Question(s):	14/15	**Meeting, date:**	Berlin, November 15-19, 2010
Study Group:	15 **Working Party:** 3	**Intended type of document**	WD25r2
Source:	Editor G.8151/Y.1374		
Title:	Draft Revision of G.8151/Y.1374 "*Management aspects of the MPLS-TP network element*", version 06 (work in progress)		

Contact:	Hing-Kam Lam Alcatel-Lucent USA	Tel: +1 908 582 0672 Fax: +1 908 582 1124 Email: Kam.Lam@alcatel-lucent.com

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

The document contains the draft version of G.8151/Y.1374 Revision. It aligns the published version of the Recommendation (10/2007) with the result of the MPLS-TP work. Changes to the document are shown with revision marks, except the table of content.

Editor NOTE: This document is work in progress and is not ready for consent yet.

Document history:

Version	Date	Description
00	April 30, 2009	▪ Change the term T-MPLS to MPLS-TP ▪ Change the abbreviation TM to MT ▪ In tables 7-1, 8-1, 8-2, 8-3, 8-4, and 10-1 note the need to update the fault cause (cXXX), MI signals, value range, and PM primitive per G.8121
01	May 28, 2009	▪ Updated per the review at the Sophia-Antipolis meeting
02	Sep. 17, 2009	TD179 (WP3/15) Geneva, 28 September - 09 October 2009 ▪ Update Section 3.1 Terms ▪ Update Section 7.2.1 adding pointer to G.7710 for mapping ofr failures to probable causes ▪ Update Section 7.2.14 Table7-3 for the Operational State ▪ Create a place holder in Section 10.2 for MT.NE specific performance management requirements
03	April 12, 2010	WD17 (Q9, 10, 12, 14) Stockholm, 12-16 April 2010 ▪ Align Figure 6.4 with the generic figure of G.7710 Corrigendum 1 Also presented as TD352/3 in the June 2010 SG15 plenary meeting.
04	Nov. 2010	WD25 (Q9, 10, 12, 14) Berlin, November 15 – 19, 2010 ▪ To align with WD28 for MT_TT_So and MT_TT_Sk in Table 7-1 (failure), Table 7-2 (ARC), Table 7-3 (Operational state), Table 8-1 (configuration), and Table 10-1 (PM primitive) ▪ To align with WD17 for MT/MT_A_So, MT/MT_A_Sk, and MT/ETH_A_So in Table 8-2

Version	Date	Description
05	Nov. 2010	WD25r1 (Q9, 10, 12, 14) Berlin, November 15 – 19, 2010 ▪ Restore the non-MPLS-TP server adaptation failure (Table 7-1), ARC (Table 7-2), Operation state (Table 7-3), and configuration (Table 8-1) to be consistent with G.8121.
06	Nov. 2010	WD25r2 (Q9, 10, 12, 14) Berlin, November 15 – 19, 2010 ▪ For MT_TT, change CV to CC to align with changes made in G.8121 (WD19r2)

ITU-T Recommendation G.8151/Y.1374 ~~(G.tmpls-mgmt)~~

Management aspects of the ~~T-~~MPLS-TP network element

ITU-T Recommendation G.8151/Y.1374 ~~(G.tmpls-mgmt)~~

Management aspects of the ~~T~~ MPLS-TP network element

Summary

This Recommendation addresses management aspects of the ~~Transport~~ MPLS Transport Profile (MPLS-TP) capable network element containing transport functions of one or more of the layer networks of the ~~transport~~ MPLS-TP network. The management of the ~~transport~~ MPLS-TP layer networks is separable from that of its client layer networks so that the same means of management can be used regardless of the client. The management functions for fault management, configuration management, performance monitoring, and security management are specified.

The 2011~~0~~ Revision of this Recommendation ~~has been~~ aligneds with the MPLS-TP architecture and requirements jointly developed by IETF and ITU-T ~~in the 2008/2009 time frame~~ and documented in [IETF RFC 5654~~mpls-tp-req~~], [IETF RFC 5860~~mpls-tp-oam-req~~], and [IETF RFC 5951~~mpls-tp-nm-req~~].

1 Scope

This Recommendation addresses management aspects of the ~~Transport~~ MPLS Transport Profile (~~T~~ MPLS-TP) capable network element containing transport functions of one or more of the layer networks of the ~~T~~ MPLS-TP network. The management of the ~~T~~ MPLS-TP layer networks is separable from that of its client layer networks so that the same means of management can be used regardless of the client. In this version of the Recommendation, fault management, configuration management, performance management, and security management are specified. Accounting management is for further study. Further more, only the management information (MI) of the following ~~T~~ MPLS-TP equipment functions ~~are~~ is addressed:

- ~~T~~ MPLS-TP layer connection function,
- ~~T~~ MPLS-TP layer trail termination functions,
- ~~T~~ MPLS-TP server to ~~T~~ MPLS-TP client adaptation functions,
- ~~T~~ MPLS-TP server to Ethernet client adaptation functions,~~,~~
- SDH server to ~~T~~ MPLS-TP client adaptation functions,
- PDH server to ~~T~~ MPLS-TP client adaptation functions, and
- OTN sever to ~~T~~ MPLS-TP client adaptation functions.

The management of the adaptation of other clients and servers with respect to ~~T~~ MPLS-TP is for further study.

This Recommendation also describes the management network organizational model for communication between an element management layer (EML) Operations System and the ~~T~~ MPLS-TP equipment management function within an ~~T~~ MPLS-TP network element.

The architecture described in this Recommendation for the management of ~~T~~ MPLS-TP transport networks is based upon the following considerations:

- The management view of network element functional elements should be uniform whether those elements form part of an inter-domain interface or part of an intra-domain interface. Those properties necessary to form such a uniform management view are to be included in this Recommendation.

Formatted: English (U.S.)

Formatted: Strikethrough

Formatted: Strikethrough

Formatted: Strikethrough

- ~~T~~-MPLS-TP layer network entities (~~T~~MTLNE) refer to trail termination, adaptation and connection functions as described in [ITU-T G.8110.1/Y.1370.1],
- a network element may only contain ~~T~~-MPLS-TP layer network entities,
- a network element may contain both ~~T~~-MPLS-TP layer network entities (~~T~~MTLNE) and client layer network entities (CLNE),
- client layer entities are managed as part of their own logical domain (e.g. Ethernet management network),
- CLNE and ~~T~~MTLNE may or may not share a common message communication function (MCF) and management application function (MAF) depending on application,
- CLNE and ~~T~~MTLNE may or may not share the same agent.

This Recommendation is compliant with the transport profile of MPLS (MPLS-TP) as defined by the IETF. In the event of a misalignment in MPLS-TP related architecture and protocols between this ITU-T Recommendation and the referenced IETF RFCs, the RFCs will take precedence.

2 References

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

[ITU-T G.806] ITU-T Recommendation G.806 (200~~9~~6), *Characteristics of transport equipment – Description methodology and generic functionality*

[ITU-T G.7041/Y.1303] ITU-T Recommendation G.7041/Y.1303 (2008~~5~~) ~~and Amendment 1 (2006)~~, *Generic framing procedure (GFP)*

[ITU-T G.7710/Y.1701] ITU-T Recommendation G.7710/Y.1701 (2007), *Common equipment management function requirements*, plus Corrigendum 1 (2009)

[ITU-T G.7712/Y.1703] ITU-T Recommendation G.7712/Y.1703 (2010~~9~~3), *Architecture and specification of data communication network*

[ITU-T G.8110.1/Y.1370.1] ITU-T Recommendation G.8110.1/Y.1370.1 (2011~~09~~6), *Architecture of ~~Transport~~ MPLS Transport Profile (~~T~~-MPLS-TP) layer network*

[ITU-T G.8112/Y.1371] ITU-T Recommendation G.8112/Y.1371 (200~~9~~6), *Interfaces for the ~~Transport~~ MPLS Transport Profile (~~T~~-MPLS-TP) Hierarchy*.

~~[ITU-T G.8114/Y.1373] ITU-T Recommendation G.8114/Y.1373 (ex Y.17tom), (2007), Operation & Maintenance mechanisms for T-MPLS layer networks~~

[ITU-T G.8121/Y.1741] ITU-T Recommendation G.8121/Y.1381~~1741~~ (2010~~9~~6) ~~and Amendment 1 (2007)~~, *Characteristics of ~~multi protocol label switched (~~MPLS~~)~~ Transport Profile (MPLS-TP) equipment functional blocks*

[ITU-T M.20] ITU-T Recommendation M.20 (1992), *Maintenance philosophy for telecommunication networks*.

Formatted: Highlight
Formatted: Highlight
Formatted: Highlight
Formatted: Highlight
Formatted: Highlight

[ITU-T M.3010] ITU-T Recommendation M.3010 (2000) and Amendments, *Principles for a telecommunications management network*

[ITU-T M.3013] ITU-T Recommendation M.3013 (2000), *Considerations for a telecommunications management network*.

[ITU-T M.3100] ITU-T Recommendation M.3100 (2005), *Generic network information model*.

[ITU-T X.700] ITU-T Recommendation X.700 (1992), *Management framework for Open Systems Interconnection (OSI) For CCITT Applications*.

[ITU-T X.701] ITU-T Recommendation X.701 (1997), *Information technology – Open Systems Interconnection – Systems management overview*.

[ITU-T X.733] ITU-T Recommendation X.733 (1992) and Amendments, *Information technology – Open Systems Interconnection – Systems Management: Alarm reporting function.*

[ITU-T X.735] ITU-T Recommendation X.735 (1992) and Amendments, Information technology – *Open Systems Interconnection – Systems management: Log control function*.

[IETF RFC 5654~~mpls-tp-req~~] IETF RFC 5654~~mpls-tp-req~~ (2009), *MPLS-TP Requirements*.

[IETF RFC 5860~~mpls-tp-oam-req~~] IETF RFC 5860~~mpls-tp-oam-req~~ (2010~~9~~), *Requirements for OAM in MPLS Transport Networks*.

[IETF RFC 5951~~mpls-tp-nm-req~~] IETF RFC 5951~~mpls-tp-nm-req~~ (2010~~9~~), *MPLS TP Network Management Requirements*.

Formatted: Indent: Left: 0 cm, Hanging: 1.4 cm

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

~~**3.1.1** The following terms are defined in [ITU-T G.7710/Y.1701]:~~

3.1.1 Local Craft Terminal: [ITU-T G.7710/Y.1701]

3.1.2 Management Application Function (MAF): [ITU-T G.7710/Y.1701]

~~**3.1.2** The following terms are defined in [ITU-T G.7712/Y.1703]:~~

3.1.3 Data Communication Network (DCN): [ITU-T G.7712/Y.1703]

Formatted: Bullets and Numbering

~~**3.1.3** The following terms are defined in [ITU-T G.806]:~~

3.1.4 Atomic Function (AF): [ITU-T G.806]

3.1.5 Management Point (MP): [ITU-T G.806]

Formatted: French (France)

~~**3.1.4** The following terms are defined in [ITU-T M.3010]:~~

3.1.6 Network Element (NE): [ITU-T M.3010]

3.1.7 Network Element Function (NEF): [ITU-T M.3010]

3.1.8 Operations System (OS): [ITU-T M.3010]

3.1.9 Q-Interface: [ITU-T M.3010]

3.1.10 Workstation Function (WF): [ITU-T M.3010]

~~**3.1.5 The following term is defined in [ITU-T M.3013]:**~~

~~**3.1.11**~~ Message Communication Function (MCF): [ITU-T M.3013]

~~**3.1.6 The following terms are defined in [ITU-T M.3100]:**~~

~~**3.1.12**~~ Alarm reporting~~;~~: [ITU-T M.3100]

~~**3.1.13**~~ Alarm Reporting Control (ARC): [ITU-T M.3100]~~;~~

~~**3.1.14**~~ Managed entity: [ITU-T M.3100]~~;~~

~~**3.1.15**~~ Management interface: [ITU-T M.3100]~~;~~

~~**3.1.16**~~ Persistence interval: [ITU-T M.3100]~~;~~

~~**3.1.17**~~ Operations System (OS): [ITU-T M.3100]~~;~~

~~**3.1.18**~~ Operations System Function (OSF): [ITU-T M.3100]~~;~~

~~**3.1.19**~~ Qualified problem: [ITU-T M.3100]~~;~~

~~**3.1.20**~~ Reset threshold report: [ITU-T M.3100]~~;~~

~~**3.1.21**~~ Threshold report: [ITU-T M.3100]~~;~~

~~**3.1.22**~~ Timed interval: [ITU-T M.3100]~~;~~

~~**3.1.7 The following term is defined in [ITU-T X.700]:**~~

~~**3.1.23**~~ Managed Object (MO): [ITU-T X.700]

~~**3.1.8 The following terms are defined in [ITU-T X.701]:**~~

~~**3.1.24**~~ Agent: [ITU-T X.701]

~~**3.1.25**~~ Manager: [ITU-T X.701]

~~**3.1.26**~~ Managed Object Class (MOC): [ITU-T X.701]

Formatted: French (France)

Formatted: French (France)

Formatted: French (France)

Formatted: French (France)

Formatted: English (U.S.)

Formatted: French (France)

Formatted: French (France)

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

3.2 Terms defined in this Recommendation

This Recommendation defines or specializes the following terms:

3.2.1 ~~T~~ MPLS-TP Management Network (~~T~~MT.MN): An ~~T~~ MPLS-TP Management Network is a subset of a TMN that is responsible for managing those parts of a network element that contain ~~T~~ MPLS-TP layer network entities. A ~~T~~MT.MN may be subdivided into a set of ~~T~~ MPLS-TP Management SubNetworks.

3.2.2 ~~T~~ MPLS-TP Management SubNetwork (~~T~~MT.MSN): An ~~T~~ MPLS-TP Management SubNetwork (~~T~~MT.MSN) consists of a set of separate Embedded Control Channels (ECC) and associated intra-site data communication links which are interconnected to form a Data Communications Network (DCN) within any given ~~T~~ MPLS-TP transport topology. For ~~T~~ MPLS-TP, the physical channel supporting the ECC is the ~~T~~ MPLS-TP Management Communication Channel (MCC) as defined in [ITU-T G.~~811~~7712/Y.17037~~3~~]. A ~~T~~MT.MSN represents a ~~T~~ MPLS-TP specific Local Communication Network (LCN) portion of a network operator's overall Data Communication Network or TMN.

3.2.3 ~~T-~~MPLS-TP Network Element (~~T~~MT.NE): That part of a network element that contains entities from one or more ~~T-~~MPLS-TP layer networks. A ~~T~~MT.NE may therefore be a standalone physical entity or a subset of a network element. It supports at least Network Element Functions (NEF) and may also support an Operations System Function (OSF). It contains Managed Objects (MO), a Message Communication Function (MCF) and a Management Application Function (MAF). The functions of a ~~T~~MT.NE may be contained within an NE that also supports other layer networks. These layer network entities are considered to be managed separately from ~~T-~~MPLS-TP entities. As such they are not part of the ~~T~~MT.MN or ~~T~~MT.MSN.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

AcSL	Accepted Signal Label
AF	Atomic Function
AIS	Alarm Indication Signal
ALM	ALarM reporting
ARC	Alarm Reporting Control
CLNE	Client Layer Network Entity
CP	Connection Point
CtrlP	Control Plane
DCN	Data Communication Network
ECC	Embedded Communication Channel
EMF	Equipment Management Function
FCAPS	Fault Management, Configuration Management, Account Management, Performance Management and Security Management
FFS	For Further Study
GNE	Gateway Network Element
IP	Internet Protocol
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
LAN	Local Area Network
LCN	Local Communication Network
LCT	Local Craft Terminal
MAF	Management Application Function
MCC	Management Communication Channel
MCF	Message Communication Function
MD	Mediation Device
MF	Mediation Function
MI	Management Information

Formatted: English (U.S.)

MIB	Management Information Base
MN	Management Network
MO	Managed Object
MOC	Managed Object Class
MP	Management Point
MgmtP	Management Plane
MPLS	Multi-Protocol Label Switching
~~T~~-MPLS-TP	~~Transport~~ MPLS Transport Profile
MSN	Management SubNetwork
~~T~~MT.C	~~T~~-MPLS-TP Channel layer
~~T~~MT.MN	~~T~~-MPLS-TP MN
~~T~~MT.MSN	~~T~~-MPLS-TP MSN
~~T~~MT.NE	~~T~~-MPLS-TP NE
~~T~~MT.P	~~T~~-MPLS-TP Path layer
~~T~~MT.S	~~T~~-MPLS-TP Section layer
M~~T~~TM-n	~~T~~-MPLS-TP Transport Module layer n
NALM	No ALaRm reporting
NALM-CD	No ALaRm reporting, Count Down
NALM-NR	No ALaRm reporting, Not Ready
NALM-QI	No ALaRm reporting, Qualified Inhibit
NALM-TI	No ALaRm reporting, Timed Inhibit
NE	Network Element
NEF	Network Element Function
NEL	Network Element Layer
OAM	Operations, Administration, Maintenance
OAM&P	Operations, Administration, Maintenance and Provisioning
OS	Operations System
OSF	Operations System Function
OSI	Open Systems Interconnection
PMC	Performance Monitoring Clock
QoS	Quality of Service
SCC	Signalling Communication Channel
RTC	Real Time Clock
TCM	Tandem Connection Monitoring
TMN	Telecommunication Management Network

Formatted: English (U.S.)

Comment [KL1]: Need confirmation on the name of the channel layer.

WAN	Wide Area Network
WS	WorkStation
WTR	Wait To Restore

5 Conventions

In this Recommendation, ~~T~~MT.MN stands for ~~T~~ MPLS-TP Management Network, ~~T~~MT.MSN for ~~T~~ MPLS-TP Management Subnetwork, ~~T~~MT.NE for ~~T~~ MPLS-TP NE, ~~T~~MT.C for ~~T~~ MPLS-TP Channel layer, ~~T~~MT.P for ~~T~~ MPLS-TP Path layer, and ~~T~~MT.S for ~~T~~ MPLS-TP Section layer.

6 ~~T~~ MPLS-TP management architecture

See [ITU-T G.7710] section 6 for the generic architecture for managing transport equipment. ~~T~~ MPLS-TP specific management architecture is described below.

6.1 ~~T~~ MPLS-TP network management architecture

The transport layer networks of ~~Transport MPLS (T~~ MPLS-TP~~)~~ are described in [ITU-T G.8110.1/Y.1370.1~~], ~~ and [ITU-T G.8112/Y.1371]~~, and [ITU-T G.8114/Y.1373]~~. The management of the ~~T~~ MPLS-TP layer networks is separable from that of its client layer networks so that the same means of management can be used regardless of the client.

6.1.1 Relationship between TMN, ~~T~~MT.MN and ~~T~~MT.MSN

The ~~T~~ MPLS-TP Management Network (~~T~~MT.MN) may be partitioned into ~~T~~ MPLS-TP Management SubNetworks (~~T~~MT.MSNs). The inter-relationship between a management network, its subnetworks and a TMN as generically described in section 6 of [ITU-T G.7710/Y.1701] is applicable to ~~T~~ MPLS-TP.

6.1.2 Access to the ~~T~~MT.MSN

See [ITU-T G.7710/Y.1701] section 6.1.2 for the generic requirements.

6.1.3 ~~T~~MT.MSN requirements

See [ITU-T G.7710/Y.1701] section 6.1.3 for the generic requirements.

In addition all ~~T~~MT.NEs must support Message Communication Functions (MCFs). The MCF of an ~~T~~MT.NE initiates/terminates (in the sense of the lower protocol layers), forwards, or otherwise processes management messages over MCCs, or over other DCN interfaces. In addition:

- All ~~T~~MT.NEs are required to terminate the ~~T~~MT.S-MCCs~~, see 6.1.8~~. In OSI terms, this means that each NE must be able to perform the functions of an end system.
- ~~T~~MT.NEs may also be required to forward management messages between ports according to routing control information held in the ~~T~~MT.NE. In OSI terms, this means that some ~~T~~MT.NEs may be required to perform the functions of an intermediate system.
- In addition to supporting interfaces for the ~~T~~MT.S-MCC, a ~~T~~MT.NE may also be required to support other DCN interfaces, which may include ~~T~~MT.P-MCCs or ~~T~~MT.C-MCCs or an Ethernet DCN interface.

The use of the ~~T~~MT.P-MCCs and ~~T~~MT.C-MCCs for management communications is within the scope of this Recommendation~~, see 6.1.7~~.

6.1.4 ~~T~~MT.MSN Data Communication Network

Refer to [ITU-T G.7710/Y.1701] section 6.1.4 for the generic requirements.

6.1.4.1 Management Communication Channel

The ~~T~~MT.MN supports three Management Communication Channels (MCCs):

1) ~~T~~MT.S-MCC (MCC_S)
2) ~~T~~MT.P-MCC (MCC_P)
3) ~~T~~MT.C-MCC (MCC_C)

The general ~~T~~MT.S-, ~~T~~MT.P-, and ~~T~~MT.C-MCCs are ~~defined~~ described in [ITU-T G.7712/Y.1703 ~~G.8114/Y.1373~~].

Comment [KL2]: Will be defined in the G.7712 Revision

Formatted: English (U.S.)

Figure 6-1 illustrates a network scenario consisting of two operators. Operator B provides an ~~T~~MT.P Service to operator A (i.e. Operator B transports the ~~T~~MT.P signal that begins and ends Operator A's domain). According to ~~Amendment 1 of~~ [ITU-T G.8110.1/Y.1370.1], the MCC_P and the MCC_C signals passed transparently through Operator B's network.

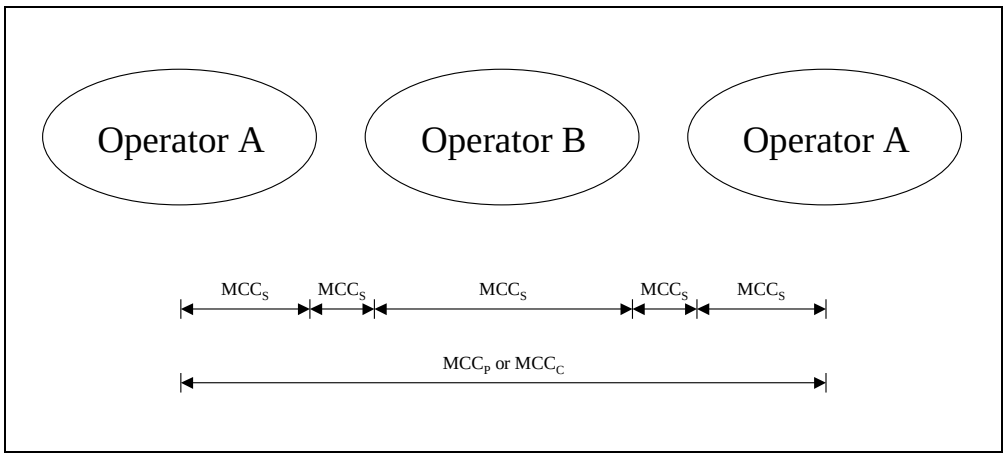
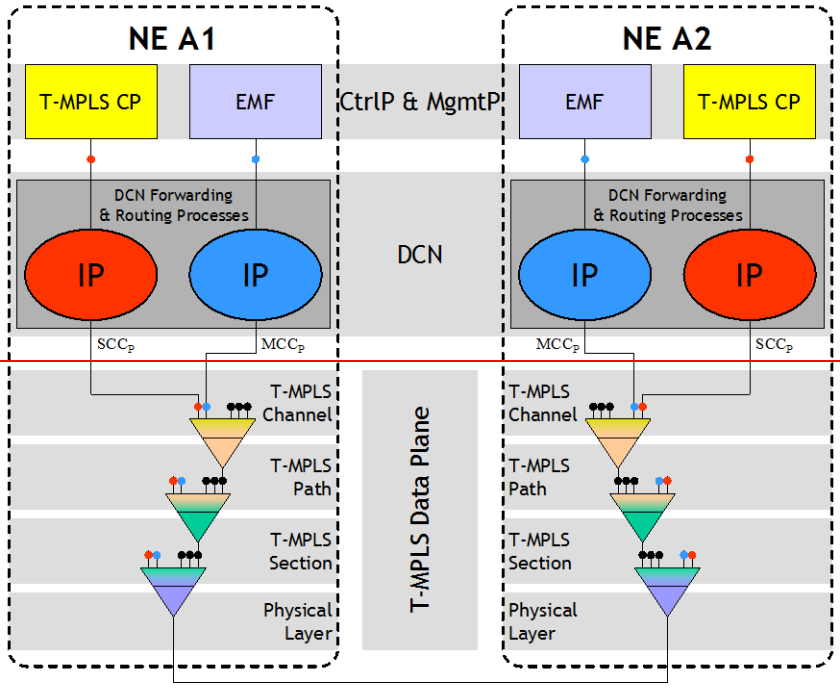


Figure 6-1/G.8151/Y.1374 – MCC scenarios

The physical layer is terminated in every network element and its related adaptation function provides the ~~T~~MT.S signals as well as the MCC_S. Hence, the MCC_S cannot cross administrative domains. In Figure 6-1, Figure 6-2, and Figure 6-3 illustrate scenarios where the MCC_P and MCC_C are transported transparently though Operator B's domain (the Operator B network elements are not shown in Figure 6-2 and Figure 6-3). In these scenarios it is possible that Operator B may use the MCC_S within its own domain for the management of its domain.


NE A1
NE A2
T-MPLS CP
EMF
CtrlP & MgmtP
EMF
T-MPLS CP
DCN Forwarding & Routing Processes
DCN
IP
IP
IP
IP
SCCp
MCCp
MCCp
SCCp
T-MPLS Channel
T-MPLS Path
T-MPLS Section
Physical Layer
T-MPLS Data Plane
T-MPLS Channel
T-MPLS Path
T-MPLS Section
Physical Layer

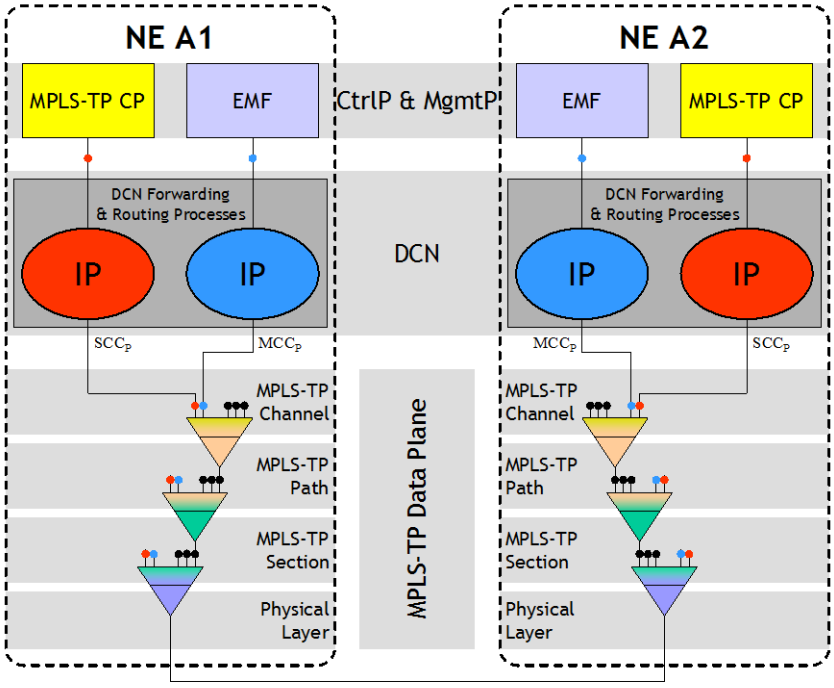
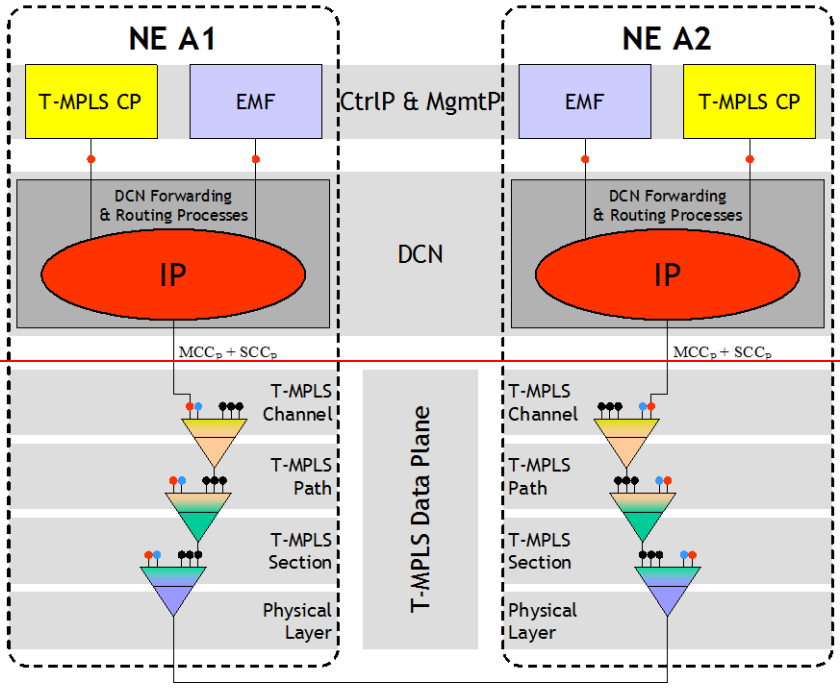

NE A1
NE A2
MPLS-TP CP
EMF
CtrlP & MgmtP
EMF
MPLS-TP CP
DCN Forwarding & Routing Processes
DCN
IP
IP
IP
IP
SCCp
MCCp
MCCp
SCCp
MPLS-TP Channel
MPLS-TP Path
MPLS-TP Section
Physical Layer
MPLS-TP Data Plane
MPLS-TP Channel
MPLS-TP Path
MPLS-TP Section
Physical Layer

Figure 6-2/G.8151/Y.1374 – MCC_P Scenario Example 1


NE A1
NE A2
T-MPLS CP
EMF
CtrlP & MgmtP
EMF
T-MPLS CP
DCN Forwarding & Routing Processes
IP
DCN
DCN Forwarding & Routing Processes
IP
MCCp + SCCp
MCCp + SCCp
T-MPLS Channel
T-MPLS Path
T-MPLS Section
Physical Layer
T-MPLS Data Plane
T-MPLS Channel
T-MPLS Path
T-MPLS Section
Physical Layer

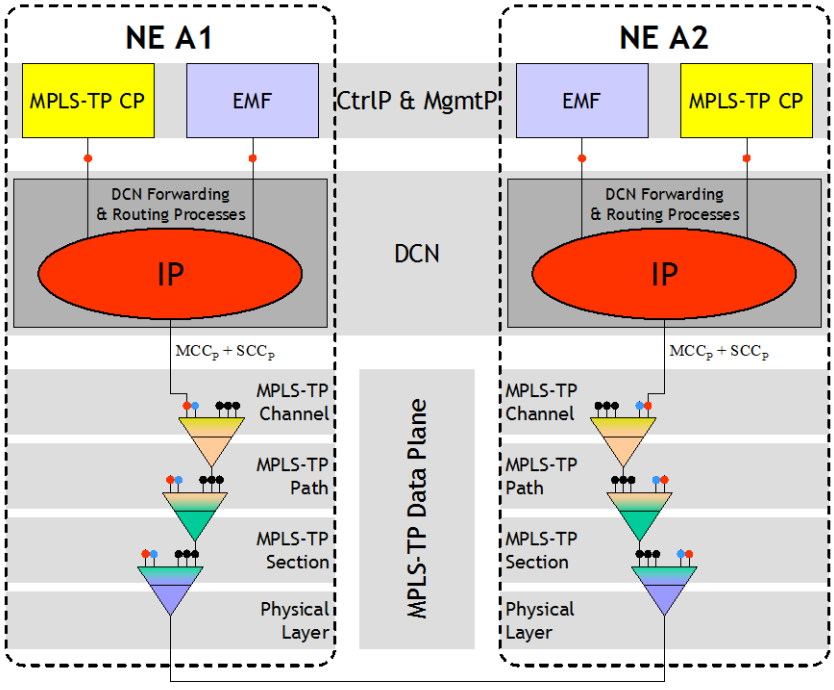

NE A1
NE A2
MPLS-TP CP
EMF
CtrlP & MgmtP
EMF
MPLS-TP CP
DCN Forwarding & Routing Processes
IP
DCN
DCN Forwarding & Routing Processes
IP
MCCp + SCCp
MCCp + SCCp
MPLS-TP Channel
MPLS-TP Path
MPLS-TP Section
Physical Layer
MPLS-TP Data Plane
MPLS-TP Channel
MPLS-TP Path
MPLS-TP Section
Physical Layer

Figure 6-3/G.8151/Y.1374 – MCC$_P$ Scenario Example 2

6.1.4.2 MCC physical characteristics

The ~~T~~MT.S-, ~~T~~MT.C- and ~~T~~MT.P-MCCs are logical elements within the ~~T-~~MPLS-TP Transport Module (~~T~~MTM-n). The MCC provides general management communications between two ~~T-~~MPLS-TP network elements with access to the ~~T~~MT.S, ~~T~~MT.P, and ~~T~~MT.C characteristic information respectively. The ~~T~~MT.S-, ~~T~~MT.P-, or ~~T~~MT.C-MCC is provided by the ~~T-~~MPLS-TP OAM function at section, path, or channel layer as ~~defined~~ described in [ITU-T G.7712/Y.1703~~G.8114/Y.1373~~] or by any other ECC of the ~~T-~~MPLS-TP transport network ~~that is under study for [ITU-T G.7712/Y.1703]~~.

The ~~T~~MT.S Management Communication Channel (MCC$_S$) shall operate as a single message channel between ~~T~~MT.S termination points. The bit rate of the MCC$_S$ shall be configurable. ~~Further details are under study for [ITU-T G.7712/Y.1703].~~

The ~~T~~MT.P Management Communication Channel (MCC$_P$) shall operate as a single message channel between any network elements that terminate the ~~T~~MT.P layer. The MCC$_P$ is transported transparently through ~~T~~MT.NEs that only terminate the ~~T~~MT.S layer and forward the ~~T~~MT.P signal. The bit rate of the MCC$_P$ shall be configurable~~. Further details are under study for [ITU-T G.7712/Y.1703]~~.

The ~~T~~MT.C Management Communication Channel (MCC$_C$) shall operate as a single message channel between any network elements that terminate the ~~T~~MT.C layer. The MCC$_C$ is transported transparently through ~~T~~MT.NEs that only terminate the ~~T~~MT.S layer or the ~~T~~MT.S and ~~T~~MT.P layers and forward the ~~T~~MT.C signal. The bit rate of the MCC$_C$ shall be configurable. ~~Further details are under study for [ITU-T G.7712/Y.1703]~~.

6.1.4.3 MCC data link layer protocol

The MCC data link protocols for management applications are under study for [ITU-T G.7712/Y.1703].

6.1.5 Management of DCN

See [ITU-T G.7710/Y.1701] section 6.1.5 for the generic requirements.

6.1.6 Remote log-in

See [ITU-T G.7710/Y.1701] section 6.1.6 for the generic requirements.

6.1.7 Relationship between technology domains

See [ITU-T G.7710/Y.1701] section 6.1.7 for the generic requirements.

6.2 ~~T-~~MPLS-TP equipment management architecture

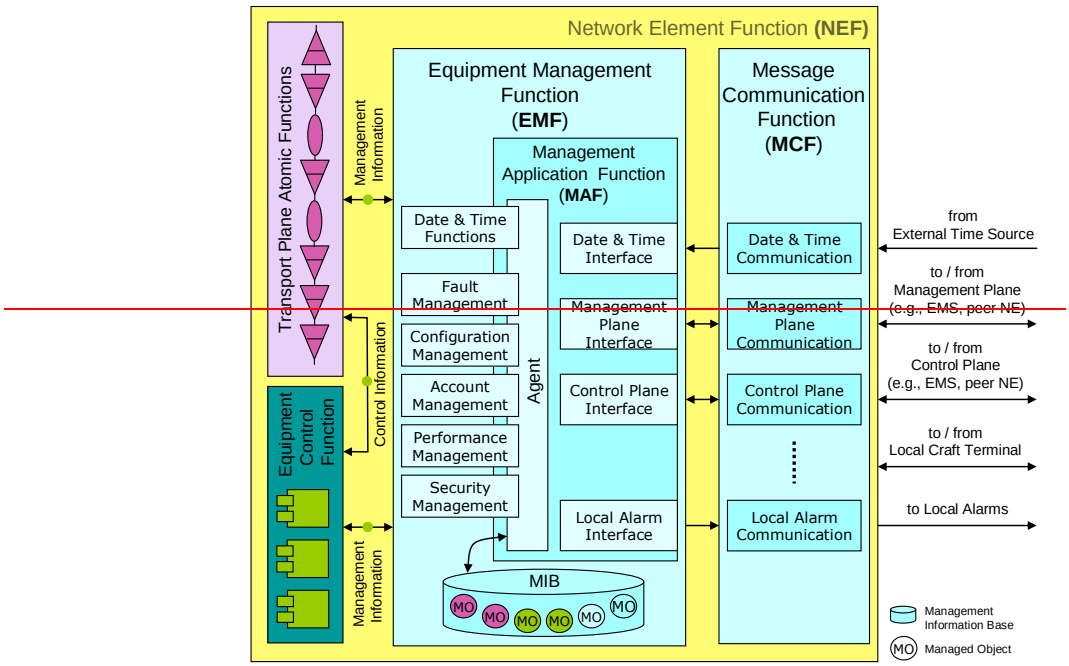
This section provides an overview of the minimum functions which are required to support inter-vendor/network communications and single-ended maintenance of ~~T~~MT.NEs within an MSN, or between communicating peer ~~T~~MT.NEs across a network interface. Single-ended maintenance is the ability to access remotely located ~~T~~MT.NEs to perform maintenance functions (see the Performance Management Applications, section 1~~1~~0.1 of [ITU-T G.7710/Y.1701]).

It should be noted that the management functions have been categorized according to the classifications given in [ITU-T X.700].

Detailed specifications of the management functions, in terms of managed objects classes, attributes and message specification, are for further study.

The ~~T~~ MPLS-TP Equipment Management Function (EMF) (see Figure 6-4) provides the means through which the ~~T~~ MPLS-TP Network Element Function (NEF) is managed by an internal or external manager. If a Network Element (NE) contains an internal manager, this manager will be part of the ~~T~~ MPLS-TP EMF.

The ~~T~~ MPLS-TP EMF interacts with the other atomic functions (refer to [ITU-T G.8121/Y.1741]) by exchanging information across the MP reference points. See [ITU-T G.806] and [ITU-T G.8121/Y.1741] for more information on Atomic Functions and on MPs. The ~~T~~ MPLS-TP EMF contains a number of functions that provide a data reduction mechanism on the information received across the MP reference points. The outputs of these functions are available to the agent via the network element resources and Management Application Functions (MAF) which represent this information as managed objects.



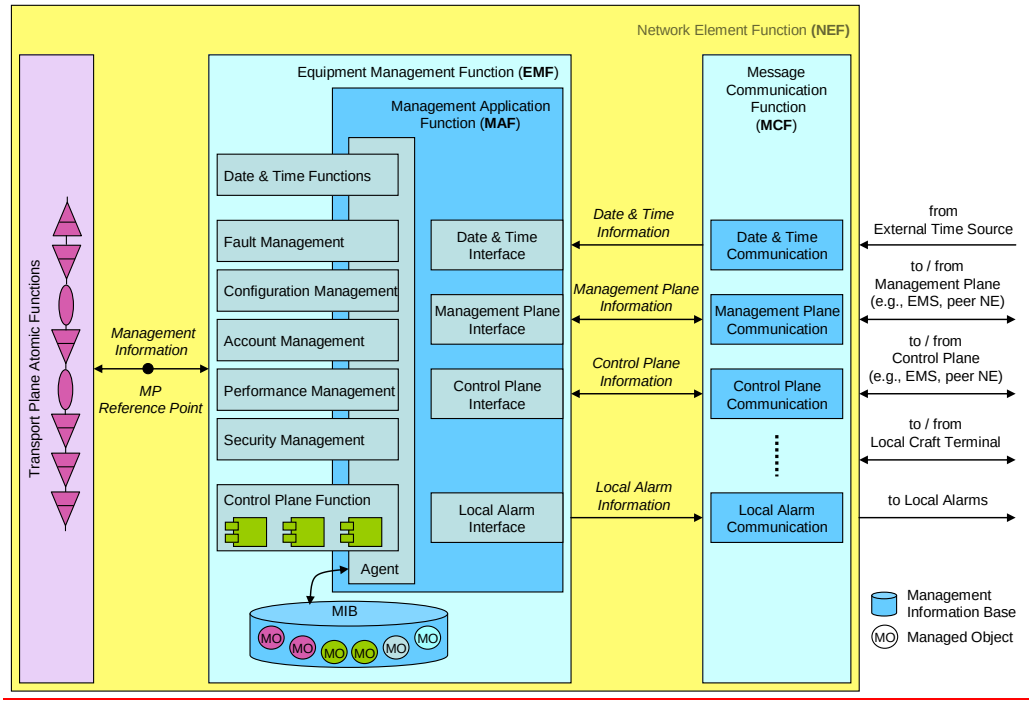


Figure 6.4/G.8151/Y.1374 – ~~T~~ MPLS-TP Equipment Management Function

Network element resources provide event processing and storage. The MAF processes the information provided to and by the NE resources. The agent converts this information to management messages and responds to management messages from the manager by performing the appropriate operations on the managed objects.

This information to and from the agent is passed across the V reference point to the Message Communication Function (MCF).

6.3 Information flows over Management Points (MP)

The information flows described in this clause are functional. The existence of these information flows in the equipment will depend on the functionality provided by the ~~T~~ MPLS-TP NE and the options selected.

The information flow over the MP reference points that arises from anomalies and defects detected in the atomic functions is described in specific details for each atomic function in [ITU-T G.8121/Y.1741].

The information flow over the MP reference points that arises from ~~configuration and~~ provisioning and reporting data is described in specific details for each atomic function in [ITU-T G.8121/Y.1741]. The information listed under the ~~Set~~ Input column refers to the ~~configuration and~~ provisioning data that is passed from the ~~T~~ MPLS-TP EMF to the atomic functions. The information listed under the ~~Get~~ Output column refers to the ~~status~~ reports passed to ~~made in response to a request from~~ the ~~T~~ MPLS-TP EMF ~~for such information~~from the atomic functions.

Formatted: Normal_after_title, Centered

7 Fault (maintenance) Management

Fault Management is a set of functions which enables the detection, isolation and correction of abnormal operation of the telecommunication network and its environment. It provides facilities for the performance of the maintenance phases from [ITU-T M.20]. The quality assurance measurements for fault management include component measurements for reliability, availability and survivability.

7.1 Fault Management Applications

See [ITU-T G.7710/Y.1701] for a description of the basic Fault Management applications.

7.1.1 Supervision

The supervision process describes the way in which the actual occurrence of a disturbance or fault is analyzed with the purpose of providing an appropriate indication of performance and/or detected fault condition to maintenance personnel. The supervision philosophy is based on the concepts underlying the functional model of [ITU-T G.805], [ITU-T G.8110.1/Y.1370.1], and the Alarm Reporting Function of [ITU-T X.733].

The five basic supervision categories are related to transmission, quality of service, processing, equipment, and environment. These supervision processes are able to declare fault causes, which need further validation before the appropriate alarm is reported. See [ITU-T G.7710/Y.1701] for additional discussion of these categories.

The ~~T~~MT.NE shall indicate to the OS when a Termination Point is no longer able to supervise the signal (e.g. implementing equipment has a fault or loss of power).

7.1.1.1 Transmission Supervision

See clause 7.1.1.1 of [ITU-T G.7710/Y.1701] for a description of transmission supervision.

For MT.NE, the following defects must be monitored for the purpose of transmission supervision.

– <To be provided per G.8121>

The atomic function associated failure conditions are listed in clause 7.2.1.

Formatted: Bullets and Numbering

Formatted: English (U.K.)

7.1.1.2 Quality of Service Supervision

See [ITU-T G.7710/Y.1701] for a description of quality of service supervision.

7.1.1.3 Processing Supervision

See [ITU-T G.7710/Y.1701] for a description of processing supervision.

7.1.1.4 Hardware Supervision

See [ITU-T G.7710/Y.1701] for a description of equipment supervision.

7.1.1.5 Environment Supervision

See [ITU-T G.7710/Y.1701] for a description of environmental supervision.

7.1.2 Validation

See [ITU-T G.7710/Y.1701] for a description of fault cause validation.

7.1.3 Alarm Handling

7.1.3.1 Severity Assignment

See [ITU-T G.7710/Y.1701] for a description of severity categories.

7.1.3.2 Alarm Reporting Control

Alarm Reporting Control (ARC) provides an automatic in-service provisioning capability.

The following ARC states may be specified for a managed entity:

ALM	ALarM reporting; Alarm reporting is turned on.
NALM	No ALarM reporting; Alarm reporting is turned off.
NALM-CD	No ALarM reporting, CountDown; This is a substate of NALM-QI and performs the persistence timing countdown function when the managed entity is qualified problem free.
NALM-NR	No ALarM reporting, NotReady; This is a substate of NALM-QI and performs a wait function until the managed entity is qualified problem free.
NALM-QI	No ALarM reporting, Qualified Inhibit; Alarm reporting is turned off until the managed entity is qualified problem free for a specified persistence interval.
NALM-TI	No ALarM reporting, Timed Inhibit; Alarm Reporting is turned off for a specified timed interval.

Alarm reporting may be turned off (using NALM, NALM-TI, or NALM-QI) on a per-managed entity basis to allow sufficient time for customer testing and other maintenance activities in an "alarm free" state. Once a managed entity is ready, alarm reporting is automatically turned on (to ALM). The managed entity may be automatically turned on either by using NALM-TI or NALM-QI and allowing the resource to transition out automatically, or by invoking first the NALM state from an EMS and when maintenance activity is done, invoking the ALM state. This later automation is carried out by the EMS. For further details relating to ARC, see [ITU-T M.3100].

7.1.3.3 Reportable Failures

See [ITU-T G.7710/Y.1701] for a description of reportable failures.

7.1.3.4 Alarm Reporting

Alarm surveillance is concerned with the detection and reporting of relevant events and conditions which occur in the network. In a network, events and conditions detected within the equipment and incoming signals should be reportable. In addition, a number of events external to the equipment should also be reportable. Alarms are indications that are automatically generated by an NE as a result of the declaration of a failure. The OS shall have the ability to define which events and conditions generate autonomous reports, and which shall be reported on request.

The following alarm-related functions shall be supported:

1. Autonomous reporting of alarms;
2. Request for reporting of all alarms;
3. Reporting of all alarms;
4. Allow or inhibit of autonomous alarm reporting;
5. Reporting on request status of allow or inhibit alarm reporting;

6. Reporting of protection switch events.

7.1.3.4.1 Local Reporting

See [ITU-T G.7710/Y.1701] for a description of local reporting.

7.1.3.4.2 TMN Reporting

See [ITU-T G.7710/Y.1701] for a description of TMN reporting.

7.2 Fault Management functions

Figure 7-1 contains the functional model of Fault Management inside the ~~T-~~MPLS-TP EMF. This model is consistent with the alarm flow functional model, specified in [ITU-T M.3100]. It must be noted that it does not address configuration aspects relating to Fault Management, the full ARC functional model, nor does it define where all possible event report parameters get assigned. Figure 7-1 is intended only to illustrate which well-known functions are impacted by ARC, and which are not, and to provide a generalized alarm flow view.

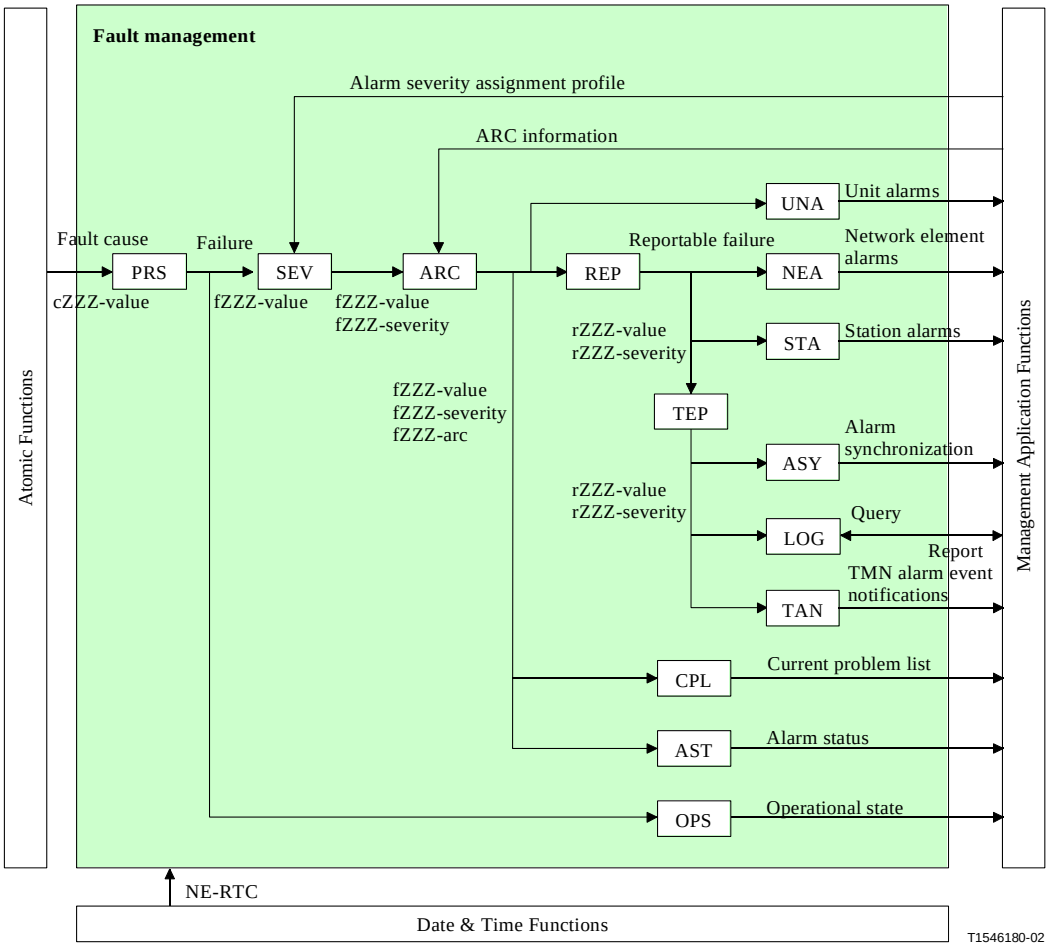


Figure 7-1/G.8151/Y.1374– Fault management within the ~~T-~~MPLS-TP NEF

7.2.1 Fault Cause Persistency function – PRS

The defect correlations provide a data reduction mechanism on the fault and performance monitoring primitives' information presented at the MP reference points.

The equipment management function within the network element performs a persistency check on the fault causes (that are reported across the MP reference points) before it declares a fault cause a failure. In addition to the transmission failures, hardware failures with signal transfer interruption are also reported at the input of the fault cause function for further processing. See Figure 7-2.

Symbol

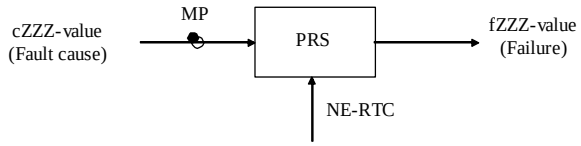


Figure 7-2/G.8151/Y.1374– Fault Cause Persistency function

Inputs and outputs

Table 7-1/G.8151/Y.1374– Inputs/outputs for the fault cause persistency function

~~Process~~ Atomic Function (G.8121)	Input	Output
~~T~~MT~~2~~_TT_Sk	cSSF cLCK cLOC[i] cMMG cUNL cUNM cUNP cUNPhb cDEG cRDI	fSSF fLCK fLOC[i] fMMG fUNL fUNM fUNP fUNPhb fDEG fRDI
Sn/~~T~~MT_A_Sk	cPLM cLFD cEXM cUPM	fPLM fLFD fEXM fUPM
Sn-X-L/~~T~~MT_A_Sk	cPLM cLFD cEXM cUPM	fPLM fLFD fEXM fUPM
Sm/~~T~~MT_A_Sk	cPLM cLFD cEXM cUPM	fPLM fLFD fEXM fUPM
Sm-X-L/~~T~~MT_A_Sk	cPLM cLFD cEXM cUPM	fPLM fLFD fEXM fUPM
Pq/~~T~~MT_A_Sk	cPLM cLFD cEXM cUPM	fPLM fLFD fEXM fUPM

Formatted Table

~~Process~~ Atomic Function (G.8121)	Input	Output
Pq-X-L/~~T~~MT_A_Sk	cPLM cLFD cEXM cUPM	fPLM fLFD fEXM fUPM
ODUkP/~~T~~MT_A_Sk	cPLM cLFD cEXM cUPM	fPLM fLFD fEXM fUPM
ODUkP-X-L/~~T~~MT_A_Sk	cVcPLM cLFD cEXM cUPM	fVcPLM fLFD fEXM fUPM

Formatted Table

See [ITU-T G.7710] for the mapping of failure (fXXX) to the generic probable cause to be used in alarm reporting.

Formatted: English (U.K.)

Process

The equipment management function within the network element performs a persistency check on the fault causes before it declares a fault cause a failure.

A transmission failure (fXXX) shall be declared if the fault cause persists continuously for 2.5 ± 0.5 s. The failure shall be cleared if the fault cause is absent continuously for 10 ± 0.5 s.

The specific set of failures associated with each atomic function is listed in Table 7-1.

The failure declaration and clearing shall be time stamped. The time-stamp shall indicate the time at which the fault cause is activated at the input of the fault cause persistency (i.e. defect-to-failure integration) function, and the time at which the fault cause is deactivated at the input of the fault cause persistency function.

7.2.2 Severity Assignment function – SEV

See [ITU-T G.7710/Y.1701] for a description of the severity assignment function.

7.2.3 Alarm Reporting Control function – ARC

The Alarm Report Control (ARC) function allows a Management System to control the alarm reporting on a managed entity basis as defined in [ITU-T M.3100].

The alarms that can be controlled with this function are defined for each atomic function in [ITU-T G.8121/Y.1741].

The following ARC states may be specified for a managed entity:

ALM ALarM reporting; Alarm reporting is turned on.

NALM No ALarM reporting; Alarm reporting is turned off.

NALM-CD No ALarM reporting, CountDown; This is a substate of NALM-QI and performs the persistence timing countdown function when the managed entity is qualified problem free.

NALM-NR No ALarM reporting, NotReady; This is a substate of NALM-QI and performs a wait function until the managed entity is qualified problem free.

NALM-QI No ALarM reporting, Qualified Inhibit; Alarm reporting is turned off until the managed entity is qualified problem free for a specified persistence interval.

NALM-TI No ALarM reporting, Timed Inhibit; Alarm Reporting is turned off for a specified timed interval.

The ALM state is required for all managed entities that can detect alarms.

In addition at least one of the states: NALM, NALM-TI, or NALM-QI must be supported.

If NALM-QI is supported, then NALM-NR is required and NALM-CD is optional.

Table 7-2/G.8151/Y.1374– ARC specifications for ~~T~~ MPLS-TP

Atomic Function	Qualified Problems	QoS Reporting	Default State Value
~~T~~MT~~2~~_TT_Sk	fSSF fLCK fLOC[i] fMMG fUNL fUNM fUNP fUNPhb fDEG fRDI~~FFS~~	FFS	~~FFS~~ALM
Sn/~~T~~MT_A_Sk	fPLM fLFD fEXM fUPM~~FFS~~	FFS	ALM~~FFS~~
Sn-X-L/~~T~~MT_A_Sk	fPLM fLFD fEXM fUPM~~FFS~~	FFS	ALM~~FFS~~
Sm/~~T~~MT_A_Sk	fPLM fLFD fEXM fUPM~~FFS~~	FFS	ALM~~FFS~~
Sm-X-L/~~T~~MT_A_Sk	fPLM fLFD fEXM fUPM~~FFS~~	FFS	ALM~~FFS~~
Pq/~~T~~MT_A_Sk	fPLM fLFD fEXM fUPM~~FFS~~	FFS	ALM~~FFS~~
Pq-X-L/~~T~~MT_A_Sk	fPLM fLFD fEXM	FFS	ALM~~FFS~~

Formatted Table

Formatted: English (U.S.), Not Highlight

Formatted: English (U.S.), Not Highlight

Formatted: English (U.S.), Not Highlight

Formatted: English (U.S.), Not Highlight

Formatted: Font: 11 pt, Not Highlight

Formatted: Font: 11 pt, Not Highlight

Atomic Function	Qualified Problems	QoS Reporting	Default State Value
	fUPM~~FFS~~		
ODUkP/~~T~~MT_A_Sk	fPLM fLFD fEXM fUPM~~FFS~~	FFS	ALM~~FFS~~
ODUkP-X-L/~~T~~MT_A_Sk	fVcPLM fLFD fEXM fUPM~~FFS~~	FFS	ALM~~FFS~~

Formatted Table

7.2.4 Reportable Failure function – REP

See [ITU-T G.7710/Y.1701] for a description of the reportable failure function.

7.2.5 Unit Alarms function – UNA

See [ITU-T G.7710/Y.1701] for a description of the unit alarms function.

7.2.6 Network Element Alarms function – NEA

See [ITU-T G.7710/Y.1701] for a description of the network element alarms function.

7.2.7 Station Alarms function – STA

See [ITU-T G.7710/Y.1701] for a description of the station alarms function.

7.2.8 TMN Event Pre-processing function – TEP

See [ITU-T G.7710/Y.1701] for a description of the TMN event pre-processing function.

7.2.9 Alarm Synchronization function – ASY

See [ITU-T G.7710/Y.1701] for a description of the alarm synchronization function.

7.2.10 Logging function – LOG

Alarm history management is concerned with the recording of alarms. Historical data shall be stored in registers in the NE. Each register contains all the parameters of an alarm message.

Registers shall be readable on demand or periodically. The OS can define the operating mode of the registers as wrapping or stop when full. The OS may also flush the registers or stop recording at any time.

NOTE – Wrapping is the deletion of the earliest record to allow a new record when a register is full. Flushing is the removal of all records in the register. See [ITU-T X.735] for additional details.

See [ITU-T G.7710/Y.1701] for a description of the logging function.

7.2.11 TMN Alarm Event Notification function – TAN

See [ITU-T G.7710/Y.1701] for a description of the TMN alarm event notification function.

7.2.12 Current Problem List function – CPL

See [ITU-T G.7710/Y.1701] for a description of the current problem list function

7.2.13 Alarm Status function – AST

See [ITU-T G.7710/Y.1701] for a description of the alarm status function

7.2.14 Operational State function – OPS

See [ITU-T G.7710/Y.1701] for a description of the operational state function.

The following table lists the failures that could influence the operational state of the related objects.

Table 7-3/G.8151/Y.1374– Operational State Function Input and Output Signals for MPLS-TP

Atomic Function	Failure input (fZZZ-value)	Operational State output (Enabled/Disabled)
MT_TT_Sk	fSSF fLCK fLOC[i] fMMG fUNL fUNM fUNP fUNPhb fDEG fRDI	Enabled Enabled Enabled Enabled Enabled Enabled Enabled Enabled Enabled Enabled
Sn/MT_A_Sk	fPLM fLFD fEXM fUPM	Enabled Enabled Enabled Enabled
Sn-X-L/MT_A_Sk	fPLM fLFD fEXM fUPM	Enabled Enabled Enabled Enabled
Sm/MT_A_Sk	fPLM fLFD fEXM fUPM	Enabled Enabled Enabled Enabled
Sm-X-L/MT_A_Sk	fPLM fLFD fEXM fUPM	Enabled Enabled Enabled Enabled
Pq/MT_A_Sk	fPLM fLFD fEXM fUPM	Enabled Enabled Enabled Enabled
Pq-X-L/MT_A_Sk	fPLM fLFD fEXM fUPM	Enabled Enabled Enabled Enabled
ODUkP/MT_A_Sk	fPLM fLFD fEXM fUPM	Enabled Enabled Enabled Enabled
ODUkP-X-L/MT_A_Sk	fVcPLM fLFD	Enabled Enabled

Formatted: Table_Head
Formatted Table
Formatted: Font: 11 pt
Formatted: Space Before: 0 pt, After: 0 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: English (U.S.), Not Highlight
Formatted: English (U.S.)

	fEXM fUPM	Enabled Enabled

7.2.15 External Events

For further study

8 Configuration management

See [ITU-T G.7710/Y.1701] for the generic requirements for configuration management. ~~T~~ MPLS-TP specific specifications, if needed, are explicitly described.

8.1 Hardware

See [ITU-T G.7710/Y.1701] for a description of hardware management.

8.2 Software

See [ITU-T G.7710/Y.1701] for a description of software management.

8.3 Protection Switching

See [ITU-T G.7710/Y.1701] for a description of the generic management requirements for protection switching. The MPLS-TP specific management requirements will be provided after the protection switching process is defined in G.8121.

~~For further study~~

8.4 Trail Termination

See [ITU-T G.7710/Y.1701] for a description of trail termination management.

This function allows a user to provision and monitor the operation of the ~~T~~ MPLS-TP Trail Termination process.

The MI signals listed in the following table are communicated between the EMF and the ~~T~~ MPLS-TP Trail Termination process across the management point within the ~~T~~MT.NE.

Table 8-1/G.8151/Y.1374 – Provisioning and reporting for termination functions

MI Signal	Value Range	Default Value
MT_TT_So Provisioning		
~~T~~MT~~2~~_TT_So_MI_C~~C~~V~~_~~Enable	true, false	false
MT_TT_So_MI_LM_Enable	true, false	false
~~T~~MT~~2~~_TT_So_MI_C~~C~~V~~_~~MEG_ID	13 byte string	~~–~~Note-2
~~T~~MT~~2~~_TT_So_MI_C~~C~~V~~_~~MEP_ID	13 bit string	Note-2~~–~~
~~T~~MT~~2~~_TT_So_MI_C~~C~~V~~_~~Priority~~HB~~	Note-1	Note-1
~~T~~MT~~2~~_TT_So_MI_C~~C~~V~~_~~Period	3.33 msec, 10 msec, 100 msec, 1sec, 10 sec, 1 min, 10 min	1sec
~~T~~MT~~2~~_TT_So_MI_TTLVALUE	0..255	255
MT_TT_So_MI_MEL	0..7	7

Formatted: English (U.S.)
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: English (U.S.), Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight

MI Signal	Value Range	Default Value
MT_TT_Sk Provisioning		
~~T~~MT~~2~~_TT_Sk_MI_CC~~V~~_MEG_ID	13 byte string	Note-2~~--~~
~~T~~MT~~2~~_TT_Sk_MI_CC~~V~~_PeerMEP_ID[]	List of 13 bit strings	Empty list
~~T~~MT~~2~~_TT_Sk_MI_CC~~V~~_Enable	true, false	false
~~T~~MT~~2~~_TT_Sk_MI_CC~~V~~_Period	3.33 msec, 10 msec, 100 msec, 1sec, 10 sec, 1 min, 10 min	1sec
~~T~~MT~~2~~_TT_Sk_MI_CC~~V~~_Priority~~HB~~	Note-1	Note-1
~~T~~MT~~2~~_TT_Sk_MI_LM_Enable	true, false	false
~~T~~MT~~2~~_TT_Sk_MI_Get_SvdCC~~V~~	--	--
~~T~~MT~~2~~_TT_Sk_MI_LM_DEGM	2-10; See Table 7-1/G.806	10
~~T~~MT~~2~~_TT_Sk_MI_LM_M	2-10	10
~~T~~MT~~2~~_TT_Sk_MI_LM_DEGTHR	0% .. 100%; See Table 7-1/G.806	30%
~~T~~MT~~2~~_TT_Sk_MI_1second	--	--
~~T~~MT~~2~~_TT_Sk_MI_SSF_Reported	true, false	false
~~T~~MT~~2~~_TT_Sk_MI_RDI_Reported	true, false	false
MT_TT_Sk_MI_MEL	0..7	7
MT_TT_Sk Reporting		
~~T~~MT~~2~~_TT_Sk_MI_SvdCC~~V~~	Last received CC~~V~~ frame(s) that caused defect	--

Note-1: According to [ITU-T G.8121/Y.1741].

Note-2: A value must be provided at provisioning.

The EMF shall support the following functions:

- Provisioning the trail termination management information
- Retrieving the trail termination management information
- Notifying the changes of the trail termination management information
- Receiving the monitored trail termination management information

8.5 Adaptation

See section 8.5 of [ITU-T G.7710/Y.1701] for a description of adaptation management.

An Access Point that has multiple adaptation functions connected to it, thereby allowing different clients to be transported via the server signal, requires a mechanism for the selection of the active client.

This function allows a user to provision and monitor the operation of the ~~T~~ MPLS-TP Adaptation processes.

The MI signals listed in the following table are communicated between the EMF and the Adaptation processes across the management point within the ~~T~~ MPLS-TP NE.

Formatted: English (U.S.)
Formatted: Not Highlight
Formatted: English (U.S.)
Formatted: Not Highlight
Formatted: English (U.S.), Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight
Formatted: Not Highlight

Table 8-2/G.8151/Y.1374 – Provisioning and reporting for adaptation functions

MI Signal	Value Range	Default Value
MT/MT_A_So Provisioning		
MT/MT_A_So_MI_Admin_State~~TMT/TMT_A_So_MI_SCCType (See Table 6-3 of G.7041)~~	LCK, Normal ~~0..255~~	Normal~~32~~
~~T~~MT/~~T~~MT_A_So_MI_Label [1…M]	16 to (2**20)-1	--Note-2
~~T~~MT/~~T~~MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1--
~~T~~MT/~~T~~MT_A_So_MI_PSC[1…M]	Note-1	Note-1
~~T~~MT/~~T~~MT_A_So_MI_PHB2EXPMapping[1…M]	Note-1	Note-1
~~T~~MT/~~T~~MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-2--
MT/MT_A_So_MI_Client_MEL[1…M]	0..7	7
MT/MT_A_So_MI_LCK_Period[1…M]	1 s, 1 min	1 s
MT/MT_A_So_MI_LCK_PSC[1…M]	0..7	7
MT/MT_A_Sk Provisioning		
MT/MT_A_Sk_MI_Admin_State~~TMT/TMT_A_Sk_MI_SCCType~~	LCK, Normal~~0..255~~	Normal~~32~~
~~T~~MT/~~T~~MT_A_Sk_MI_Label [1…M]	16 to (2**20)-1	Note-2--
~~T~~MT/~~T~~MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1--
~~T~~MT/~~T~~MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
~~T~~MT/~~T~~MT_A_Sk_MI_ EXP2PHBMapping[1…M]	Note-1	Note-1
~~T~~MT/~~T~~MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-2--
MT/MT_A_Sk_MI_Client_MEL[1...M]	0..7	7
MT/MT_A_Sk_MI_AIS_Period[1...M]	1 s, 1 min	1 s
MT/MT_A_Sk_MI_AIS_PSC[1...M]	0..7	7
MT/MT_A_Sk_MI_LCK_Period[1...M]	1 s, 1 min	1 s
MT/MT_A_Sk_MI_LCK_PSC[1...M]	0..7	7
MT/ETH_A_So Provisioning		
MT/ETH_A_So_MI_Admin_State	LCK, Normal	Normal
~~T~~MT/ETH_A_So_MI_FCSEnable	true, false	true
~~T~~MT/ETH_A_So_MI_~~CIIEnable~~CWEnable	true, false	~~false~~true
~~T~~MT/ETH_A_So_MI_SQUse	true, false	false
~~T~~MT/ETH_A_So_MI_PRI2PSCMapping	Note-1	Note-1
MT/ETH_A_So_MI_MEP_MAC	6 byte Unicast MAC address	--
MT/ETH_A_So_MI_Client_MEL	0..7	7
MT/ETH_A_So_MI_LCK_Period	1 s, 1 min	1 s
MT/ETH_A_So_MI_LCK_Pri	0..7	7
MT/ETH_A_So_MI_MEL	0..7	7
MT/ETH_A_Sk Provisioning		
~~T~~MT/ETH_A_Sk_MI_FCSEnable	true, false	true
~~T~~MT/ETH_A_Sk_MI_CIIEnable	true, false	false

Formatted: English (U.S.)
Formatted Table
Formatted Table
Formatted: English (U.S.)
Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted: Highlight
Formatted: Highlight
Formatted: English (U.S.)
Formatted: English (U.S.)
Formatted: English (U.S.)
Formatted: English (U.S.)
Formatted Table
Formatted Table

MI Signal	Value Range	Default Value
~~T~~MT/ETH_A_Sk_MI_SQCheck	true, false	false
~~T~~MT/ETH_A_Sk_MI_QoSTransitMode	X (DiffSer enabled), Y (DiffSer disabled)	–Y
~~T~~MT/ETH_A_Sk_MI_PSC2PRIMapping	Note-1	Note-1
Sn/MT_A_So Provisioning		
Sn/~~T~~MT_A_So_MI_SCCType	0..255	32
Sn/~~T~~MT_A_So_MI_Label[1…M]	16 to (2**20)-1	Note-2–
Sn/~~T~~MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1–
Sn/~~T~~MT_A_So_MI_PSC[1…M]	Note-1	Note-1
Sn/~~T~~MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
Sn/~~T~~MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1–
Sn/MT_A_Sk Provisioning		
Sn/~~T~~MT_A_Sk_MI_SCCType	0..255	32
Sn/~~T~~MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1	–Note-2
Sn/~~T~~MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	–Note-1
Sn/~~T~~MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
Sn/~~T~~MT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
Sn/~~T~~MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1–
Sn/MT_A_Sk Reporting		
Sn/~~T~~MT_A_Sk_MI_AcSL (see Table 9-11 of G.707)	0..255	--
Sn/~~T~~MT_A_Sk_MI_AcEXI (see Table 6-2 of G.7041)	0..15	--
Sn/~~T~~MT_A_Sk_MI_LastValidUPI (see Table 6-3 of G.7041)	0..255	--
Sn-X-L/MT_A_So Provisioning		
Sn-X-L/~~T~~MT_A_So_MI_SCCType (See Table 6-3 of G.7041)	0..255	32
Sn-X-L/~~T~~MT_A_So_MI_Label[1…M]	16 to (2**20)-1	Note-2–
Sn-X-L/~~T~~MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1–
Sn-X-L/~~T~~MT_A_So_MI_PSC[1…M]	Note-1	Note-1
Sn-X-L/~~T~~MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
Sn-X-L/~~T~~MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1–
Sn-X-L/MT_A_Sk Provisioning		
Sn-X-L/~~T~~MT_A_Sk_MI_SCCType (See Table 6-3 of G.7041)	0..255	32
Sn-X-L/~~T~~MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1	Note-2–
Sn-X-L/~~T~~MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1–
Sn-X-L/~~T~~MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
Sn-X-L/~~T~~MT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
Sn-X-L/~~T~~MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1–
Sn-X-L/MT_A_Sk Reporting		

Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted Table
Formatted Table
Formatted Table

MI Signal	Value Range	Default Value
Sn-X-L/~~T~~MT_A_Sk_MI_AcSL (see Table 9-11 of G.707)	0..255	--
Sn-X-L/~~T~~MT_A_Sk_MI_AcEXI (see Table 6-2 of G.7041)	0..15	--
Sn-X-L/~~T~~MT_A_Sk_MI_LastValidUPI (see Table 6-3 of G.7041)	0..255	--
Sm/MT_A_So Provisioning		
Sm/~~T~~MT_A_So_MI_SCCType	0..255	32
Sm/~~T~~MT_A_So_MI_Label[1…M]	16 to (2**20)-1	Note-2–
Sm/~~T~~MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1–
Sm/~~T~~MT_A_So_MI_PSC[1…M]	Note-1	Note-1
Sm/~~T~~MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
Sm/~~T~~MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1–
Sm/MT_A_Sk Provisioning		
Sm/~~T~~MT_A_Sk_MI_SCCType	0..255	32
Sm/~~T~~MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1	Note-2–
Sm/~~T~~MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1–
Sm/~~T~~MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
Sm/~~T~~MT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
Sm/~~T~~MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1–
Sm/MT_A_Sk Reporting		
Sm/~~T~~MT_A_Sk_MI_AcSL (see Table 9-12 and Table 9-13 of G.707)	0..255	--
Sm/~~T~~MT_A_Sk_MI_AcEXI (see Table 6-2 of G.7041)	0..15	--
Sm/~~T~~MT_A_Sk_MI_LastValidUPI (see Table 6-3 of G.7041)	0..255	--
Sm-X-L/MT_A_So Provisioning		
Sm-X-L/~~T~~MT_A_So_MI_SCCType	0..255	32
Sm-X-L/~~T~~MT_A_So_MI_Label[1…M]	16 to (2**20)-1	Note-2–
Sm-X-L/~~T~~MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1–
Sm-X-L/~~T~~MT_A_So_MI_PSC[1…M]	Note-1	Note-1
Sm-X-L/~~T~~MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
Sm-X-L/~~T~~MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1–
Sm-X-L/MT_A_Sk Provisioning		
Sm-X-L/~~T~~MT_A_Sk_MI_SCCType	0..255	32
Sm-X-L/~~T~~MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1	Note-2–
Sm-X-L/~~T~~MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1–
Sm-X-L/~~T~~MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
Sm-X-L/~~T~~MT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
Sm-X-L/~~T~~MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1–

Formatted: English (U.S.)
Formatted Table
Formatted Table
Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted Table
Formatted: English (U.S.)
Formatted Table

MI Signal	Value Range	Default Value
Sm-X-L/MT_A_Sk Reporting		
Sm-X-L/MT_A_Sk_MI_AcSL	0..255	--
Sm-X-L/MT_A_Sk_MI_AcEXI	0..15	--
Sm-X-L/MT_A_Sk_MI_LastValidUPI	0..255	--
Pq/MT_A_So Provisioning		
Pq/MT_A_So_MI_SCCType	0..255	32
Pq/MT_A_So_MI_Label[1…M]	16 to (2**20)-1	Note-2
Pq/MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1
Pq/MT_A_So_MI_PSC[1…M]	Note-1	Note-1
Pq/MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
Pq/MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1
Pq/MT_A_Sk Provisioning		
Pq/MT_A_Sk_MI_SCCType	0..255~~A, B~~	32
Pq/MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1~~A, B~~	Note-2
Pq/MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP~~A, B~~	Note-1
Pq/MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
Pq/MT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
Pq/MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1
Pq/MT_A_Sk Reporting		
Pq/MT_A_Sk_MI_AcSL (see Clause 2.1.2 of G.832)	0..7	--
Pq/MT_A_Sk_MI_AcEXI (see Table 6-2 of G.7041)	0..15	--
Pq/MT_A_Sk_MI_LastValidUPI (see Table 6-3 of G.7041)	0..255	--
Pq-X-L/MT_A_So Provisioning		
Pq-X-L/MT_A_So_MI_SCCType	0..255	32
Pq-X-L/MT_A_So_MI_Label[1…M]	16 to (2**20)-1	Note-2
Pq-X-L/MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1
Pq-X-L/MT_A_So_MI_PSC[1…M]	Note-1	Note-1
Pq-X-L/MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
Pq-X-L/MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1
Pq-X-L/MT_A_Sk Provisioning		
Pq-X-L/MT_A_Sk_MI_SCCType	0..255	32
Pq-X-L/MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1	Note-2
Pq-X-L/MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	Note-1
Pq-X-L/MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
Pq-X-L/MT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
Pq-X-L/MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1
Pq-X-L/MT_A_Sk Reporting		
Pq-X-L/MT_A_Sk_MI_AcSL	0..7	--

Formatted: English (U.S.)
Formatted Table

MI Signal	Value Range	Default Value
Pq-X-L/~~T~~MT_A_Sk_MI_AcEXI	0..15	--
Pq-X-L/~~T~~MT_A_Sk_MI_LastValidUPI	0..255	--
ODUkP/MT_A_So Provisioning		
ODUkP/~~T~~MT_A_So_MI_Active	true, false	false
ODUkP/~~T~~MT_A_So_MI_SCCType	0..255	32
ODUkP/~~T~~MT_A_So_MI_Label[1…M]	16 to (2**20)-1	–Note-2
ODUkP/~~T~~MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	–Note-1
ODUkP/~~T~~MT_A_So_MI_PSC[1…M]	Note-1	Note-1
ODUkP/~~T~~MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
ODUkP/~~T~~MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1–
ODUkP/MT_A_Sk Provisioning		
ODUkP/~~T~~MT_A_Sk_MI_Active	true, false	false
ODUkP/~~T~~MT_A_Sk_MI_SCCType	0..255	32
ODUkP/~~T~~MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1	–Note-2
ODUkP/~~T~~MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	–Note-1
ODUkP/~~T~~MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1
ODUkP/~~T~~MT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
ODUkP/~~T~~MT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1–
ODUkP/MT_A_Sk Reporting		
ODUkP/~~T~~MT_A_Sk_MI_AcPT (see Table 15-8 of G.709)	0..255	--
ODUkP/~~T~~MT_A_Sk_MI_AcEXI (see Table 6-2 of G.7041)	0..15	--
ODUkP/~~T~~MT_A_Sk_MI_LastValidUPI (see Table 6-3 of G.7041)	0..255	--
ODUkP-X-L/MT_A_So Provisioning		
ODUkP-X-L/~~T~~MT_A_So_MI_Active	true, false	false
ODUkP-X-L/~~T~~MT_A_So_MI_SCCType	0..255	32
ODUkP-X-L/~~T~~MT_A_So_MI_Label[1…M]	16 to (2**20)-1	–Note-2
ODUkP-X-L/~~T~~MT_A_So_MI_LSPType[1…M]	E-LSP, L-LSP	–Note-1
ODUkP-X-L/~~T~~MT_A_So_MI_PSC[1…M]	Note-1	Note-1
ODUkP-X-L/~~T~~MT_A_So_PHB2EXPMapping[1…M]	Note-1	Note-1
ODUkP-X-L/~~T~~MT_A_So_MI_QoSEncodingMode[1…M]	A, B	Note-1–
ODUkP-X-L/MT_A_Sk Provisioning		
ODUkP-X-L/~~T~~MT_A_Sk_MI_Active	true, false	false
ODUkP-X-L/~~T~~MT_A_Sk_MI_SCCType	0..255	32
ODUkP-X-L/~~T~~MT_A_Sk_MI_Label[1…M]	16 to (2**20)-1	–Note-2
ODUkP-X-L/~~T~~MT_A_Sk_MI_LSPType[1…M]	E-LSP, L-LSP	–Note-1
ODUkP-X-L/~~T~~MT_A_Sk_MI_PSC[1…M]	Note-1	Note-1

Formatted: English (U.S.)
Formatted Table
Formatted Table
Formatted Table
Formatted Table
Formatted Table
Formatted Table

MI Signal	Value Range	Default Value
ODUkP-X-L/TMT_A_Sk_MI_EXP2PHBMapping[1…M]	Note-1	Note-1
ODUkP-X-L/TMT_A_Sk_MI_QoSDecodingMode[1…M]	A, B	Note-1–
ODUkP-X-L/MT_A_Sk Reporting		
ODUkP-X-L/TMT_A_Sk_MI_AcVcPT (see Table 15-8 of G.709)	0..255	--
ODUkP-X-L/TMT_A_Sk_MI_AcEXI (see Table 6-2 of G.7041)	0..15	--
ODUkP-X-L/TMT_A_Sk_MI_LastValidUPI (see Table 6-3 of G.7041)	0..255	--

Note-1: According to [ITU-T G.8121/Y.1741]

Note-2: A value must be provided at provisioning.

The EMF shall support the following functions:

- Provisioning the flow forwarding management information
- Retrieving the flow forwarding management information
- Notifying the changes of the flow forwarding management information

8.6 Connection

See section 8.6 of [ITU-T G.7710/Y.1701] for a description of connection management.

This function allows a user to provision the operation of a T-MPLS-TP Connection process.

The MI signals listed in the following table are communicated from the EMF to the Connection process through the management point.

Table 8-3/G.8151/Y.1374 – Provisioning and reporting for connection functions

MI Signal	Value Range	Default Value
MT_C Provisioning (Per matrix connection)		
TMT_C_MI_ConnectionType	Protected, unprotected	–unprotected
TMT_C_MI_Return_CP_ID	NULL (for unidirectional), or the Connection point (CP) identifier (for bidirectional)	--
TMT_C_MI_ConnectionPortIds	Set of connection point identifiers	--

Note-1: According to [ITU-T G.8121/Y.1741]

The EMF shall support the following functions:

- Provisioning of the connection management information
- Retrieving the connection management information
- Notifying the changes of the connection management information

Formatted: English (U.S.)
Formatted Table
Formatted Table
Formatted: Not Highlight
Formatted: Not Highlight

8.7 DEG Thresholds

For further study

8.8 XXX_Reported

See section 8.8 of [ITU-T G.7710/Y.1701] for a description of XXX_Reported management.

Table 9-4 below provides the MI signals that need to be provisioned for consequential defect/failure.

Table 8-4/G.8151/Y.1374– Consequential defect/failure related provisioning

MI signal	Value range	Default value
MI_SSF_Reported	true, false	false
MI_BDI_Reported	true, false	false

Formatted: English (U.S.)

8.9 Alarm Severity

See section 8.9 of [ITU-T G.7710/Y.1701] for a description of alarm severity.

8.10 Alarm Reporting Control (ARC)

See section 8.10 of [ITU-T G.7710/Y.1701] for a description of alarm report control.

8.11 PM Thresholds

For further study

8.12 TCM Activation

For further study

8.13 Date & Time

The Date and Time Functions within the ~~T~~ MPLS-TP EMF comprise the local Real Time Clock (RTC) function and the Performance Monitoring Clock (PMC) function. The Message Communication Function within the ~~T~~ MPLS-TP NEF shall be capable of setting the local Real Time Clock function.

The date and time values are incremented by a free running local clock, or by an external timing source. The FCAPS functions need date and time information, e.g. to time stamp event reports. They obtain this information from the Date & Time Function.

8.13.1 Date & Time Applications

Section 8.13.1 of [ITU-T G.7710/Y.1701] identifies three Date & Time applications. These are:

– Time stamping

– Performance Monitoring Clock signals

– Activity scheduling

The ~~T~~ MPLS-TP NEF functional requirements for these applications are specified in the following subsections.

8.13.1.1 Time-stamping

See section 8.13.1.1 of [ITU-T G.7710/Y.1701] for a description of the time-stamping application.

8.13.1.2 Performance Monitoring Clock Signals

See section 8.13.1.2 of [ITU-T G.7710/Y.1701] for a description of the PMC signals.

8.13.1.3 Activity Scheduling

See section 8.13.1.3 of [ITU-T G.7710/Y.1701] for a description of the activity scheduling.

8.13.2 Date & Time Functions

There are three Date & Time functions defined. The local Real Time Clock (RTC) function is required for time stamping and activity scheduling. The Local Real Time Clock alignment function is required for aligning the clock with an External Time Reference. The Performance Monitoring Clock (PMC) function, in addition to RTC, is typical for digital counter measurements.

8.13.2.1 Local Real Time Clock Function

The local Real Time Clock function is specified in section 8.13.2.1 of [ITU-T G.7710/Y.1701].

8.13.2.2 Local Real Time Clock alignment function with External Time Reference

The Local Real Time Clock alignment function with External Time Reference is specified in section 8.13.2.2 of [ITU-T G.7710/Y.1701].

8.13.2.3 Performance Monitoring Clock Function

The Performance Monitoring Clock function is specified in section 8.13.2.3 of [ITU-T G.7710/Y.1701].

9 Accounting Management

For further study

10 Performance Management

See [ITU-T G.7710/Y.1701] Clause 10 for the generic requirements for performance management. ~~T~~ MPLS-TP specific management requirements are described below.

10.1 Performance management applications

See [ITU-T G.7710/Y.1701] Clause 10.1 for the generic description for performance management applications.

10.2 Performance monitoring functions

See [ITU-T G.7710/Y.1701] Clause 10.2 for generic requirements of performance monitoring functions.

The following are ~~Eo~~MT specific performance management requirements

1. <To be provided>

~~T~~ MPLS-TP NE provides the following PM management information (see Table 10-1).

Formatted: English (U.K.)

Table 10-1/G.8151/Y.1374 – PM Management Information

PM Management Information	G.8121 Function
~~T~~MT~~2~~_TT_Sk_MI_pN_LF~~L~~ ~~T~~MT~~2~~_TT_Sk_MI_pN_TF ~~T~~MT~~2~~_TT_Sk_MI_pF_LF~~L~~ ~~T~~MT~~2~~_TT_Sk_MI_pF_TF ~~T~~MT~~2~~_TT_Sk_MI_pF_DS ~~T~~MT~~2~~_TT_Sk_MI_pN_DS	~~T~~MT~~2~~_TT_Sk

The EMF shall support the following functions:

– Notifying of the PM management information

11 Security management

See [ITU-T G.7710/Y.1701] for a description of security management.

Formatted: English (U.S.)

Formatted: English (U.S.)