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Umbrella Information Model (UIM)
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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

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- x the first digit:
  - 1 presented to TSG for information;
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  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

As a result of the analysis of the requirements for the harmonization of the 3GPP and TM Forum Information Models in the context of FMC basic use cases were developed [6], [14]. These use cases led to the recognition that it would be necessary to define common model elements applicable for wire-line and wireless networks. This document defines these common model elements.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] ATM Forum, Technical Committee, Network Management, M4 Network View CMIP MIB Specification, "CMIP Specification for the M4 Interface", Sep, 1995.

[2] 3GPP TS 28,652: "Evolved Universal Terrestrial Radio Access (E-UTRAN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS) ".

[3] Void

[4] Void

[5] 3GPP TS 32.622: "Generic network resources IRP: NRM".

[6] 3GPP TR 32.833: "Study on Management of Converged Networks"

[7] TM Forum GB922,"Information Framework (SID) Suite, Release 9.5"http://www.tmforum.org/DocumentsInformation/GB922InformationFramework/45189/article.html.

[8] TM Forum MTOSI 2.1:(http://www.tmforum.org/MTOSIRelease21/11998/home.html).

[9] Void.

[10] Void.

[11] TM Forum "SD1-18_layers.pdf" (part of [8]) (Especially "4.2.7 ATM and SDH capable STM-4").

[12] Void.

[13] Void.

[14] TM Forum TR 166 "Information Model Federation Concepts and Principles" (http://collab.tmforum.org/sf/go/doc13634?nav=1).

[15] Void.

[16] TM Forum MTOSI "SD1-25_objectNaming.pdf" .

[17] ITU-T X.200 (07/1994) "Information technology – Open Systems Interconnection – Basic Reference Model: The basic model".

[18] 3GPP TS 21.905: "Vocabulary for 3GPP Specifications".

[19] ITU-T G,805:"TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS Digital networks – General aspects: Generic functional architecture of transport networks".

[20] 3GPP TS 28.622 "Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this document, the following definitions, symbols and abbreviations apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [18] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [18].

CP	Connection Point
DM	Domain Manager
DN	Distinguished Name
EM	Element Manager
FNIM	Federated Network Information Model
FMC	Fixed Mobile Convergence
IOC	Information Managed Object
LR	Layer Rate
LT	Layer Termination
MTNM	Multi Technology Network Management (TM Forum)
MTOSI	Multi Technology Operations System Interface (TM Forum)
NRM	Network Resource Model (3GPP)
SDO	Standards Development Organization
SID	Shared Information & Data Model (TM Forum)
SLF	Subscription Location Function (3GPP)
TPE	Termination Point Encapsulation
UIM	Umbrella Information Model
VCAT	Virtual Concatenation

4 UIM – Partition operational

4.1 Introduction

This section introduces a number of classes that form the UIM. These classes are represented in UML and are implementation neutral views in that they only capture the semantics of the model from both a purpose neutral and purpose specific perspective. They do not:

a) Include syntax or representation of the information in a system or on-the-wire between systems;

b) Relate to the protocol used to create/delete/read/write/modify the NM information.

Various SDOs and organizations are expected to use the UIM classes for definition of Domain/Technology-specific model classes. This procedure will maximize the probability of the domain/technology specific concrete classes (from various SDOs) being semantically consistent, a necessary characteristic for FMC NM purposes.

The Generic NRM IRP [20] defines abstract classes and other NRM IRPs such as E-UTRAN NRM IRP [2] define concrete classes. The Generic NRM IRP abstract classes are harmonized (if not identical) to those definedin this document.

The UIM defined in this document provides the set of classes etc. that strengthen consistency of representation in the fixed and mobile environments. For management of an FNIM solution many other classes will be required in addition to those in the UIM.

The UIM cannot be used directly for implementation. Implementation classes must be derived from those in the UIM by Inheritance or some other appropriate mechanism.

Implementation classes derived from those in the UIM (e.g. for the fixed environment) must use different names from those used in the UIM.

Where an implementation class is essentially identical to that in UIM the name of the implementation class should be the same as that of the UIM minus the underscore, e.g. the UIM class "*Function_*" would become "Function".

4.2 Class diagram

The criteria for choosing these classes is their relevance to (e.g. can be used by) Domain/Technology-specific model classes (e.g. 3GPP network resource model [2], ATM network management model [1], TMF MTNM[8].

Note that this set of classes is basic in that their definitions and usage are necessary for the harmonization of various Domain/Technology-specific model classes, forming the so-called FNIM.

These classes are *abstract*. Other classes are for further study.

- *Domain_* (similar to SubNetwork of 3GPP [20] and MultiLayerSubNetwork of SID/MTOSI [7])
- *Function_* (similar to ManagedFunction of 3GPP [20] and LogicalResource of SID/MTOSI [7])
- *LayerTermination_* (similar to a single layer in the layerParameterList_T structure of SID/MTOSI [7])
- *ManagedElement_* (similar to ManagedElement of 3GPP [20] and SID/MTOSI [7])
- *ManagementSystem_* (similar to ManagementNode of 3GPP [20] and OperationsSystem of SID/MTOSI [7])
- *TerminationPointEncapsulation_* (similar to TerminationPoint of SID/MTOSI [7])
- *Top_* (similar to *Top* [20] of 3GPP and RootEntity of SID/MTOSI [7])
- *TopologicalLink_* (similar to Link [20] of 3GPP and TopologicalLink of SID/MTOSI [7])

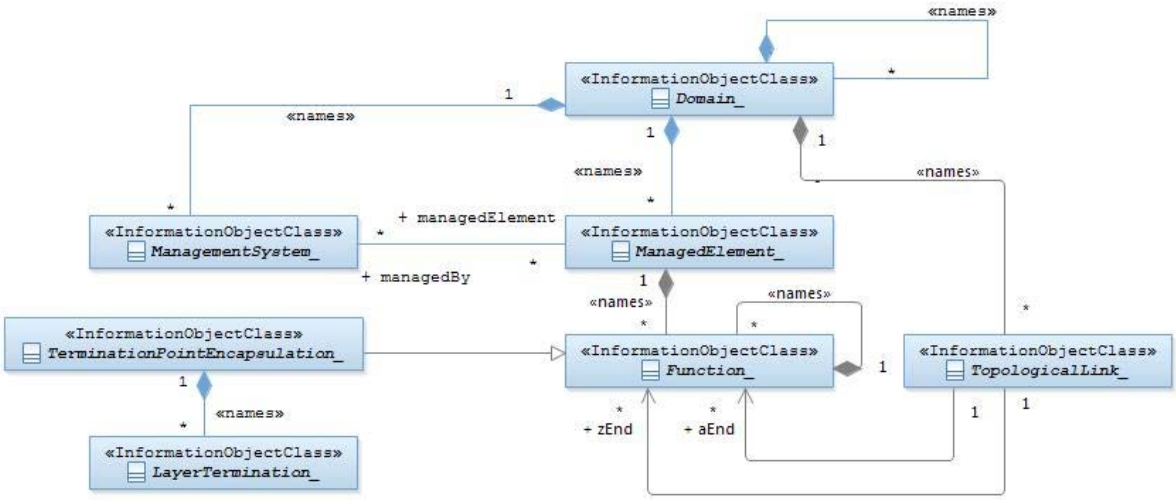

Figure 1: Class diagram

Note: The above class diagram shows the naming and as well as inheritance relations.

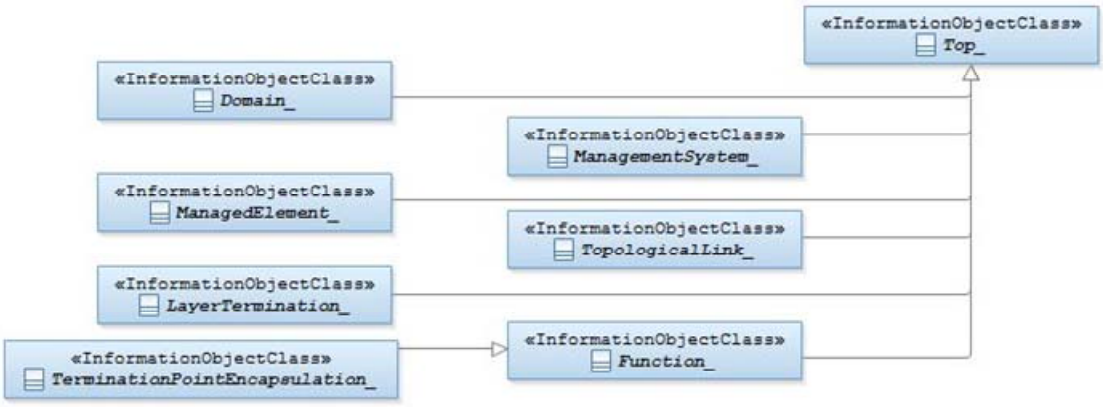

Figure 2: Inheritance class diagram

4.3 Class definitions

4.3.1 *Domain_*

4.3.1.1 Definition

This class groups managed entities:

- Such that the group represents a topological structure which describes the potential for connectivity;
- Subject to common administration;
- With common characteristics.

A domain is a partition of instances of managed entities.

4.3.1.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
dnPrefix	M	M	-	-	M
		T	F	F	T
userLabel	M	M	M	-	M
		T	T	F	T
userDefinedNetworkType	M	M	M	-	M
		T	T	F	T

4.3.2 *ManagedElement_*

4.3.2.1 Definition

This (and its contained *Function_*(s)) represents telecommunications resources (e.g. equipment) within the telecommunications network. This group performs Managed Element (ME) functions, e.g., provides support and/or service to the subscriber.

This can also provide access to a grouping of equipments for management purposes.

An ME communicates with a manager (directly or indirectly) for the purpose of being monitored and/or controlled. MEs may or may not additionally perform element management functionality.

An ME (and its contained *Function_*(s)) may or may not be geographically distributed. An ME (and its contained *Function_*(s)) is often referred to as a "Network Element".

4.3.2.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
dnPrefix	M	M	-	-	M
		T	F	F	T
managedElementTypeList	O	M	-	-	M
		T	F	F	T
userLabel	M	M	M	-	M
		T	T	F	T
locationName	M	M	-	-	M
		T	F	F	T
Attribute related to role					
managedBy	O	M	-	-	M
		T	F	F	T

4.3.3 *Function_*

4.3.3.1 Definition

This represents a process, task, transformation or a relation between inputs and outputs.

4.3.3.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
userLabel	O	M	M	-	M
		T	T	F	T

4.3.4 *ManagementSystem_*

4.3.4.1 Definition

This represents a telecommunications management system (DM/EM) that contains functionality for managing a number of MEs. The management system communicates with the MEs directly or indirectly over one or more interfaces for the purpose of monitoring and/or controlling these MEs.

This class has similar characteristics as the *ManagedElement_*. The main difference between these two classes is that the *ManagementSystem_* has a special association to the MEs that it is responsible for managing.

4.3.4.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
userLabel	M	M	M	-	M
		T	T	F	T
Attribute related to role					
managedElements	O	M	-	-	M
		T	F	F	T

4.3.5 *TopologicalLink_*

4.3.5.1 Definition

The *TopologicalLink_* represents a communication relationship between network entities and indicates that information is intended to flow between those network entities. The *TopologicalLink_* always represents a logical relationship.

4.3.5.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
userLabel	M	M	M	-	M
		T	T	F	T
layerProtocolNameList	O	M	-	-	M
		T	F	F	T
Attribute related to role					
aEnd	M	M	-	-	M
		T	F	F	T
zEnd	M	M	-	-	M
		T	F	F	T

4.3.6 *TerminationPointEncapsulation_*

4.3.6.1 Definition

The *TerminationPointEncapsulation_* (TPE) represents one or more functions that terminate/originate a signal that adapt a signal for use, and that enable a signal to propagate. Hence a TPE can represent the end point of a signal flow (see Annex C (informative): Rationale and Usage of TPE/LT for information on structure).

The TPE can also represent the intermediate point of a signal flow. See Annex C (informative): Rationale and Usage of TPE/LT for information on TPE structure.

A TPE is capable of encapsulating multiple transport functions (G.805 termination functions, adapters, points etc.) at many different layers where the encapsulated transport functions are all related to the same signal flow. There are specific rules that guide encapsulation (see Annex C (informative): Rationale and Usage of TPE/LT for information on usage). The encapsulated layers may be exposed (of its details of the transport assembly) via usage of instances of *LayerTermination_* (LT).

The TPE deals equivalently with unidirectional and bidirectional flows.

4.3.6.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
tpeType	CM	M	-	-	M
		T	F	F	T

4.3.6.3 Attribute constraints

Name	Definition
tpeType Support Qualifier	The condition is "The subject class instance name-contains one or more *LayerTermination_* instances ".

4.3.7 *LayerTermination_*

4.3.7.1 Definition

The *LayerTermination_* (LT) encapsulates the functions and points associated with one instance of a layer [17]. The functions include the adapter functions, the termination functions and the connection points of that layer. In this case the term layer is essentially synonymous with the term protocol as use by other standards. All functions encapsulated have the same signal granularity, closely associated characteristic type and essential rate. A specific *LayerTermination* may be equipped with a subset of capabilities. Where the TPE is semi-transparent the layers encapsulated by a TPE are exposed by the *LayerTermination_* set that it contains.

The *LayerTermination_* provides the relevant layer parameters for the semi-transparent TPE cases.

The *LayerTermination_* allows for detailed layer description of a TPE (potentially representing a port) and for precise association of the TPE with a *TopologicalLink_* (or other representatives of forwarding relationship).

4.3.7.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
layerProtocol NameList	M	M	-	-	M
		T	F	F	T
direction	M	M	-	-	M
		T	F	F	T
ltType	M	M	-	-	M
		T	F	F	T
index	CM	M	-	-	M
		T	F	F	T

4.3.7.3 Attribute constraints

Name	Definition
index Support Qualifier	The condition is "More than one *LayerTermination_* instances (named-contained by the same *TerminationPointEncapsulation_* instance) are associated with the same signal flow."

4.3.8 *Top_*

4.3.8.1 Definition

The *Top_* is a logical construct representing the origin of definitions for all classes defined for the converged network management purposes. All other classes specified in this document and in other FNIM specifications must inherit from *Top_* directly or indirectly.

4.3.8.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
id	M	M	-	M	-
		T	F	T	F

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Void.

6 UIM – Class attribute definitions

6.1 Attribute properties

Attribute Name	Documentation and Allowed Values	Properties
direction	Represents the flow of traffic within the LT. allowedValues: The allowed values are: ➢ Client-Server: Signal flows down the LT, e.g. traffic is taken from a number of low rate clients and multiplexed into a higher rate server. ➢ Server-Client: Signal flows up the LT. ➢ Bidirectional; Signal flow is both Client-Server and Server-Client.	type: String multiplicity: 1 isOrdered: False isUnique: True defaultValue: None isNullable: False
dnPrefix	It carries the DN Prefix information or no information. See Annex C of 32.300 [2] for one usage of this attribute. allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: T defaultValue: None isNullable: False
id	An attribute whose class name and value can be used as an RDN when naming an instance of the object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance. allowedValues: format of allowed values to be conformant with TS 32.300 [3].	type: String multiplicity: 1 isOrdered: False isUnique: True defaultValue: None isNullable: False
index	Provides any relevant indexing of the LT (channel number, e.g. '3') allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: False isUnique: True defaultValue: None isNullable: False
layerProtocolNameList	Name(s) and additional descriptive information such as version number for the protocol(s)/layer(s) used for the associated communication link. Syntax and semantic is not specified. allowedValues: allowed value examples: "X2AP", "LR Optical Channel"	type: String multiplicity: 1..* isOrdered: F isUnique: T defaultValue: None isNullable: True
locationName	The physical location (e.g. an address) of an entity represented by a (derivative of) *ManagedElement_*. It may contain no information to support the case where the derivative of *ManagedElement_* needs to represent a distributed multi-location NE. allowedValues: N/A	type: String multiplicity: 1 isOrdered: False isUnique: True defaultValue: None isNullable: False
ltType	The name of the specification that describes the internal construction of the LT, indicating for example that it possesses a G.805 CP but no G.805 TCP (see [11]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: T defaultValue: None isNullable: False

Attribute Name	Documentation and Allowed Values	Properties
managedElementTypeList	It is a multi-valued attribute with one or more unique elements. Thus, it may represent one ME functionality or a combination of more than one functionality. The actual syntax and encoding of this attribute is Solution Set specific. allowedValues: 1) The allowed values of this attribute are the names of the IOC(s) that are (a) derived/subclassed from ManagedFunction and (b) directly name-contained by ManagedElement IOC (on the first level below ManagedElement), but with the string "Function" excluded. 2) If a ManagedElement contains multiple instances of a ManagedFunction this attribute will not contain repeated values. 3) The capitalisation (usage of upper/lower case) of characters in this attribute is insignificant. Thus, the NodeB should be case insensitive when reading these values. 4) Two examples of allowed values are: • NodeB; • HLR, VLR.	type: String multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
tpeType	The name of the specification that describes the construction of the TPE emphasising for example the access to the TPE and whether it is associated with a physical port directly or not (see [11]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: False isUnique: True defaultValue: None isNullable: False
userDefinedNetworkType	Textual information indicating network type, e.g. "UTRAN". It may contain no information if there is no appropriate network type can be used. allowedValues: N/A	type: String multiplicity: 1 isOrdered: False isUnique: True defaultValue: None isNullable: False
userLabel	A user-friendly (and user assignable) name of this object. allowedValues: N/A	type: String multiplicity: 1 isOrdered: False isUnique: True defaultValue: None isNullable: False
Attribute related to role		
aEnd	The value of this attribute shall be a list of Distinguished Name of the alphabetically first instance in the Link subclass name to which this link/relation is associated (i.e., pointing to the instance of <X> as described in the definition of Link IOC in the present document). As an example, with Link_As_Slf, aEnd would contain the Distinguished Name of the AsFunction instance, and the zEnd would contain the Distinguished Name of SlfFunction instance. allowedValues: 1) For the instance whose class is defined by 3GPP, the format of the allowed values would be in conformant with that defined in TS 32.300 [3]. 2) See Note1.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False passedById: True

Attribute Name	Documentation and Allowed Values	Properties
managedBy	This relates to the role played by *ManagementSystem_* in the relation between *ManagedSystem_* and *ManagedElement_*. This attribute contains a list of the DN(s) of the related subclasses of *ManagementSystem_* instance(s). allowedValues: N/A	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False passedById: True
managedElements	This relates to the role played by *ManagedElement_* in the relation between *ManagedSystem_* and *ManagedElement_*. This attribute contains a list of the DN(s) of the related subclasses of *ManagedElement_* instance(s). allowedValues: N/A	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False passedById: True
zEnd	The value of this attribute shall be a list of Distinguished Name of the alphabetically second instance in the Link subclass name to which this link/relation is associated (i.e., pointing to the instance of <Y> as described in the definition of Link IOC in the present document). As an example, with Link_As_Slf, aEnd would contain the Distinguished Name of the AsFunction instance, and the zEnd would contain the Distinguished Name of SlfFunction instance. allowedValues: 1) For the instance whose class is defined by 3GPP, the format of the allowed values would be in conformant with that defined in TS 32.300 [3]. 2)See Note1.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False passedById: True
Note 1: For the instance whose class is defined by TM Forum, the format of the allowed values would be in conformant with that defined in TM Forum MTOSI SD1-25_objectNaming [16].		

Annex A (informative):
Void

Annex B (informative):
Void

Annex C (informative): Rationale and Usage of TPE/LT

This Annex provides the rationale and the usage of LT in conjunction with TPE.

Rational

A TPE is capable of encapsulating multiple transport functions (G.805 [19] termination functions, adapters, points etc.) at many different layers where the encapsulated transport functions are all related to the same signal flow. See Figure 10: UIM related to TM Forum model and ITU-T concepts.

The TPE is used to both reduce the instances of objects required to represent a given transport assembly and to also simplify the translation from traditional environments where layering is not fully represented.

The encapsulation may be opaque, i.e. not exposing the layering, or semi-transparent, exposing the explicit layering but compacted into a single TPE instance. In the former case, TPE instance does not need to name-contain any LT. In the latter case, TPE instance needs to name-contain instances of LT.

The TPE deals equivalently with unidirectional and bidirectional flows. A bidirectional flow is where pairings of unidirectional flows have some shared fate or are considered as related in some way such that all entities associated with the whole bidirectional flow will be encapsulated in one TPE. Where a bidirectional flow is encapsulated it is possible to connect to only one of the two directions of flow and this can be represented through parameters of the TPE.

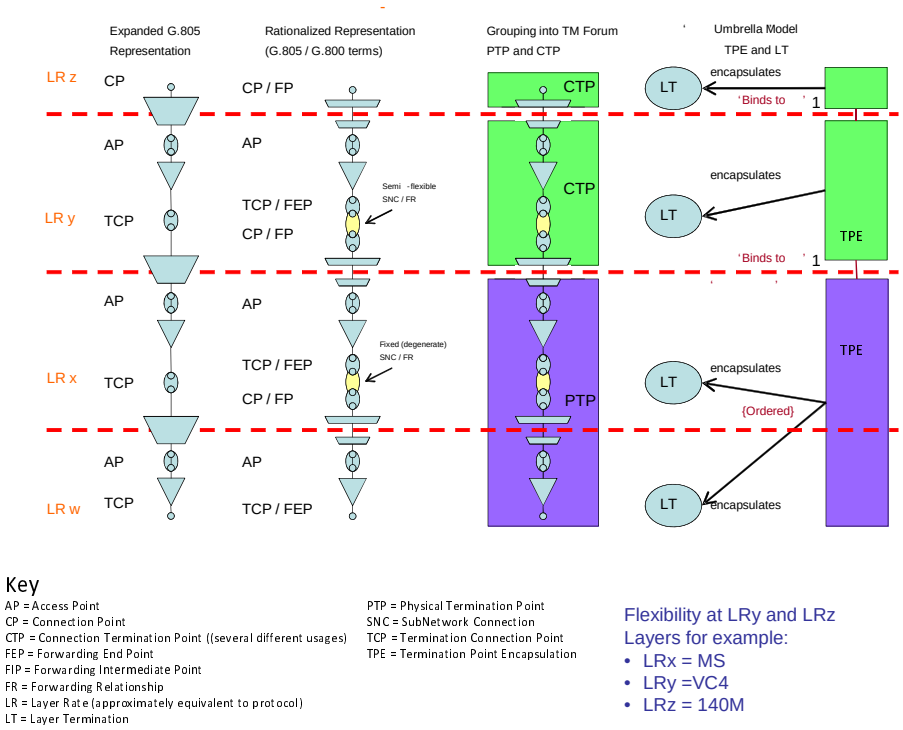
Usage

The TPE provides a place against which to raise alarms, display parameters and set attributes associated with the signal flow.

The TPE can be related:

- Directly to one or more physical ports (i.e. that the signal is associated directly with an externally visible connector)
    - Note that a physical port could also be related to more than one TPE;
- To logical functions that anchor the signal flow (i.e. it is floating between flexible functions in the equipment with no externally visible connector);
- To another supporting TPE to represent a client signal of the supporting TPE where there may be many instances of client;
    - Note that there may be many instances of server TPE that feed a single client (e.g., in the case of VCAT)

For background see SD1-18 Functional Modelling Concepts [11] and naming refer to SD1-25 Object Naming [16].



Key

AP = Access Point
CP = Connection Point
CTP = Connection Termination Point ((several different usages)
FEP = Forwarding End Point
FIP = Forwarding Intermediate Point
FR = Forwarding Relationship
LR = Layer Rate (approximately equivalent to protocol)
LT = Layer Termination
PTP = Physical Termination Point
SNC = SubNetwork Connection
TCP = Termination Connection Point
TPE = Termination Point Encapsulation

Flexibility at LRy and LRz
Layers for example:
- LRx = MS
- LRy =VC4
- LRz = 140M

Figure 11: UIM related to TM Forum model and ITU-T concepts

Annex D (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2012-08					First draft	--	0.1.0
2012-12	SA#58				1.0.0 sent for SA#58 for information	0.1.0	1.0.0
2013-01					Version for approval	1.0.0	1.1.0
2013-03	SA#59	SP-130064			MCC cleanup and presented for approval	1.1.0	2.0.0
2013-03					Approved version	2.0.0	11.0.0
2014-09	-	-	-	-	Update to Rel-12 version (MCC)	11.0.0	**12.0.0**
2016-01	-	-	-	-	Update to Rel-13 version (MCC)	12.0.0	**13.0.0**

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2017-06	SA#76	SP-170507	0011	1	A	Remove Editor notes and correct references	13.1.0

History

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V13.1.0	July 2017	Publication