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Study Group:	15 **Working Party:** 3	**Intended type of document** (R-C-TD):wd	19r2
Source:	Editors G.8121		
Title:	Draft revised G.8121 (Version 0.4)		

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Please don't change the structure of this table, just insert the necessary information.

Abstract

This WD is the latest draft G.8121 as posted TD332/3 (05/2010) that was not opened and discussed in the last plenary meeting.

Updated draft is issued as r1 and r2 where following wds are captured for input drafting:

Clause 6.1: WD20

Clause 8.1: WD21 (based on wd12 & 13)

Clause 8.2 to 8.5: WD16

Clause 9.2: WD28 (note: editors are still checking what to be captured or modified) → r2

Clause 9.3: WD17

Clause 9.4: WD22 (+ some proposal from the editor)

Others: Reference was reviewed per WD07

[Ed note:No contributions received to address BFD based processes. Contribution are invited]

Note: WD17 (APS, Multipoint APs) {18, 26}, 24 will be captured to LL of G.8121 as WD32.

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INTERNATIONAL TELECOMMUNICATION UNION

TELECOMMUNICATION STANDARDIZATION SECTOR

STUDY PERIOD 2009-2012

STUDY GROUP 15

TD 332 (WP 3/15)

English only

Original: English

Question(s): 9/15 Geneva, 31 May - 11 June 2010

TEMPORARY DOCUMENT

Source: Editor G.8121

Title: Draft revised G.8121

Introduction

This document presents the draft revision to G.8121 (Published on 03/2006 with Corrigendum1 on 12/2006 and Amendment 1 on 10/2007).

Document History:

Version	Date	Summary of updates
0.1	May, 2009 (as updated Wd9r5 & TD182/3)	- Replace "T-MPLS" by "MPLS-TP" in text - Use MT as acronym for Layer functions, symbols and Interfaces, instead of "TM" - Add second paragraph in clause 1 - OAM and defects related description as in Clause 6, 8 and 9 (as marked gray) have been kept as current G.8121 (i.e. nothing but T-MPLS & TM changed), even if editors proposed texts in align with mpls-tp-oam-fwk. They will be revised when mpls-tp-oam-fwk and/or G.mplstpoam are enough for input. - Put clarification for Figure 1 & Figure 9 to indicate that only Ethernet is client. - Clarify the description of clause 6.3 - Put editors note in Clause 3 & 4 - Comments from Q14 such as LCK & pseudo code are captured - G.8114 & Y.1711 (Label 14) related description removed in r5
0.2	Apr, 2010	- Added/modified some references such as RFCs and IETF I-Ds in clause 2 - Added some abbreviations in align with updated RFCs - Put some notes for proposal of remove or modify, since they are related to Y.1711 based OAM terminologies are found (See Marked as Gray with diffmark) or not referred in this document
0.2.1	Apr, 2010	- Put some editors' notes per contributions and drafting results (see next page) - Added/modified some references such as IETF I-Ds in clause 2 and bibliography per wd25rx (will be added/modified after wd25rx is approved)
0.3	May, 2010	- Added/modified some references per wd25r6
0.4	Nov, 2010	- Updated following clauses - Clause 6.1: WD20 - Clause 8.1: WD21 - Clause 8.2 to 8.5: WD16 - Clause 9.2: WD28 Clause 9.3: WD17 - Clause 9.4: WD22 (+ some proposal from the editor) - Reference per wd07r1

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International Telecommunication Union

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TELECOMMUNICATION
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G.8121/Y.1381

(03/2006)
Corrigendum (12/2006)
Amendment (10/2007)

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

Ethernet over Transport aspects – MPLS over Transport aspects

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

Internet protocol aspects – Transport

Characteristics of MPLS-TP equipment functional blocks

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ITU-T Recommendation G.8121/Y.1381

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
ETHERNET OVER TRANSPORT ASPECTS	G.8000–G.8999
General aspects	G.8000–G.8099
MPLS over Transport aspects	**G.8100–G.8199**
Quality and availability targets	G.8200–G.8299
ACCESS NETWORKS	G.9000–G.9999

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

ITU-T Recommendation G.8121/Y.1381

Characteristics of MPLS-TP equipment functional blocks

Summary

This Recommendation specifies both the functional components and the methodology that should be used in order to specify MPLS-TP layer network functionality of network elements; it does not specify individual MPLS-TP network equipment as such.

Source

ITU-T Recommendation G.8121/Y.1381 was approved on 29 March 2006 by ITU-T Study Group 15 (2005-2008) under the ITU-T Recommendation A.8 procedure.

Keywords

Atomic functions, equipment functional blocks, MPLS-TP layer network, MPLS-TP.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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

INTELLECTUAL PROPERTY RIGHTS

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

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

ITU-T Recommendation G.8121/Y.1381

Characteristics of MPLS-TP equipment functional blocks

1 Scope

This Recommendation describes both the functional components and the methodology that should be used in order to describes MPLS-TP layer network functionality of network elements; it does not describe individual MPLS-TP network equipment as such.

This Recommendation is compliant with the transport profile of MPLS as defined by the IETF. In the event of a misalignment in MPLS-TP related architecture, framework, and protocols between this ITU-T Recommendation and the referenced IETF RFCs, the RFCs will take precedence. This Recommendation forms part of a suite of Recommendations covering the full functionality of network equipment. These Recommendations are ITU-T Recs G.806 (Conventions and Generic Equipment Functions), G.798 (OTN functions), G.783 (SDH functions), G.705 (PDH functions), G.781 (Synchronization functions), I.732 (ATM functions), G.8021/Y.1341 (ETH functions), G.7710/Y.1701, G.784 and G.874 (Management functions). This Recommendation also follows the principles defined in ITU-T Rec. G.805.

[Note: Recommendations marked grey are not covered at this of time. Proposed to remove]

These Recommendations specify a library of basic building blocks and a set of rules by which they may be combined in order to describe digital transmission equipment. The library comprises the functional building blocks needed to specify completely the generic functional structure of the MPLS-TP layer network. In order to be compliant with this Recommendation, equipment needs to be describable as an interconnection of a subset of these functional blocks contained within this Recommendation. The interconnections of these blocks should obey the combination rules given.

Not every atomic function defined in this Recommendation is required for every application. Different subsets of atomic functions may be assembled in different ways according to the combination rules given in this Recommendation to provide a variety of different capabilities. Network operators and equipment suppliers may choose which functions must be implemented for each application.

Figure 1 presents the set of atomic functions associated with the traffic signal transport. It is noted that this recommendation only defines Ethernet for the client of MPLS-TP as MT/ETH adaptation function.

[Ed note:No contributions received to address BFD based processes. Contribution are invited]

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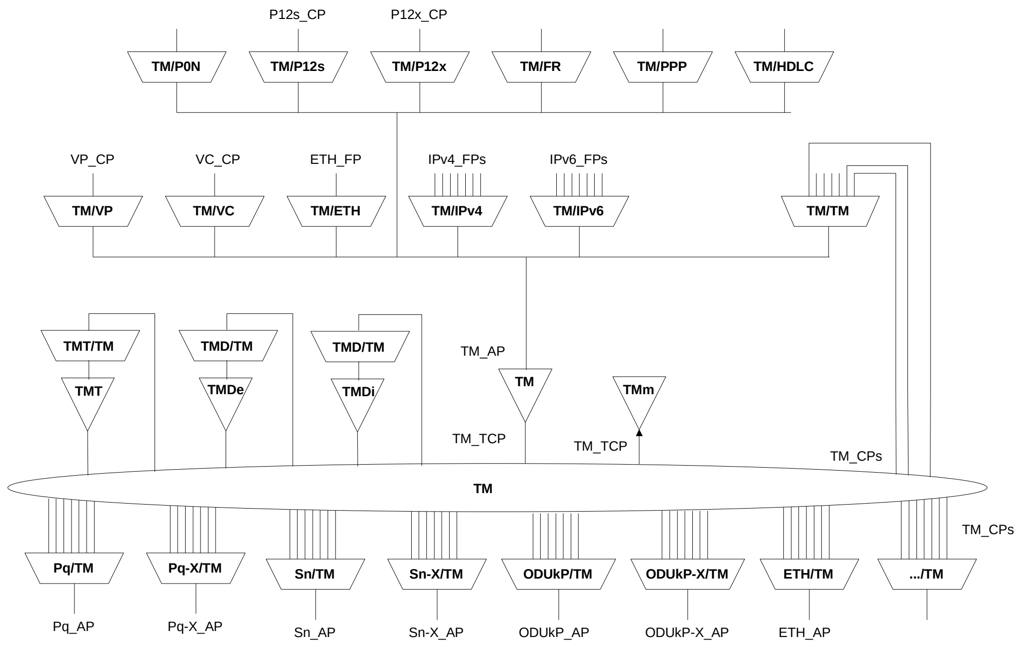

Figure 1/G.8121/Y.1381 – MPLS-TP atomic functions
[Replace TM by MT. Needs to clarify what is currently defined]

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2 References

[Note: It will be updated in September time after the relevant documents such as IETF RFCs/I-Ds are available/updated]

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

– ITU-T Recommendation G.705 (2000), *Characteristics of plesiochronous digital hierarchy (PDH) equipment functional blocks.*

– ITU-T Recommendation G.707/Y.1322 (2003), *Network node interface for the synchronous digital hierarchy (SDH).*

– ITU-T Recommendation G.709/Y.1331 (~~2003~~2009), *Interfaces for the Optical Transport Network (OTN).*

– ITU-T Recommendation G.780/Y.1351 (2004), *Terms and definitions for synchronous digital hierarchy (SDH) networks.*

– ITU-T Recommendation G.783 (2006), *Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks.*

– ITU-T Recommendation G.798 (12/2006), *Characteristics of optical transport network hierarchy equipment functional blocks*

– ITU-T Recommendation G.805 (2000), *Generic functional architecture of transport networks.*

– ITU-T Recommendation G.806 (2006), *Characteristics of transport equipment – Description methodology and generic functionality.*

– ITU-T Recommendation G.808.1 (2006), *Generic protection switching – Linear trail and subnetwork protection.*

– ITU-T Recommendation G.809 (2003), *Functional architecture of connectionless layer networks.*

– ITU-T Recommendation G.870/Y.1352 (2004), *Terms and definitions for Optical Transport Networks (OTN).*

– ITU-T Recommendation G.8101/Y.1355 (2010), *Terms and definitions for MPLS transport profile* . [added in r2]

– ITU-T Recommendation G.8110/Y.1370 (2005), *MPLS layer network architecture.*

– ITU-T Recommendation G.8110.1/Y.1370.1 (2006), *Architecture of MPLS-TP (MPLS-TP) layer network.*

– ITU-T Recommendation G.8112/Y.1371 (2006), *Interfaces for the MPLS-TP (MPLS-TP) hierarchy.*– ITU-T Recommendation G.7041/Y.1303 (2005), *Generic framing procedure (GFP).*

– ITU-T Recommendation G.7042/Y.1305 (2006), *Link capacity adjustment scheme (LCAS) for virtual concatenated signals.*

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– ITU-T Recommendation G.8021/Y.1341 (20074), *Characteristics of Ethernet transport network equipment functional blocks.*

– ITU-T Recommendation Y.1415 (2005), *Ethernet-MPLS network interworking – User plane interworking.*

– ITU-T Recommendation G.8131/Y.1382 (2007), *Linear protection switching for MPLS-TP (MPLS-TP) networks*

- ITU-T Recommendation G.7043/Y.1343 (7/2004), *Virtual Concatenation of Plesiochronous Digital Hierarchy (PDH) signals.*

- ITU-T Recommendation G.8040/Y.1340 (9/2005), *GFP frame mapping into Plesiochronous Digital Hierarchy (PDH)*

– ITU-T Recommendation G.7712/Y.1703 (2010), *Architecture and specification of data communication network.*

– ITU-T Recommendation G.tpoam (201x), *Architecture and specification of data communication network* [Note: add when approved]

– ITU-T Recommendation G.8131/Y.1382 (201x), *Linear protection switching for MPLS-TP networks.* [Note: add when revised G.8131 is approved]

– ITU-T Draft Recommendation G.8132/Y.1383 (201x), *Ring protection switching for MPLS-TP networks.* [add when G.8132 is approved]

– IETF RFC 3031 (2001), *Multiprotocol label switching architecture.*

– IETF RFC 3032 (2001), *MPLS label stack encoding.*

– IETF RFC 3270 (2002), *Multi-Protocol Label Switching (MPLS) support of Differentiated Services.*

– IETF RFC 3443 (2003), *Time To Live (TTL) processing in Multi-Protocol Label Switching (MPLS) networks.*

– IETF RFC 5462 (2009), *Multiprotocol Label Switching (MPLS) Label Stack Entry: "EXP" Field Renamed to "Traffic Class" Field.*

[Note: RFCs are removed due to dependency on other Recommendations]

[Note: do we need RFC 4448 and RFC 4720 for clause 8?]

[Note: Listed RFCs above are required to verify whether listed or not listed by referring other Recommendations]

3 Definitions

[Note: It will be updated in September time after the relevant documents such as IETF RFCs/I-Ds are available/updated]

This Recommendation uses the following terms defined in ITU-T Rec. G.805:

3.1 access point

3.2 adapted information

3.3 characteristic information

3.4 client/server relationship

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3.5 connection

3.6 connection point

3.7 layer network

3.8 matrix

3.9 network

3.10 network connection

3.11 reference point

3.12 subnetwork

3.13 subnetwork connection

3.14 termination connection point

3.15 trail

3.16 trail termination

3.17 transport

3.18 transport entity

3.19 transport processing function

3.20 unidirectional connection

3.21 unidirectional trail

[Note: Following terms should be refer to G.8101 or other MPLS-TP recommendations. Update will be made by Feb 2010]

This Recommendation uses the following terms defined in RFC 3031:

3.22 label

3.23 label stack

3.24 label switched path

This Recommendation uses the following terms defined in RFC 3032:

3.25 Bottom of Stack

3.26 Time To Live

3.27 Label value

This Recommendation uses the following terms defined in RFC 3270:

3.28 Per-Hop Behaviour

This Recommendation uses the following terms defined in RFC 5586

3.29 Associated Channel Header

3.30 Generic Associated Channel

3.31 G-ACh Label

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4 Abbreviations

This Recommendation uses the following abbreviations:

AI	Adapted Information
AP	Access Point
BDI	Backward Defect Indication [Note: Aberration based on Y.1711 so propose to remove]
BIP	Bit Interleaved Parity [Note: Aberration based on Y.1711 so propose to remove]
CI	Characteristic Information
CII	Common Interworking Indicator
CP	Connection Point
CV	Connectivity Verification
DL	Defect Location [Note: Aberration based on Y.1711 so propose to remove]
DT	Defect Type [Note: Aberration based on Y.1711 so propose to remove]
FDI	Forward Defect Indication [Note: Aberration based on Y.1711 so propose to remove]
FFD	Fast Failure Detection [Note: Aberration based on Y.1711 so propose to remove]
FP	Flow Point
FTP	Flow termination point
LSP	Label Switched Path
MPLS	Multi-Protocol Label Switching
OAM	Operation, Administration and Maintenance
PHB	Per Hop Behaviour
PSC	PHB Scheduling Class
S	Bottom of Stack
SCC	Signalling Communication Channel
TCP	Termination Connection Point
TFP	Termination Flow Point
MPLS-TP	MPLS Transport Profile
TTL	Time-To-Live
TTSI	Trail Termination Source Identifier
ODU	Optical Channel Data Unit
ODUk	Optical Channel Data Unit – order k
ODUk-Xv	Virtual concatenated Optical Channel Data Unit – order k
OPU	Optical Payload Unit
OPUk	Optical Payload Unit of level k
OPUk-Xv	Virtually concatenated Optical Payload Unit of level k
OTH	Optical Transport Hierarchy

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P11s	1544 kbit/s PDH path layer with synchronous 125 µs frame structure according to ITU-T G.704
P12s	2048 kbit/s PDH path layer with synchronous 125 µs frame structure according to ITU-T G.704
P31s	34368 kbit/s PDH path layer with synchronous 125 µs frame structure according to ITU-T G.832
P32e	44 736 kbit/s PDH path layer with frame structure according to ITU T G.704
PSI	Payload Structure Indication
PT	Payload Type
RES	Reserved overhead
vcPT	virtual concatenation Payload Type
VcPLM	Virtual concatenation Payload Mismatch
TC	Traffic Class
ACH	Associated Channel Header
G-Ach	Generic Associated Channel
GAL	G-ACh Label
TLV	Type Length Value

5 Conventions

The diagrammatic convention for connection-oriented layer networks described in this Recommendation is that of ITU-T Rec. G.805.

6 Supervision

The generic supervision functions are defined in clause 6/G.806. Specific supervision functions for the MPLS-TP network are defined in this clause.

6.1 Defects

[Ed Note: Some of current text has dependency on draft G.tpoam & G.8110.1]

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6.1.1 Summary of Entry/Exit conditions for defects

The defect Entry and Exit conditions are based on events. Occurrence or absence of specific events may raise or reset specific defects.

In the following:

Valid means a received value is ***equal*** to the value configured via the MI input interface(s).

Invalid means a received value is ***not equal*** to the value configured via the MI input interface(s).

The events defined for this Recommendation are summarized in Table 6-1 as a quick overview.

Table 6-1/ G.8121/Y.1381 – Overview of Events

Event	Meaning

unexpMEG	Reception of a CCM packet with an invalid MEG value
unexpMEP	Reception of a CCM packet with an invalid MEP value
unexpPeriod	Reception of a CCM packet with an invalid Periodicity value, but with valid MEG and MEP values.
unexpPriority	Reception of a CCM packet with an invalid Priority value, but with valid MEG and MEP values.
expCCM[]	Reception of a CCM packet with valid MEG and MEP values.
RDI[]=x	Reception of a CCM packet with the RDI flag set to x; where x=0 (remote defect clear) and x=1 (remote defect set) .
LCK	Reception of an LCK packet
AIS	Reception of an AIS packet
BS	Bad Second, a second in which the Lost Packet Ratio exceeds the Degraded
Note1: APS related events are TBD Note2: The notation "expCCM[]" and "RDI[]" has been chosen for consistency with the equivalent terms in G.8021 for Ethernet technology.	

The occurrence or absence of these events may detect or clear a defect. An overview of the conditions is given in Table 6-2. The notation "#event=x (K*period)" is used to indicate the occurrence of x events within the period as specified between the brackets.

Table 6-2 gives a quick overview of the types of defects for MPLS-TP layer and the raising and clearing conditions for the these defects as described in [MPLS-TP OAM FWK];.

Table 6-2/ G.8121/Y.1381 – Overview of Detection and Clearing Conditions

Defect	**RFDIe Condition**	**Clearing Condition**
dLOC[]	#expCCM[]==0 (K*MI_CC_Period)	expCCM[]
dUNPr	unexpPriority	#unexpPriority==0 (K*CCM_Period)
dMMG	unexpMEG	#unexpMEG==0 (K* CCM _Period)
dUNM	unexpMEP	#unexpMEP==0 (K*CCM_Period)
dUNP	unexpPeriod	#unexpPeriod==0 (K*CCM_Period)
dRDI[]	RDI[]==1	RDI[]==0
dAIS	AIS	#AIS==0 (K*AIS_Period)
dLCK	LCK	#LCK==0 (K*LCK Period)
dDEG	FFS	FFS

6.1.2 Continuity Supervision

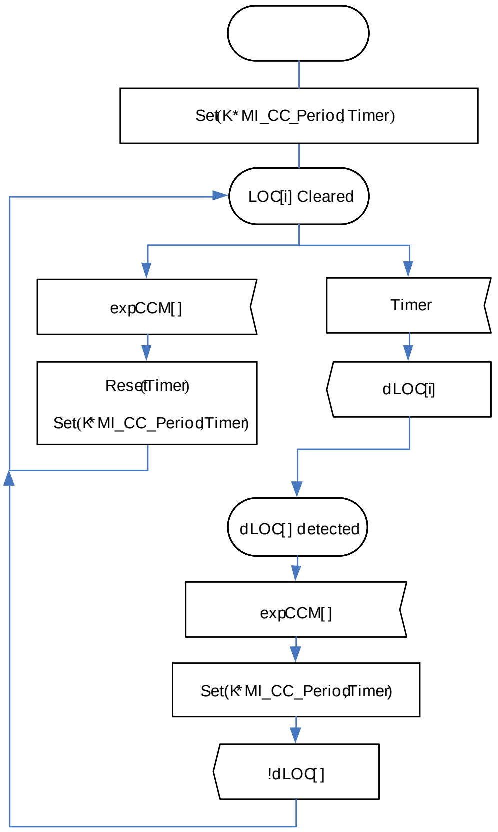

Figure 6-x/G.8121/Y.1381 – dLOC detection and clearance process

6.1.2.1 Loss Of Continuity defect (dLOC)

The Loss of Connectivity Verification defect is calculated at the MPLS-TP layer. It monitors the presence of continuity in MPLS-TP trails.

Its detection and clearance are defined in Figure 6-1.

[Ed note: Details will refer to *5.1.1.1. in [oam-fwk]*]

6.1.3 Connectivity Supervision

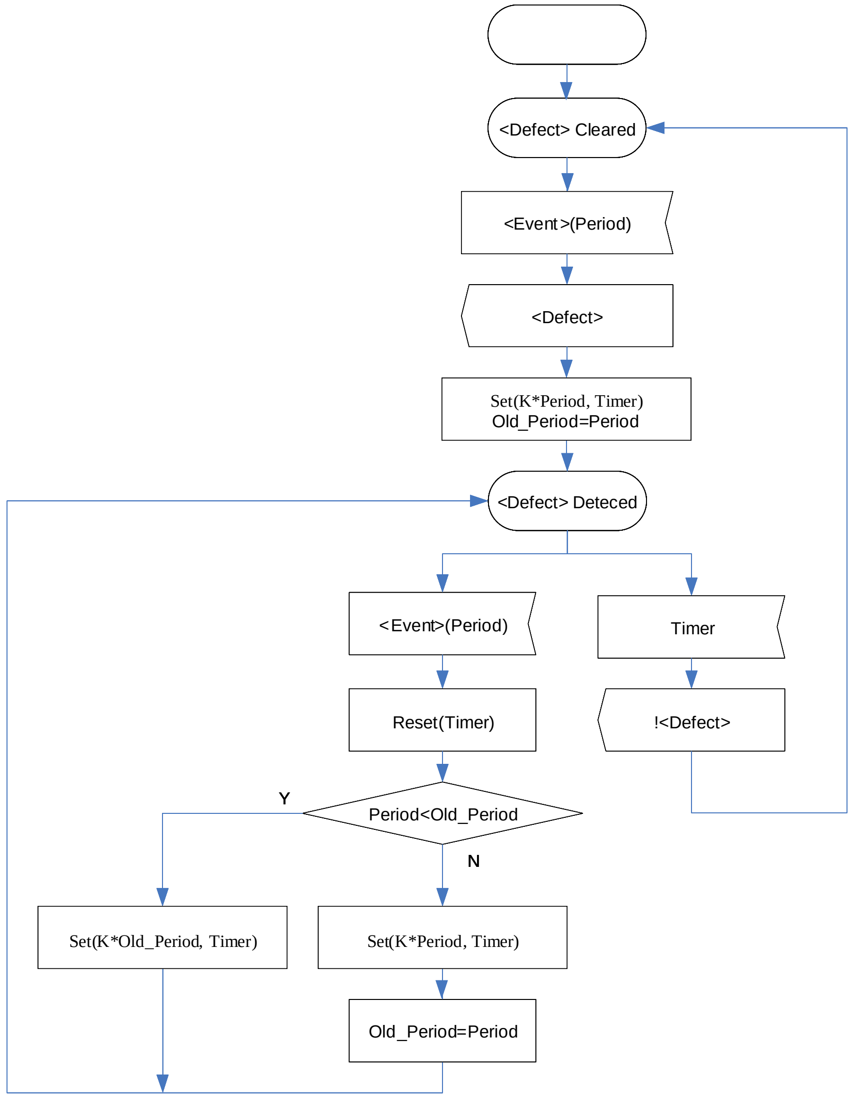

Figure 6-2/G.8021/Y.1341 – Defect detection and clearance process for dMMG, dUNM, dUNP, dUNPr, dAIS, dLCK

Figure 6-2 shows a generic state diagram that is used to detect and clear the dMMG, dUNM, dUNP, dUNPr, dAIS, dLCK defects. In this diagram <Defect> needs to be replaced with the specific defect and <Event> with the specific event related to this defect.

Figure 6-2 shows that the Timer is set based on the last received period value, unless an earlier CCM packet triggering <Event> (and therefore the detection of <Defect>) carried a longer period. As a consequence clearing certain defects may take more time than necessary.

6.1.3.1 Mismerge defect (dMMG)

The Mismerge defect detect is calculated at the MPLS-TP layer. It monitors the connectivity in a Maintenance Entity Group.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to *5.1.1.2. in [oam-fwk]* and/or G.806]

6.1.3.4 Unexpected MEP defect (dUNM)

The Unexpected MEP defect is calculated at the MPLS-TP layer. It monitors the connectivity in a Maintenance Entity Group.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to *5.1.1.2. in [oam-fwk]* and/or G.806]

6.1.3.5 Degraded Signal defect (dDEG)

The Degraded Signal defect is calculated at the MPLS-TP layer. It monitors the connectivity of a MPLS-TP Trail.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to G.806]

6.1.4 Protocol Supervision

6.1.4.1 Unexpected Periodicity defect (dUNP)

The Unexpected Periodicity defect is calculated at the MPLS-TP layer. It detects the configuration of different periodicities at different MEPs belonging to the same MEG.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to *5.1.1.3. in [oam-fwk]* and/or G.806]

6.1.4.2 Unexpected Priority defect (dUNPr)

The Unexpected Priority defect is calculated at the MPLS-TP layer. It detects the configuration of different Priorities for CCM at different MEPs belonging to the same MEG.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to G.806]

6.1.4.3 Protection protocol supervision

FFS

6.1.5 Maintenance Signal Supervision

6.1.5.1 Remote Defect Indicator defect (dRDI)

The Remote Defect Indicator defect is calculated at the MPLS-TP layer. It monitors the presence of an RDI maintenance signal.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to *5.2. in [oam-fwk]* and/or G.806]

6.1.5.2 Alarm Indicate Signal defect (dAIS)

The Alarm Indicate Signal defect is calculated at the MPLS-TP layer. It monitors the presence of an AIS maintenance signal.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to *5.3. in [oam-fwk]* and/or G.806]

6.1.5.3 Locked Defect (dLCK)

The Locked defect is calculated at the MPLS-TP layer. It monitors the presence of a Locked maintenance signal.

Its detection and clearance are defined Figure 6-2. Details are FFS.

[Ed note: Details will refer to *5.4. in [oam-fwk]* and/or G.806]

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[Note: This clause will be revised when [mpls-tp-oam-fwk] / G.mplstpoam available]

[Note: Clause 6.2 may be merged to 6.1 following to the development of [oam-fwk]/G/mplstpoam]

Note: the defect definitions in this sub-clause are applicable to TM_TT_Sk functions.

6.1.1 Nomenclature

The following terms are used in the criteria definition below:

- "expected packet":
  - in an LSP configured with CV: a CV packet with TTSI==ExTTSI
  - in an LSP configured with FFD: an FFD packet with TTSI==ExTTSI
- "unexpected FFD":
  - in an LSP configured with CV: any FFD packet
  - in an LSP configured with FFD: an FFD packet with TTSI≠ExTTSI
- "unexpected CV":
  - in an LSP configured with CV: a CV packet with TTSI≠ExTTSI
  - in an LSP configured with FFD: any CV packet
- "expected packet period":
  - in an LSP configured with CV: the CV period (one second)
  - in an LSP configured with FFD: the FFD period used by the sink function
- E: Number of "expected packets" received during the most recent three "expected packet periods"
- Uffd: Number of "unexpected FFD" received during the most recent three "expected packet periods"
- Ucv_3cv: Number of "unexpected CV" received during the most recent three CV periods (i.e. three seconds)

6.1.2 Summary of Defect Entry/Exit criteria

The defects shall be raised/cleared as per Table 1.

Table 1/G.8121/Y.1381 – Defect raise and clearing conditions

Defect	Raise condition	Clearing condition
dLOCV	(E==0)	(2<=E)

dMismatch	(E==0) && ((Ucv_3cv>0) || (Uffd>0))	(1<=E) || ((Ucv_3cv==0) && (Uffd==0))
dMismerge	(E>0) && ((Ucv_3cv>0) || (Uffd>0))	(E==0) || ((Ucv_3cv==0) && (Uffd==0))
dExcess	(E>=5)	(E<=4)

NOTE – It is a known fact that there is a possibility for toggling dMismerge situations. These can occur for mismerges of FFD LSPs of a certain FFD period with FFD LSPs with longer FFD periods. The recommended way of handling this situation is that network domains be operated with at most one FFD frequency (in addition to the basic CV frequency).

dExcess: align with mpls-req or oam-req?

6.1.3 Continuity supervision

6.1.3.1 Loss of Connectivity Verification defect (dLOCV)

The Loss of Connectivity Verification defect is calculated at the MPLS-TP layer. It monitors the presence of continuity in MPLS-TP trails.

Its raise and clearing conditions are defined in Table 1.

6.1.4 Connectivity supervision

6.1.4.1 Trail Termination Source Identifier Mismatch defect (dMismatch)

The Trail Termination Source Identifier Mismatch defect is calculated at the MPLS-TP layer. It monitors the connectivity to the specified source in MPLS-TP trails.

Its raise and clearing conditions are defined in Table 1.

6.1.4.2 Trail Termination Source Identifier Mismerge defect (dMismerge)

The Trail Termination Source Identifier Mismerge defect is calculated at the MPLS-TP layer. It monitors the absence of connectivity to sources other than the specified one in MPLS-TP trails.

Its raise and clearing conditions are defined in Table 1.

6.1.4.3 Excessive CV/FFD OAM defect (dExcess)

The Excessive CV/FFD OAM defect is calculated at the MPLS-TP layer. It monitors the rate of CV/FF packets in MPLS-TP trails.

Its raise and clearing conditions are defined in Table 1.

6.1.5 Maintenance signal supervision

6.1.5.1 Forward Defect Indicator defect (dFDI)

The Forward Defect Indicator defect is calculated at the MPLS-TP layer. It monitors the presence of an FDI maintenance signal.

The dFDI defect is raised when a single FDI OAM packet is observed at the MPLS-TP trail termination function.

The dFDI defect is cleared when in an aggregate period of 3 consecutive seconds no FDI OAM packets are observed at the MPLS-TP trail termination function.

6.1.5.2 Backward Defect Indication defect (dBDI)

The Backward Defect Indicator defect is calculated at the MPLS-TP layer. It monitors the presence of a BDI maintenance signal.

The dBDI defect is raised when a single BDI OAM packet is observed at the MPLS-TP trail termination function.

The dBDI defect is cleared when in an aggregate period of 3 consecutive seconds no BDI OAM packets are observed at the MPLS-TP trail termination function.

6.2 Defects (MT2_TT_Sk)

Note: the defect definitions in this sub-clause are applicable to MT2_TT_Sk functions.

6.2.1 Summary of Entry/Exit conditions for defects

The defect Entry and Exit conditions are based on events. Occurrence or absence of specific events may raise or reset specific defects.

In the following:

Valid means a received value is ***equal*** to the value configured via the MI input interface(s).

Invalid means a received value is ***not equal*** to the value configured via the MI input interface(s).

The events defined for this recommendation are summarized in Table 6-1. The events are generated by processes in the MT_TT_Sk function. These processes define the exact conditions for these events; Table 6-1 only provides a quick overview.

Table 6-1/ G.8121/Y.1381 – Overview of Events

Event	Meaning
unexpMEG	Reception of a CV frame with an invalid MEG value.
unexpMEP	Reception of a CV frame with an invalid MEP, but with a valid MEG.
unexpPeriod	Reception of a CV frame with invalid Periodicity, but valid MEG and MEPs values.
unexpPHB	Reception of a CV frame with invalid PHB (Per-Hop Behavior), but valid MEG and MEP values.
expCV[]	Reception of a CV frame with valid MEG and MEP values.
RDI[]=x	Reception of a CV frame with the RDI flag set to x; where x=0 (remote defect clear) and x=1 (remote defect set) .
LCK	Reception of an LCK frame
FDI	Reception of an FDI frame
BS	Bad Second, a second in which the Lost Frame Ratio exceeds the Bad Second Threshold, (BS_THR).
expAPS	Reception of a valid APS frame.
APSw	Reception of an APS frame from the working transport entity.
APSb	Reception of an APS frame with incompatible “B” bit value.
APSr	Reception of an APS frame with incompatible “Requested Signal” value.

Note: In the present form of MPLS-TP there is always a single MEP from which CV frames are expected. This is because the supported topologies are point-to-point and point-to-multipoint. The square brackets in “expCV[]” and “RDI[]” are therefore superfluous here. The notation “expCV[]”

and "RDI[]" has been chosen for consistency with the equivalent terms in G.8021 for Ethernet technology.

The occurrence or absence of these events may detect or clear a defect. An overview of the conditions is given in Table 6-2. The notation "#event=x (K*period)" is used to indicate the occurrence of x events within the period as specified between the brackets; 3.25≤K≤3.5.

Table 6-2 gives a quick overview of the raising and clearing conditions for the various defects; in the following clauses the precise conditions are specified using SDL diagrams.

Table 6-2/ G.8121/Y.1381 – Overview of Detection and Clearing Conditions

Defect	**RFDIe Condition**	**Clearing Condition**
dLOC[]	#expCV[]==0 (K*CV_Period)	expCV[]
dUNPhb	unexpPHB	#unexpPHB==0 (K*CV_Period)
dMMG	unexpMEG	#unexpMEG==0 (K*CV_Period)
dUNM	unexpMEP	#unexpMEP==0 (K*CV_Period)
dUNP	unexpPeriod	#unexpPeriod==0 (K*CV_Period)
dRDI[]	RDI[]==1	RDI[]==0
dFDI	FDI	#FDI==0 (K seconds)
dLCK	LCK	#LCK==0 (K seconds)
dDEG	#BS==DEGM (DEGM*1second)	#BS==0 (M*1second)
dFOP-CM	APSw	#APSw == 0 (K*normal APS Period)
dFOP-PM	APSb	expAPS
dFOP-NR	APSr continues more than 50ms	expAPS

Note that for the case of CV_Period the value for the CV and FDI is based on the periodicity as indicated in the CV frame that triggered the timer to be started.

For dUNPhb, dMMG, dUNM, dUNP there may be multiple frames received raising the same defect but carrying a different periodicity. In that case the longest received period will be used, see the detailed descriptions below.

Note: In the present form of MPLS-TP there is always a single MEP from which CV frames are expected. This is because the supported topologies are point-to-point and point-to-multipoint. The square brackets in "dLOC[]" are therefore superfluous here. The notation "dLOC[]" has been chosen for consistency with the equivalent terms in G.8021 for Ethernet technology.

6.2.2 Continuity Supervision

6.2.2.1 Loss Of Continuity defect (dLOC[])

The Loss of Connectivity Verification defect is calculated at the MPLS-TP layer. It monitors the presence of continuity in MPLS-TP trails.

Its raise and clearing conditions are defined in Figure 6-1.The 'period' in Figure 6-1 is the period as carried in the CV frame triggering the expCV[] event. This event is generated by the CV reception process. Furthermore in Figure 6-1 3.25≤K≤3.5.

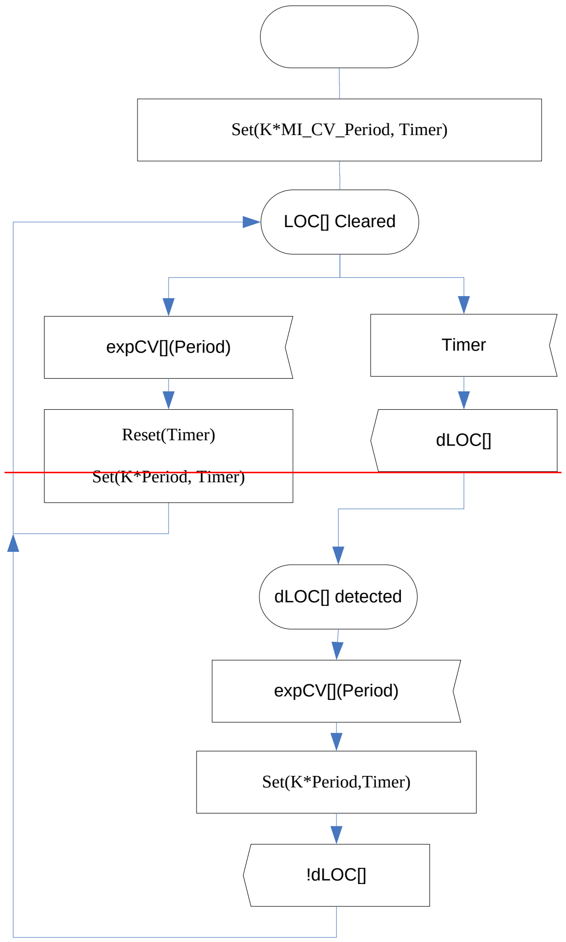

Figure 6-1/G.8121/Y.1381 – dLOC[] raising and clearing process

6.2.3 Connectivity Supervision

Figure 6-2 shows a generic state diagram that is used to define the detection and clearing conditions for dMMG, dUNM, dUNP, dUNPhb, dFDI, dLCK. In this diagram <Defect> needs to be replaced with the specific defect and <Event> with the specific event related to this defect. Furthermore in Figure 6-2 3.25≤K≤3.5.

Figure 6-2 shows that the Timer is set based on the last receive period value, unless an earlier CV frame triggering <event> (and therefore the detection of <defect>) carried a longer period. As a consequence clearing certain defects may take more time than necessary.

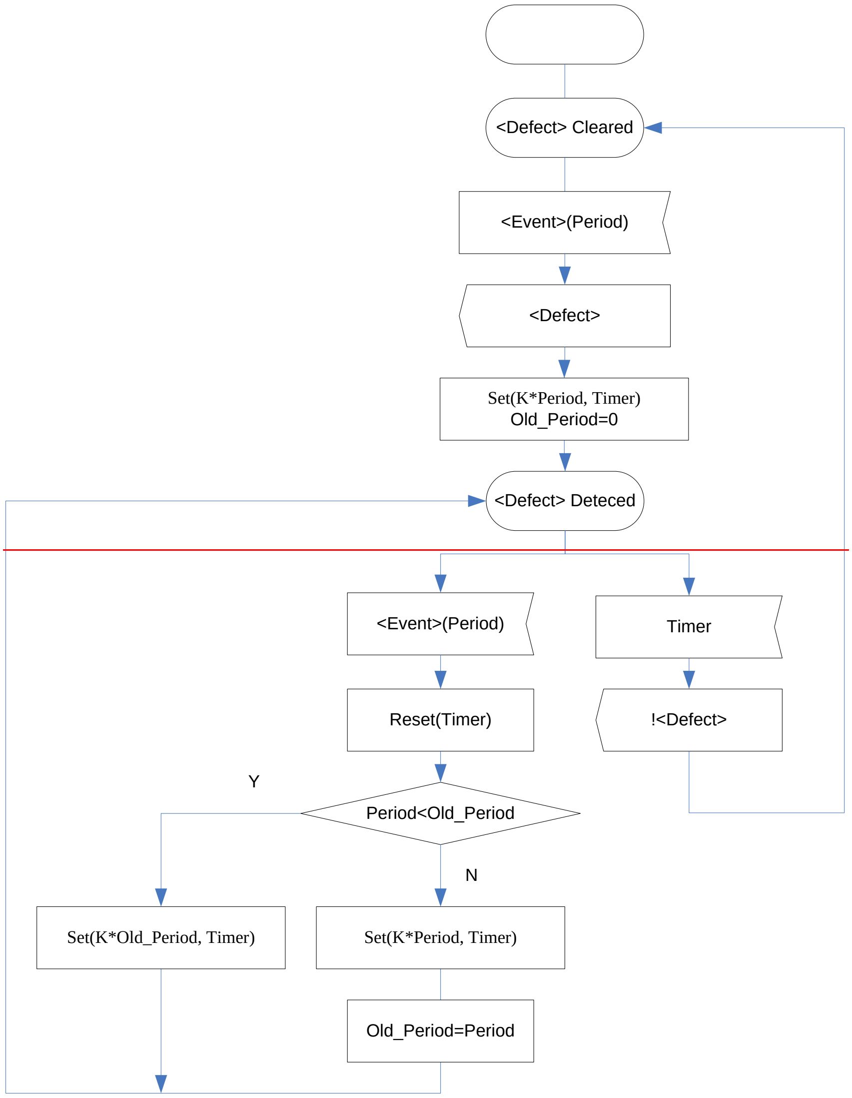

Figure 6-2/G.8121/Y.1381 – Defect raising and clearing process for dMMG, dUNM, dUNP, dUNPhb, dFDI, dLCK

6.2.3.1 Mismerge defect (dMMG)

The Mismerge defect defect is calculated at the MPLS-TP layer. It monitors the connectivity in a Maintenance Entity Group.

Its raise and clearing conditions are defined in Figure 6-2. The <Defect> in Figure 6-2 is dMMG. The <Event> in Figure 6-2 is the unexpectedMEG event (as generated by the CV receiption process) and the Period is the Period carried in the CV frame that triggered the event.

Figure 6-2 shows that the timer is set based on the last received period value, unless an earlier CV frame triggering an unexpectedMEG event carried a longer period.

6.2.3.4 Unexpected MEP defect (dUNM)

The Unexpected MEP defect is calculated at the MPLS-TP layer. It monitors the connectivity in a Maintenance Entity Group.

Its raise and clearing conditions are defined in Figure 6-2. The <Defect> in Figure 6-2 is dUNM. The <Event> in Figure 6-2 is the unexpectedMEP event (as generated by the CV receiption process) and the Period is the Period carried in the CV frame that triggered the event.

Figure 6-2 shows that the timer is set based on the last received period value, unless an earlier CV frame triggering an unexpectedMEP event carried a longer period.

6.2.3.5 Degraded Signal defect (dDEG)

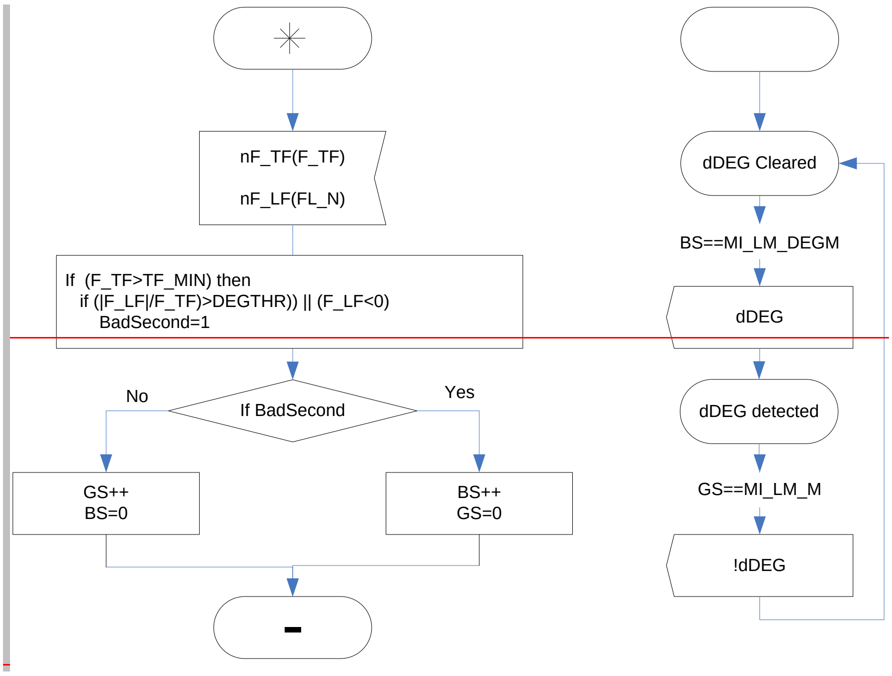

Figure 6-3/G.8121/Y.1341 – dDEG raise and clearing process

The Degraded Signal defect is calculated at the MPLS-TP layer. It monitors the connectivity of a MPLS-TP Trail.

Its detection and clearing conditions are defined in Figure 6-3.

Every second the statemachine receives the 1 second counters for far end received and transmitted frames; upon receipt it determines whTMer the second was a Bad Second. The defect is rFDIed if there are MI_LM_DEGM consecutive Bad Seconds and cleared if there are MI_LM_M consecutive Good Seconds.

In order to define a Bad Second the number of transmitted frames must exceed a threshold (TF_MIN). If this is true then a Bad Second is declared if either the Frame Loss is negative (i.e. there are more frames received than transmitted) or the Frame Loss Ratio (lost frames/transmitted frames) is smaller than DEGTHR.

6.2.4 Protocol Supervision

6.2.4.1 Unexpected Periodicity defect (dUNP)

The Unexpected Periodicity defect is calculated at the MPLS-TP layer. It detects the configuration of different periodicities at different MEPs belonging to the same MEG.

Its raise and clearing conditions are defined in Figure 6-2. The <Defect> in Figure 6-2 is dUNP. The <Event> in Figure 6-2 is the unexpectedPeriod event (generated by the CV receiption process) and the Period is the Period carried in the CV frame that triggered the event.

Figure 6-2 shows that the timer is set based on the last received period value, unless an earlier CV frame triggering an unexpectedPeriod event carried a longer period.

6.2.4.2 Unexpected Per-Hop-Behavior defect (dUNPhb)

The Unexpected PHB defect is calculated at the MPLS-TP layer. It detects the configuration of different Priorities for CV at different MEPs belonging to the same MEG.

Its raise and clearing conditions are defined in Figure 6-2. The <Defect> in Figure 6-2 is dUNPhb. The 'Event' in Figure 6-2 is the unexpectedPHB event (generated by the CV receiption process) and the Period is the Period carried in the CV frame that triggered the event.

Figure 6-2 shows that the timer is set based on the last received period value, unless an earlier CV frame triggering an unexpectedPHB event carried a longer period.

6.2.4.3 Protection protocol supervision

6.2.4.3.1 Linear protection Failure of Protocol Provisioning Mismatch (dFOP-PM)

The Failure of Protocol Provisioning Mismatch defect is calculated at the MPLS-TP layer. It monitors provisioning mismatch by comparing B bits of the transmitted and the received APS protocol.

Its detection and clearance are defined in Table 6-2. dFOP-PM is detected on receipt of an APSb events and cleared on receipt of an expAPS event. These events are generated by the subnetwork connection protection process.

6.2.4.3.2 Linear protection Failure of Protocol No Response (dFOP-NR)

The Failure of Protocol No Response defect is calculated at the MPLS-TP layer. It monitors incompletion of protection switching by comparing "Requested Signal" values of the transmitted and the received APS protocol.

Its detection and clearing conditions are defined in Table 6-2. dFOP-NR is detected when APSr event continues more than 50ms and cleared on receipt of the expAPS event. These events are generated by the subnetwork connection protection process.

6.2.4.3.3 Linear protection Failure of Protocol Configuration Mismatch (dFOP-CM)

The Failure of Protocol Configuration Mismatch defect is calculated at the MPLS-TP layer. It monitors working and protection configuration mismatch by detecting the reception of APS protocol from the protection transport entity.

Its detection and clearing conditions are defined in Table 6-2. dFOP-CM is detected on receipt of an APSw events and cleared on receipt of no APSw event during K times the normal APS transmission period defined in G.8131/Y.1382 (note: $3.25 \le K \le 3.5$). These events are generated by the subnetwork connection protection process.

6.2.5 Maintenance Signal Supervision

6.2.5.1 Remote Defect Indicator defect (dRDI[])

~~The Remote Defect Indicator defect is calculated at the MPLS-TP layer. It monitors the presence of an RDI maintenance signal.~~

~~dRDI is detected on receipt of the RDI[]=1 event and cleared on receipt of the RDI[]=0 event. These events are generated by the CV reception process.~~

~~**6.2.5.2 Forward Defect Indication defect (dFDI)**~~

~~The Forward Defect Indication defect is calculated at the MPLS-TP layer. It monitors the presence of an FDI maintenance signal.~~

~~Its raise and clearing conditions are defined in Figure 6-2. The <Defect> in Figure 6-2 is dFDI. The <Event> in Figure 6-2 is the FDI event (as generated by the FDI receiption process) and the Period is one second.~~

~~**6.2.5.3 Locked Defect (dLCK)**~~

~~The Locked defect is calculated at the MPLS-TP layer. It monitors the presence of a Locked maintenance signal.~~

~~Its raise and clearing conditions are defined in Figure 6-2. The <Defect> in Figure 6-2 is dLCK. The <Event> in Figure 6-2 is the LCK event (as generated by the LCK receiption process) and the Period is one second.~~

6.~~3~~2 Consequent actions

For generic consequent actions, see ITU-T Rec. G.806. For the specific consequent actions applicable to MPLS-TP, refer the specific atomic functions.

6.~~4~~3 Defect correlations

For the defect correlations, see the specific atomic functions.

6.~~5~~4 Performance filters

Ffs.

7 Information flow across reference points

Information flow for MPLS-TP functions is defined in clause 9. A generic description of information flow is defined in clause 7/G.806.

8 MPLS-TP processes

This clause defines the specific processes for the MPLS-TP network. Generic processes are defined in clause 8/G.806.

8.1 MPLS-TP OAM Processes

[Ed Note: Some of current text has dependency on draft G.tpoam & G.8110.1]

~~[Note: This clause will be revised when [mpls-tp-oam-fwk] / G.mplstpoam available]~~

~~ffs~~

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8.1.1 G-ACh Process

8.1.1.1 Overview

In order to ensure proper operational control, MPLS-TP network elements exchange OAM packets that strictly follow the same path as user traffic packets; that is, OAM packets are subject to the exact same forwarding schemes (e.g. fate sharing) as the user traffic packets. These OAM packets can be distinguished from the user traffic packets by using the G-ACh and GAL constructs.

The G-ACh is a generic associated control channel mechanism for Sections, LSPs and PWs, over which OAM and other control messages can be exchanged. The GAL is a label based exception mechanism to alert LERs/LSRs of the presence of an Associated Channel Header (ACH) after the bottom of the stack.

The format of GAL and ACH is described in [RFC5586] and [ITU-T G.tpoam].

8.1.1.2 G-ACh Insertion Process

Figure 8-1 describes G-ACh Insertion process.

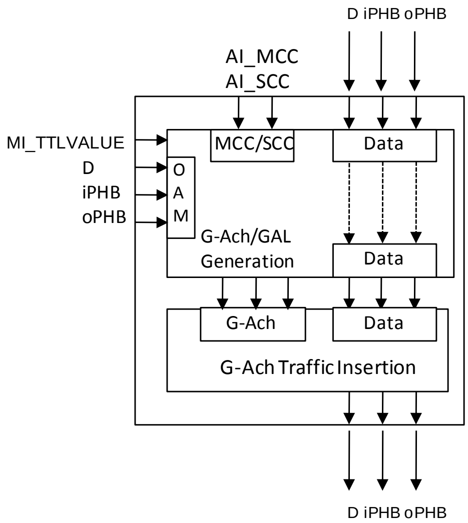

Figure 8-1 – G-ACh Insertion Process

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8.1.1.3 G-Ach Reception Process

Figure 8-2 describes G-ACh Reception process.

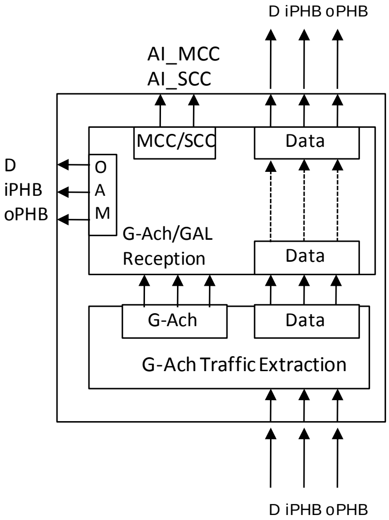

Figure 8-2 – G-ACh Reception Process

The G-ACh Traffic Unit will be extracted if it includes GAL and ACH in incoming Data. Figure 8-3 shows G-ACh traffic Extract behaviour.

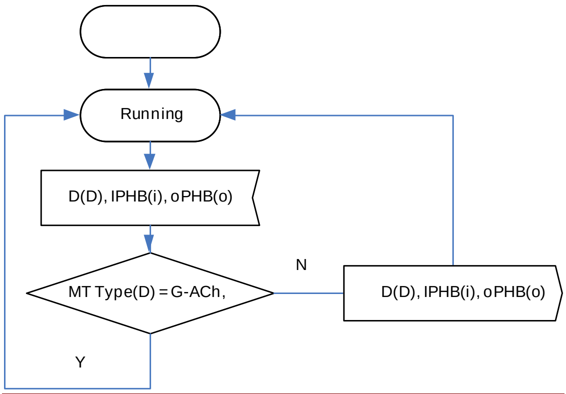

Figure 8-4 – G-ACh traffic Extract behaviour

[Note: It is required to describe malformed G-ACh such as only GAL without ACH]

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8.1.2 LCK Generate Process

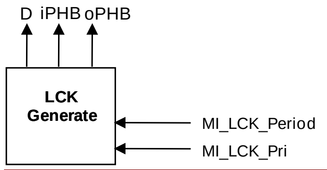

Figure 8-5 – LCK Generation process

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The LCK Generation Process generates MT_CI traffic units where the MT_CI_D signal contains the LCK signal. Figure 8-6 defines the behaviour of the LCK Generation Process.

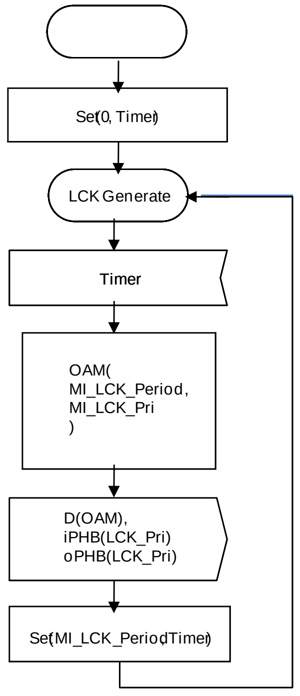

Figure 8-6 – LCK Generation behaviour

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The LCK Generation Process continuously generates LCK Traffic Units; every time the Timer expires a LCK Traffic Unit will be generated. The period between two consecutive traffic units is determined by the MI_LCK_Period input signal. Allowed values are defined in Table 8-1.

Table 8-1 – LCK period values

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3-bits	Period Value	Comments
000-011	Invalid Value	Invalid value for LCK PDUs
100	1s	1 frame per second
101	Invalid Value	Invalid value for LCK PDUs
110	1 min	1 frame per minute
111	Invalid Value	Invalid value for LCK PDUs

The MT_CI_D signal contains an M_SDU field. The format of LCK tunits is defined in [ITU-T G.topam].
The periodicity (as defined by MI_LCK_Period) is encoded in the three least significant bits of the Flags field in the LCK PDU using the values from Table 8-1.

The value of the MT_CI_PHB signal associated with the generated LCK traffic units is defined by the MI_LCK_Pri input parameter.

8.1.3 Selector Process

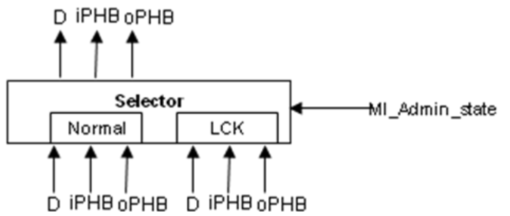

Figure 8-7 – Selector process

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The Selector process selects the valid signal from the input of the normal MT_CI signal or the MT_CI LCK signal (as generated by the LCK Generation process). The normal signal is blocked if MI_Admin_State is LOCKED. The behaviour is defined in Figure 8-7.

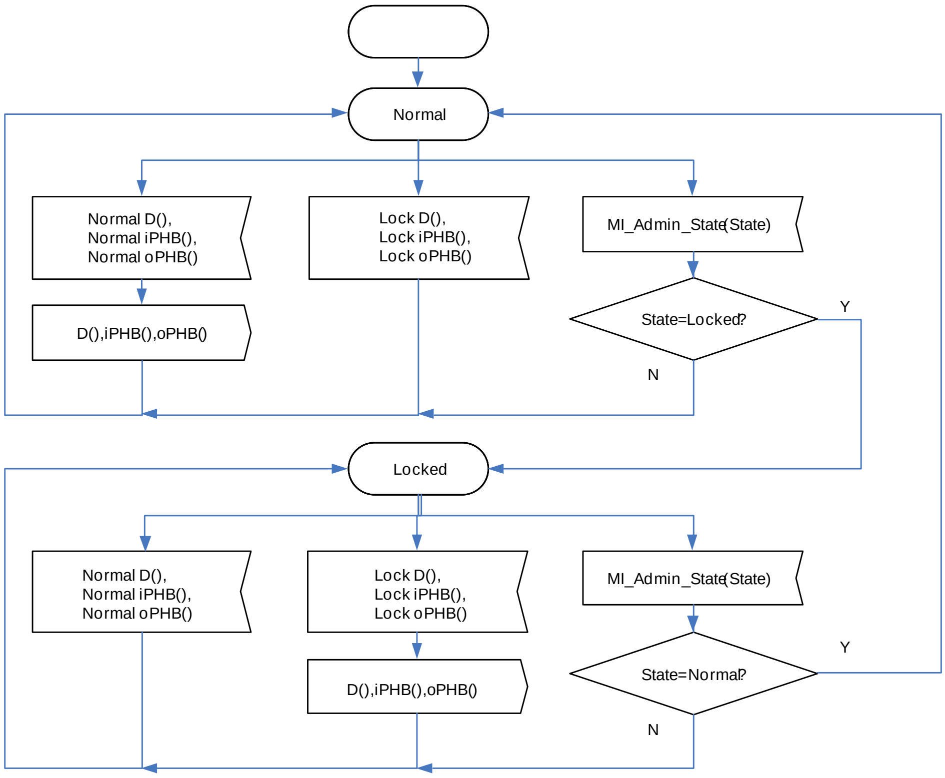

Figure 8-8 – Selector Behaviour

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8.1.4 AIS Insert Process

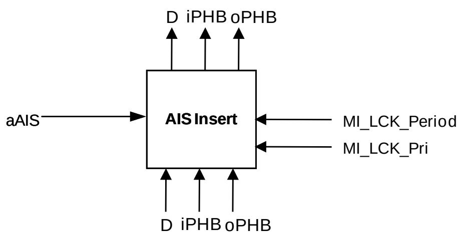

Figure 8-9 – AIS Insert process

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Figure 8-9 shows the AIS Insert Process Symbol and Figure 8-10 defines the behaviour. If the aAIS signal is true, the AIS Insert process continuously generates MT_CI traffic units where the MT_CI_D signal contains the AIS signal until the aAIS signal is false. The generated AIS traffic units are inserted in the incoming stream, i.e., the output stream contains the incoming traffic units and the generated AIS traffic units.

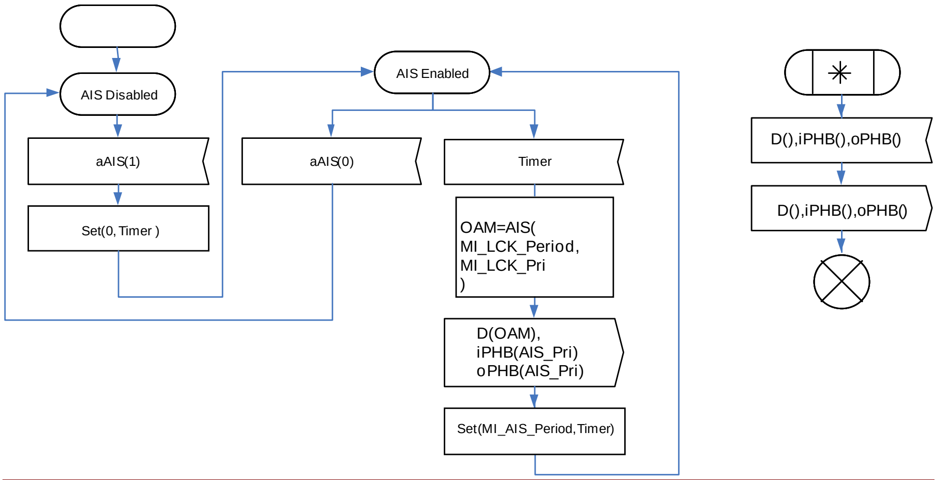

Figure 8-10 – AIS Insert behaviour

The period between consecutive AIS traffic units is determined by the MI_AIS_Period parameter. Allowed values are once per second and once per minute; the encoding of these values is defined in Table 8-2. Note that these encoding are the same as for the LCK generation process.

Table 8-2 – AIS period values

3-bits	Period Value	Comments
000-011	Invalid Value	Invalid value for AIS PDUs
100	1s	1 frame per second
101	Invalid Value	Invalid value for AIS PDUs
110	1 min	1 frame per minute
111	Invalid Value	Invalid value for AIS PDUs

The MT_CI_D signal contains an M_SDU field. The format of the M_SDU field for AIS traffic units is defined in [ITU-T G.tpoam].

The periodicity (as defined by MI_AIS_Period) is encoded in the three least significant bits of the Flags field in the AIS PDU using the values from Table 8-2.

8.1.5 APS Insert Process

FFS

8.1.6 APS Extract Process

FFS

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8.1.7 Continuity Check and Connectivity Verification (CC/CV) Process

8.1.7.1 Overview

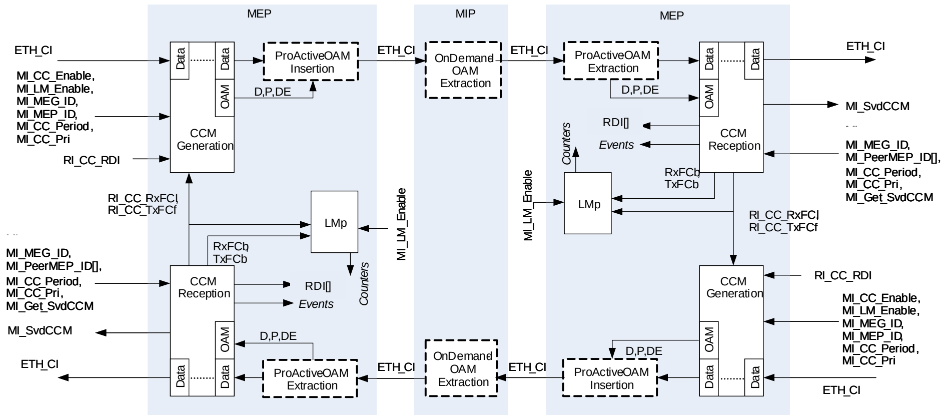

Figure 8-x – Overview of Processes involved with Continuity Check

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Figure 8-x gives an overview of the processes involved in the CC. The CCM Generation process generates the CCM frames if MI_CC_Enable is true. The MI_MEG_ID and MI_MEP_ID are the MEG and MEP IDs of the MEP itself and these IDs are carried in the CCM frame. The CCM frames are generated with a periodicity determined by MI_CC_Period and with a priority determined by MI_CC_Pri. If MI_LM_Enable is set the CCM frames will also carry Loss Measurement information. The Generated CCM Traffic Units are inserted in the flow of MT_CI by the OAM MEP Source Insertion Process.

The CCM frames pass transparently through MIPs.

The OAM MEP Sink Extraction process extracts the CCM Unit from the flow of ETH_CI and the CCM Reception process processes the received CCM Traffic Unit. It compares the received MEG ID with the provisioned MI_MEG_ID, and the received MEP_ID with the provisioned MI_PeerMEP_ID[], that contains the list of all expected peer MEPs in the MEG. Based on the processing of this frame one or more events may be generated that serve as input for the Defect Detection Process (not shown in Figure 8-x).

RDI information is carried in the CCM frame based upon the RI_CC_RDI input. It is extracted in the CCM Reception Process.

8.1.7.2 CCM Generation Process

Figure 8-x shows the CCM Generation Process Symbol and Figure 8-x describes the behaviour.

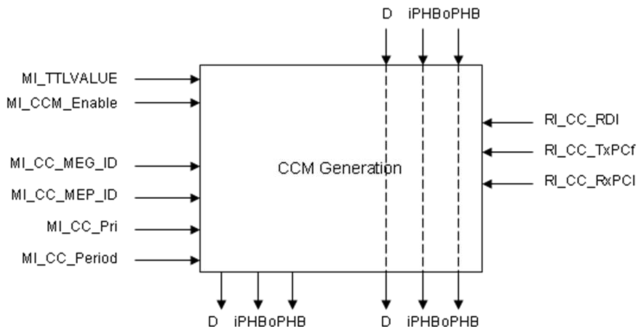

Figure 8-x/G.8121/Y.1381 – CCM Generation process symbol

This process generates MPLS-TP CI traffic units where MT_CI_D signal contains the CCM traffic units for pro-active monitoring and counts all data frames with PHB equal to MI_CCM_PHB (TxPCl).

The D, iPHB and oPHB signal are forwarded unchanged as indicated by the dotted lines in Figure 8-xx

The CC-V Generation process can be enabled and disabled using the MI_CCM_Enable signal.

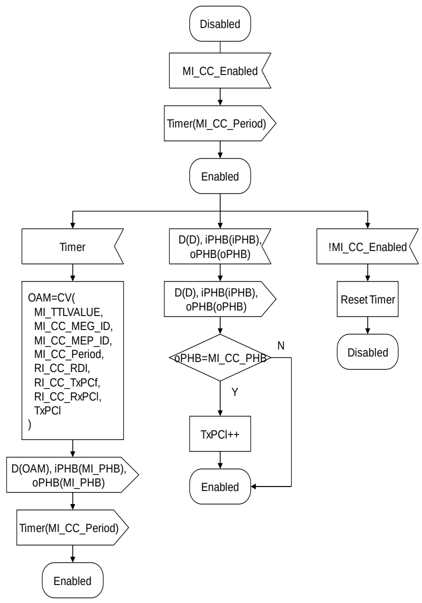

Figure 8-x/G.8121/Y.1381 – CCM Generation process

The period between the generating consecutive CCM traffic units is determined by the MI_CCM_Period parameter. Allowed values and the encoding of these values are defined in Table 8-3.

Table 8-3/G.8121/Y.1381 – CCM Period Values

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MI_CV_Period	Period Value	Comments
000	Invalid Value	Invalid value for CC-V PDUs
001	3.33ms	300 frames per second
010	10ms	100 frames per second
011	100ms	10 frames per second
100	1s	1 frame per second
101	10s	6 frames per minute
110	1 min	1 frame per minute
111	10 min	6 frame per hour

[Note: G.tpoam introduces 3.3ms, 100ms, 1s only]

8.1.7.3 CCM Reception Process

Figure 8-7 shows the CCM Reception Process Symbol and Figure 8-8 describes the behaviour.

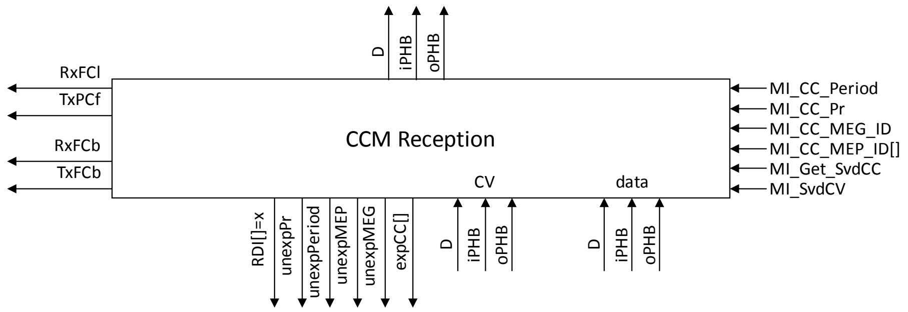

Figure 8-x/G.8121/Y.1381 – CCM Reception process Symbol

The CC-V reception process transparently forwards all the data frames and counts all data frames that have PHB (per-hop behaviour) equal to MI_CCM_PHB.

Furthermore the CCM reception process processes received CCM OAM traffic units. It checks the various fields of the OAM PDU and generates the corresponding events (as defined in clause 6).

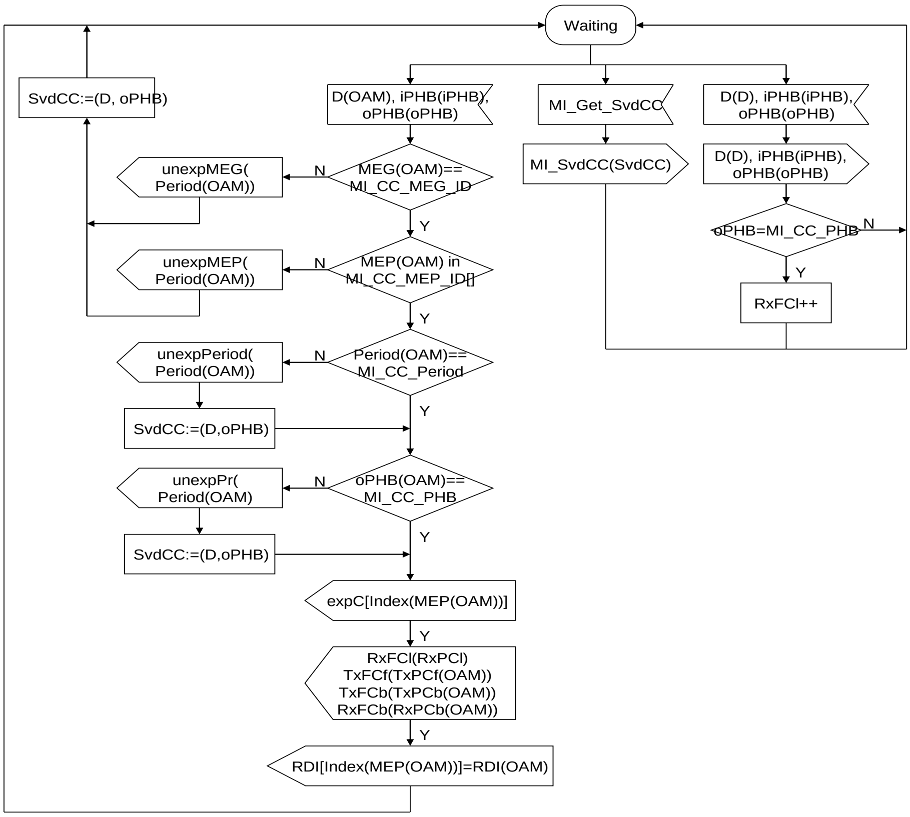

Figure 8-x/G.8121/Y.1381 – CCM Reception process

8.1.7.4 ProActive Loss Measurement (LMp) Process

This process calculates the number of transmitted and lost frames per second.

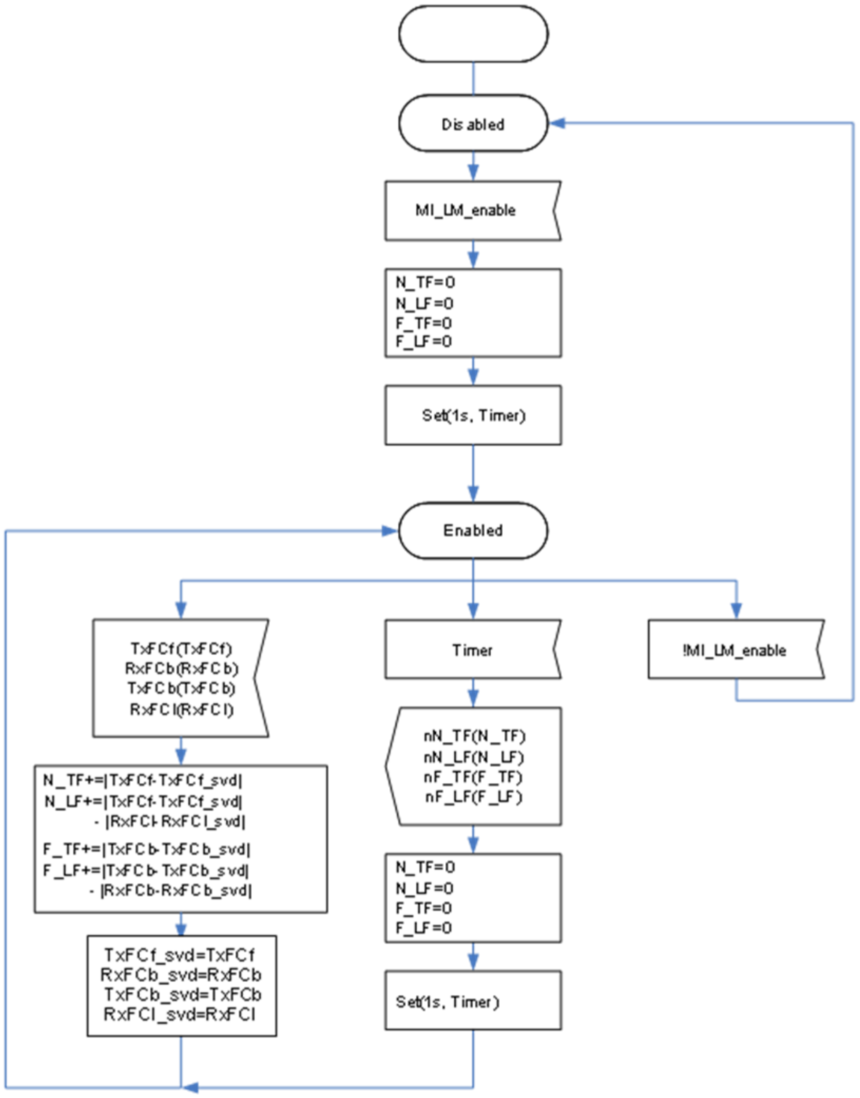

Figure 8-x/G.8121/Y.1381 – LM Process behaviour

It processes the TxFCf, RxFCb, TxFCb, RxFCl values and determines the number of transmitted frames and the number of lost frames. Every second the number of transmitted and lost frames, in that second, are sent to the Performance Monitoring and Defect Generation Processes.

8.1.8 Loopback (LB) Process

8.1.8.1 Overview

8.1.8.1 Overview

Figure 8-21 shows the different processes inside MEPs and MIPs that are involved in the Loopback Protocol.

The MEP OnDemand-OAM Source insertion process is defined in clause 9.2.1.1, the MEP OnDemand-OAM Sink extraction process in clause 9.4.1.2, the MIP OnDemand-OAM Sink Extraction process in clause 9.2.1.2, and the MIP OnDemand-OAM Source insertion process in clause 9.4. In summary, they insert and extract MT_CI OAM signals into and from the stream of MT_CI_D Traffic Units. The other processes are defined into this clause.

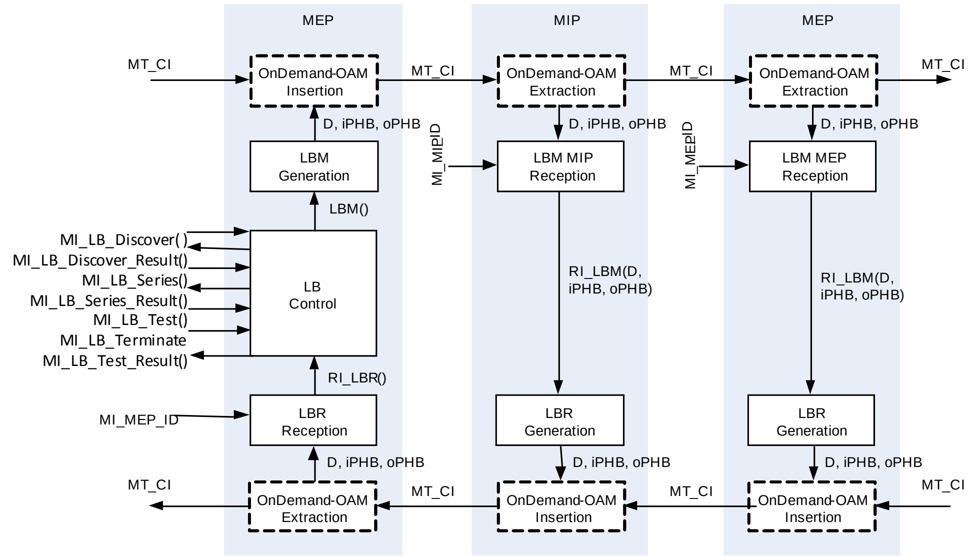

Figure 8-xx – Overview of Processes involved with Loopback
[MI_MEP_ID needs to be verified...]

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The LBM Protocol is controlled by the LB Control Process. There are three possible MI signals that can trigger the LB protocol:

- MI_LB_Discover( )
- MI_LB_Series().
- MI_LB_Test()

The details are described later in this clause.

The LBM Control Protocol triggers the LBM Generation Process to generate an LBM Traffic Unit that is received and forwarded by MIPs and received by MEPs in the same MEG. The LBM Control process controls the number of LBM generated and the period between consecutive LBM Traffic Units.

The LBM MIP/MEP reception processes process the received LBM Traffic Units and as a result the LBR Generation Process may generate an LBR Traffic Unit in response. The LBR Reception Process receives and processes the LBR Traffic Units..

The LBM Control Process processes these received values to determine the result of the requested LB operation. The result is communicated back using the following MI signals:

- MI_LB_Discover_Result():.
- MI_LB_Series_Result()::
  - OO: Number of LBR Traffic Units that were received out of order (OO).
- MI_LB_Test_Result(): Reports back the total number of LBM frames sent (Sent) as well as the total number of LBR frames received (REC); for the latter counts of specific errors are reported:
  - CRC: Number of LBR frames where the CRC in the pattern failed.
  - BER: Number of LBR frames where there was a bit error in the pattern.
  - OO: Number of LBR frames that were received out of order.

The detailed functionality of the various processes is defined below.

8.1.8.2 LB Control Process

8.1.8.3 LBM Generation Process

8.1.8.4 MIP LBM Reception Process

8.1.8.5 MEP LBM Reception Process

8.1.8.6 LBR Generation Process

8.1.8.7 LBR Reception Process

8.1.9 Loss Measurement (LM) Process

8.1.9.1 Overview

Figure 8-x shows the different processes inside MEPs and MIPs that are involved in the Loss Measurement Protocol.

The MEP OnDemand-OAM Source insertion process is defined in clause 9.2, the MEP OnDemand-OAM Sink extraction process in clause 9.2, the MIP OnDemand-OAM Sink Extraction process in clause 9.4, and the MIP OnDemand-OAM Source insertion process in clause 9.4. In summary, they insert and extract MT_CI OAM signals into and from the stream of MT_CI_D Traffic Units together with the complementing PHB signals going through an MEP and MIP.

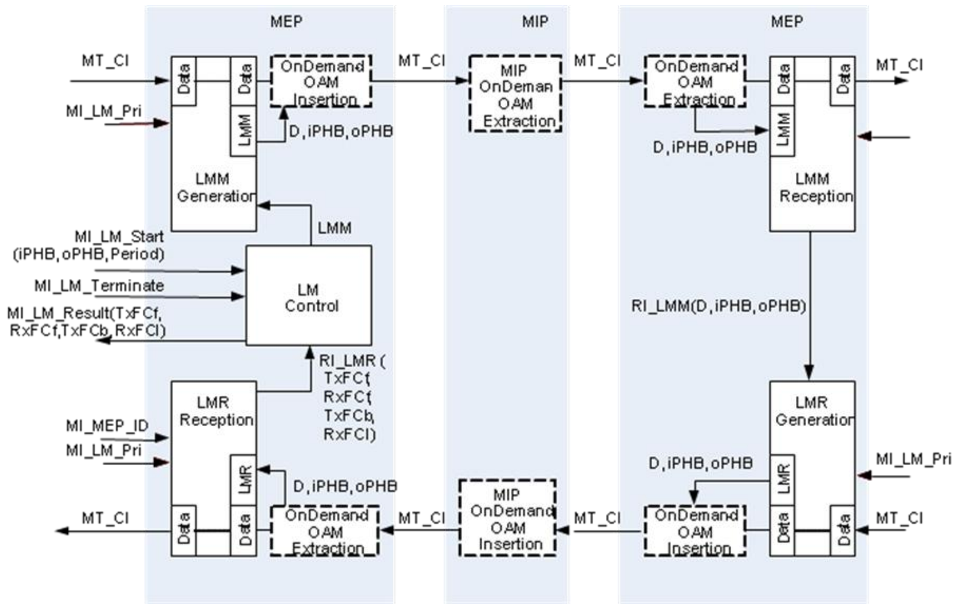

Figure 8-33 – Overview of Processes involved with Loss Measurement
[MI_MEP_ID needs to be verified...]

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The LM control process controls the LM protocol. The protocol is activated upon receipt of the MI_LM_Start(iPHB, oPHB, Period) signal and remains activated until the MI_LM_Terminate signal is received.

The result is communicated via the MI_LM_Result(N_TF, N_LF, F_TF, F_LF) signal.

The LMM Generation Protocol generates an LMM Traffic Unit that passes transparently through MIPs, but that will be processed by the LMM Reception Process in MEPs. The LMR Generation Process generates an LMR Traffic Unit in response to the receipt of an LMM Traffic Unit. The LMR Reception process receives and processes the LMR Traffic Units.

The behaviour of the processes is defined below.

Note that the LMM Generation and LMR Generation Process are both part of the LMx Generation Process. Similarly the LMM Reception and the LMR Reception Process are both part of the LMx Reception Process.

8.1.9.2 LM Control Process

8.1.9.3 LMx Generation Process

8.1.9.4 LMx Reception Process

8.1.10 Delay Measurement (DM) Process

8.1.10.1 Overview

Figure 8-41 shows the different processes inside MEPs and MIPs that are involved in the Delay Measurement Protocol.

The MEP OnDemand-OAM Source insertion process is defined in clause 9.2, the MEP OnDemand-OAM Sink extraction process in clause 9.2, the MIP OnDemand-OAM Sink Extraction process in clause 9.4, and the MIP OnDemand-OAM Source insertion process in clause 9.4. In summary, they insert and extract MT_CI OAM signals into and from the stream of MT_C_D Traffic Units and the complementing PHB signals going through an MEP and MIP;

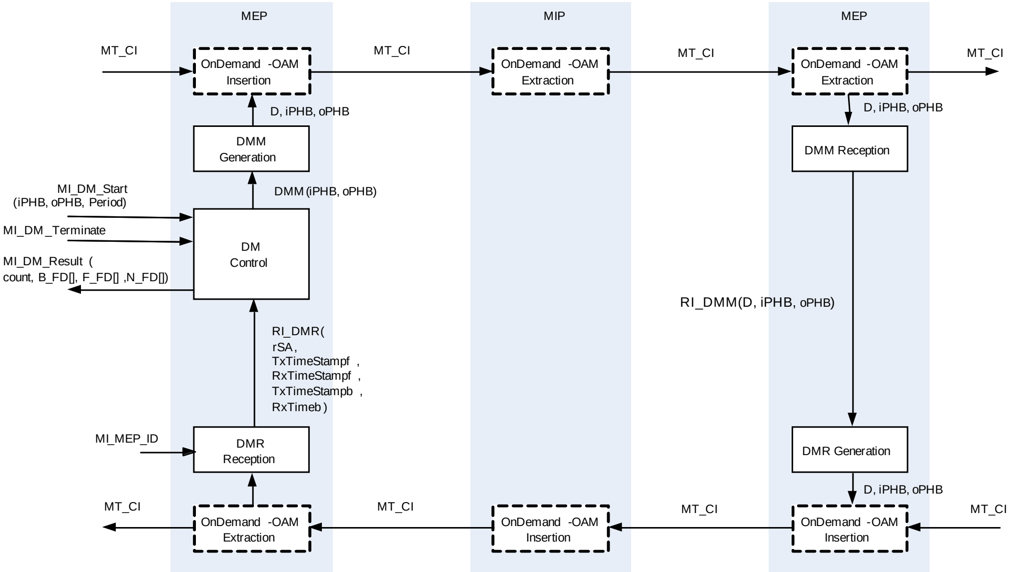

Figure 8-xx – Overview of Processes involved with Delay Measurement
[MI_MEP_ID needs to be verified...]

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The DM control process controls the DM protocol. The protocol is activated upon receipt of the MI_DM_Start(DA,P,Period) signal and remains activated until the MI_DM_Terminate signal is received. The result is communicated via the MI_DM_Result(count, B_FD[], F_FD[] ,N_FD[]) signal.

The DMM generation process generates DMM Traffic Units that pass through MIPs transparently, but are received and processed by DMM Reception processes in MEPs. The DMR Generation process may generate a DMR Traffic Unit in response. This DMR Traffic Unit also passes transparently through MIPs, but is received and processed by DMR Reception processes in MEPs.

At the Source MEP side, the DMM generation process stamps the value of the Local Time to the TxTimeStampf field in the DMM message when the first bit of the frame is transmitted. Note well that at the sink MEP side, the DMM reception process stamps the value of the Local Time to the RxTimeStampf field in the DMM message when the last bit of the frame is received.

The DMR generation and reception process stamps with the same way as the DMM generation and reception process.

8.1.10.2 DM Control Process

8.1.10.3 DMM Generation Process

8.1.10.4 DMM Reception Process

8.1.10.5 DMR Generation Process

8.1.10.6 DMR Reception Process

8.1.11 One Way Delay Measurement (1DM) Process

8.1.11.1 Overview

Figure 8-x shows the different processes inside MEPs and MIPs that are involved in the One Way Delay Measurement Protocol.

The MEP OnDemand-OAM Source insertion process is defined in clause 9.2, the MEP OnDemand-OAM Sink extraction process in clause 9.2, the MIP OnDemand-OAM Sink Extraction process in clause 9.4, and the MIP OnDemand-OAM Source insertion process in clause 9.4. In summary, they insert and extract MT_CI OAM signals into and from the stream of MT_CI_D Traffic Units and the complementing PHB signals going through an MEP and MIP.

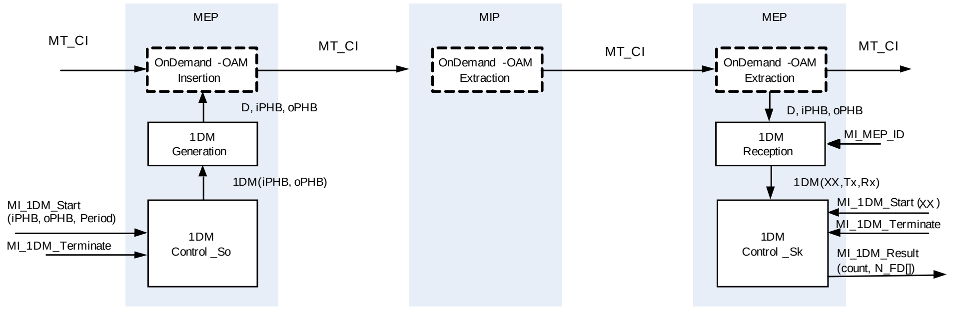

Figure 8-xx – Overview of Processes involved with One Way Delay Measurement [MEP_ID and XX need to be verified]

The 1DM protocol is controlled by the 1DM Control_So and 1DM Control_Sk processes. The 1DM Control_So process triggers the generation of 1DM Traffic Units upon the receipt of an MI_1DM_Start(iPHB, oPHB, Period) signal. The 1DM Control_Sk process processes the information from received 1DM Traffic Units after receiving the MI_1DM_Start(iPHB, oPHB, Period) signal.

The 1DM generation process generates 1DM messages that pass transparently through MIPs and are received and processed by the 1DM Reception Process in MEPs.

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At the Source MEP side, The 1DM generation process stamps the value of the Local Time to the TxTimeStampf field in the 1DM message when the first bit of the frame is transmitted. Note well that at the sink MEP side, the 1DM reception process records the value of the Local Time when the last bit of the frame is received.

8.1.11.2 DM Control_So Process

8.1.11.3 DM Generation Process

8.1.11.4 DM Reception Process

8.1.11.5 DM Control_Sk Process

8.1.12 Test (TST) Process

8.1.12.1 Overview

Figure 8-xx shows the different processes inside MEPs and MIPs that are involved in the Test Protocol.

The MEP OnDemand-OAM Source insertion process is defined in clause 9.2, the MEP OnDemand-OAM Sink extraction process in clause 92, the MIP OnDemand-OAM Sink Extraction process in clause 9.4, and the MIP OnDemand-OAM Source insertion process in clause 9.4. In summary, they insert and extract MT_CI OAM signals into and from the stream of MT_CI_D Traffic Units together with the complementing PHB signals going through an MEP and MIP.

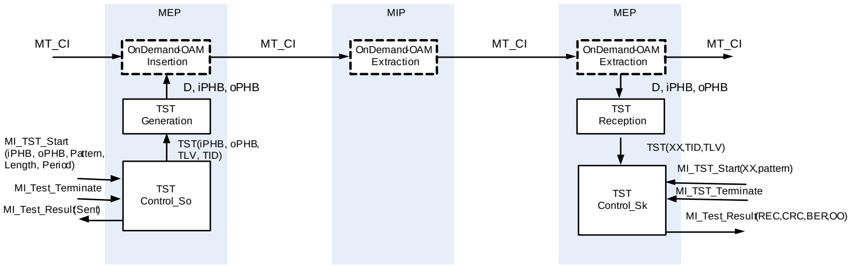

Figure 8-xx – Overview of Processes involved with Test Protocol
[MEP_ID and XX need to be verified]

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The TST protocol is controlled by the TST Control_So and TST Control_Sk processes. The TST Control_So process triggers the generation of TST Traffic Units after the receipt of an MI_TST_Start (iPHB, oPHB, Pattern, Length, Period) signal. The TST Control_Sk process processes the information from received TST Traffic Units after receiving the MI_TST_Start (Pattern) signal.

The TST generation process generates TST messages that pass transparently through MIPs and are received and processed by the TST Reception Process in MEPs.

The processes are defined below.

8.1.12.2 TST Control_So Process

8.1.12.3 TST Generation Process

8.1.12.4 TST Reception Process

8.1.12.5 TST Control_Sk Process

8.1.13 CSF Process

8.1.13.1 Overview

Figure 8-xx shows the different processes inside MEPs and MIPs that are involved in the CSF Protocol.

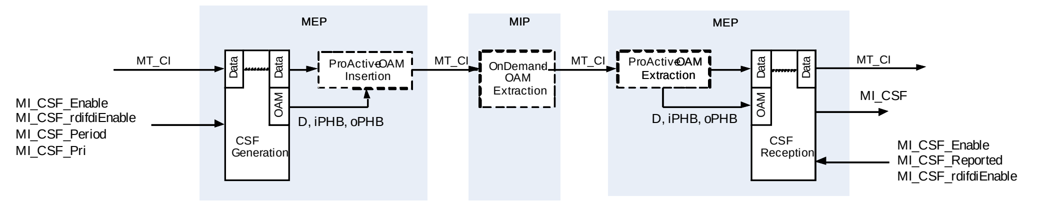


Figure 8-xx – Overview of Processes involved with CSF Protocol

The MPLS-TP Client Signal Fail function (MT-CSF) is used by a MEP to propagate to a peer MEP the detection of a failure or defect event in an MPLS client signal when the client itself does not support appropriate fault or defect detection or propagation mechanisms, such as MT-CC or MT-AIS. The MT-CSF messages propagate in the direction from MPLS-TP MEP function detecting the failure or defect event to the MPLS-TP sink-adaptation function associated with the peer MEP.

The MEP source insertion process is defined in clause 9.2.1, the MEP Sink extraction process in clause 9.2.2. The CSF frames pass transparently through MIPs.

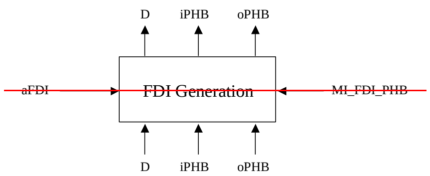
The MEP insertion process is defined in clause 9.2, the MEP Sink extraction process in clause 9.2,.

8.1.13.2 CSF Generation Process

8.1.13.3 CSF Reception Process

~~8.1.1 FDI Generation Process~~

~~Figure 8-1 shows the FDI Generation Process Symbol and Figure 8-2 describes the behaviour.~~



~~**Figure 8-1/G.8121/Y.1381 – FDI Generation process symbol**~~

~~If the aFDI signal is true, the FDI Generation process continuously generates TM_CI traffic units where the TM_CI_D signal contains the FDI signal until the aFDI signal is false. The generated~~

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FDI traffic units are inserted in the incoming stream, i.e. the output stream contains the incoming traffic units and the generated FDI traffic units.

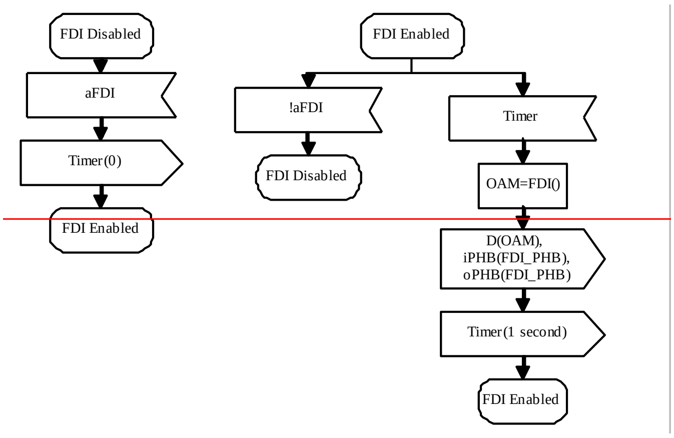

Figure 8-2/G.8121/Y.1381 – FDI Generation process

8.1.2 CV Generation Process

Figure 8-4 shows the CV Generation Process Symbol and Figure 8-5 describes the behaviour.

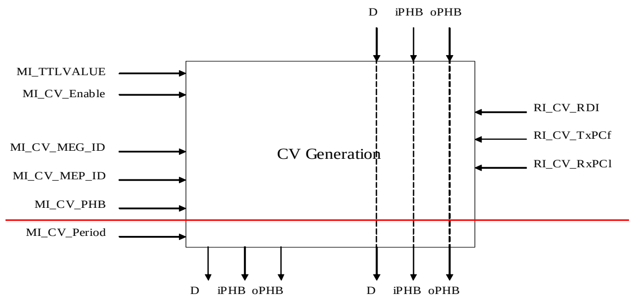

Figure 8-4/G.8121/Y.1381 – CV Generation process symbol

This process generates MPLS-TP CI traffic units where TM_CI_D signal contains the CV traffic units for pro-active monitoring and counts all data frames with PHB equal to MI_CV_PHB (TxPCl).

The D, iPHB and oPHB signal are forwarded unchanged as indicated by the dotted lines in Figure 8-4.

The CV Generation process can be enabled and disabled using the MI_CV_Enable signal.

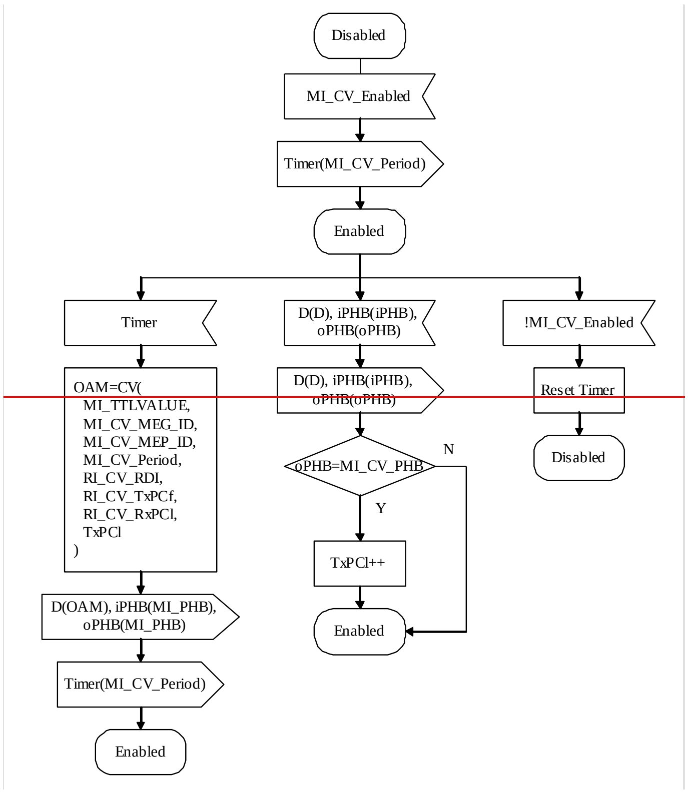

Figure 8-5/G.8121/Y.1381 – CV Generation process

The period between the generating consecutive CV traffic units is determined by the MI_CV_Period parameter. Allowed values and the encoding of these values are defined in Table 8-1.

Table 8-1/G.8121/Y.1381 – CV Period Values

MI_CV_Period	Period Value	Comments
000	Invalid Value	Invalid value for CV PDUs
001	3.33ms	300 frames per second
010	10ms	100 frames per second
011	100ms	10 frames per second
100	1s	1 frame per second
101	10s	6 frames per minute
110	1 min	1 frame per minute
111	10 min	6 frame per hour

8.1.3 CV Reception Processes

Figure 8-7 shows the CV Reception Process Symbol and Figure 8-8 describes the behaviour.

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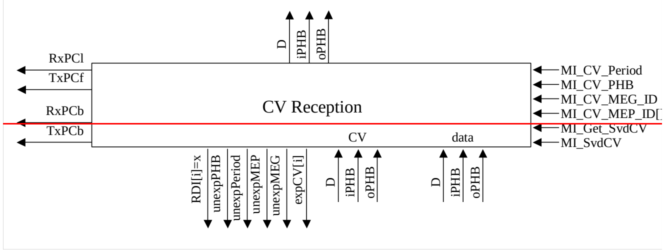


Figure 8-7/G.8121/Y.1381 – CV Reception process Symbol

The CV reception process transparently forwards all the data frames and counts all data frames that have PHB (per-hop behaviour) equal to MI_CV_PHB.

Furthermore the CV reception process processes received CV OAM traffic units. It checks the various fields of the OAM PDU and generates the corresponding events (as defined in clause 6).

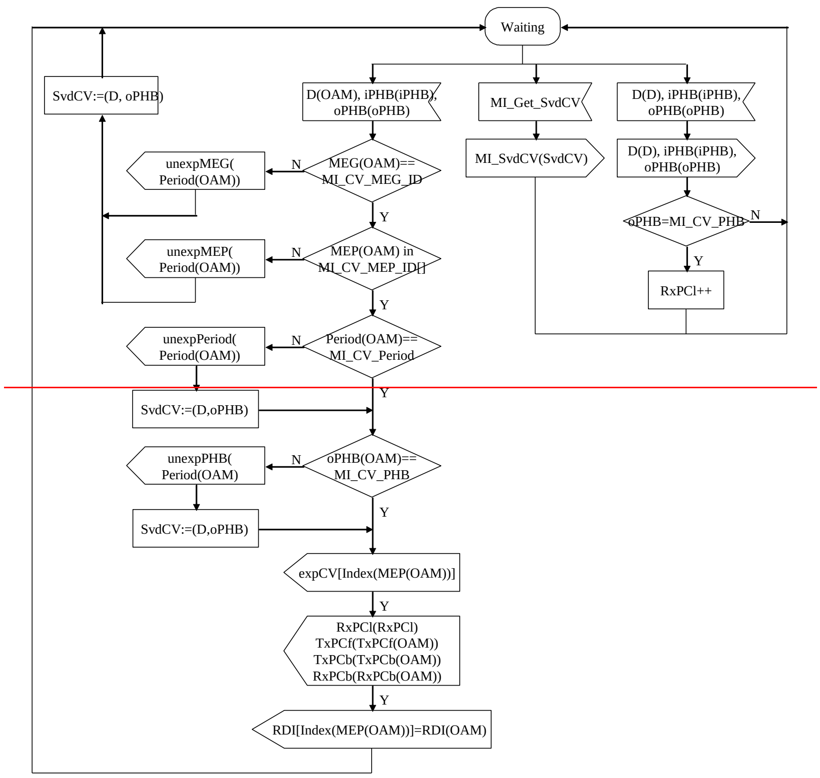
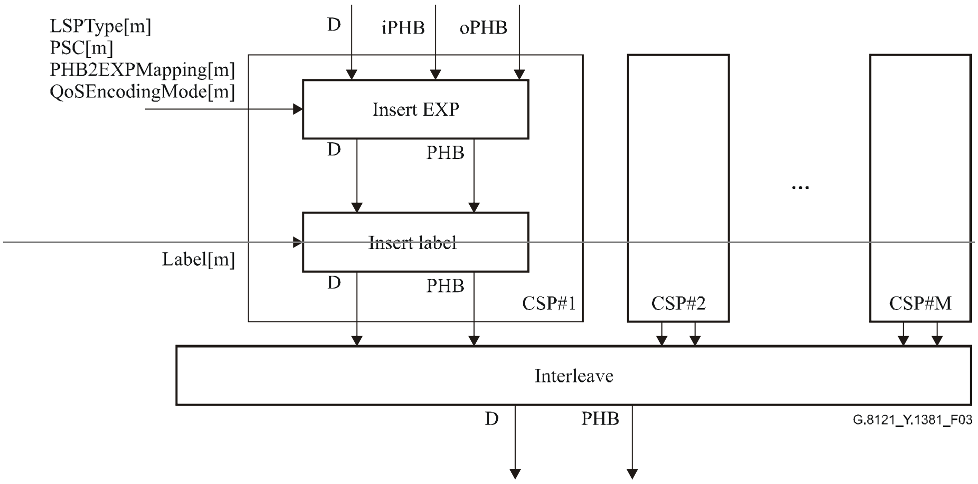


Figure 8-8/G.8121/Y.1381 – CV Reception process

8.2 TC/Label processes

[Note: check is required]

8.2.1 TC/Label source processes



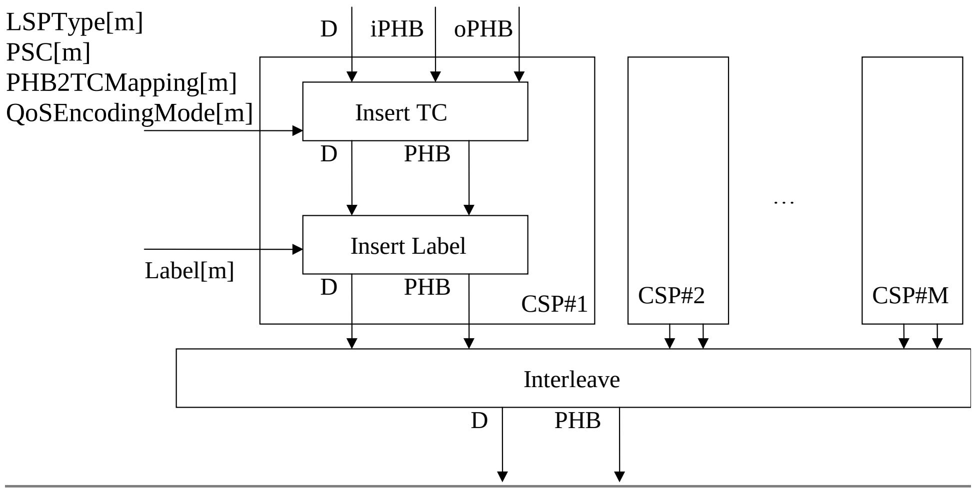


Figure 3/G.8121/Y.1381 – TC/Label source processes

~~[EXP in the figure will be replaced by TC]~~

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Figure 3 shows the TC/Label source processes. These processes are performed on a frame-per-frame basis.

Client Specific Processes: The function supports M (M ≤ 2^N – 16, with N = 20 for MPLS label) client specific processes (CSP#1 to CSP#M), each connected to a single MPLS-TP connection point. CSP#m (1 ≤ m ≤ M) is active when Label[m] has a value in the range 16 to 2^N – 1.

TC Insertion process: Insert the TC field encoding the PHB information according to the following rules:

- If LSPType[m] = L-LSP, the DP information is encoded into the TC field according to RFC 3270 and PSC[m].

- If LSPType[m] = E-LSP, the PHB information is encoded into the TC field according to the 1:1 mapping configured in the PHB2TCMapping[m].

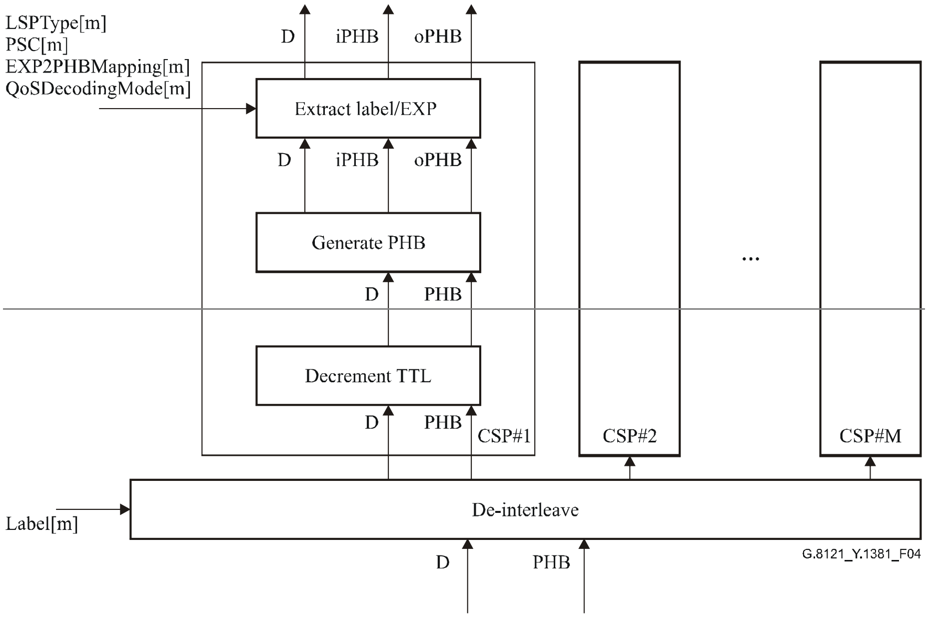
The PHB information to map into the TC field is selected according to the following rules:

- If QoSEncodingMode[m] = A, the iPHB information is mapped into the TC field.
- If QoSEncodingMode[m] = B, the oPHB information is mapped into the TC field.

Label Insertion process: Insert the 20-bit MPLS Label field with the value provided via Label[m].

Interleave process: Interleave the MPLS-TP traffic units from the client specific processes into a single stream.

8.2.2 TC/Label Sink Processes



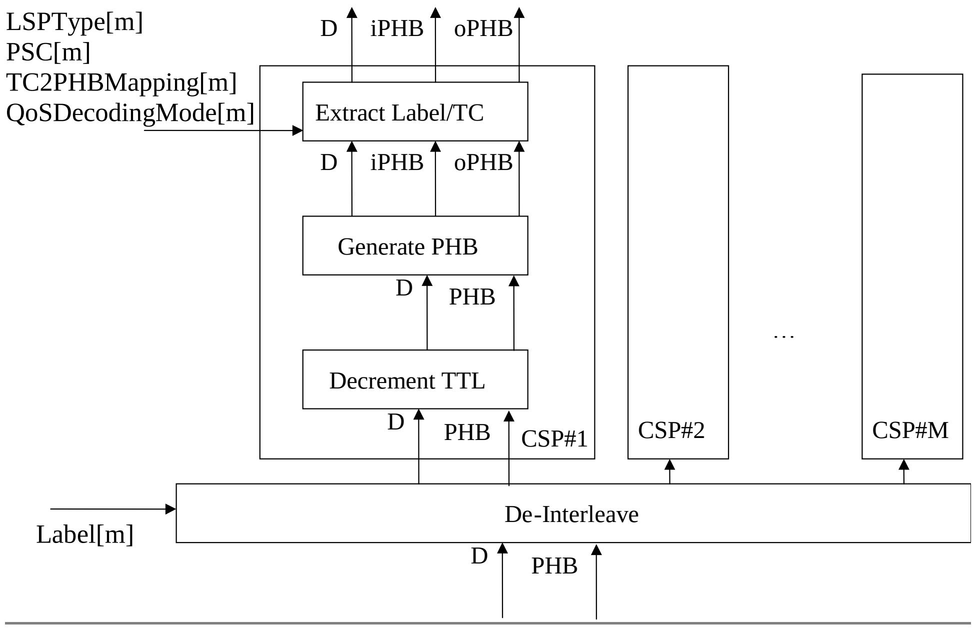


Figure 4/G.8121/Y.1381 – TC/Label sink processes
[Replace EXP by TC]

Figure 4 shows the TC/Label sink processes. These processes are performed on a frame-per-frame basis.

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De-Interleave process: De-interleave the MPLS-TP traffic units and forwards each of its Client Specific Process #m based on the value in the Label field of the traffic unit. Relation between CSP and MPLS label value is provided by Label[1..M].

Traffic units received with a label value identifying a non-active CSP are dropped.

Client Specific Processes: The function supports M ($M \leq 2^N - 16$, with N = 20 for MPLS label) client specific processes (CSP#1 to CSP#M), each connected to a single MPLS-TP connection point. CSP#m ($1 \leq m \leq M$) is active when Label[m] has a value in the range 16 to $2^N - 1$.

Label and TC Extraction process: Extract the MPLS label and the TC fields from the traffic unit.

TTL Decrement Process: Decrements the TTL. If the MPLS-TP CP is not a TCP and the decremented TTL is less than or equal to zero, the traffic unit is dropped silently.

NOTE – MIPs and MEPs compound functions are connected to the Server/MT_A (or MT/MT_A) functions via an MPLS-TP TCP.

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PHB Generation process: Processes the TC field.

The iPHB signal is generated according to the following rules:

- If LSPType[m] = L-LSP, the PSC information is equal to the PSC[m] while the DP information is decoded from the TC field according to RFC 3270 and the PSC[m].
- If LSPType[m] = E-LSP, the PHB information is decoded from the TC field according to the 1:1 mapping configured in the TC2PHBMapping[m].

The CI_oPHB is generated according to the following rule:

- If QoSDecodingMode = A, the oPHB is equal to the generated iPHB.
- If QoSDecodingMode = B, the oPHB is equal to the received PHB.

8.3 Queuing process

The queuing process buffers received MPLS packets for output according to the CI_oPHB. The details of the queuing process implementation are out of the scope of this Recommendation.

The queuing process is also responsible for dropping frames if their rate at the MT_CI is higher than the <Srv>_AI_D can accommodate. Performance monitor counters are *for further study*.

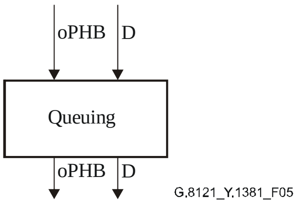

Figure 5/G.8121/Y.1381 – Queuing process

8.4 MPLS-TP-specific GFP-F processes

8.4.1 MPLS-TP-specific GFP-F source processes

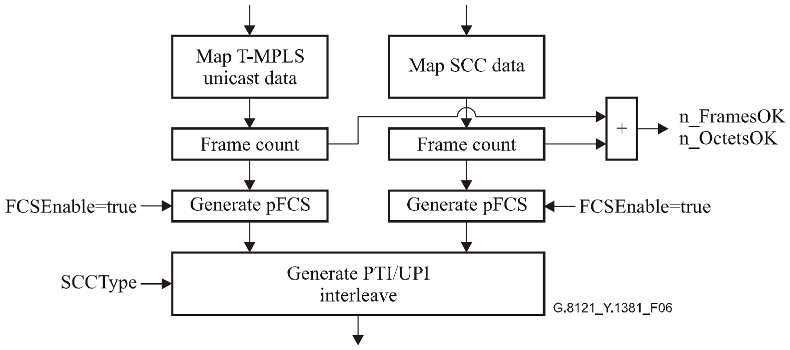

Figure 6/G.8121/Y.1381 – MPLS-TP-specific GFP-F source process
[Replace T-MPLS by MPLS-TP. Check with G.7712]

Figure 6 shows the MPLS-TP-specific GPF-F source processes. These processes are performed on a frame-per-frame basis.

Mapping of ~~unicast~~ MPLS-TP data: The MPLS-TP ~~unicast frame~~ packet is inserted into the client payload information field of the GFP frame as defined in 7.6/G.7041/Y.1303. One MPLS-TP packet~~unicast frame~~ results in one GFP frame.

~~NOTE 1 – Mapping of multicast MPLS-TP data is for further study.~~

Mapping of SCC data: The SCC frame is inserted into the client payload information field of the GFP frame as defined in clause 7/G.7041/Y.1303. One SCC packet~~frame~~ results in one GFP frame.

Frame Count: It counts the number of frames (n_FramesOK) and of octets (n_OctetsOK) that passes through.

pFCS generation: See 8.5.4.1.1/G.806. GFP FCS is always enabled (FCSEnable=true).

Generate PTI and UPI, Interleave: The PTI field of the GFP type header is set fixed to "000". The UPI field of the GFP type header is set to:

– the MPLS ~~Unicast~~ UPI (as defined in Table 6-3/G.7041/Y.1303), for frames coming from the Map MPLS-TP ~~Unicast~~ data process;

– the SCC UPI according to SCC_Type for frames coming from the Map SCC data process.

The frames are then interleaved to form a single stream.

NOTE 2 – GFP Client Management frames are not defined for MPLS-TP over GFP-F mapping.

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8.4.2 MPLS-TP-specific GFP-F sink processes

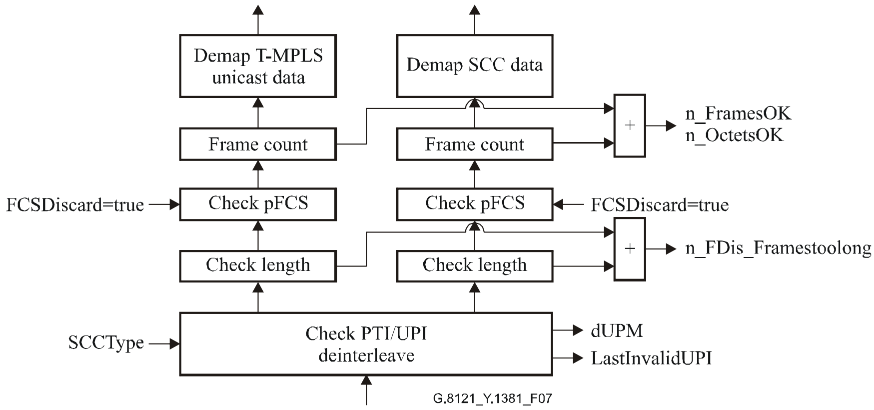

Figure 7/G.8121/Y.1381 – MPLS-TP-specific GFP-F sink process
[Replace T-MPLS by MPLS-TP Check with G.7712]

Figure 7 shows the MPLS-TP-specific GPF-F sink processes. These processes are performed on a frame-per-frame basis.

Check PTI and UPI, Deinterleave: GFP frames with an accepted PTI (AcPTI, see 8.5.1.1/G.806) of "000" are client data frames. All GFP frames with an accepted PTI (AcPTI, see 8.5.1.1/G.806) value other than "000" shall be discarded.

The UPI of client data frames is checked to generate dUPM as follows:

– a "valid-UPI frame" is a frame with a UPI that equals either the MPLS ~~Unicast~~ UPI (as defined in Table 6-3/G.7041/Y.1303) or the SCC UPI according to SCCType. All other frames are "invalid-UPI frames".

– dUPM is raised as soon as one "invalid-UPI frame" is received.

– dUPM is cleared if no "invalid-UPI frames" have been received for the last Tclear seconds.

Tclear is ffs. If dUPM is active, the latest received invalid UPI is available at LastInvalidUPI. If dUPM is not active, LastInvalidUPI is "n/a".

The UPI of client data frames is further used to deinterleave the frames:

– "valid-UPI frames" with UPI equalling the MPLS ~~Unicast~~ UPI (as defined in Table 6-3/G.7041/Y.1303) are sent towards the “Demap MPLS-TP~~Map MPLS Unicast~~ data” process.

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– "valid-UPI frames" with UPI equalling the SCC UPI according to SCCType (as defined in Table 6-3/G.7041/Y.1303) are sent towards the ~~Map~~ “Demap SCC data” process.

– "invalid-UPI frames" are discarded.

GFP-F frame length: It checks whether the length of the GFP-F frame is allowed. Frames longer than GFP_Length bytes are dropped and counted (n_FramesTooLong).

NOTE 1 – GFP_Length is for further study.

pFCS Supervision: See 8.5.4.1.2/G.806. The discarding of errored frames is always enabled (FCSdiscard=true). If the accepted PFI is 0, the frame is dropped and counted (n_FDis_PFI).

Frame Count: It counts the number of frames (n_FramesOK) and of octets (n_OctetsOK) that passes through.

Demapping of SCC data: The SCC packet~~frame~~ is extracted from the client payload information field of the GFP frame as defined in clause 7/G.7041/Y.1303. One GFP frame results in one SCC frame.

Demapping of unicast MPLS-TP data: The MPLS-TP u~~nicast frame~~packet is extracted from the client payload information field of the GFP frame as defined in 7.6/G.7041/Y.1303. One GFP frame results in one ~~MPLS unicast frame~~MPLS-TP packet.

~~NOTE 2 – Demapping of multicast MPLS-TP data is for further study.~~

8.5 Control Word (CW)~~Common Interworking Indicators (CII)~~ processes

This function performs the Control Word (CW)~~Common Interworking Indicator (CII)~~ processing as described in [IETF RFC 4448]. The CW is known as the common interworking indicators (CII) in [ITU-T Y.1415]~~ITU-T Rec. Y.1415~~.

8.5.1 CW~~CII~~ source process

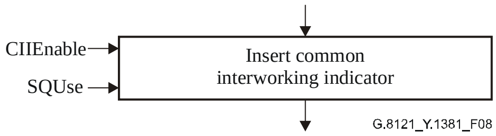

Figure 8/G.8121/Y.1381 – ~~CII~~ CW source process
[Replace "Insert Common Interworking Indicator" with "Insert Control Word". Replace "CIIenable" with "CWEnable"]

This function should generate and insert the ~~Common Interworking Indicator~~ CWas described in [IETF RFC 4448]~~ITU-T Rec. Y.1415~~, in case the indication CIIEnable is true. Otherwise no insertion should be performed. If the indication SQUse is false, the sequence number field should be set at all zeroes.

8.5.2 CII Sink Process

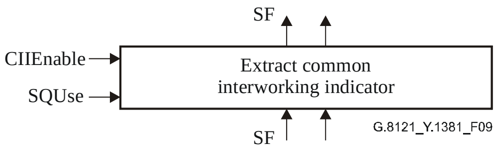

Figure 9/G.8121/Y.1381 – CII sink process
[Replace "Insert Common Interworking Indicator" with "Insert Control Word". Replace "CIIenable" with "CWEnable"]

This function should process the Common Interworking Indicator as described in ITU-T Rec. Y.1415, in case the indication CIIEnable is true. In this case, if the indication SQUse is

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true, the sequence number field should be processed and out-of-sequence packets dropped (no reordering is performed by this process).

In addition, the SF indication is passed through unaltered to the next process.

9 MPLS-TP layer functions

Figure 10 illustrates the MPLS-TP layer network and server and client layer adaptation functions. The information crossing the MPLS-TP connection point (MT_CP) is referred to as the MPLS-TP characteristic information (MT_CI). The information crossing the MPLS-TP access point (MT_AP) is referred to as the MPLS-TP adapted information (MT_AI).

The MPLS-TP layer network provides embedded hierarchy via the label stacking mechanism. This is represented in the model by MPLS-TP Tunnel sublayers, which contain MT_TT and MT/MT_A functions. The figure shows a generic example for the connection of the MPLS-TP Tunnel functions. It is not required to connect them via a MT_C function; they can be directly inserted without a connection function. It is noted that this recommendation only defines Ethernet for the client of MPLS-TP as MT/ETH adaptation function.

This mechanism (MPLS-TP tunnel sublayers) is also used when sublayer (tandem connection) monitoring is required.

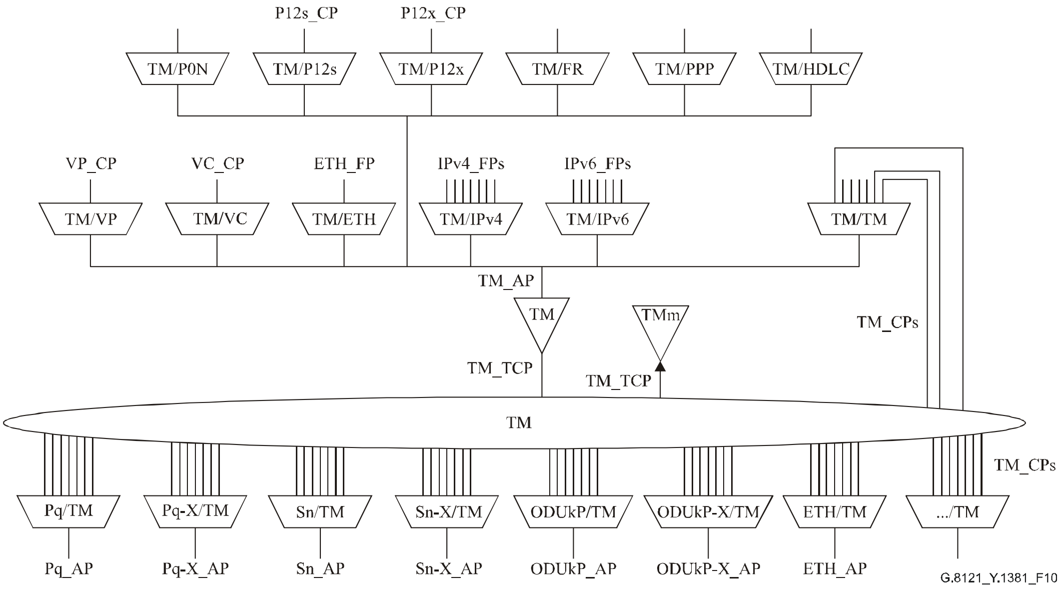

Figure 10/G.8121/Y.1381 – MPLS-TP atomic functions
[Replace TM by MT (same as fig1)]

9.1 Connection Functions (MT_C)

MT_C is the function that assigns MPLS packets at its input ports to MPLS-TP packets at its output ports.

The MT_C connection process is a unidirectional function as illustrated in Figure 22. The signal formats at the input and output ports of the function are similar, differing only in the logical sequence of the MPLS-TP packets. As the process does not affect the nature of the characteristic information of the signal, the reference point on either side of the MT_C function is the same, as illustrated in Figure 22.

Incoming MPLS-TP packets at the MT_CP are assigned to available outgoing MPLS-TP capacity at the MT_CP.

• Symbol:

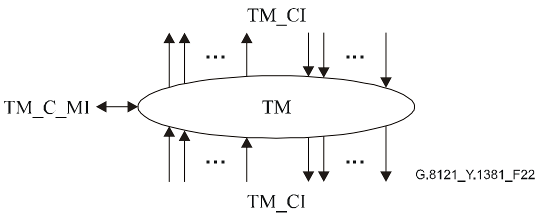

Figure 22/G.8121/Y.1381 – MT_C symbol
[Replace TM by MT]

• Interfaces:

Table 3/G.8121/Y.1381 – MT_C input and output signals

Input(s)	Output(s)
Per MT_CP, n × for the function: MT_CI_D MT_CI_iPHB MT_CI_oPHB MT_CI_SSF MT_AI_TSF per input and output connection point: *for further study* per matrix connection: MT_C_MI_ConnectionType MT_C_MI_Return_CP_ID MT_C_MI_ConnectionPortIds per SNC protection group: *for further study*	per MT_CP, m × per function: MT_CI_D MT_CI_iPHB MT_CI_oPHB MT_CI_SSF

• Processes:

In the MT_C function MPLS-TP Characteristic Information is routed between input (termination) connection points ((T)CPs) and output (T)CPs by means of matrix connections. (T)CPs may be allocated within a protection group.

NOTE – Neither the number of input/output signals to the connection function, nor the connectivity is specified in this Recommendation. That is a property of individual network elements.

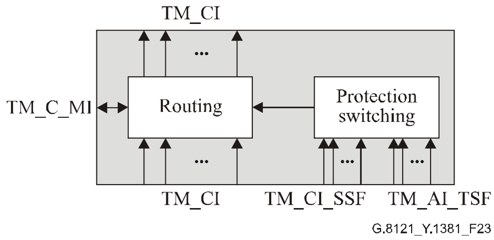

Figure 23/G.8121/Y.1381 – MT_C process diagram
[Replace TM by MT]

– *Routing process:*

This process passes all the traffic units received from a specific input to the corresponding output according to the matrix connection between the specified input and output.

Each (matrix) connection in the MT_C function shall be characterized by the:

Type of connection (MI_ConnectionType):	unprotected, protected
Traffic direction (MI_Return_CP_ID):	Unidirectional if NULL, otherwise it identifies the CP of the return connection (Note)
Input and output connection points (MI_ConnectionPortIDs):	set of connection point identifiers
NOTE – Bidirectional LSPs are supported by associating two unidirectional LSPs in the data plane, as per ITU-T Rec. G.8110.1/Y.1370.1.	

– *Protection Switching process:*

For further study.

• Performance Monitoring:

None.

• Defects:

None.

• Consequent actions:

If an output of this function is not connected to one of its inputs, the connection function shall send no traffic units and SSF = false to the output.

• Defect correlations:

None.

9.1.1 Sub-network connection protection process

For further study.

9.2 Termination functions

~~[Note: This sub-clause will be revised when [mpls-tp-oam-fwk] / G.mplstpoam available]~~

~~[Note: Due to removing OAM aspects per following wd03r4, some MI signals and defect correlations for MT_TT_So and MT_TT_Sk as tentatively defined in Table 7-1 & Table 8-1 of G.8151 (wd12r1) are missing , Re-defining them will be required when [mpls-tp-oam-fwk] / G.mplstpoam available.]~~

~~[Note: Progress based on WD18 (Stockholm, Apr/2010)]~~

9.2.1 MPLS-TP Trail Termination function (MT_TT)

[Ed Note: Some of current text has dependency on draft G.tpoam & G.8110.1]

[Ed Note: Updated per WD28 in general . And some consistency with 8.1(WD21) is made]

The bidirectional MPLS-TP Trail Termination (MT_TT) function terminates the MPLS-TP ~~traffic with G-ACh frame format~~OAM to determine the status of the MPLS-TP (sub)layer trail. The MT_TT function is performed by a co-located pair~~Figure xx shows the combination~~ of the ~~unidirectional sink and~~ MPLS-TP trail termination source (MT_TT_So) and sink (MT_TT_Sk) functions as shown in Figure 9-a1.~~to form a bidirectional function.~~

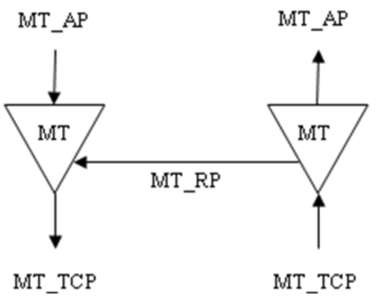

Figure 9-a1~~xx~~/G.8121/Y.1381 – MT_TT

9.2.1.1 ~~T~~ MPLS-TP Trail Termination Source function (MT~~TM~~_TT_So)

The MT_TT_So function determines and inserts the TTL value in the shim header TTL field and adds ~~T~~ MPLS-TP OAM for pro-active monitoring ~~including the CV, FFD and BDI signals~~ to the MT_AI signal at its MT_AP.

The information flow and processing of the MT_TT_So function is defined with reference to ~~Figure xx~~Figure9-*.

• **Symbol:**

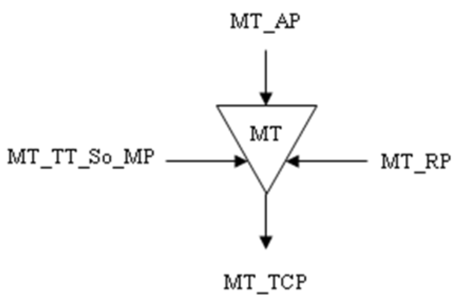

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Figure xxFigure9-*/G.8121/Y.1381 –MT_TT_So function

• **Interfaces:**

Table 9-*x/G.8121/Y.1381 – MT_TT_So inputs and outputs

[Ed note: Some names of parameters are modified in align with clause8 – **done in r1→r2**]

Input(s)	Output(s)
MT_AP: MT_AI_D MT_AI_PHB MT_AI_MCC MT_AI_SCC **MT_RP:** MT_RI_CC_RDI MT_RI_CC_TxFCf, MT_RI_CC_RxFCl MT_RI_CC_Blk **MT_TT_So_MP:** MT_TT_So_MI_TTIVALUE MT_TT_So_MI_CC_Enable MT_TT_So_MI_LM_Enable MT_TT_So_MI_CC-_MEG_ID MT_TT_So_MI_CC_MEP_ID MT_TT_So_MI_CC_Priority MT_TT_So_MI_CC_Period MT_TT_So_MI_MEL[1]	**MT_TCP:** MT_CI_D MT_CAI_oPHB MT_CAI_iPHB

• **Processes:**

The processes associated with the MT_TT_So function are as depicted in Figure xx.

[1] The value of the MEL field may be configurable. The default value is "111".

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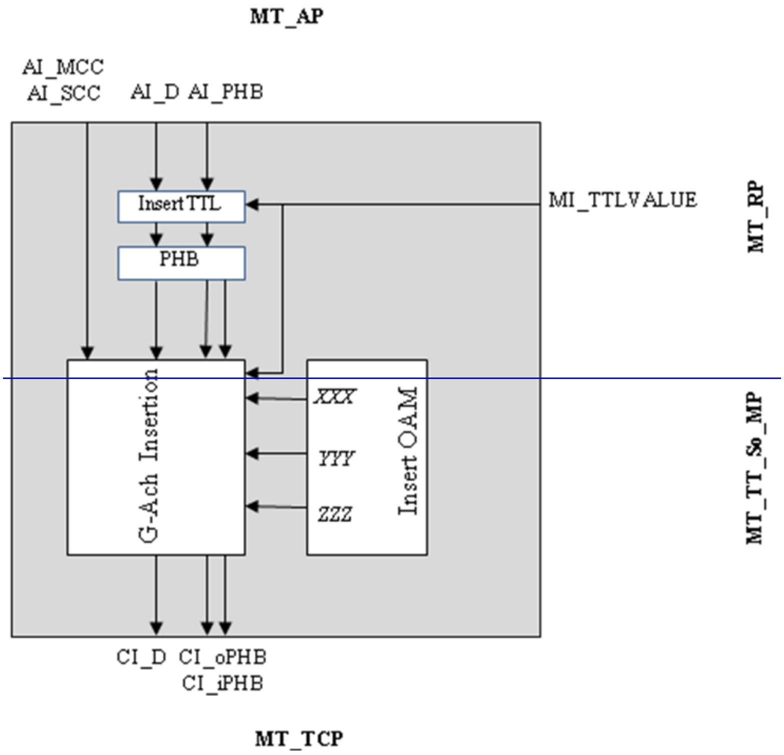

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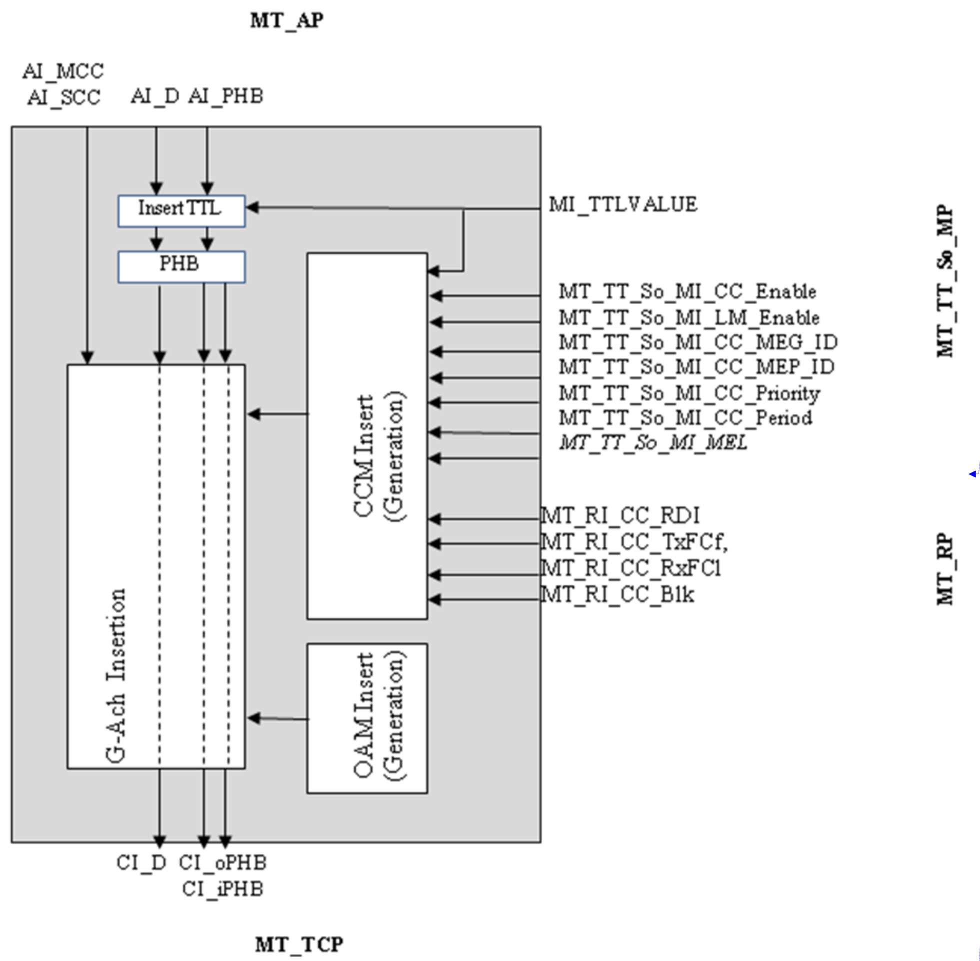

Figure xx/G.8121/Y.1381 –MT_TT_So process diagram
[Ed note : Figure is partly updated per wd28(11/2010)]

PHB: The AI_PHB signal is assigned to both the CI_iPHB and CI_oPHB signals at the MT_TCP reference point.

Insert TTL: The Time To Live value is inserted in the outer shim header's TTL field within the MT_AI traffic unit

G-Ach Insertion: G-Ach processing is performed per [RFC5586]. MCN and SCN frame processing is performed per [RFC5718] Other Frames that require G-Ach processing is Clause8.1.1~~ffs~~

CC~~V~~ Generation Process: See 8.1/G.8121

Insert OAM Insert: ffs [Ed note: This block will be replaced by Generation processes in clause 8]

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• Defects:

None.

• Consequent actions:

None.

• Defect correlations:

None.

• Performance monitoring:

None.

~~ffs~~

9.2.1.2 ~~T-~~MPLS-TP Trail Termination Sink function (MT~~TM~~_TT_Sk)

The MT_TT_Sk function reports the state of the MPLS-TP Trail (Network Connection). It extracts MPLS-TP trail OAM - for pro-active monitoring - from the MPLS-TP signal at its MT_TCP, detects defects, counts during 1-second periods errors and defects to feed Performance Monitoring when connected and forwards the defect information as backward indications to the companion MT_TT_So function.

Note – The MT_TT_Sk function extracts and processes one level of MPLS-TP OAM irrespective of the presence of more levels.

~~T-MPLS Trail. It extracts MPLS-TP traffic with G-ACh frame format.~~

The information flow and processing of the MT_TT_Sk function is defined with reference to Figure xx.

• Symbol:

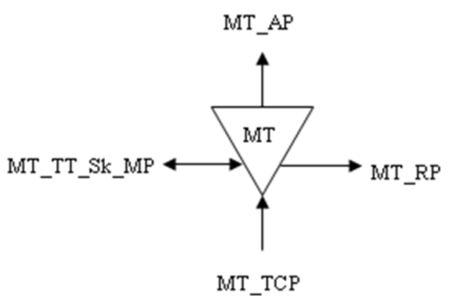

Figure xx/G.8121/Y.1381 – MT_TT_Sk function

• Interfaces:

Table x/G.8121/Y.1381 – MT_TT_Sk inputs and outputs

[Ed note: Some name of parameters are modified in align with clause8 **– done r1→r2**]

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Input(s)	Output(s)
MT_TCP: MT_CI_D MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **MT_TT_Sk_MP:** MT_TT_Sk_MI_CC_MEG_ID MT_TT_Sk_MI_CC_PeerMEP_ID[] MT_TT_Sk_MI_CC_Enable MT_TT_Sk_MI_CC_Period MT_TT_Sk_MI_CC_Priority MT_TT_Sk_MI_LM_Enable MT_TT_Sk_MI_Get_SvdCC MT_TT_Sk_MI_1second MT_TT_Sk_MI_LM_DEGM MT_TT_Sk_MI_LM_M MT_TT_Sk_MI_LM_DEGTHR MT_TT_Sk_MI_SSF_Reported MT_TT_Sk_MI_RDI_Reported MT_TT_So_MI_MEL[2]	**MT_AP:** MT_AI_D MT_AI_PHB MT_AI_TSF MT_AI_MCC MT_AI_SCC **MT_RP:** MT_RI_CC_RDI MT_RI_CC_RxPCl MT_RI_CC_TxPCf **MT_TT_Sk_MP:** MT_TT_Sk_MI_cSSF MT_TT_Sk_MI_cLCK MT_TT_Sk_MI_cLOC[i] MT_TT_Sk_MI_cMMG MT_TT_Sk_MI_cUNL MT_TT_Sk_MI_cUNM MT_TT_Sk_MI_cUNP MT_TT_Sk_MI_cUNPhb MT_TT_Sk_MI_cDEG MT_TT_Sk_MI_cRDI MT_TT_Sk_MI_pN_LF MT_TT_Sk_MI_pN_TF MT_TT_Sk_MI_pF_LF MT_TT_Sk_MI_pF_TF MT_TT_Sk_MI_pF_DS MT_TT_Sk_MI_pN_DS MT_TT_Sk_MI_SvdCC

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[2] The value of the MEL field may be configurable. The default value is "111".

• Processes:

The processes associated with the MT_TT_Sk function are as depicted in Figure xx.

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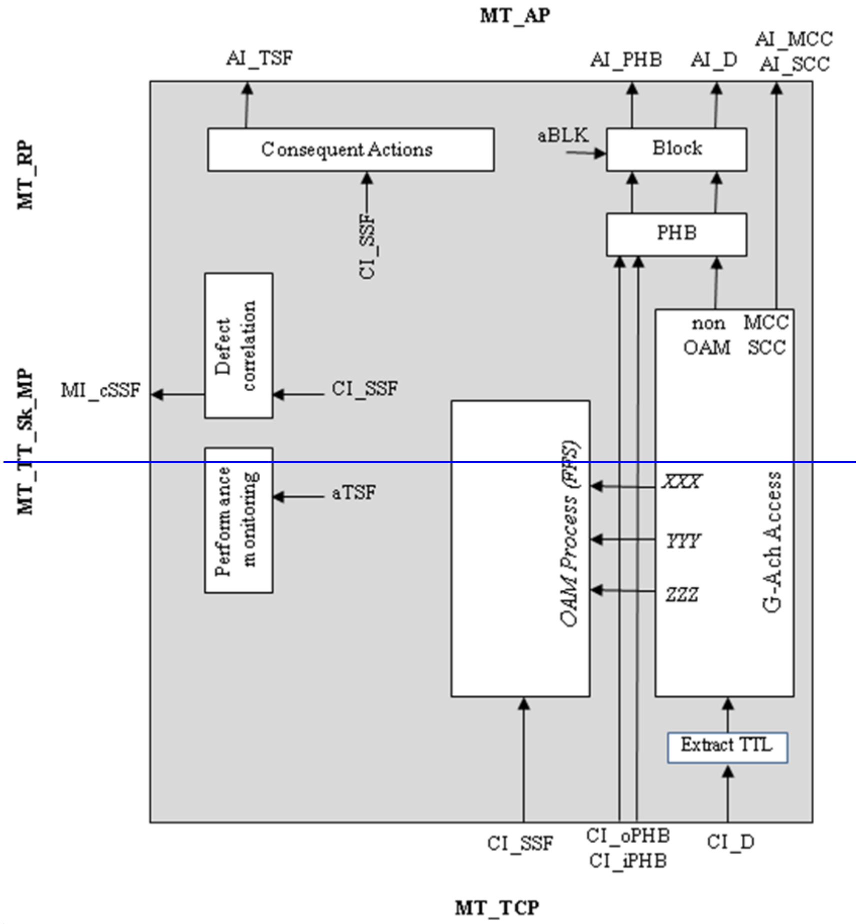

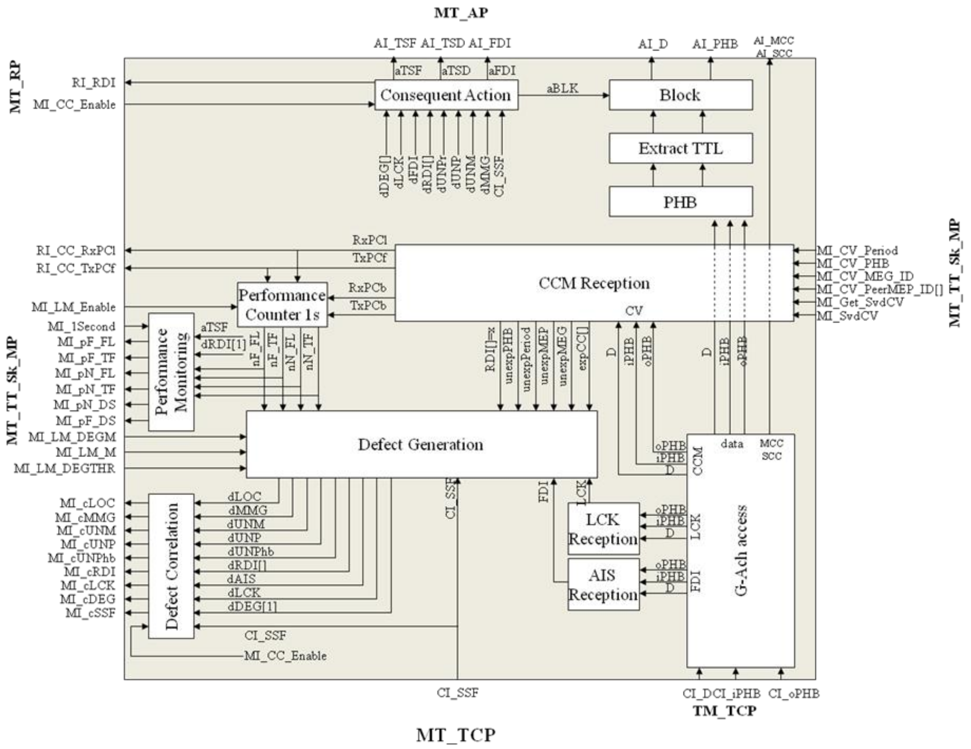

Figure xx/G.8121/Y.1381 – MT_TT_Sk process diagram
[Ed note: Figure is partly updated per wd28(11/2010)]

PHB: The CI_oPHB signal is assigned to the AI_PHB signal at the reference point MT_AP.

Note that the CI_iPHB signal is not used by any of the processes in the function.

Extract TTL: The Time To Live value is extracted from the outer shim header's TTL field within the MT_CI traffic unit

Block: When the aBlock consequent action is asserted, this process drops all traffic units arriving at its input.

G-Ach Access: G-Ach processing is performed per [RFC5586]. MCN and SCN frame processing is performed per [RFC5718] Other Frames that require G-Ach processing is Clause8.1.1ffs

AIS Reception Process: See clause 8.1.4/G.8121~~This process generates the FDI event (see Table 6-1)~~.

LCK Reception Process: See clause 8.1.3/G.8121~~This process generates the LCK event (see Table 6-1)~~.

~~**BDI**: This process detects dBDI.~~

CC~~V~~ Reception Process: See clause 8.1.7~~3~~/G.8121.

Performance Counter Process: This process is for further study.

Defect Generation: This process raises and clears the defects as defined in clause 6.1/G.8121.

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OAM process: ffs

• **Defects:**

ffs

• **Consequent actions:**

ffs

• **Defect correlations:**

ffs

• **Performance monitoring:**

Ffs.

ffs

9.2.2 MPLS-TP non-intrusive monitor function (TMm_TT_Sk)

Ffs.

9.3 Adaptation functions

9.3.1 MPLS-TP to MPLS-TP adaptation function (MT/MT_A)

9.3.1.1 MPLS-TP to MPLS-TP adaptation source function (MT/MT_A_So)

This function maps client MT_CI traffic units into server MT_AI traffic units.

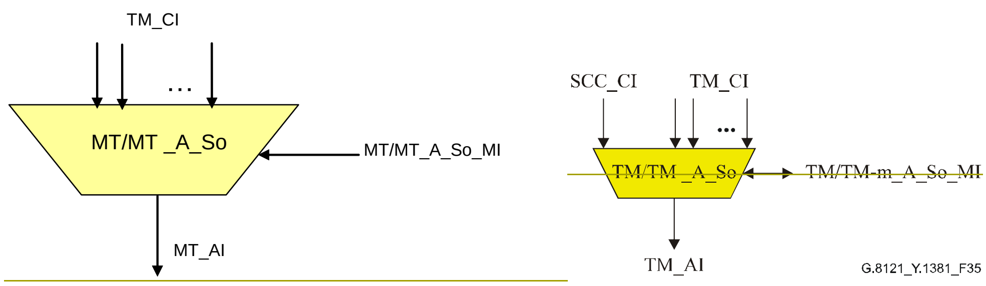

Figure 35/G.8121/Y.1381 – MT/MT_A_So function
[Replace TM by MT]

• Interfaces:

Table 6/G.8121/Y.1381 – MT/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB **SCC_CP:** SCC_CI_Data **MT/MT_A_So_MI:** MT/MT_A_So_MI_SCCType MT/MT_A_So_MI_Admin_State MT/MT_A_So_MI_Label[1…M] MT/MT_A_So_MI_LSPType[1…M] MT/MT_A_So_MI_PSC[1…M] MT/MT_A_So_MI_PHB2TCMapping[1…M] MT/MT_A_So_MI_QoSEncodingMode[1…M] MT/MT_A_So_MI_Client_MEL[1…M] MT/MT_A_So_MI_LCK_Period[1…M] MT/MT_A_So_MI_LCK_PSC[1…M]	**MT_AP:** MT_AI_Data MT_AI_PHB

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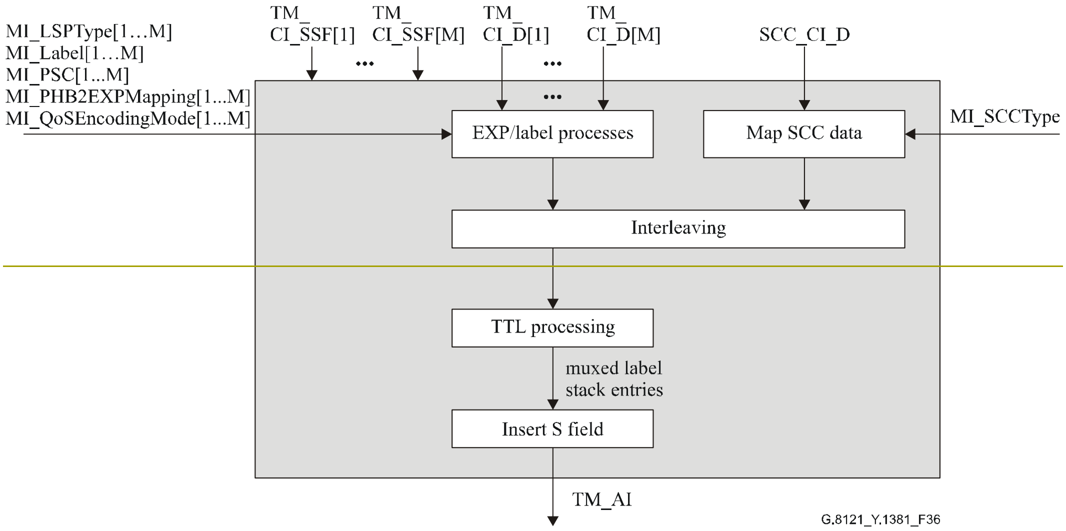
• Processes:

A process diagram of this function is shown in Figure 36.



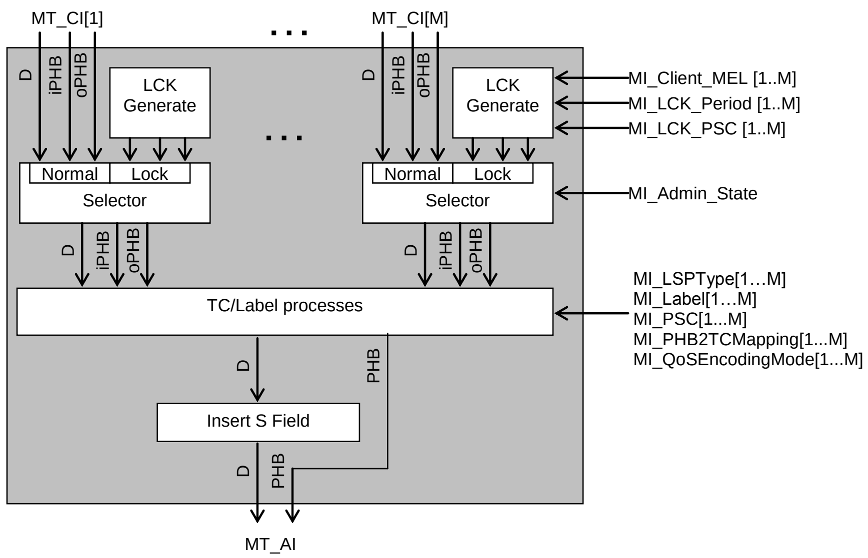


Figure 36/G.8121/Y.1381 – MT/MT_A_So process diagram
~~[Replace TM by MT, EXP by TC]~~

~~[Note: Alignment with G.7712 (clause 7.1.2.3.3) should be done]~~

– LCK Generate process:

See 8.1.X. Each CP has its LCK Generate process.

– Selector process:

See 8.1.X. The normal CI is blocked if Admin_State = LOCKED.

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– *TC/Label processes:*

See 8.2.1.

~~– *Map SCC Data:*~~

~~Ffs.~~

~~– *Interleave:*~~

~~Interleaves the traffic units from the client specific processes into a single stream.~~

~~Traffic units from the TC/Label source processes are associated with S=0 (bottom of label stack is not reached) to indicate the client is MPLS.~~

~~Traffic units from the SSC_CI are associated with S=1 (bottom of label stack is reached) to indicate the client is SCC (and therefore not MPLS).~~

– *S Field Insertion:*

A 1-bit S Field set ~~equal~~ to 0 (not bottom of label stack) is inserted to indicate the client is MPLS.

~~the value generated by the interleave process~~.

• Defects:

None.

• Consequent actions:

None.

• Defect correlations:

None.

• Performance monitoring:

None.

9.3.1.2 MPLS-TP to MPLS-TP adaptation sink function (MT/MT_A_Sk)

This function retrieves client MT_CI traffic units from server MT_AI traffic units.

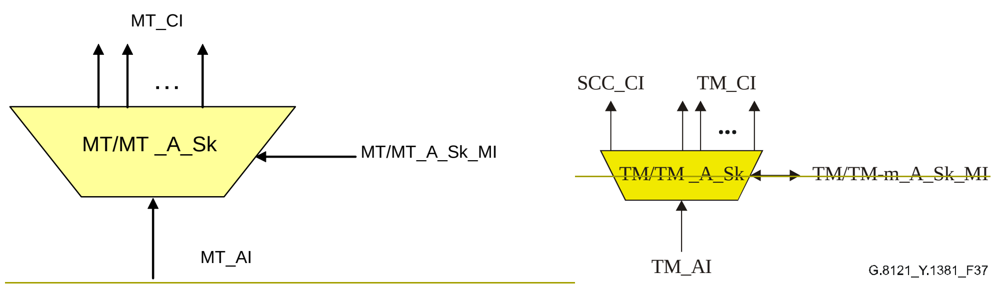


Figure 37/G.8121/Y.1381 – MT/MT_A_Sk function
~~[Replace TM by MT~~]

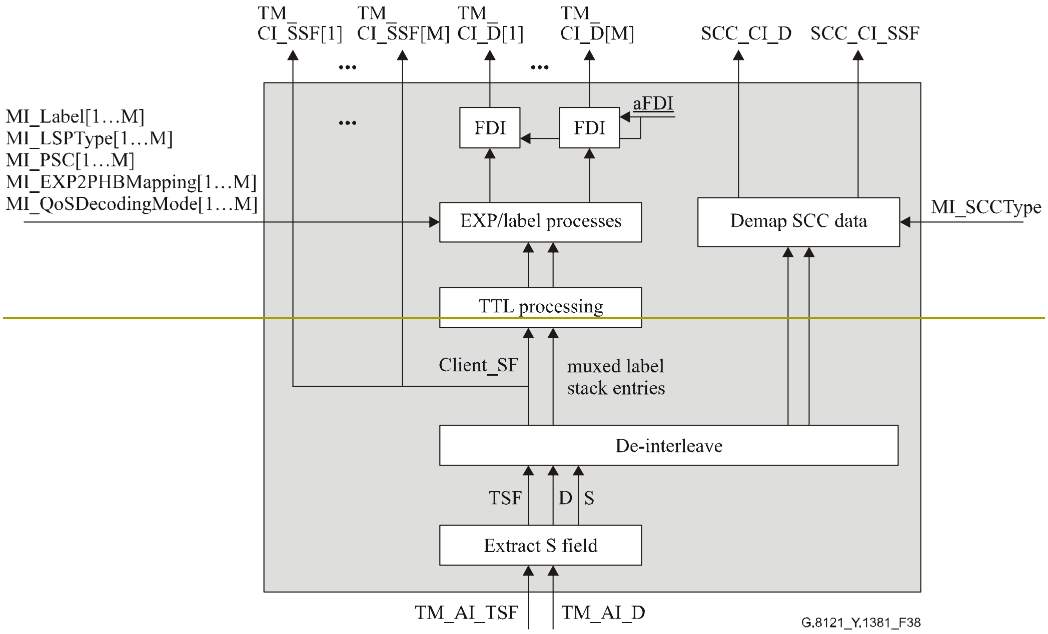
• Interfaces:

Table 7/G.8121/Y.1381 – MT/MT_A_Sk interfaces

Inputs	Outputs
MT_AP: MT_AI_Data MT_AI_PHB MT_AI_TSF MT_AI_AIS **MT/MT_A_Sk_MP:** MT/MT_A_Sk_MI_SCCType MT/MT_A_Sk_MI_AdminState MT/MT_A_Sk_MI_Label[1…M] MT/MT_A_Sk_MI_LSPType[1…M] MT/MT_A_Sk_MI_PSC[1…M] MT/MT_A_Sk_MI_ TC2PHBMapping[1…M] MT/MT_A_Sk_MI_QoSDecodingMode[1…M] MT/MT_A_Sk_MI_Client_MEL[1...M] MT/MT_A_Sk_MI_AIS_Period[1...M] MT/MT_A_Sk_MI_AIS_PSC[1...M] MT/MT_A_Sk_MI_LCK_Period[1...M] MT/MT_A_Sk_MI_LCK_PSC[1...M]	**Each MT_CP:** MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **SCC_CP:** SCC_CI_Data SCC_CI_SSF

• Processes:

A process diagram of this function is shown in Figure 38.



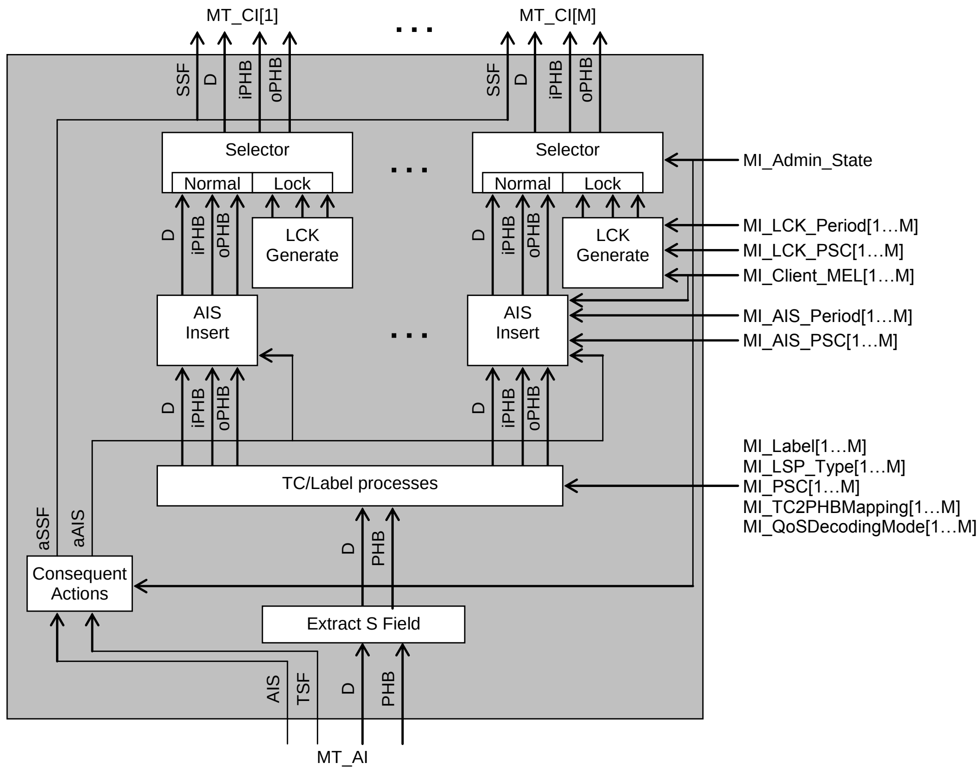


Figure 38/G.8121/Y.1381 – MT/MT_A_Sk process diagram
[Replace TM by MT, and EXP by TC / FDI see below]

– *Selector process:*

See 8.1.X. The normal CI is blocked if Admin_State = LOCKED.

<<It is assumed that the Selector process will be defined in clause 8.1. Reference to section 8.1.X to be updated based on G.8121 table of contents>>

– *LCK Generate process:*

– *AISFDI process:*

See 8.1.X.

This process inserts MPLS-TP FDI OAM packets when consequent action aFDI is asserted.

[Note: FDI process should be updated]

– *TC/Label processes:*

See 8.2.2.

– *Demap SCC data:*

Ffs.

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– *S field extraction:*

Extract and process the 1-bit S Field : the retrieved S Field should have the value 0 (not bottom of label stack) to indicate the client is MPLS; for such case the traffic unit is accepted and forwarded (together with the PHB information) after extraction of the S-bit field to the next process. For the case the S-bit has the value 1, the traffic unit is silently discarded.

~~and passes it to the De-interleave process~~.

~~– *De-interleave:*~~

~~De-interleaves the traffic units passing them to the client specific processes based on the S value associated with the traffic unit.~~

~~Traffic units with S=0 (bottom of label stack is not reached) indicating that the client is MPLS are sent to the TC/Label sink processes.~~

~~Traffic units with S=1 (bottom of label stack is reached) indicating that the client is SCC (and therefore not MPLS) are sent to the SCC_CI.~~

• Defects:

None.

• Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF

~~aFDI~~aAIS ← AI_~~TSF~~ AIS ~~[Note: aFDI should be updated]~~

• Defect correlations:

None.

• Performance monitoring:

None.

9.3.2 MPLS-TP to ETH adaptation function (MT/ETH_A)

~~[Note: Need to be aligned with updated G.8110.1 overall]~~

9.3.2.1 MPLS-TP to ETH adaptation source function (MT/ETH_A_So)

This function maps the ETH_CI information for transport in an MT_AI signal.

The information flow and processing of the MT/ETH_A_So function is defined with reference to Figure 39.

• Symbol:

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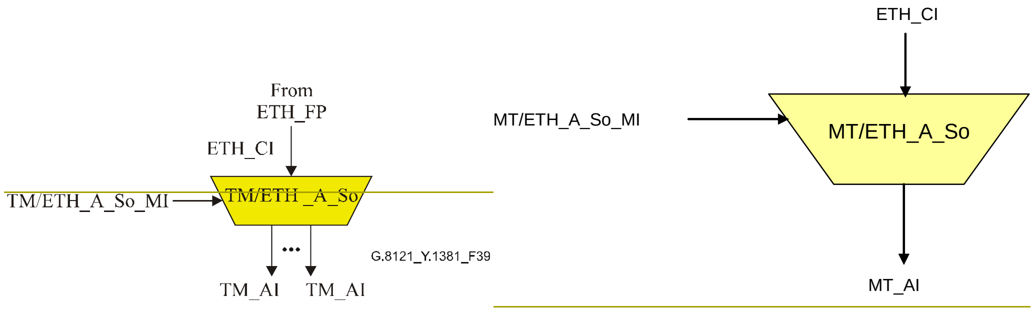

Figure 39/G.8121/Y.1381 – MT/ETH_A_So function
~~[Replace TM by MT]~~

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• **Interfaces:**

Table 8/G.8121/Y.1381 – MT/ETH_A_So Inputs and Outputs

Inputs	Outputs
ETH_FP: ETH_CI_Data ETH_CI_P ETH_CI_DE **MT/ETH_A_So_MP:** MT/ETH_A_So_MI_AdminState MT/ETH_A_So_MI_FCSEnable MT/ETH_A_So_MI_~~CIIEnable~~CWEnable MT/ETH_A_So_MI_SQUse MT/ETH_A_So_MI_PRI2PSCMapping MT/ETH_A_So_MI_MEP_MAC MT/ETH_A_So_MI_Client_MEL MT/ETH_A_So_MI_LCK_Period MT/ETH_A_So_MI_LCK_Pri MT/ETH_A_So_MI_MEL	~~Each~~ **MT_AP:** MT_AI_Data MT_AI_PHB

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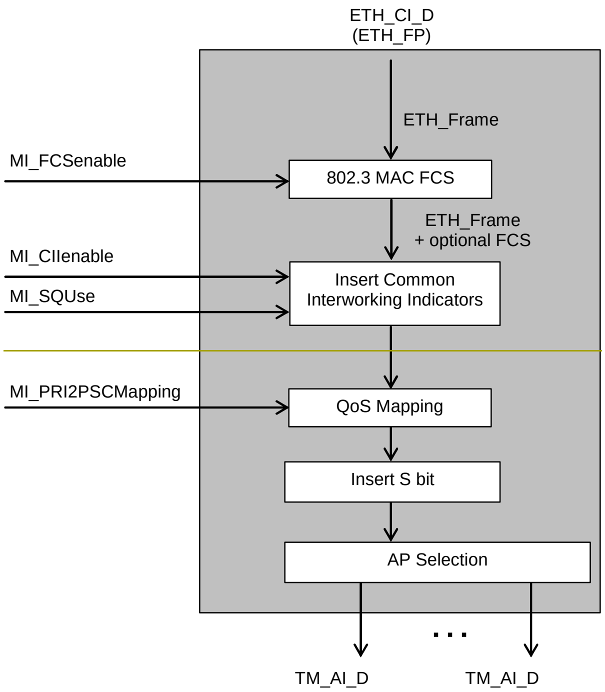
• Processes:

The processes associated with the MT/ETH_A_So function are as depicted in Figure 40.



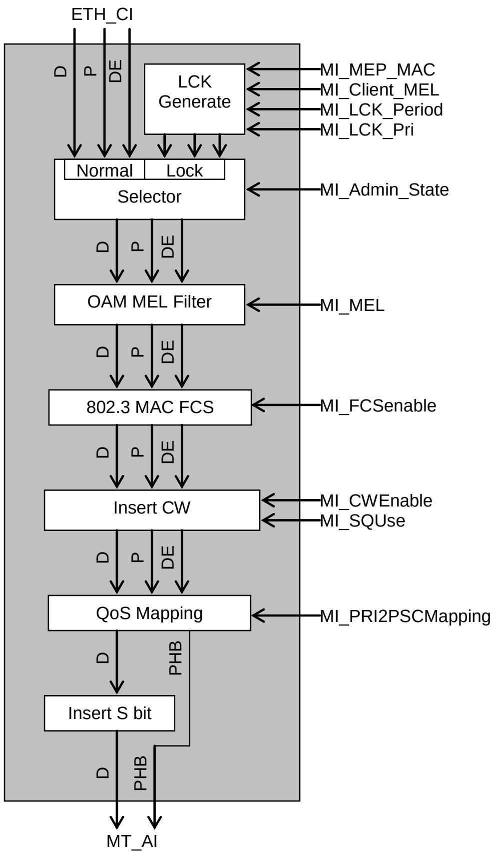


Figure 40/G.8121/Y.1381 – MT/ETH_A_So process diagram

[Replace TM by MT]

[LCK gen is missing. See Figure 9-19/G.8021 for information]

[Note (Apr/2010): introduce LCK command in G.8121 similar to that in G.8021]

– *LCK Generate process:*

See 8.1.2/G.8021/Y.1341.

– *Selector process:*

See 8.1.3/G.8021/Y.1341. The normal CI is blocked if Admin_State = LOCKED.

– *OAM MEL Filter process:*

See 8.1.1/G.8021/Y.1341.

– *802.3 MAC FCS generation:*

See 8.98.1/G.8021/Y.1341. MAC FCS generation is optional (see [IETF RFC 4720] and [ITU-T Y.1415]ITU-T Rec. Y.1415): MAC FCS is generated if MI_FCSEnabled is True.

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– *CW Insertion process:Common interworking indicators insertion:*

See 8.5.1.

– *QoS mapping process:*

This process maps the Ethernet-based QoS signals into MPLS-based QoS signals.

The PSC part of the AI_PHB is generated by the received CI_P according to the 1:1 mapping configured by the MI_PRI2PSCMapping.

The DP part of the AI_PHB is generated by the received CI_DE according to the following rule:

```
If CI_DE = True
     DP(AI_PHB) = Yellow
Else
     DP(AI_PHB) = Green
```

– *S field Field insertion:*

A 1-bit S Field set to 1 (bottom of label stack) is inserted to indicate the client is not MPLS.

– *AP selection:*

Select the output MT_AP based on the packet's output PSC.

• Defects:

None.

• Consequent actions:

None.

• Defect correlations:

None.

• Performance monitoring:

None.

9.3.2.2 MPLS-TP to ETH adaptation sink function (MT/ETH_A_Sk)

This function extracts the ETH_CI information from an MT_AI signal.

The information flow and processing of the MT/ETH_A_Sk function is defined with reference to Figure 41.

• Symbol:

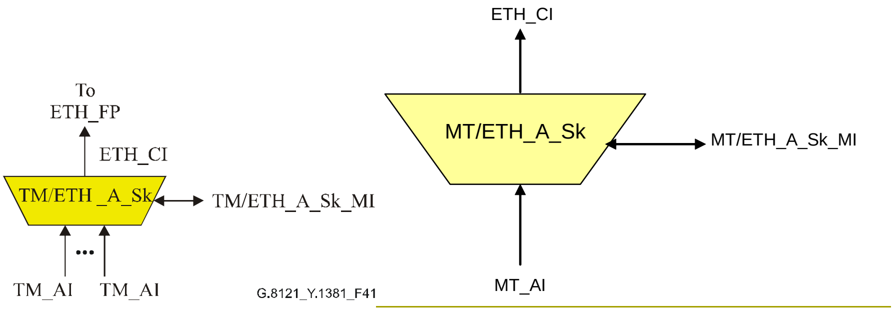

Figure 41/G.8121/Y.1381 – MT/ETH_A_Sk function
~~[Replace TM by MT]~~

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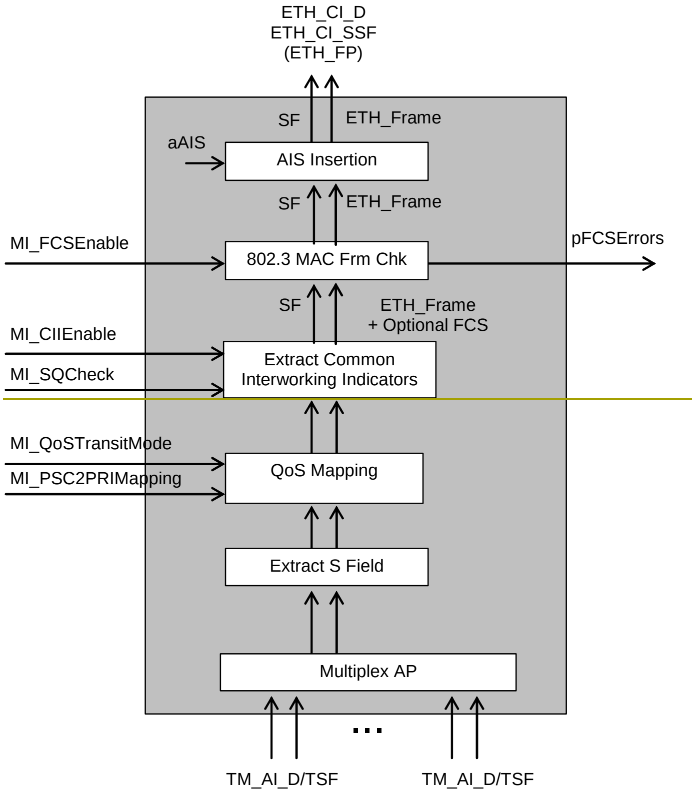
• **Interfaces:**

Table 9/G.8121/Y.1381 – MT/ETH_A_Sk Inputs and Outputs

Inputs	Outputs
Each MT_AP: MT_AI_Data MT_AI_PHB MT_AI_TSF **MT/ETH_A_Sk_MP:** MT/ETH_A_Sk_MI_FCSEnable MT/ETH_A_Sk_MI_CIIEnable MT/ETH_A_So_MI_SQUse ~~MT/ETH_A_Sk_MI_QoSTransitMode~~ MT/ETH_A_Sk_MI_PSC2PRIMapping	**ETH_FP:** ETH_CI_Data ETH_CI_P ETH_CI_DE ETH_CI_SSF

• Processes:


ETH_CI_D
ETH_CI_SSF
(ETH_FP)
SF
ETH_Frame
aAIS
AIS Insertion
SF
ETH_Frame
MI_FCSEnable
802.3 MAC Frm Chk
pFCSErrors
SF
ETH_Frame
+ Optional FCS
MI_CIIEnable
MI_SQCheck
Extract Common
Interworking Indicators
MI_QoSTransitMode
MI_PSC2PRIMapping
QoS Mapping
Extract S Field
Multiplex AP
...
TM_AI_D/TSF
TM_AI_D/TSF

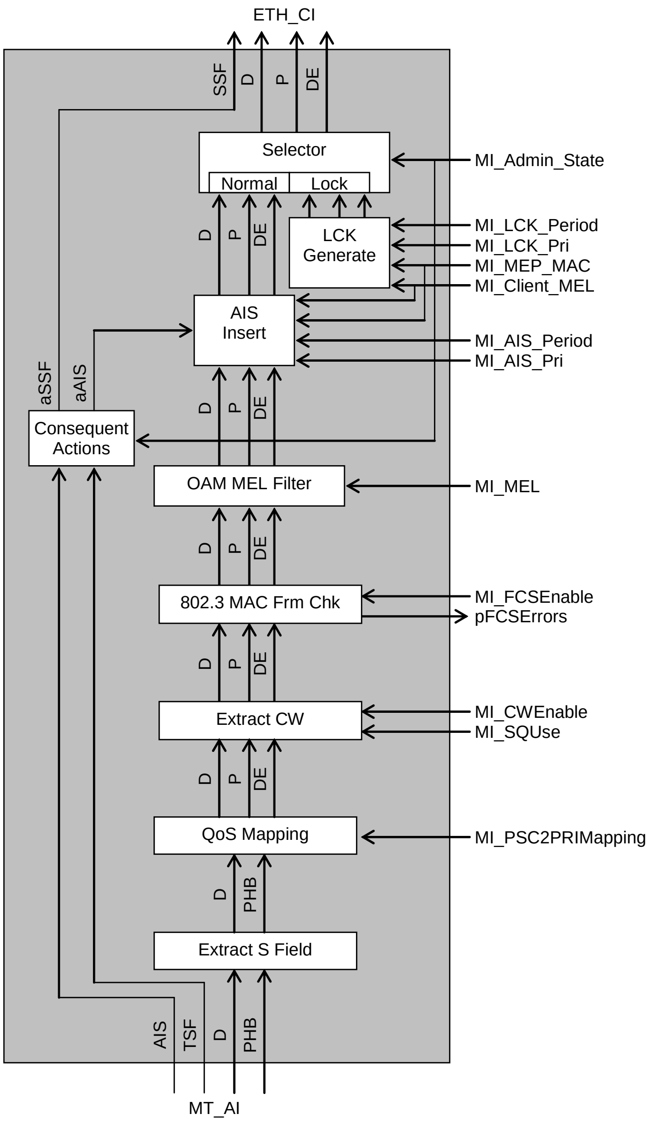


Figure 42/G.8121/Y.1381 – MT/ETH_A_Sk process diagram

~~[Replace TM by MT]~~

~~[LCK gen is missing. See Figure 9-21/G.8021 for information]~~

~~[Note (Apr/2010): introduce LCK command in G.8121 similar to that in G.8021]~~

– Selector process:

See 8.1.3/G.8021/Y.1341. The normal CI is blocked if Admin_State = LOCKED.

– LCK Generate process:

See 8.1.2/G.8021/Y.1341.

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– *AIS Insert process:*

See 8.1.4/G.8021/Y.1341.

– *OAM MEL Filter process:*

See 8.1.1/G.8021/Y.1341.

– *AIS insertion:*

When aAIS is asserted, insert Ethernet AIS.

– *"802.3 MAC Frame Check" process:*

See 8.9.2/G.8021/Y.1341. MAC Frame Check is optional (see [IETF RFC 4720] and [ITU-T Y.1415]ITU-T Rec. Y.1415): MAC FCS is checked if MI_FCSEnabled is True.

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– *Common interworking indicatorsCW Eextraction process:*

See 8.5.2.

– *QoS mapping process:*

This process maps the MPLS-based QoS signals into Ethernet-based QoS signals.

The CI_P is generated by the received PSC part of the AI_PHB according to the 1:1 mapping configured by the MI_PSC2PRIMapping.

The CI_DE is generated by the received DP part of the AI_PHB according to the following rule [Note: ckeck of algo is required What are X & Y?]:

```
If DP(AI_PHB) = Green
      CI_DE = False
Else
      CI_DE = True
```

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```
If MI_QoSTransitMode = X
If DP(AI_PHB) = Green
CI_DE = False
Else
CI_DE = True
Else If MI_QoSTransitMode = Y
CI_DE = False
```

– *S field extraction:*

Extract and process the 1-bit S Field: the retrieved S Field should have the value 1 (bottom of label stack) to indicate the client is not MPLS: for such case the traffic unit is accepted and forwarded (together with the PHB information) after extraction of the S-bit field to the next process. For the case the S-bit has the value 0, the traffic unit is silently discarded..

– *Multiplex AP:*

Multiplex the MT_AI traffic units coming from all the MT_APs.

• Defects:

None.

• Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF and (not MI_Admin_State == LOCKED)

aAIS ← AI_AISThe definitions of aAIS and aSSF are for further study.

• Defect correlations:

None.

• Performance monitoring:

Ffs.

9.3.2.3 MPLS-TP to ETH multiplexing adaptation source function (MT/ETH-m_A_So)

Ffs.

9.3.2.4 MPLS-TP to ETH multiplexing adaptation sink function (MT/ETH-m_A_Sk)

Ffs.

9.3.3 MPLS-TP to IP adaptation function (MT/IP_A)

Ffs.

9.4 MT Diagnostic Function

9.4.1 MT Diagnostic Trail Termination Functions for MEPs

These functions are included in MT_TT .See clause 9.2

9.4.2 MT Diagnostic Flow Termination Functions for MIPs (MTDi_TT)

[Note: Wd22 proposes:

- *insertion/extract of OAM traffic units with TTL expire mechanism*
- *receipt of on-demand OAM traffic units destined for MIP*
- *generation of on-demand OAM traffic units from MIP*

Following text is provided by editor by the contribution

]

9.4.2.1 MT Diagnostic Flow Termination Source Function for MIPs (MTDi_TT_So)

Symbol

Figure 9 – MTDi_TT_So symbol

Interfaces

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Table 9-13 – MTDi_TT_So interfaces

Inputs	Outputs

Processes

Figure – MTDi_TT_So Process

Defects None.

Consequent actions None.

Defect correlations None.

Performance monitoring None.

9.4.2.2 MT Diagnostic Flow Termination Sink Function for MIPs (MTDi_TT_Sk)

Symbol

Figure 9 – MTDi_TT_Sk symbol

Interfaces

Table 9 – MTDi_TT_Sk interfaces

Inputs	Outputs

Processes

Figure 9 – MTDi_TT_Sk Process

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Defects None.

Consequent actions None.

Defect correlations None.

Performance monitoring None.

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10 Non-MPLS-TP Server to MPLS-TP adaptation functions

[Note : Ckecking MI_xxx required]

[Note : Need to add the refernce [IETF mpls-tp-data-plene] for the validity of this clause overall ?]

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10.1 SDH to MPLS-TP adaptation function (S/MT_A)

10.1.1 VC-n to MPLS-TP adaptation functions (S*n*/MT_A; *n*=3, 3-X, 4, 4-X)

10.1.1.1 VC-n to MPLS-TP adaptation source function (S*n*/MT_A_So)

This function maps MT_CI information onto an Sn_AI signal (n=3, 3-X, 4, 4-X).

Data at the Sn_AP is a VC-n (n = 3, 3-X, 4, 4-X), having a payload as described in ITU-T Rec. G.707/Y.1322, but with indeterminate POH bytes: J1, B3, G1.

• Symbol:

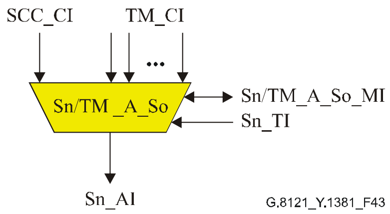

Figure 43/G.8121/Y.1381 – Sn/MT_A_So symbol
[Replace TM by MT]

• Interfaces:

Table 10/G.8121/Y.1381 – Sn/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB **SCC_CP:** SCC_CI_Data **Sn_TP:** Sn_TI_Clock Sn_TI_FrameStart **Sn/MT_A_So_MP:** Sn/MT_A_So_MI_SCCType	**Sn_AP:** Sn_AI_Data Sn_AI_Clock Sn_AI_FrameStart

Sn/MT_A_So_MI_Label[1…M] Sn/MT_A_So_MI_LSPType[1…M] Sn/MT_A_So_MI_PSC[1…M] Sn/MT_A_So_PHB2TCMapping[1…M] Sn/MT_A_So_MI_QoSEncodingMode[1…M]	

• **Processes:**

A process diagram of this function is shown in Figure 44.

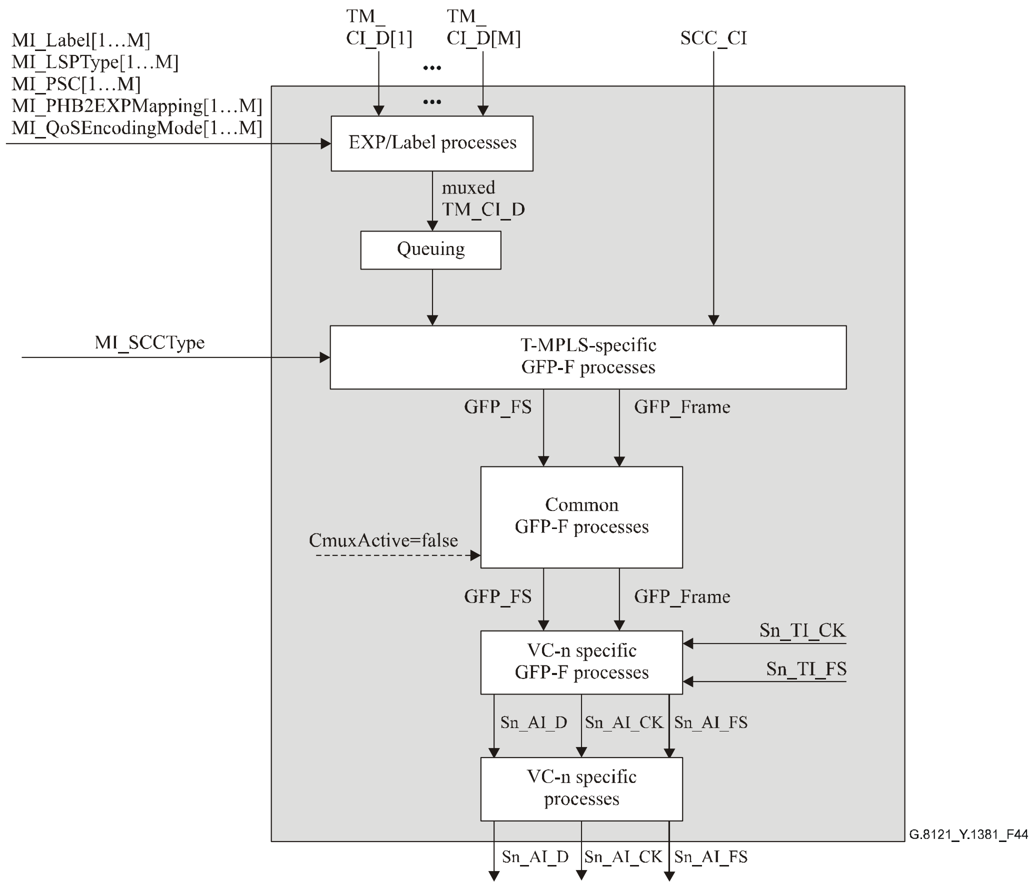

Figure 44/G.8121/Y.1381 – Sn/MT_A_So process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, and EXP by TC / FDI see 9.3.1.2]

– *TC/Label processes:*

See 8.2.1.

– *Queuing process:*

See 8.3.

– *MPLS-TP-specific GFP-F source process:*

See 8.4.1.

– *Common GFP source process:*

See 8.5.3.1/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

– *VC-n specific GFP source process:*

See 8.5.2.1/G.806. The GFP frames are mapped into the VC-n payload area according to 10.6/G.707/Y.1322.

– *VC-n specific source process:*

C2: Signal label information is derived directly from the Adaptation function type. The value for "GFP mapping" in Table 9-11/G.707/Y.1322 is placed in the C2 byte position.

H4: For Sn/MT_A_So with n=3, 4, the H4 byte is sourced as all-zeros.

NOTE 1 – For Sn/MT_A_So with n=3-X, 4-X, the H4 byte is undefined at the Sn-X_AP output of this function (as per clause 12/G.783).

NOTE 2 – For Sn/MT_A_So with n=3, 4, 3-X, 4-X, the K3, F2, F3 bytes are undefined at the Sn-X_AP output of this function (as per clause 12/G.783).

• Defects:

None.

• Consequent actions:

None.

•Defect correlations:

None.

• Performance monitoring:

Ffs.

10.1.1.2 VC-n to MPLS-TP adaptation sink function (S*n*/MT_A_Sk)

This function extracts MT_CI information from the Sn_AI signal (n=3, 3-X, 4, 4-X), delivering MT_CI.

Data at the Sn _AP is a VC-n (n=3, 3-X, 4, 4-X) but with indeterminate POH bytes J1, B3, G1, as per ITU-T Rec. G.707/Y.1322.

• Symbol:

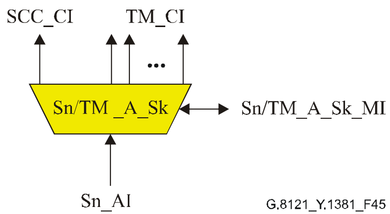

Figure 45/G.8121/Y.1381 – Sn/MT_A_Sk symbol
[Replace TM by MT]

• Interfaces:

Table 11/G.8121/Y.1381 – Sn/MT_A_Sk interfaces

Inputs	Outputs
Sn_AP: Sn_AI_Data Sn_AI_ClocK Sn_AI_FrameStart Sn_AI_TSF **Sn/MT_A_Sk_MP:** Sn/MT_A_Sk_MI_SCCType Sn/MT_A_Sk_MI_Label[1…M] Sn/MT_A_Sk_MI_LSPType[1…M] Sn/MT_A_Sk_MI_PSC[1…M] Sn/MT_A_Sk_MI_TC2PHBMapping[1…M] Sn/MT_A_Sk_MI_QoSDecodingMode[1…M]	**Each MT_CP:** MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **SCC_CP:** SCC_CI_Data SCC_CI_SSF **Sn/MT_A_Sk_MP:** Sn/MT_A_Sk_MI_AcSL Sn/MT_A_Sk_MI_AcEXI Sn/MT_A_Sk_MI_LastValidUPI Sn/MT_A_Sk_MI_cPLM Sn/MT_A_Sk_MI_cLFD Sn/MT_A_Sk_MI_cEXM Sn/MT_A_Sk_MI_cUPM

• Processes:

A process diagram of this function is shown in Figure 46.

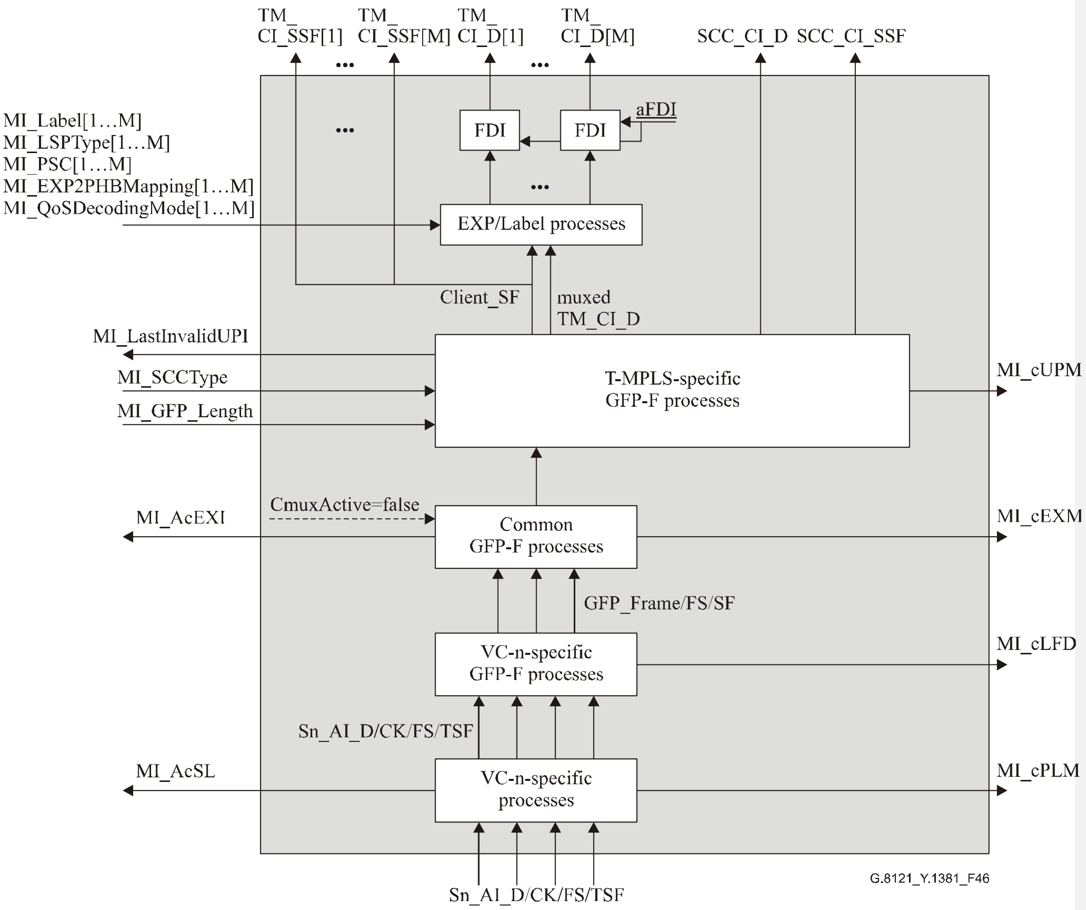

Figure 46/G.8121/Y.1381 – Sn/MT_A_Sk process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, , and EXP by TC / FDI see 9.3.1.2]

– *FDI process:*

This process inserts MPLS-TP FDI OAM packets when consequent action aFDI is asserted.

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– *TC/Label processes:*

See 8.2.2.

– *MPLS-TP-specific GFP-F sink process:*

See 8.4.2.

– *Common GFP sink process:*

See 8.5.3.2/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

– *VC-n specific GFP sink process:*

See 8.5.2.2/G.806. The GFP frames are demapped from the VC-n payload area according to 10.6/G.707/Y.1322.

– *VC-n-specific sink process:*

C2: The signal label is recovered from the C2 byte as per 6.2.4.2/G.806. The signal label for "GFP mapping" in Table 9-11/G.707/Y.1322 shall be expected. The accepted value of the signal label is also available at the Sn/MT_A_Sk_MP.

• Defects:

dPLM – See 6.2.4.2/G.806.

dLFD – See 6.2.5.2/G.806.

dEXM – See 6.2.4.4/G.806.

dUPM – See 8.4.2.

• Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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• Defect correlations:

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cPLM ← dPLM and (not AI_TSF)

cLFD ← dLFD and (not dPLM) and (not AI_TSF)

cEXM ← dEXM and (not dPLM) and (not dLFD) and (not AI_TSF)

cUPM ← dUPM and (not dEXM) and (not dPLM) and (not dLFD) and (not AI_TSF)

• Performance monitoring:

Ffs.

10.1.2 LCAS-capable VC-n to MPLS-TP adaptation functions (S*n*-X-L/MT_A; *n*=3, 4)

10.1.2.1 LCAS-capable VC-n to MPLS-TP adaptation source function (S*n*-X-L/MT_A_So)

This function maps MT_CI information onto an Sn-X-L_AI signal (n=3, 4).

Data at the Sn-X-L_AP is a VC-n-X (n = 3, 4), having a payload as described in ITU-T Rec. G.707/Y.1322, but with indeterminate POH bytes: J1, B3, G1.

• **Symbol:**

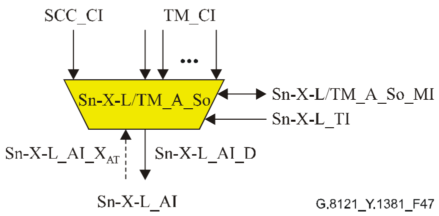

Figure 47/G.8121/Y.1381 – Sn-X-L/MT_A_So symbol
[Replace TM by MT]

• **Interfaces:**

Table 12/G.8121/Y.1381 – Sn-X-L/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB **SCC_CP:** SCC_CI_Data **Sn-X-L_AP:** Sn-X-L_AI_X_{AT} **Sn-X-L_TP:** Sn-X-L_TI_Clock Sn-X-L_TI_FrameStart **Sn-X-L/MT_A_So_MP:** Sn-X-L/MT_A_So_MI_SCCType Sn-X-L/MT_A_So_MI_Label[1…M] Sn-X-L/MT_A_So_MI_LSPType[1…M] Sn-X-L/MT_A_So_MI_PSC[1…M] Sn-X-L/MT_A_So_PHB2TCMapping[1…M] Sn-X-L/MT_A_So_MI_QoSEncodingMode[1…M]	**Sn-X-L_AP:** Sn-X-L_AI_Data Sn-X-L_AI_Clock Sn-X-L_AI_FrameStart

• Processes:

A process diagram of this function is shown in Figure 48.

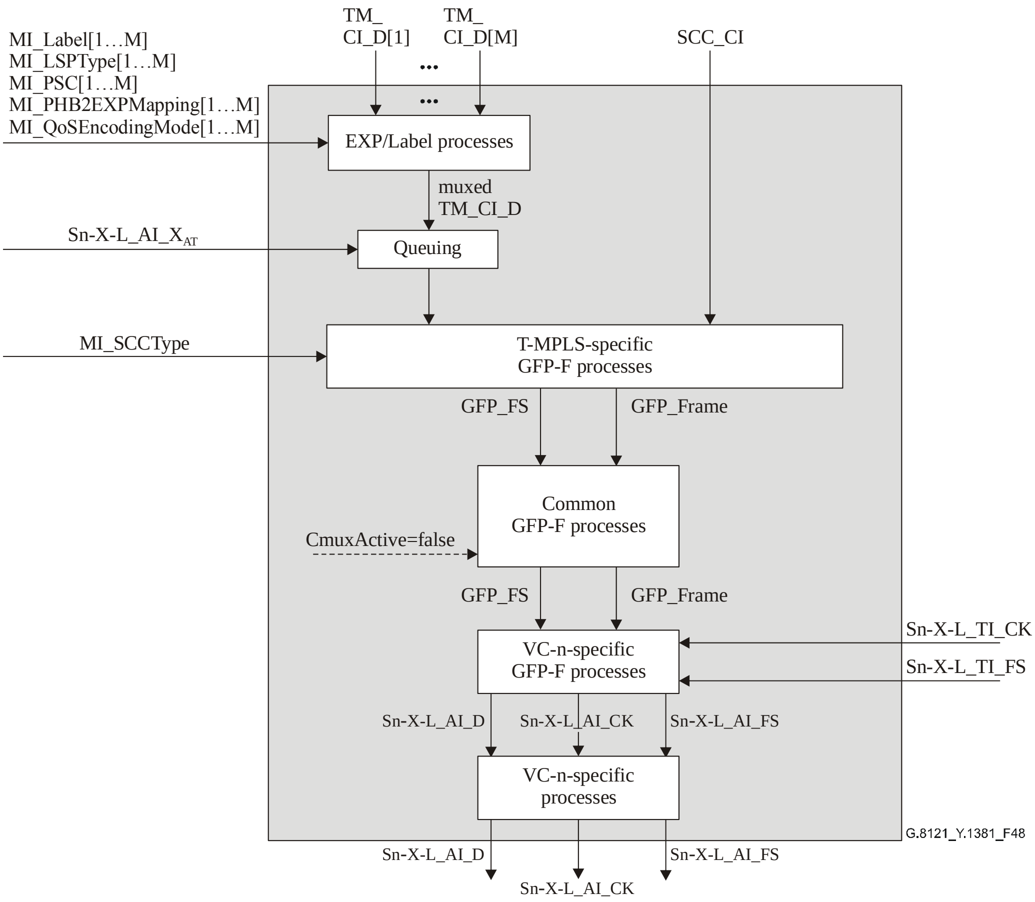

Figure 48/G.8121/Y.1381 – Sn-X-L/MT_A_So process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, and EXP by TC]

The processes have the same definition as in 10.1.1.1.

• Defects:

None.

• Consequent actions:

None.

• Defect correlations:

None.

• Performance monitoring:

Ffs.

10.1.2.2 LCAS-capable VC-n to MPLS-TP adaptation sink function (S*n*-X-L/MT_A_Sk)

This function extracts MT_CI information from the Sn-X-L_AI signal (n=3, 4), delivering MT_CI.

Data at the Sn-X-L_AP is a VC-n-Xv (n=3, 4) but with indeterminate POH bytes J1, B3, G1, as per ITU-T Rec. G.707/Y.1322.

• Symbol:

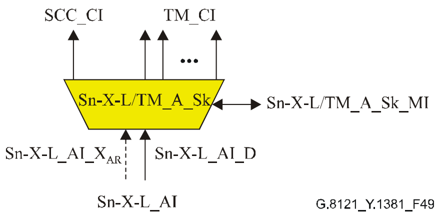

Figure 49/G.8121/Y.1381 – Sn-X-L/MT_A_Sk symbol
[Replace TM by MT]

• Interfaces:

Table 13/G.8121/Y.1381 – Sn-X-L/MT_A_Sk interfaces

Inputs	Outputs
Sn-X-L_AP: Sn-X-L_AI_Data Sn-X-L_AI_ClocK Sn-X-L_AI_FrameStart Sn-X-L_AI_TSF Sn-X-L_AI_X_{AR} **Sn-X-L/MT_A_Sk_MP:** Sn-X-L/MT_A_Sk_MI_SCCType Sn-X-L/MT_A_Sk_MI_Label[1…M] Sn-X-L/MT_A_Sk_MI_LSPType[1…M] Sn-X-L/MT_A_Sk_MI_PSC[1…M] Sn-X-L/MT_A_Sk_MI_TC2PHBMapping[1…M] Sn-X-L/MT_A_Sk_MI_QoSDecodingMode[1…M]	**Each MT_CP:** MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **SCC_CP:** SCC_CI_Data SCC_CI_SSF **Sn-X-L/MT_A_Sk_MP:** Sn-X-L/MT_A_Sk_MI_AcSL Sn-X-L/MT_A_Sk_MI_AcEXI Sn-X-L/MT_A_Sk_MI_LastValidUPI Sn-X-L/MT_A_Sk_MI_cPLM Sn-X-L/MT_A_Sk_MI_cLFD Sn-X-L/MT_A_Sk_MI_cEXM Sn-X-L/MT_A_Sk_MI_cUPM

• Processes:

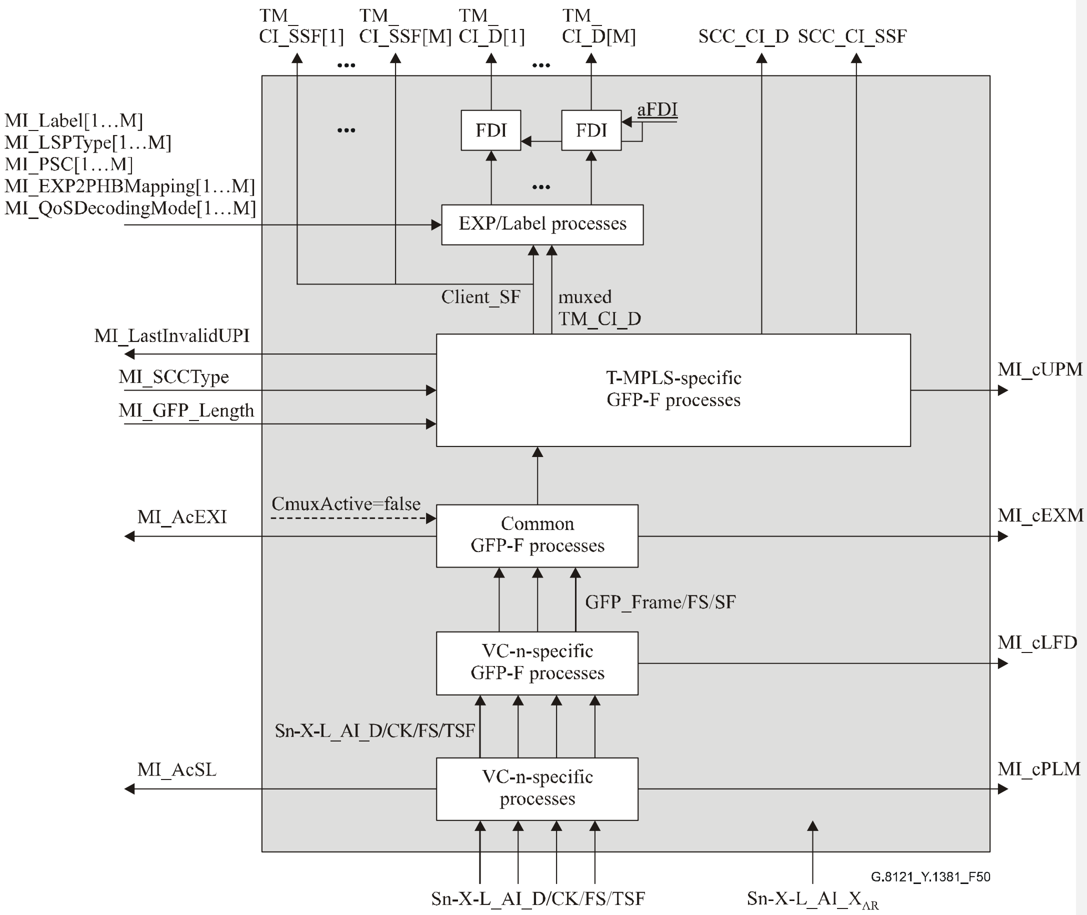

Figure 50/G.8121/Y.1381 – Sn-X-L/MT_A_Sk process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, EXP by TC / FDI needs to be updated]

See process diagram and process description in 10.1.1.2. The additional Sn-X-L_AI_X_{AR} interface is not connected to any of the internal processes.

• Defects:

dPLM – See 6.2.4.2/G.806.

dLFD – See 6.2.5.2/G.806.

dUPM – See 8.4.2.

dEXM – See 6.2.4.4/G.806.

• Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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• Defect correlations:

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cPLM ← dPLM and (not AI_TSF)

cLFD ← dLFD and (not dPLM) and (not AI_TSF)

cEXM ← dEXM and (not dPLM) and (not dLFD) and (not AI_TSF)

cUPM ← dUPM and (not dEXM) and (not dPLM) and (not dLFD) and (not AI_TSF)

• Performance monitoring:

Ffs.

10.1.3 VC-m to MPLS-TP adaptation functions (S*m*/MT_A; *m*=11, 11-X, 12, 12-X)

10.1.3.1 VC-m to MPLS-TP adaptation source function (S*m*/MT_A_So)

This function maps MT_CI information onto an Sm_AI signal (m=11, 11-X, 12, 12-X).

Data at the Sm_AP is a VC-m (m = 11, 11-X, 12, 12-X), having a payload as described in ITU-T Rec. G.707/Y.1322, but with indeterminate POH bytes: J2, V5[1-4], V5[8].

• Symbol:

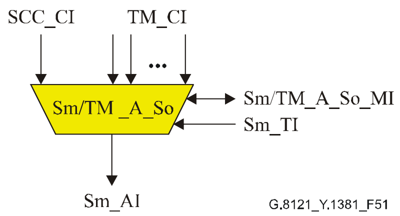

Figure 51/G.8121/Y.1381 – Sm/MT_A_So symbol
[Replace TM by MT]

• Interfaces:

Table 14/G.8121/Y.1381 – Sm/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB **SCC_CP:** SCC_CI_Data **Sm_TP:** Sm_TI_Clock Sm_TI_FrameStart **Sm/MT_A_So_MP:** Sm/MT_A_So_MI_SCCType Sm/MT_A_So_MI_Label[1…M] Sm/MT_A_So_MI_LSPType[1…M] Sm/MT_A_So_MI_PSC[1…M] Sm/MT_A_So_PHB2TCMapping[1…M] Sm/MT_A_So_MI_QoSEncodingMode[1…M]	**Sm_AP:** Sm_AI_Data Sm_AI_Clock Sm_AI_FrameStart

• Processes:

A process diagram of this function is shown in Figure 52.

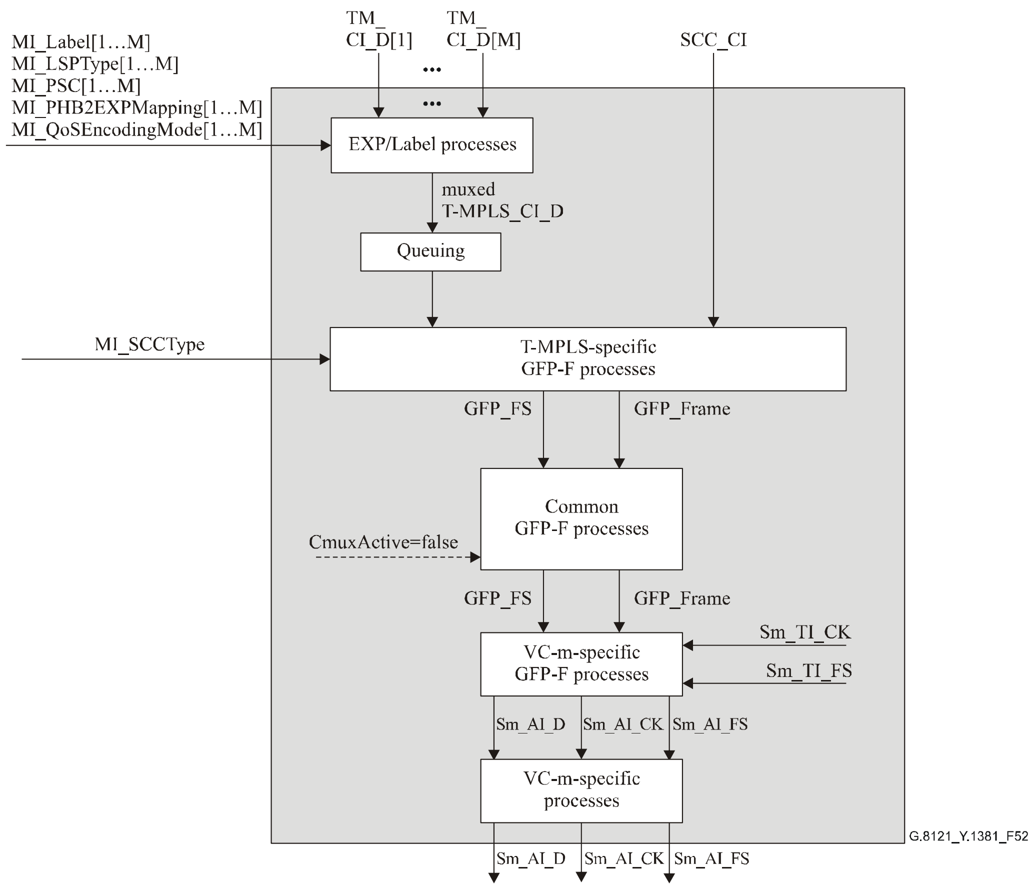

Figure 52/G.8121/Y.1381 – Sm/MT_A_So process diagram
[Replace TM by MT]

– *TC/Label processes:*

See 8.2.1.

– *Queuing process:*

See 8.3.

– *MPLS-TP-specific GFP-F source process:*

See 8.4.1.

– *Common GFP source process:*

See 8.5.3.1/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

– *VC-m-specific GFP source process:*

See 8.5.2.1/G.806. The GFP frames are mapped into the VC-m payload area according to 10.6/G.707/Y.1322.

– *VC-m-specific source process:*

V5[5-7] and K4[1]: Signal label information is derived directly from the Adaptation function type. The value for "GFP mapping" in Table 9-13/G.707/Y.1322 is placed in the K4[1] Extended Signal Label field as described in 8.2.3.2/G.783.

K4[2]: For Sm/MT_A_So with m = 11, 12, the K4[2] bit is sourced as all-zeros.

NOTE 1 – For Sm/MT_A_So with m = 11-X, 12-X, the K4[2] bit is undefined at the Sm-X_AP output of this function (as per clause 13/G.783).

NOTE 2 – For Sm/MT_A_So with m = 11, 11-X, 12, 12-X, 2, the K4[3-8], V5[1-4] and V5[8] bits are undefined at the Sm-X_AP output of this function (as per clause 13/G.783).

• Defects:

None.

• Consequent actions:

None.

• Defect correlations:

None.

• Performance monitoring:

Ffs.

10.1.3.2 VC-m to MPLS-TP adaptation sink function (Sm/MT_A_Sk)

This function extracts MT_CI information from the Sm_AI signal (m=11, 11-X, 12, 12-X), delivering MT_CI.

Data at the Sm _AP is a VC-m (m=11, 11-X, 12, 12-X) but with indeterminate POH bytes J2, V5[1-4], V5[8], as per ITU-T Rec. G.707/Y.1322.

• Symbol:

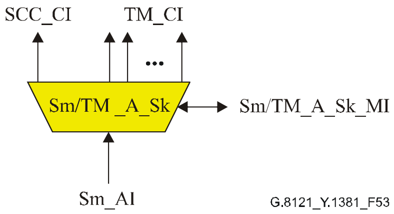

Figure 53/G.8121/Y.1381 – Sm/MT_A_Sk symbol
[Replace TM by MT]

• Interfaces:

Table 15/G.8121/Y.1381 – Sm/MT_A_Sk interfaces

Inputs	Outputs
Sm_AP: Sm_AI_Data Sm_AI_ClocK Sm_AI_FrameStart Sm_AI_TSF **Sm/MT_A_Sk_MP:** Sm/MT_A_Sk_MI_SCCType Sm/MT_A_Sk_MI_Label[1…M] Sm/MT_A_Sk_MI_LSPType[1…M] Sm/MT_A_Sk_MI_PSC[1…M] Sm/MT_A_Sk_MI_TC2PHBMapping[1…M] Sm/MT_A_Sk_MI_QoSDecodingMode[1…M]	**Each MT_CP:** MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **SCC_CP:** SCC_CI_Data SCC_CI_SSF **Sm/MT_A_Sk_MP:** Sm/MT_A_Sk_MI_AcSL Sm/MT_A_Sk_MI_AcEXI Sm/MT_A_Sk_MI_LastValidUPI Sm/MT_A_Sk_MI_cPLM Sm/MT_A_Sk_MI_cLFD Sm/MT_A_Sk_MI_cEXM Sm/MT_A_Sk_MI_cUPM

• Processes:

A process diagram of this function is shown in Figure 54.

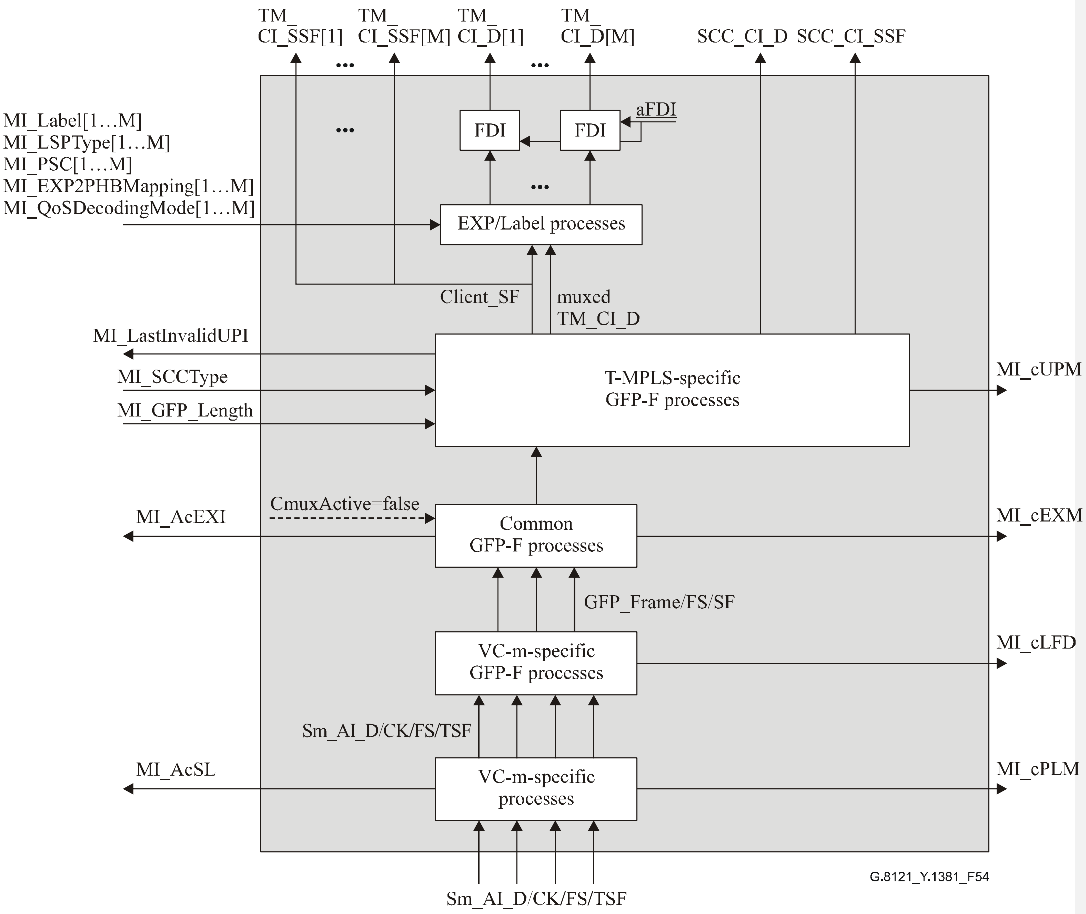

Figure 54/G.8121/Y.1381 – Sm/MT_A_Sk process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, EXP by TC / FDI needs to be updated]

– *FDI process:*

This process inserts MPLS-TP FDI OAM packets when consequent action aFDI is asserted.

[Note: FDI should be updated]

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– *TC/Label processes:*

See 8.2.2.

– *MPLS-TP specific GFP-F sink process:*

See 8.4.2.

– *Common GFP sink process:*

See 8.5.3.2/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

– *VC-m-specific GFP sink process:*

See 8.5.2.2/G.806. The GFP frames are demapped from the VC-m payload area according to 10.6/G.707/Y.1322.

– *VC-m-specific sink process:*

V5[5-7] and K4[1]: The signal label is recovered from the extended signal label position as described in 8.2.3.2/G.783 and 6.2.4.2/G.806. The signal label for "GFP mapping" in Table 9-13/G.707/Y.1322 shall be expected. The accepted value of the signal label is also available at the Sm/MT_A_Sk_MP.

• Defects:

dPLM – See 6.2.4.2/G.806.

dLFD – See 6.2.5.2/G.806.

dUPM – See 8.4.2.

dEXM – See 6.2.4.4/G.806.

• Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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• Defect correlations:

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cPLM ← dPLM and (not AI_TSF)

cLFD ← dLFD and (not dPLM) and (not AI_TSF)

cEXM ← dEXM and (not dPLM) and (not dLFD) and (not AI_TSF)

cUPM ← dUPM and (not dEXM) and (not dPLM) and (not dLFD) and (not AI_TSF)

• Performance monitoring:

Ffs.

10.1.4 LCAS-capable VC-m to MPLS-TP adaptation functions (Sm-X-L/MT_A; *m*=11, 12)

10.1.4.1 LCAS-capable VC-m to MPLS-TP Adaptation Source function (Sm-X-L/MT_A_So)

This function maps MT_CI information onto an Sm-X-L_AI signal (m=11, 12).

Data at the Sm-X-L_AP is a VC-m-X (m = 11, 12), having a payload as described in ITU-T Rec. G.707/Y.1322, but with indeterminate POH bytes: J2, V5[1-4], V5[8].

• Symbol:

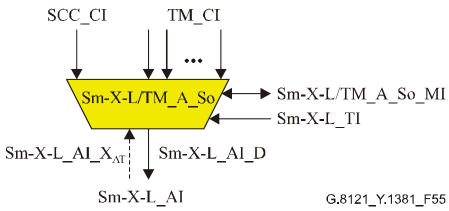

Figure 55/G.8121/Y.1381 – Sm-X-L/MT_A_So symbol
[Replace TM by MT]

• Interfaces:

Table 16/G.8121/Y.1381 – Sm-X-L/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB **SCC_CP:** SCC_CI_Data **Sm-X-L_AP:** Sm-X-L_AI_X$_{AT}$ **Sm-X-L_TP:** Sm-X-L_TI_Clock Sm-X-L_TI_FrameStart **Sm-X-L/MT_A_So_MP:** Sm-X-L/MT_A_So_MI_SCCType Sm-X-L/MT_A_So_MI_Label[1…M] Sm-X-L/MT_A_So_MI_LSPType[1…M] Sm-X-L/MT_A_So_MI_PSC[1…M] Sm-X-L/MT_A_So_PHB2TCMapping[1…M] Sm-X-L/MT_A_So_MI_QoSEncodingMode[1…M]	**Sm-X-L_AP:** Sm-X-L_AI_Data Sm-X-L_AI_Clock Sm-X-L_AI_FrameStart

• Processes:

A process diagram of this function is shown in Figure 56.

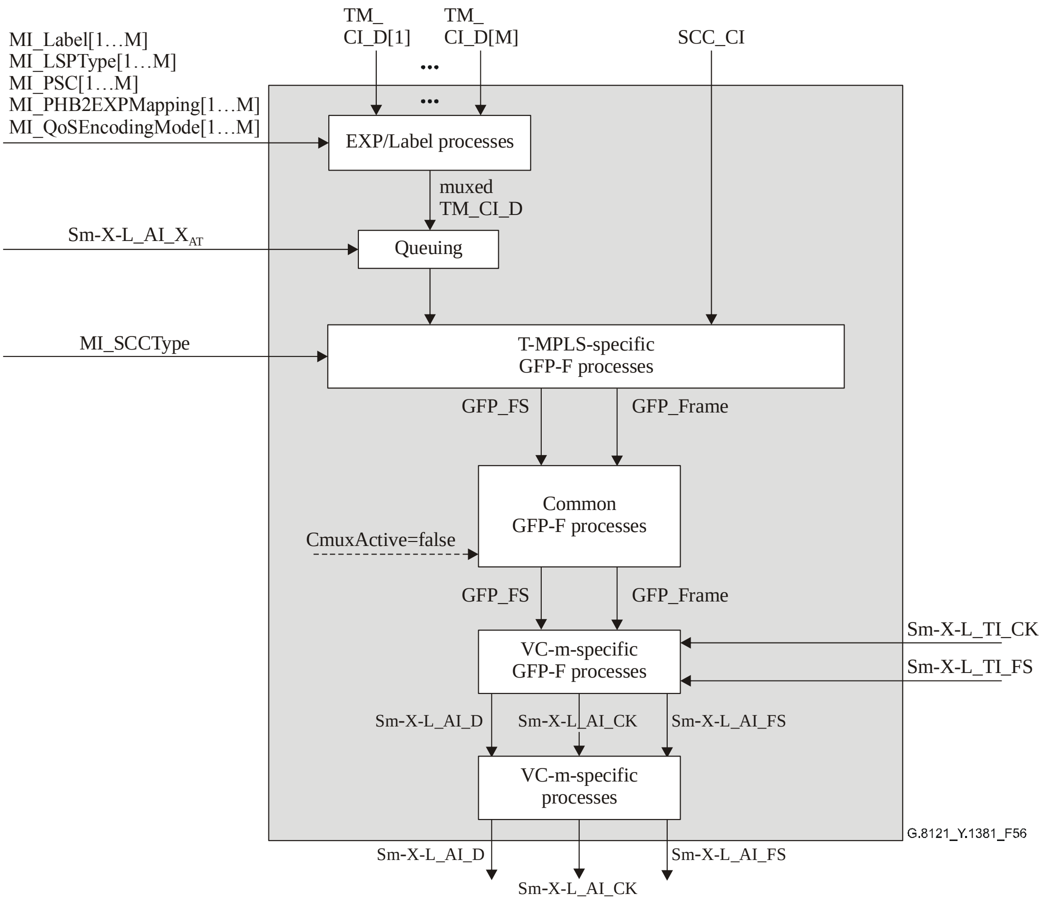

Figure 56/G.8121/Y.1381 – Sm-X-L/MT_A_So process diagram
[Replace TM & T-MPLS by MT & MPLS-TP]

The processes have the same definition as in 10.1.1.1.

• Defects:

None.

• Consequent actions:

None.

• Defect correlations:

None.

• Performance monitoring:

Ffs.

10.1.4.2 LCAS-capable VC-m to MPLS-TP adaptation sink function (Sm-X-L/MT_A_Sk)

This function extracts MT_CI information from the Sm-X-L_AI signal (m=11, 12), delivering MT_CI.

Data at the Sm-X-L_AP is a VC-m-Xv (m=11, 12) but with indeterminate POH bytes J2, V5[1-4], V5[8], as per ITU-T Rec. G.707/Y.1322.

• Symbol:

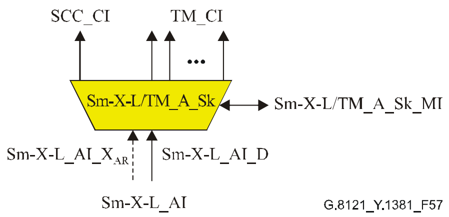

Figure 57/G.8121/Y.1381 – Sm-X-L/MT_A_Sk symbol
[Replace TM by MT]

• Interfaces:

Table 17/G.8121/Y.1381 – Sm-X-L/MT_A_Sk interfaces

Inputs	Outputs
Sm-X-L_AP: Sm-X-L_AI_Data Sm-X-L_AI_ClocK Sm-X-L_AI_FrameStart Sm-X-L_AI_TSF Sm-X-L_AI_X_{AR} **Sm-X-L/MT_A_Sk_MP:** Sm-X-L/MT_A_Sk_MI_SCCType Sm-X-L/MT_A_Sk_MI_Label[1…M] Sm-X-L/MT_A_Sk_MI_LSPType[1…M] Sm-X-L/MT_A_Sk_MI_PSC[1…M] Sm-X-L/MT_A_Sk_MI_TC2PHBMapping[1…M] Sm-X-L/MT_A_Sk_MI_QoSDecodingMode[1…M]	**Each MT_CP:** MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **SCC_CP:** SCC_CI_Data SCC_CI_SSF **Sm-X-L/MT_A_Sk_MP:** Sm-X-L/MT_A_Sk_MI_AcSL Sm-X-L/MT_A_Sk_MI_AcEXI Sm-X-L/MT_A_Sk_MI_LastValidUPI Sm-X-L/MT_A_Sk_MI_cPLM Sm-X-L/MT_A_Sk_MI_cLFD Sm-X-L/MT_A_Sk_MI_cEXM Sm-X-L/MT_A_Sk_MI_cUPM

• Processes:

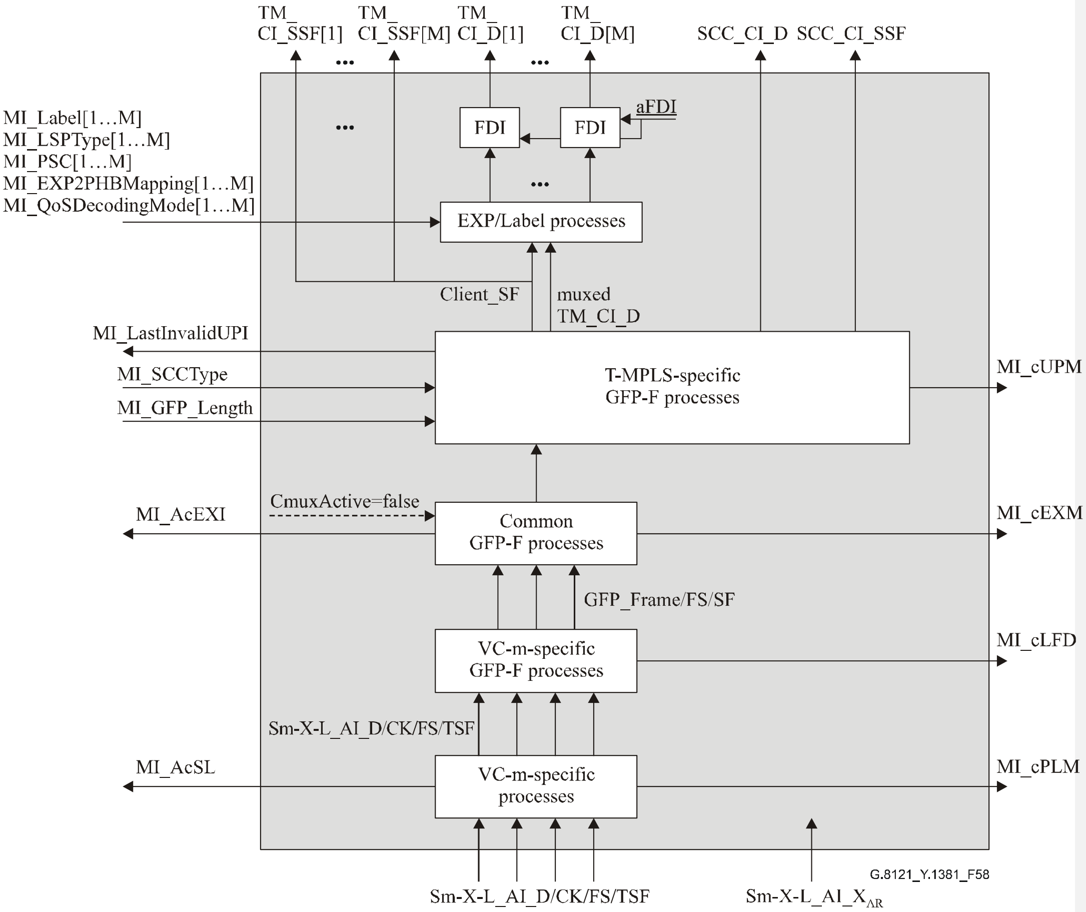

Figure 58/G.8121/Y.1381 – Sm-X-L/MT_A_Sk process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, EXP by TC / FDI needs to be updated]

See process diagram and process description in 10.1.1.2. The additional Sm-X-L_AI_X_{AR} interface is not connected to any of the internal processes.

• Defects:

dPLM – See 6.2.4.2/G.806.

dLFD – See 6.2.5.2/G.806.

dUPM – See 8.4.2.

dEXM – See 6.2.4.4/G.806.

• Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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• Defect correlations:

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cPLM ← dPLM and (not AI_TSF)

cLFD ← dLFD and (not dPLM) and (not AI_TSF)

cEXM ← dEXM and (not dPLM) and (not dLFD) and (not AI_TSF)

cUPM ← dUPM and (not dEXM) and (not dPLM) and (not dLFD) and (not AI_TSF)

• Performance monitoring:

Ffs.

10.2 OTH to MPLS-TP Adaptation function (O/MT_A)

10.2.1 ODU*k* to MPLS-TP Adaptation functions (ODU*k*P/MT_A; k=1,2,3)

10.2.1.1 ODUk to MPLS-TP adaptation source function (ODUkP/MT_A_So)

The ODUkP/MT_A_So function creates the ODUk signal from a free running clock. It maps the MT_CI information into the payload of the OPUk (k = 1, 2, 3), adds OPUk Overhead (RES, PT) and default ODUk Overhead.

Symbol:

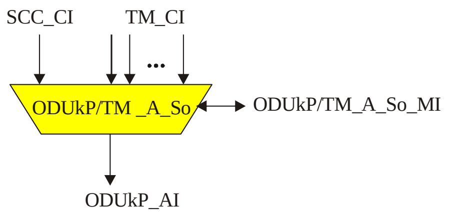

Figure 59/G.8121/Y.1381 – ODUkP/MT_A_So symbol
[Replace TM & T-MPLS by MT & MPLS-TP]

Interfaces:

Table 10/G.8121/Y.1381 – ODUkP/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB **SCC_CP:** SCC_CI_Data **ODUkP/MT_A_So_MP:** ODUkP/MT_A_So_MI_Active	**ODUkP_AP:** ODUkP_AI_Data ODUkP_AI_Clock ODUkP_AI_FrameStart ODUkP_AI_MultiFrameStart

ODUkP/MT_A_So_MI_SCCType ODUkP/MT_A_So_MI_Label[1…M] ODUkP/MT_A_So_MI_LSPType[1…M] ODUkP/MT_A_So_MI_PSC[1…M] ODUkP/MT_A_So_PHB2TCMapping[1…M] ODUkP/MT_A_So_MI_QoSEncodingMode[1…M]	

Processes:

A process diagram of this function is shown in Figure 44.

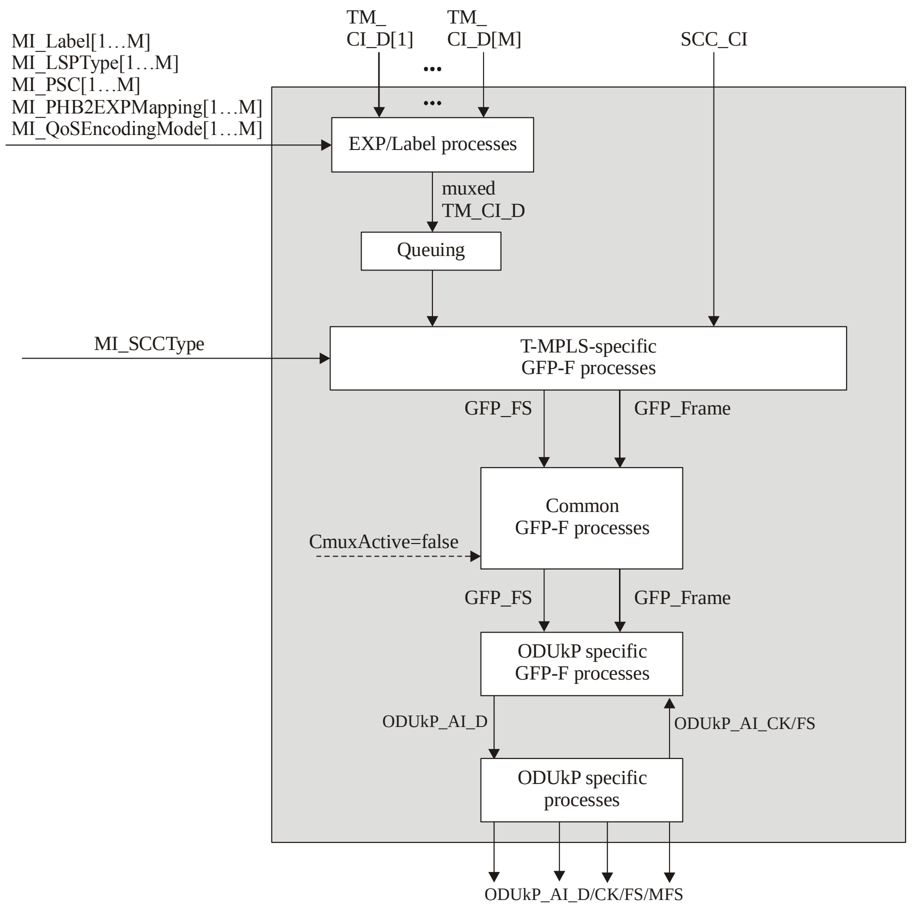

Figure 44/G.8121/Y.1381 – ODUkP/MT_A_So process diagram
[Replace TM & T-MPLS by MT & MPLS-TP]

– *TC/Label processes:*

See 8.2.1.

– *Queuing process:*

See 8.3.

– *MPLS-TP-specific GFP-F source process:*

See 8.4.1.

– *Common GFP source process:*

See 8.5.3.1/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

– *ODUk specific GFP source process:*

See 8.5.2.1/G.806. The GFP frames are mapped into the ODUk payload area according to 17.3/G.709/Y.1331.

– *ODUk specific source process:*

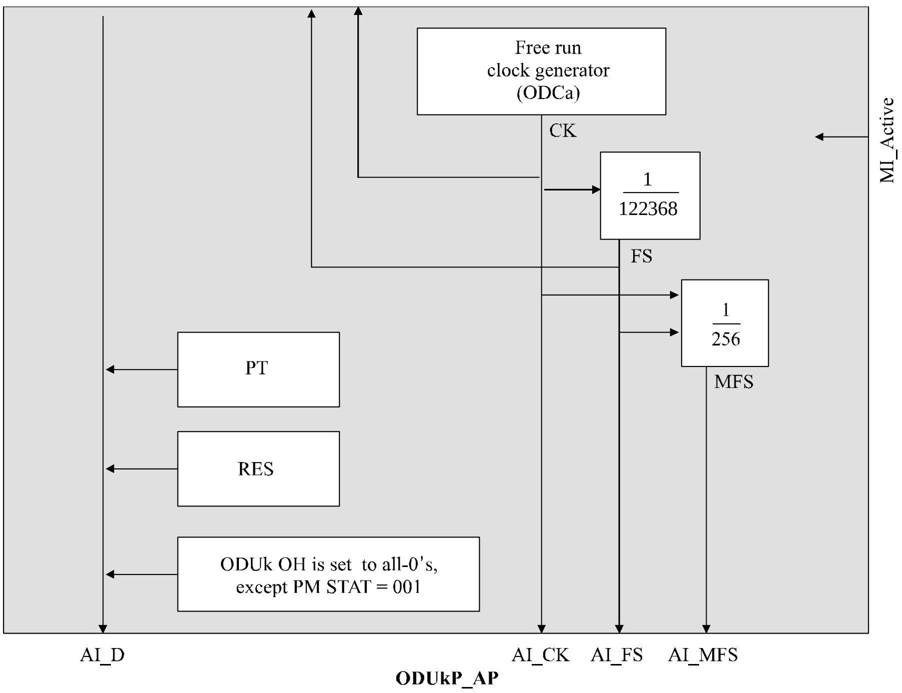

Figure 11-2/G.8121/Y.1381 – ODUkP specific source processes

Clock and (Multi)Frame Start signal generation: The function shall generate a local ODUk clock (ODUkP_AI_CK) of "239/(239 – k) * $4^{(k-1)}$ * 2 488 320 kHz ± 20 ppm" from a free running oscillator. The jitter and wander requirements as defined in Annex A/G.8251 (ODCa clock) apply.

The function shall generate the (multi)frame start reference signals AI_FS and AI_MFS for the ODUk signal. The AI_FS signal shall be active once per 122368 clock cycles. AI_MFS shall be active once every 256 frames.

PT: The payload type information is derived directly from the Adaptation function type. The value for "GFP mapping" shall be inserted into the PT byte position of the PSI overhead as defined in 15.9.2.1.1/G.709/Y.1331.

RES: The function shall insert all-0's into the RES bytes.

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All other bits of the ODUk overhead should be sourced as "0"s, except the ODUk-PM STAT field which should be set to the value "normal path signal" (001).

Defects:

None.

Consequent actions:

None.

Defect correlations:

None.

Performance monitoring:

Ffs.

10.2.1.2 ODUk to MPLS-TP adaptation sink function (ODUkP/MT_A_Sk)

The ODUkP/MT_A_Sk extracts MT_CI information from the ODUkP payload area. It extracts the OPUk Overhead (PT and RES) and monitors the reception of the correct payload type.

Symbol:

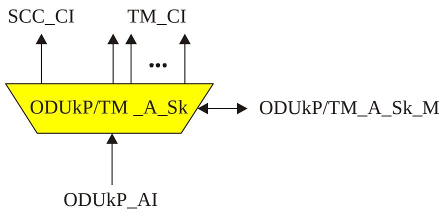

Figure 45/G.8121/Y.1381 – ODUkP/MT_A_Sk symbol
[Replace TM & T-MPLS by MT & MPLS-TP]

Interfaces:

Table 11/G.8121/Y.1381 – ODUkP/MT_A_Sk interfaces

Inputs	Outputs
ODUkP_AP: ODUkP_AI_Data ODUkP_AI_ClocK ODUkP_AI_FrameStart ODUkP_AI_MultiFrameStart ODUkP_AI_TSF **ODUkP/MT_A_Sk_MP:** ODUkP/MT_A_Sk_MI_Active ODUkP/MT_A_Sk_MI_SCCType ODUkP/MT_A_Sk_MI_Label[1…M] ODUkP/MT_A_Sk_MI_LSPType[1…M] ODUkP/MT_A_Sk_MI_PSC[1…M] ODUkP/MT_A_Sk_MI_TC2PHBMapping[1…M] ODUkP/MT_A_Sk_MI_QoSDecodingMode[1…M]	**Each MT_CP:** MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **SCC_CP:** SCC_CI_Data SCC_CI_SSF **ODUkP/MT_A_Sk_MP:** ODUkP/MT_A_Sk_MI_AcPT ODUkP/MT_A_Sk_MI_AcEXI ODUkP/MT_A_Sk_MI_LastValidUPI ODUkP/MT_A_Sk_MI_cPLM ODUkP/MT_A_Sk_MI_cLFD ODUkP/MT_A_Sk_MI_cEXM ODUkP/MT_A_Sk_MI_cUPM

Processes:

A process diagram of this function is shown in Figure 46.

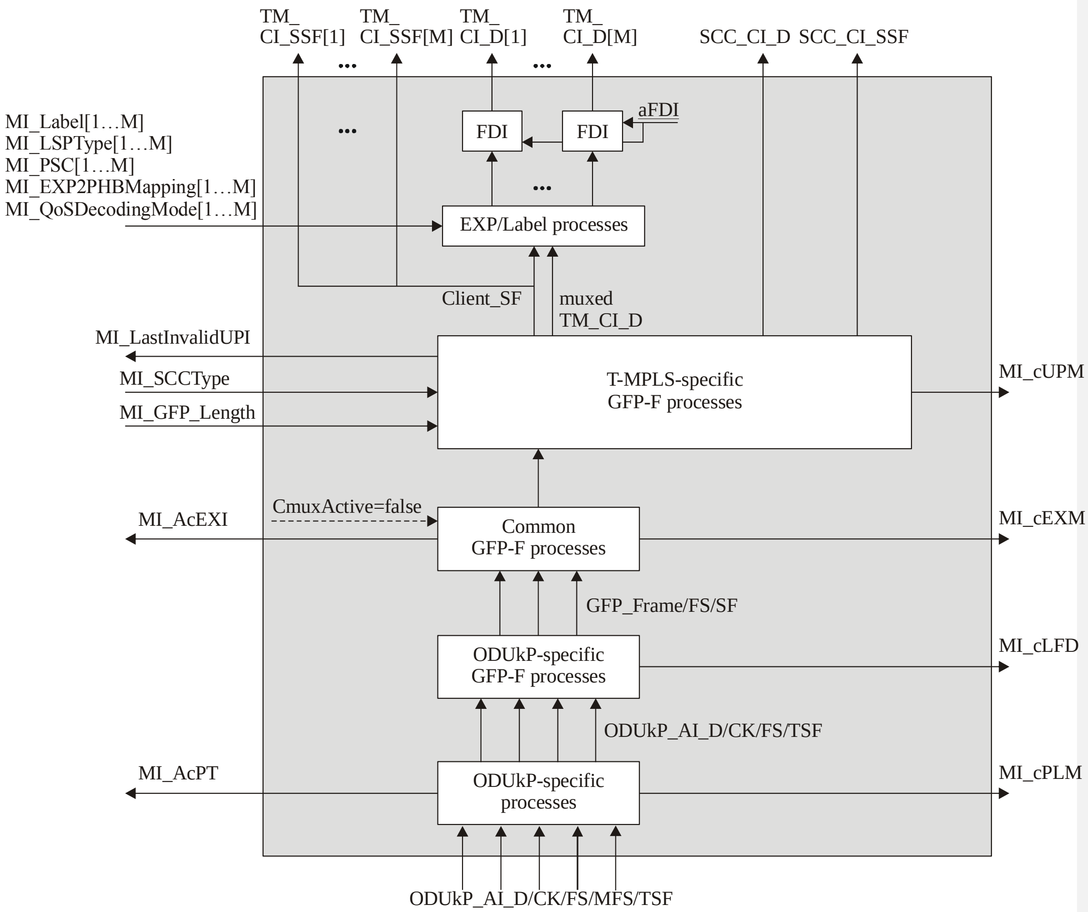

Figure 46/G.8121/Y.1381 – ODUkP/MT_A_Sk process diagram

[Replace TM & T-MPLS by MT & MPLS-TP, *EXP by TC / FDI needs to be updated*]

– *FDI process:*

This process inserts MPLS-TP FDI OAM packets when consequent action aFDI is asserted.

[Note: FDI should be updated]

– *TC/Label processes:*

See 8.2.2.

– *MPLS-TP-specific GFP-F sink process:*

See 8.4.2.

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– *Common GFP sink process:*

See 8.5.3.2/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

– *ODUk specific GFP sink process:*

See 8.5.2.2/G.806. The GFP frames are demapped from the ODUk payload area according to 17.3/G.709/Y.1331.

– *ODUk-specific sink process:*

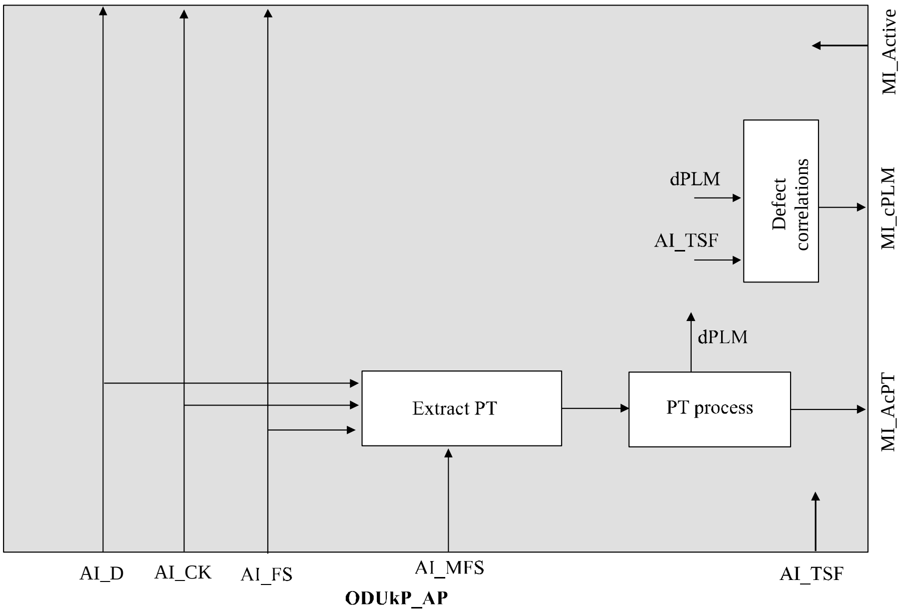

Figure 11-4/G.8121/Y.1381 – ODUkP specific sink processes

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PT: The function shall extract the PT byte from the PSI overhead as defined in 8.7.1/G.798. The payload type value for "GFP mapping" in 15.9.2.1.1/G.709/Y.1331 shall be expected. The accepted PT value is available at the MP (MI_AcPT) and is used for PLM defect detection.

RES: The value in the RES bytes shall be ignored.

Defects:

dPLM – See 6.2.4.1/G.798.

dLFD – See 6.2.5.2/G.806.

dEXM – See 6.2.4.4/G.806.

dUPM – See 8.4.2.

Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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Defect correlations:

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cPLM ← dPLM and (not AI_TSF)

cLFD ← dLFD and (not dPLM) and (not AI_TSF)

cEXM ← dEXM and (not dPLM) and (not dLFD) and (not AI_TSF)

cUPM ← dUPM and (not dEXM) and (not dPLM) and (not dLFD) and (not AI_TSF)

Performance monitoring:

Ffs.

10.2.2 LCAS-capable ODU*k* to MPLS-TP Adaptation functions (ODU*k*P-X-L/MT_A; k=1,2,3)

10.2.2.1 LCAS-capable ODUk to MPLS-TP adaptation source function (ODUkP-X-L/MT_A_So)

The ODUkP-X-L/MT_A_So function creates the ODUk-X-L signal from a free running clock. It maps the MT_CI information into the payload of the OPUk-Xv (k = 1, 2, 3), adds OPUk-Xv Overhead (RES, vcPT).

Symbol:

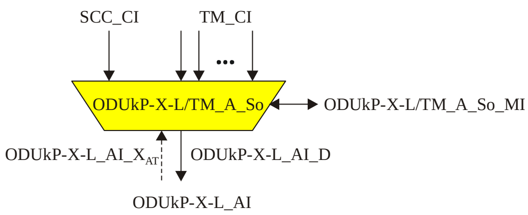

Figure 47/G.8121/Y.1381 – ODUkP-X-L/MT_A_So symbol
[Replace TM & T-MPLS by MT & MPLS-TP]

Interfaces:

Table 12/G.8121/Y.1381 – ODUkP-X-L/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB **SCC_CP:** SCC_CI_Data **ODUkP-X-L_AP:** ODUkP-X-L_AI_X_{AT} **ODUkP-X-L/MT_A_So_MP:**	**ODUkP-X-L_AP:** ODUkP-X-L_AI_Data ODUkP-X-L_AI_Clock ODUkP-X-L_AI_FrameStart ODUkP-X-L_AI_MultiFrameStart

ODUkP-X-L/MT_A_So_MI_Active ODUkP-X-L/MT_A_So_MI_SCCType ODUkP-X-L/MT_A_So_MI_Label[1…M] ODUkP-X-L/MT_A_So_MI_LSPType[1…M] ODUkP-X-L/MT_A_So_MI_PSC[1…M] ODUkP-X-L/MT_A_So_PHB2TCMapping[1…M] ODUkP-X-L/MT_A_So_MI_QoSEncodingMode[1…M]	

Processes:

A process diagram of this function is shown in Figure 48.

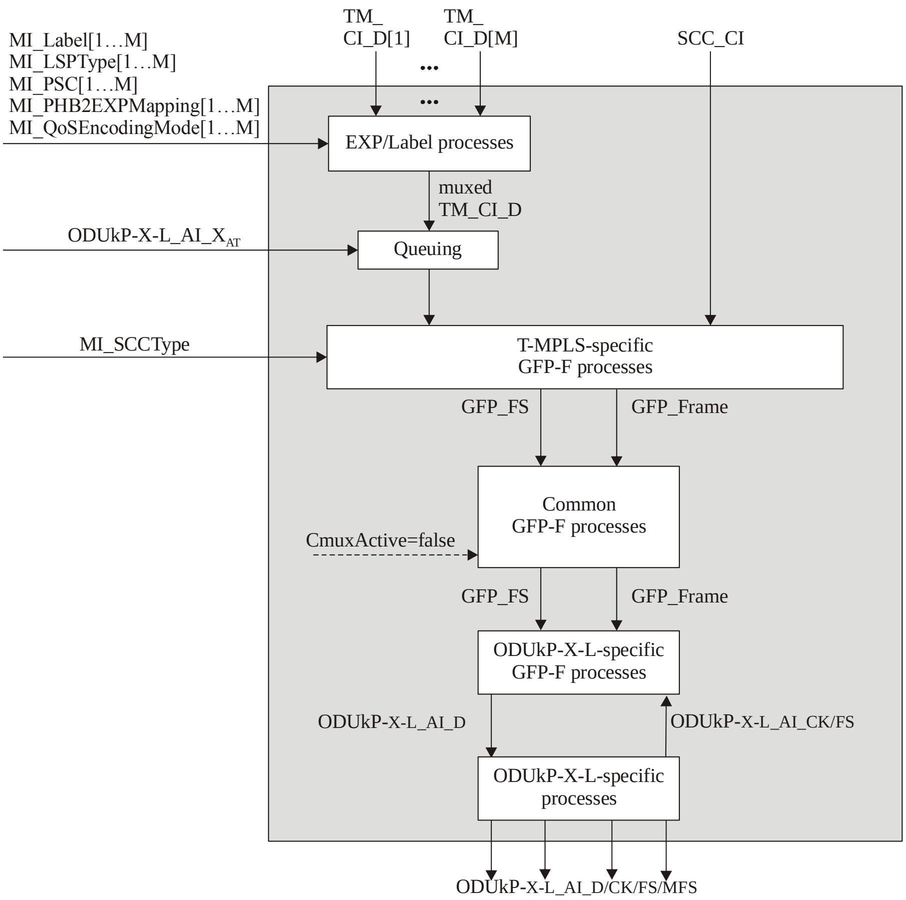

Figure 48/G.8121/Y.1381 – ODUkP-X-L/MT_A_So process diagram
[Replace TM & T-MPLS by MT & MPLS-TP]

The processes have the same definition as in 10.2.1.1.

ODUkP-X-L specific source process:

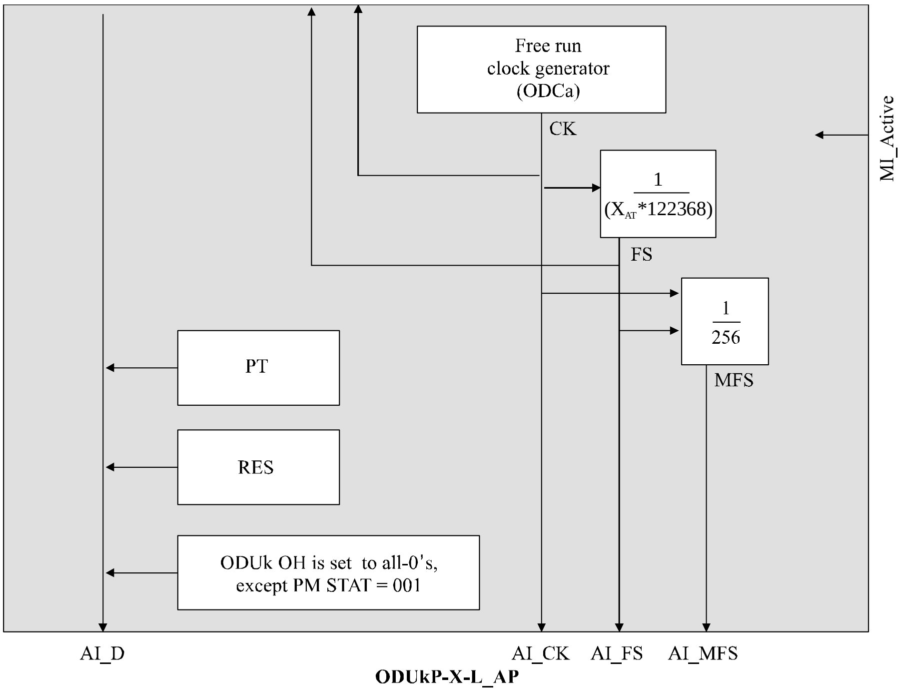

Figure 11-2/G.8121/Y.1381 – ODUkP-X-L specific source processes

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Clock and (Multi)Frame Start signal generation: The function shall generate a local ODUk clock (ODUkP_AI_CK) of " $X_{AT} * 239/(239 - k) * 4^{(k-1)} * 2\,488\,320$ kHz ± 20 ppm" from a free running oscillator. The jitter and wander requirements as defined in Annex A/G.8251 (ODCa clock) apply.

The function shall generate the (multi)frame start reference signals AI_FS and AI_MFS for the ODUk signal. The AI_FS signal shall be active once per 122368 clock cycles. AI_MFS shall be active once every 256 frames.

vcPT: The payload type information is derived directly from the Adaptation function type. The value for "GFP mapping" shall be inserted into the vcPT byte position of the PSI overhead as defined in 18.1.2.2/G.709/Y.1331.

RES: The function shall insert all-0's into the RES bytes.

Defects:

None.

Consequent actions:

None.

Defect correlations:

None.

Performance monitoring:

Ffs.

10.2.2.2 LCAS-capable ODUk to MPLS-TP adaptation sink function (ODUkP-X-L/MT_A_Sk)

The ODUkP-X-L/MT_A_Sk extracts MT_CI information from the ODUkP-Xv payload area. It extracts the OPUk-Xv Overhead (vcPT and RES) and monitors the reception of the correct payload type.

Symbol:

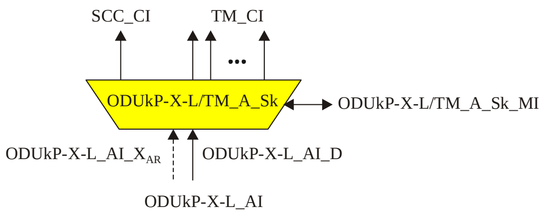

Figure 49/G.8121/Y.1381 – ODUkP-X-L/MT_A_Sk symbol
[Replace TM & T-MPLS by MT & MPLS-TP]

Interfaces:

Table 13/G.8121/Y.1381 – ODUkP-X-L/MT_A_Sk interfaces

Inputs	Outputs
ODUkP-X-L_AP: ODUkP-X-L_AI_Data ODUkP-X-L_AI_ClocK ODUkP-X-L_AI_FrameStart ODUkP-X-L_AI_MultiFrameStart ODUkP-X-L_AI_TSF ODUkP-X-L_AI_X_{AR} **ODUkP-X-L/MT_A_Sk_MP:** ODUkP-X-L/MT_A_Sk_MI_Active ODUkP-X-L/MT_A_Sk_MI_SCCType ODUkP-X-L/MT_A_Sk_MI_Label[1…M] ODUkP-X-L/MT_A_Sk_MI_LSPType[1…M] ODUkP-X-L/MT_A_Sk_MI_PSC[1…M] ODUkP-X-L/MT_A_Sk_MI_TC2PHBMapping[1…M] ODUkP-X-L/MT_A_Sk_MI_QoSDecodingMode[1…M]	**Each MT_CP:** MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF **SCC_CP:** SCC_CI_Data SCC_CI_SSF **ODUkP-X-L/MT_A_Sk_MP:** ODUkP-X-L/MT_A_Sk_MI_AcVcPT ODUkP-X-L/MT_A_Sk_MI_AcEXI ODUkP-X-L/MT_A_Sk_MI_LastValidUPI ODUkP-X-L/MT_A_Sk_MI_cVcPLM ODUkP-X-L/MT_A_Sk_MI_cLFD ODUkP-X-L/MT_A_Sk_MI_cEXM ODUkP-X-L/MT_A_Sk_MI_cUPM

Processes:

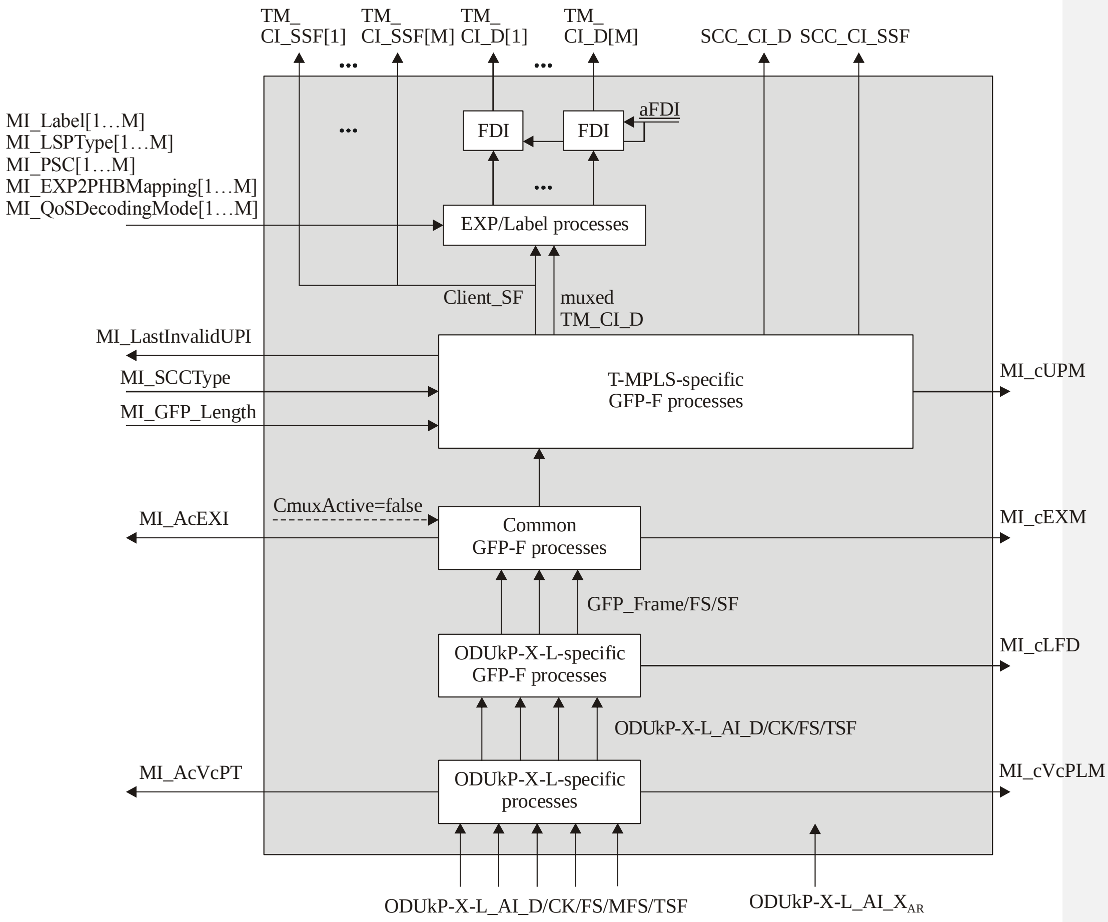

Figure 50/G.8121/Y.1381 – ODUkP-X-L/MT_A_Sk process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, EXP by TC / FDI needs to be updated]

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See process diagram and process description in 10.2.1.2. The additional ODUkP-X-L_AI_X_{AR} interface is not connected to any of the internal processes.

ODUkP-X-L specific sink process:

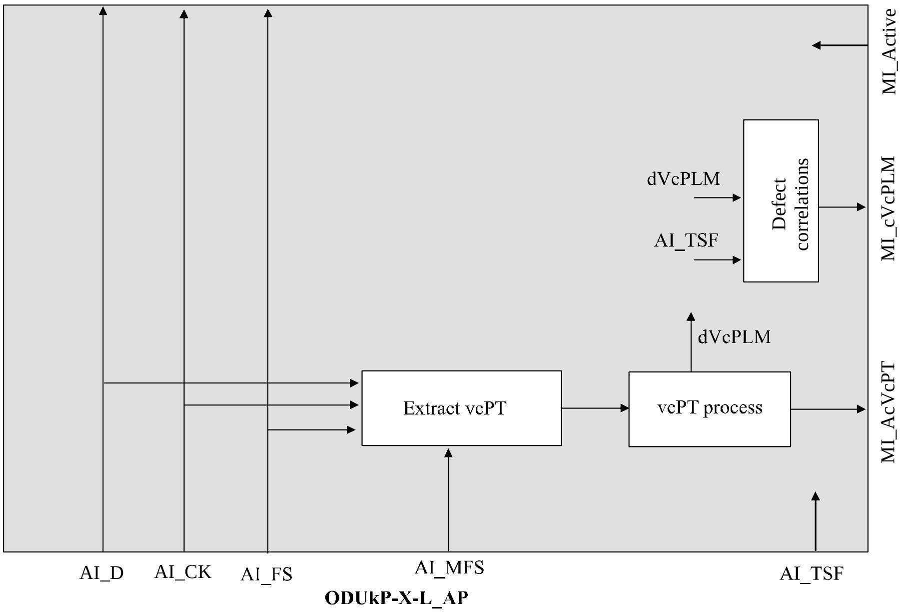

Figure 11-4/G.8121/Y.1341 – ODUkP-X-L specific sink processes

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PT: The function shall extract the vcPT byte from the PSI overhead as defined in 8.7.3/G.798. The payload type value for "GFP mapping" in 18.1.2.2/G.709/Y.1331 shall be expected. The accepted PT value is available at the MP (MI_AcPT) and is used for PLM defect detection.

RES: The value in the RES bytes shall be ignored.

Defects:

dVcPLM – See 6.2.4.2/G.798.

dLFD – See 6.2.5.2/G.806.

dUPM – See 8.4.2.

dEXM – See 6.2.4.4/G.806.

Consequent actions:

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dVcPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dVcPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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Defect correlations:

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cVcPLM ← dVcPLM and (not AI_TSF)

cLFD ← dLFD and (not dVcPLM) and (not AI_TSF)

cEXM ← dEXM and (not dVcPLM) and (not dLFD) and (not AI_TSF) cUPM ← dUPM and (not dEXM) and (not dVcPLM) and (not dLFD) and (not AI_TSF)

Performance monitoring:

Ffs.

10.3 daptation function (P/MT_A)

10.3.1 P*q* to MPLS-TP Adaptation functions (P*q*/MT_A; q = 11s, 12s, 31s, 32e)

10.3.1.1 P*q* to MPLS-TP Adaptation Source function (P*q*/MT_A_So)

This function maps MT_CI information onto a Pq_AI signal (q = 11s, 12s, 31s, 32e).

Data at the Pq_AP is a Pq (q = 11s, 12s, 31s, 32e), having a payload as described in ITU-T G.7043/Y.1343 with a value of N=1. The VLI byte is reserved and not used for payload data.

Symbol

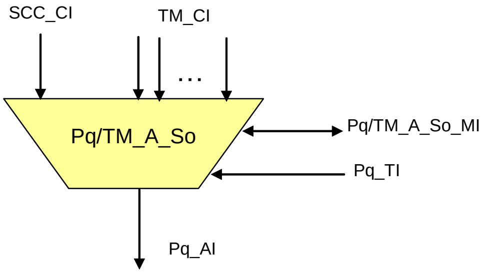

Figure 1/G.8121/Y.1381 – Pq/MT_A_So symbol
[Replace TM by MT]

Interfaces

Table 1/G.8121/Y.1381: Pq/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB SCC_CP: SCC_CI_Data Pq_TP: Pq_TI_Clock Pq_TI_FrameStart Pq/MT_A_So_MP: Pq/MT_A_So_MI_SCCType Pq/MT_A_So_MI_Label[1…M] Pq/MT_A_So_MI_LSPType[1…M] Pq/MT_A_So_MI_PSC[1…M] Pq/MT_A_So_PHB2TCMapping[1…M] Pq/MT_A_So_MI_QoSEncodingMode[1…M]	Pq_AP: Pq_AI_Data Pq_AI_Clock Pq_AI_FrameStart

Processes

A process diagram of this function is shown in Figure 20.

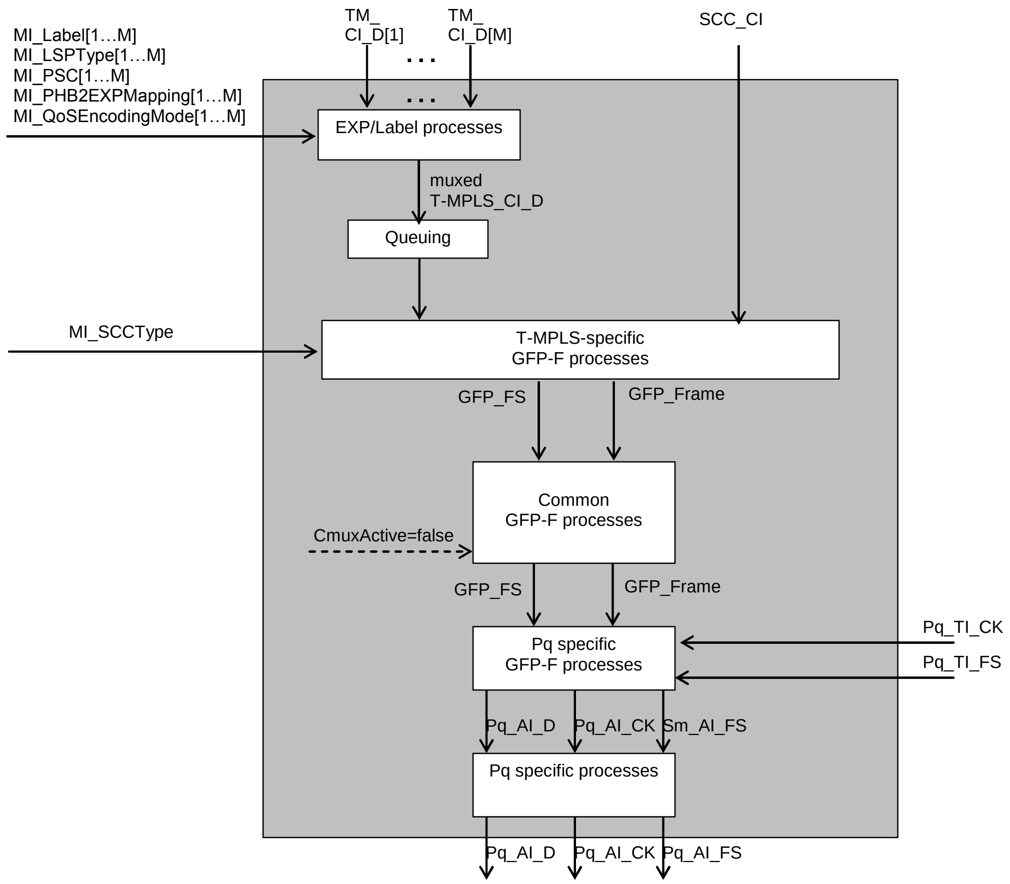

Figure 20/G.8121/Y.1381 – Pq/MT_A_So process diagram
[Replace TM & T-MPLS by MT & MPLS-TP]

TC/Label processes:

See 8.2.1/G.8121/Y.1381.

Queuing process:

See 8.3/G.8121/Y.1381.

MPLS-TP-specific GFP-F source process:

See 8.4.1/G.8121/Y.1381.

Common GFP source process:

See 8.5.3.1/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

Pq specific GFP source process:

See 8.5.2.1/G.806. The GFP frames are mapped into the Pq payload area according to G.8040/Y.1340.

Pq specific source process:

Note: the VLI byte is fixed stuff equal to 0x00 at the Pq_AP output of this function.

P31s specific:

MA: Signal label information is derived directly from the Adaptation function type. The value for "GFP mapping" in clause 2.1/G.832 is placed in the Payload Type field of the MA byte.

Defects

None.

Consequent actions

None.

Defect correlations

None.

Performance monitoring

Ffs.

10.3.1.2 *Pq* to MPLS-TP Adaptation Sink function (P*q*/MT_A_Sk)

This function extracts MT_CI information from the Pq_AI signal (q = 11s, 12s, 31s, 32e), delivering MT_CI.

Data at the Pq _AP is a Pq (q = 11s, 12s, 31s, 32e), having a payload as described in ITU-T G.7043/Y.1343 with a value of N=1. The VLI byte is reserved and not used for payload data.

Symbol

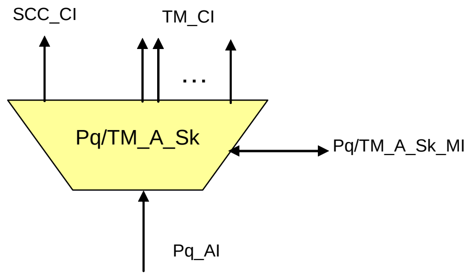

Figure 2/G.8121/Y.1381 – Pq/MT_A_Sk symbol
[Replace TM by MT]

Interfaces

Table 2/G.8121/Y.1381: Pq/MT_A_Sk interfaces

Inputs	Outputs
Pq_AP: Pq_AI_Data Pq_AI_ClocK Pq_AI_FrameStart Pq_AI_TSF Pq/MT_A_Sk_MP: Pq/MT_A_Sk_MI_SCCType Pq/MT_A_Sk_MI_Label[1…M] Pq/MT_A_Sk_MI_LSPType[1…M] Pq/MT_A_Sk_MI_PSC[1…M] Pq/MT_A_Sk_MI_TC2PHBMapping[1…M] Pq/MT_A_Sk_MI_QoSDecodingMode[1…M]	Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF SCC_CP: SCC_CI_Data SCC_CI_SSF Pq/MT_A_Sk_MP: Pq/MT_A_Sk_MI_AcSL Pq/MT_A_Sk_MI_AcEXI Pq/MT_A_Sk_MI_LastValidUPI Pq/MT_A_Sk_MI_cPLM Pq/MT_A_Sk_MI_cLFD Pq/MT_A_Sk_MI_cEXM Pq/MT_A_Sk_MI_cUPM

Processes

A process diagram of this function is shown in Figure 22.

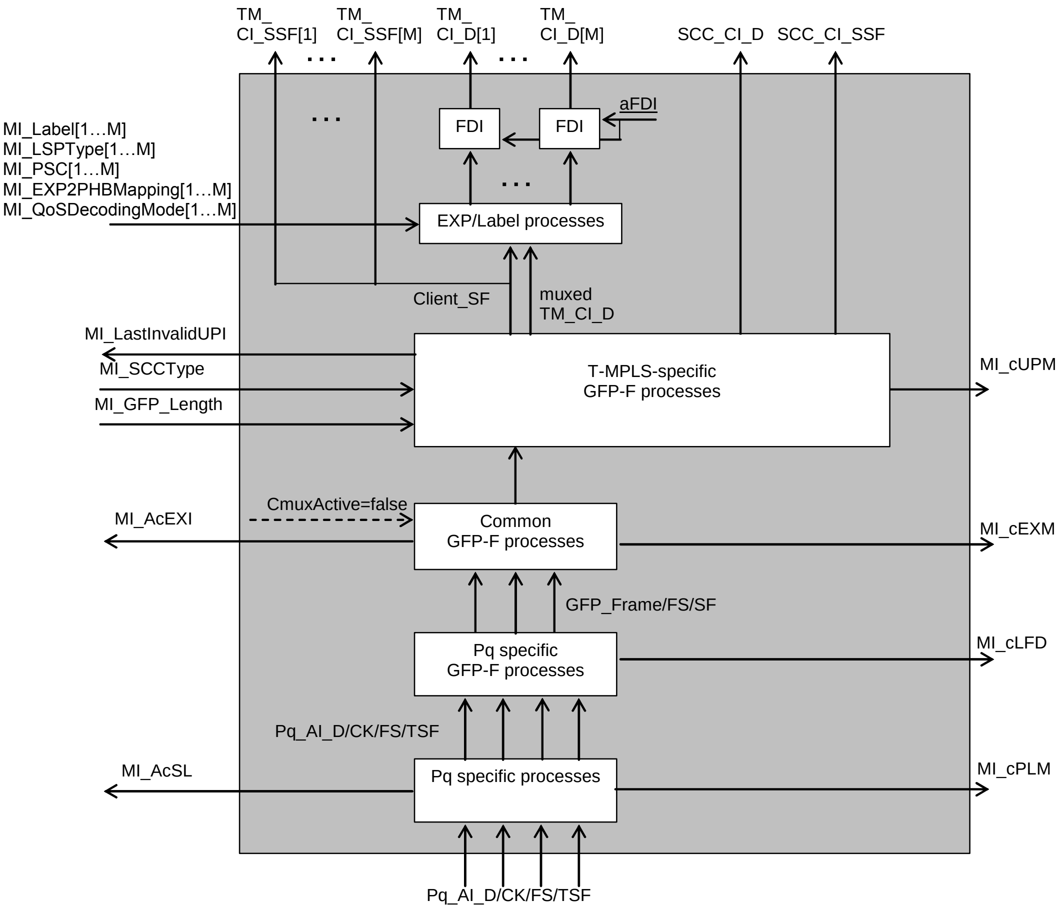

Figure 22/G.8121/Y.1381 – Pq/MT_A_Sk process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, EXP by TC / FDI needs to be updated]

FDI process:

This process insert MPLS-TP FDI OAM packets when consequent action aFDI is asserted.

[Note: FDI should be updated]

TC/Label processes:

See 8.2.2/G.8121/Y.1381.

MPLS-TP specific GFP-F sink process:

See 8.4.2/G.8121/Y.1381.

Common GFP sink process:

See 8.5.3.1/G.806. GFP channel multiplexing is not supported (CMuxActive=false).

Pq specific GFP sink process:

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See 8.5.2.1/G.806. The GFP frames are demapped from the Pq payload area according to G.8040/Y.1340.

Pq specific sink process:

Note: the VLI byte at the Pq_AP input of this function is ignored.

P31s specific:

MA: The signal label is recovered from the Payload Type field in the MA byte as per 6.2.4.2/G.806. The signal label for "GFP mapping" in clause 2.1/G.832 shall be expected. The accepted value of the signal label is also available at the P31s/ETH_A_Sk_MP.

Defects

dPLM – See 6.2.4.2/G.806.

dLFD – See 6.2.5.2/G.806.

dUPM - See 8.4.2/G.8121/Y.1381

dEXM – See 6.2.4.4/G.806.

Note: dPLM is only defined for q = 31s. dPLM is assumed to be false for q = 11s, 12s, 32e.

Consequent actions

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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Defect correlations

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cPLM ← dPLM and (not AI_TSF)

cLFD ← dLFD and (not dPLM) and (not AI_TSF)

cEXM ← dEXM and (not dPLM) and (not dLFD) and (not AI_TSF)

cUPM ← dUPM and (not dEXM) and (not dPLM) and (not dLFD) and (not AI_TSF)

Performance monitoring

Ffs.

10.3.2 LCAS-capable P*q* to MPLS-TP Adaptation functions (P*q*-X-L/MT_A; *q*=11s, 12s, 31s, 32e)

10.3.2.1 LCAS-capable P*q* to MPLS-TP Adaptation Source function (P*q*-X-L/MT_A_So)

This function maps MT_CI information onto an Pq-X-L_AI signal (q=11s, 12s, 31s, 32e).

Data at the Pq-X-L_AP is a Pq-X (q = 11s, 12s, 31s, 32e), having a payload as described in ITU-T G.7043/Y.1343.

Symbol

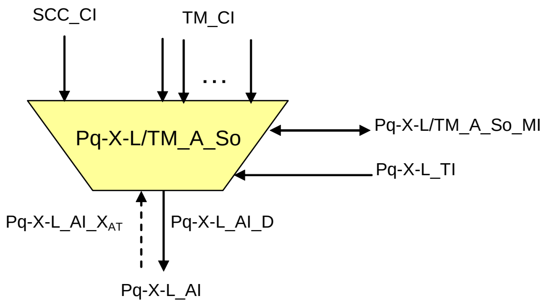

Figure 3/G.8121/Y.1381 – Pq-X-L/MT_A_So symbol
[Replace TM by MT]

Interfaces

Table 3/G.8121/Y.1381: Pq-X-L/MT_A_So interfaces

Inputs	Outputs
Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB SCC_CP: SCC_CI_Data Pq-X-L_AP: Pq-X-L_AI_X_{AT} Pq-X-L_TP: Pq-X-L_TI_Clock Pq-X-L_TI_FrameStart Pq-X-L/MT_A_So_MP: Pq-X-L/MT_A_So_MI_SCCType Pq-X-L/MT_A_So_MI_Label[1…M] Pq-X-L/MT_A_So_MI_LSPType[1…M] Pq-X-L/MT_A_So_MI_PSC[1…M] Pq-X-L/MT_A_So_PHB2TCMapping[1…M] Pq-X-L/MT_A_So_MI_QoSEncodingMode[1…M]	Pq-X-L_AP: Pq-X-L_AI_Data Pq-X-L_AI_Clock Pq-X-L_AI_FrameStart

Processes

A process diagram of this function is shown in Figure 24.

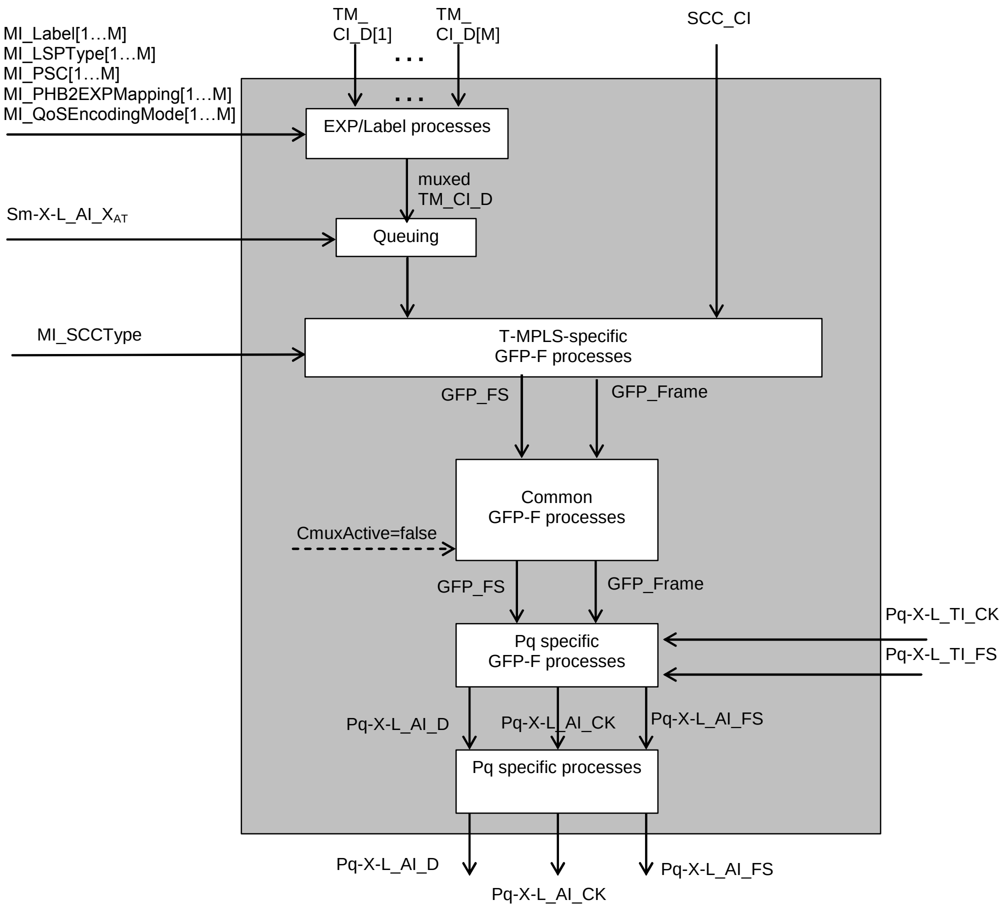

Figure 24/G.8121/Y.1381 – Pq-X-L/MT_A_So process diagram
[Replace TM & T-MPLS by MT & MPLS-TP]

The processes have the same definition as in 10.1.1.1/G.8121/Y.1381.

Defects

None.

Consequent actions

None.

Defect correlations

None.

Performance monitoring

Ffs.

10.3.2.2 LCAS-capable Pq to MPLS-TP Adaptation Sink function (Pq-X-L/MT_A_Sk)

This function extracts MT_CI information from the Pq-X-L_AI signal (q = 11s, 12s, 31s, 32e), delivering MT_CI.

Data at the Pq-X-L_AP is a Pq-Xv (q = 11s, 12s, 31s, 32e), having a payload as described in ITU-T G.7043/Y.1343.

Symbol

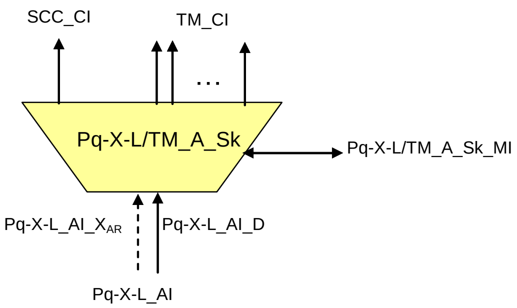

Figure 4/G.8121/Y.1381 – Pq-X-L/MT_A_Sk symbol
[Replace TM by MT]

Interfaces

Table 4/G.8121/Y.1381: Pq-X-L/MT_A_Sk interfaces

Inputs	Outputs
Pq-X-L_AP: Pq-X-L_AI_Data Pq-X-L_AI_ClocK Pq-X-L_AI_FrameStart Pq-X-L_AI_TSF Pq-X-L_AI_X_{AR} Pq-X-L/MT_A_Sk_MP: Pq-X-L/MT_A_Sk_MI_SCCType Pq-X-L/MT_A_Sk_MI_Label[1…M] Pq-X-L/MT_A_Sk_MI_LSPType[1…M] Pq-X-L/MT_A_Sk_MI_PSC[1…M] Pq-X-L/MT_A_Sk_MI_TC2PHBMapping[1…M] Pq-X-L/MT_A_Sk_MI_QoSDecodingMode[1…M]	Each MT_CP: MT_CI_Data MT_CI_iPHB MT_CI_oPHB MT_CI_SSF SCC_CP: SCC_CI_Data SCC_CI_SSF Pq-X-L/MT_A_Sk_MP: Pq-X-L/MT_A_Sk_MI_AcSL Pq-X-L/MT_A_Sk_MI_AcEXI Pq-X-L/MT_A_Sk_MI_LastValidUPI Pq-X-L/MT_A_Sk_MI_cPLM Pq-X-L/MT_A_Sk_MI_cLFD Pq-X-L/MT_A_Sk_MI_cEXM Pq-X-L/MT_A_Sk_MI_cUPM

Processes

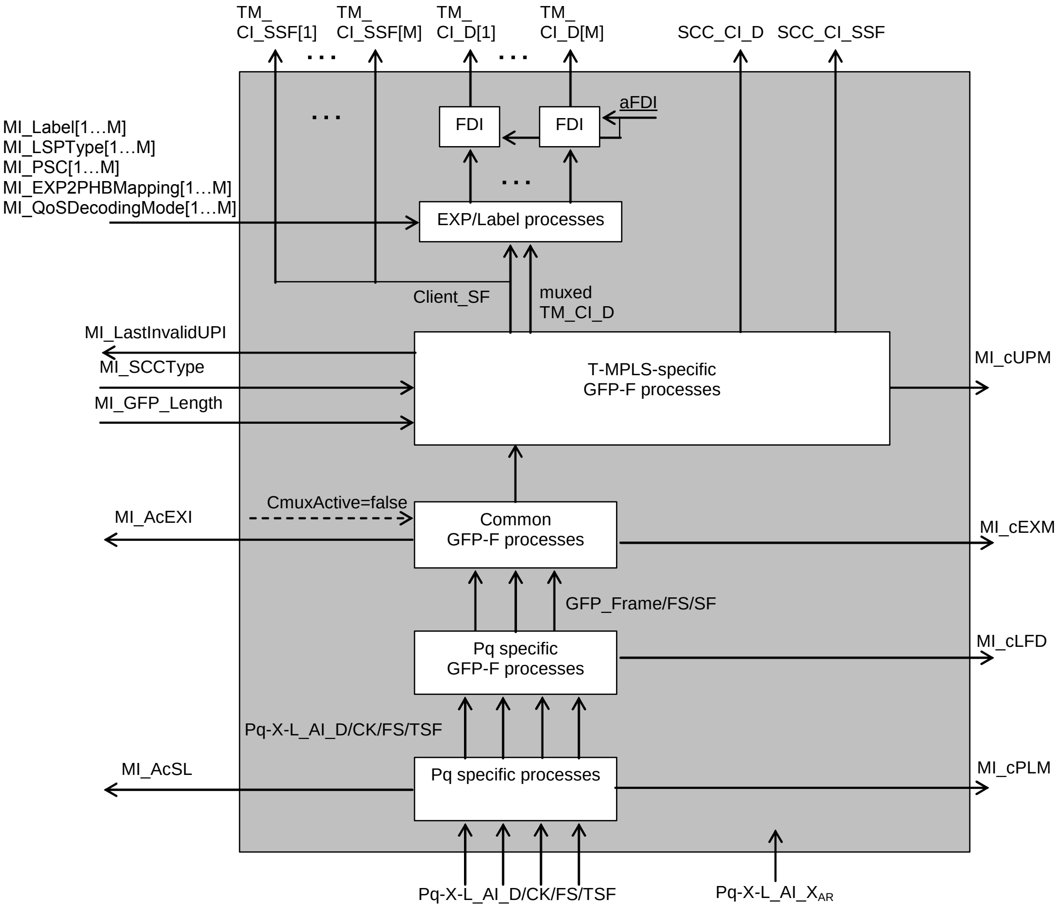

Figure 5/G.8121/Y.1381 – Pq-X-L/MT_A_Sk process diagram
[Replace TM & T-MPLS by MT & MPLS-TP, EXP by TC / FDI needs to be updated]

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See process diagram and process description in 10.1.1.2/G.8121/Y.1381. The additional Pq-X-L_AI_X_{AR} interface is not connected to any of the internal processes.

Defects

dPLM – See 6.2.4.2/G.806.

dLFD – See 6.2.5.2/G.806.

dUPM - See 8.4.2/G.8121/Y.1381

dEXM – See 6.2.4.4/G.806.

Note: dPLM is only defined for q = 31s. dPLM is assumed to be false for q = 11s, 12s, 32e.

Consequent actions

The function shall perform the following consequent actions:

aSSF ← AI_TSF or dPLM or dLFD or dUPM or dEXM

aFDI ← AI_TSF or dPLM or dLFD or dUPM or dEXM [Note: aFDI should be updated]

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Defect correlations

The function shall perform the following defect correlations to determine the most probable fault cause (see 6.4/G.806). This fault cause shall be reported to the EMF.

cPLM ← dPLM and (not AI_TSF)

cLFD ← dLFD and (not dPLM) and (not AI_TSF)

cEXM ← dEXM and (not dPLM) and (not dLFD) and (not AI_TSF)

cUPM ← dUPM and (not dEXM) and (not dPLM) and (not dLFD) and (not AI_TSF)

Performance monitoring

Ffs.

10.4 ETH to MPLS-TP adaptation function (ETH/MT_A)

Ffs.

11 Interworking functions based on ITU-T Rec. G.805

Ffs.

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