i) *Add before the last bullet item in 6.5.2 the following additional bullet item:*

"• On detection of a Signal Fail condition, block the ETH_CI traffic units and insert the ETH-AIS signal at the client's MEG level. ETH-AIS insertion can be disabled; e.g., when the client MEG is under control of a spanning tree protocol."

j) *Add between "ETH_CI" and "traffic unit" in the last bullet item in subclause 6.5.2 the words "or ETH-AIS".*

k) *Add before the first bullet item in 6.5.2.1.1 the following additional bullet item:*
"– Optionally generate and insert IEEE 802.3 protocol (e.g., PAUSE) traffic units."

l) *Add after the last bullet item in 6.5.2.1.1 the following additional bullet item:* "– Optionally terminate IEEE 802.3 protocol traffic units."

m) *Replace (twice) the words "the appropriate Recommendation" in the text in 6.5.2.2.1 SDH Path/ETH adaptation by "ITU-T Rec. G.8012/Y.1308".*

n) *Replace (twice) the references to G.7041/Y.1303 in the text in 6.5.2.2.2 OTN Path/ETH adaptation by "G.8012/Y.1308".*

o) *Modify the text in 6.5.2.2.3 MPLS Path/ETH adaptation as follows:*

6.5.2.2.3 MPLS path/ETH and T-MPLS/ETH adaptation

The adaptation to the MPLS and T-MPLS path layer networks is performed in MPLS/ETH and T-MPLS/ETH adaptation (MPLS/ETH_A, TM/ETH_A) functions. The MPLS/ETH_A and TM/ETH_A ~~is~~are considered to consist of two types of processes: client-specific processes and server-specific processes. The description of the server-specific processes for MPLS/ETH adaptation is outside the scope of this Recommendation. The description of the server-specific processes for T-MPLS/ETH adaptation is specified in ITU-T Rec. G.8110.1/Y.1370.1.

The bidirectional MPLS/ETH and T-MPLS/ETH adaptation function is performed by a co-located pair of source and sink MPLS/ETH and T-MPLS/ETH adaptation functions.

The MPLS/ETH and T-MPLS/ETH adaptation source (MPLS/ETH_A_So, TM/ETH_A_So) function performs (in addition to the server layer non-specific processes as described in 6.5.2) the following server-layer related specific processes:

- Map the ETH_CI traffic unit in the ETH over MPLS specific frame as specified in ITU-T Rec. G.8012/Y.1308.
- Map the ETH over MPLS link specific frame in the payload of the MPLS packet.

The MPLS/ETH and T-MPLS/ETH adaptation sink (MPLS/ETH_A_Sk, TM/ETH_A_Sk) function performs (in addition to the server-layer non-specific processes as described in 6.5.2) the following server-layer related specific process:

- Extract ETH_CI traffic units from the MPLS or T-MPLS payload field.

4.7 Additions to Clause 7, Ethernet network management

Replace the text in clause 7 with:

This clause describes network management for the Ethernet transport network. In particular, it describes the maintenance entities, maintenance entity supervision techniques and layer network management requirements for fault, performance and configuration management, management communications and client/server interaction management.

Generic fault, configuration and performance management

The Ethernet transport network shall provide support for fault, configuration and performance management end-to-end and also within and between administrative boundaries.

It shall provide a means of detection and notification in the event of a misconnection.

The Ethernet transport network shall provide facilities to detect faults, isolate faults and initiate recovery actions where applicable. The Ethernet transport network shall provide facilities for single-ended maintenance.

In the event of a signal within the server layer being interrupted, upstream and downstream network entities in the server layer shall be notified.

The Ethernet transport network shall be able to detect performance degradations to avoid failures and verify quality of service.

Generic management communications

The Ethernet transport network shall support communications between:

- OSs and remote NEs;
- craft terminals and local or remote NEs.

These forms of communication may also be supported externally to the Ethernet transport network.

4.8 Additions to subclause 7.1, Ethernet maintenance entities

Modify the title of subclause 7.1 as follows:

7.1 Ethernet maintenance entities groups

Modify 7.1 as follows:

The ETH layer network may contain multiple administrative domains: e.g., user, service provider and one or more network operator domains. Each of these administrative domains has an associated maintenance entity group located between a ~~pair-set~~ of ETH flow points at the boundaries of that ETH layer network administrative domain. Maintenance entities groups also exist between a ~~pair~~ set of ETH flow points at the boundary of two adjacent ETH layer network administrative domains. Figures ~~23-7-1~~ (top left, bottom) and ~~24-7-2~~ illustrate such ETH layer network administrative domain maintenance entities and maintenance entity groups for the point-to-point and multipoint connection/fragment cases.