ETSI TS 128 620 V14.0.0 (2017-04)

Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Fixed Mobile Convergence (FMC) Federated Network Information Model (FNIM) Umbrella Information Model (UIM)
(3GPP TS 28.620 version 14.0.0 Release 14)

Reference
RTS/TSGS-0528620ve00

Keywords
LTE,UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 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.

To be noted:

- The Umbrella Information Model (UIM) described in this document provides the set of classes etc. that have been agreed for convergence to strengthen consistency of representation in the fixed and mobile environments. For full management of an FNIM solution many other classes will be required in addition to those in the UIM.
- The UIM is necessary but not sufficient for implementation.
- 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.
- 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 the abstract class defined 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".

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 32.xyz series on NRM.

[3] 3GPP TS 32.300 "Telecommunication management; Configuration Management; Name convention for Managed Objects".

[4] 3GPP S5-102610 "S5vTMFa033 E NSN Proposed enhancement of Generic NRM IOCs v3".

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

[6] 3GPP TR 32.833 "Study on Management of Converged Networks" (3GPP SA5).

[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] TM Forum "SD1-44_ConnectionlessTechnologyManagement.pdf"(part of [0]) (Especially Appendix III Mapping MEF – MTNMETH).

[10] TM Forum "SD1-7_DSLOverview.pdf" (part of [0]).

[11] TM Forum "SD1-18_layers.pdf" (part of [0]) (Especially "4.2.7 ATM and SDH capable STM-4").

[12] TM Forum "Connectionless, Connection Oriented Convergence and TP Modelling" (http://tmforum.org/FeatureDescription/ConnectionlessConnection/41718/article.html).

[13] TM Forum TR 146 "Lifecycle Compatibility Release 1.0" (http://www.tmforum.org/TechnicalReports/TR146LifecycleCompatibility/36664/article.html).

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

[15] Fixed Mobile Convergence (FMC) Federated Network Information Model (FNIM).

[16] TM Forum MTOSI "SD1-25_objectNaming.pdf" (part of [0]).

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this document, the following definitions, symbols and abbreviations apply. For definitions, symbols and abbreviations not found here. See also Fixed Mobile Convergence (FMC) Federated Network Information Model (FNIM) [0].3.2 Symbols

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [x] 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 [x].

AS	Application Server (3GPP)
BBF	Broadband Forum
CIM	Common Information Model (DMTF)
CP	Connection Point
DM	Domain Manager
DN	Distinguished Name
DTMF	Distributed Management Task Force
EM	Element Manager
FNIM	Federated Network Information Model
FMC	Fixed Mobile Convergence
HLR	Home Location Register (3GPP)
IOC	Information Managed Object
IRP	Integration Reference Point (3GPP)
LR	Layer Rate
LT	Layer Termination
ME	Managed Element
MTNM	Multi Technology Network Management (TM Forum)
MTOSI	Multi Technology Operations System Interface (TM Forum)
NE	Network Element
NM	Network Management
NRM	Network Resource Model (3GPP)
NW	Network
SDO	Standards Development Organization
SID	Shared Information & Data Model (TM Forum)
SLF	Subscription Location Function (3GPP)

TCP	Termination Connection Point
TPE	Termination Point Encapsulation
UIM	Umbrella Information Model
UML	Unified Modeling Language
UTRAN	Universal Terrestrial Radio Access Network (3GPP)
VCAT	Virtual Concatenation
VLR	Visitors Location Register (3GPP)

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.

Currently, 3GPP SA5 defines its abstract classes in its Generic NRM IRP [0] and defines concrete classes in other NRM IRPs such as EUTRAN NRM IRP. 3GPP/SA5 have agreement and will consider changes in classes in its Generic NRM IRP such that they are harmonized (if not identical) to those (to-be-defined) as UIM classes. Classes from other IRPs that are relevant for consideration in the UIM are likely to be reflected in some way in the Generic NRM IRP for use in the UIM.

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/SA5 network resource model [0], BBF ATM network management model [**Error! Reference source not found.**], TMF MTNM, DMTF CIM)"

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 [0] and MultiLayerSubNetwork of SID/MTOSI [0])
- *Function_* (similar to ManagedFunction of 3GPP [0] and LogicalResource of SID/MTOSI [0])
- *LayerTermination_* (similar to a single layer in the layerParameterList_T structure of SID/MTOSI [7])
- *ManagedElement_* (similar to ManagedElement of 3GPP [0] and SID/MTOSI [0])
- *ManagementSystem_* (similar to ManagementNode of 3GPP [0] and OperationsSystem of SID/MTOSI [7])
- *TerminationPointEncapsulation_* (similar to TerminationPoint of SID/MTOSI [0])
- *Top_* (similar to *Top* [0] of 3GPP and RootEntity of SID/MTOSI [0])
- *TopologicalLink_* (similar to Link [0] of 3GPP and TopologicalLink of SID/MTOSI [0])

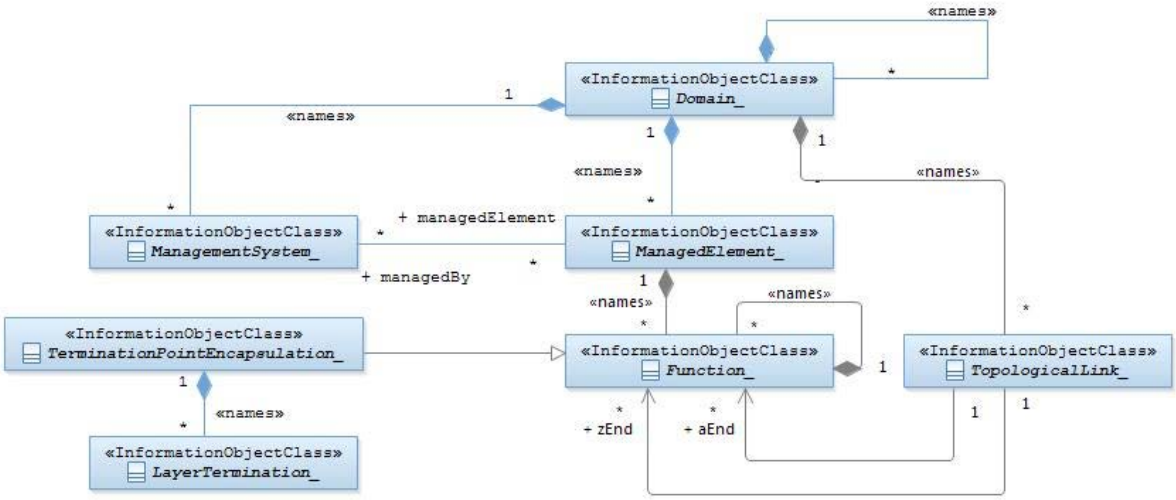


Figure 1: Class diagram

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

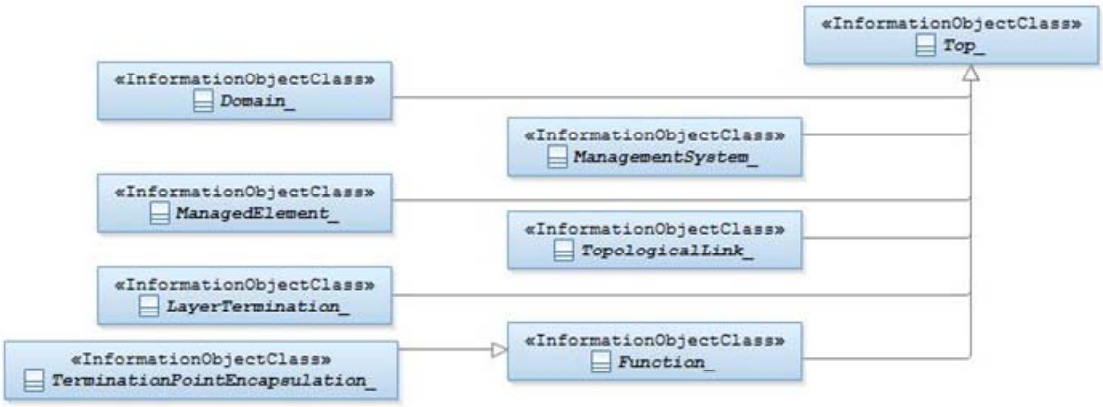


Figure 2: Inheritance class diagram

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 [0]. 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

5 UIM – Partition inventory

Editors Note: This section is intended to contain inventory related definitions of the UIM (based on agreements as documented in the respective work item descriptions). Due to differences in interpretations between 3GPP and TM Forum on inventory terminology as well as on how to integrate inventory information within the UIM, this topic has been postponed and will be addressed during Multi-SDO Project on Model Alignment Phase 2.

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 [0] 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 [0].	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 [0]). 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 [0]). 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 TS 32.300 [0]. 2) For the instance whose class is defined by TM Forum, the format of the allowed values would be in conformant with [16]TM Forum MTOSI "SD1-25_objectNaming.pdf" (part of [0] [0].	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 TS 32.300 [0]. 2) For the instance whose class is defined by TM Forum, the format of the allowed values would be in conformant with [16] TM Forum MTOSI "SD1-25_objectNaming.pdf" (part of [0] [0].	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False passedById: True

Annex A (informative): Extract from 3GPP TS 32.622 Generic network resources IRP: NRM

This appendix is an extract from [5]. One can note the similarities between the UIM class name-containment tree (see 4.2) and that defined in [5].

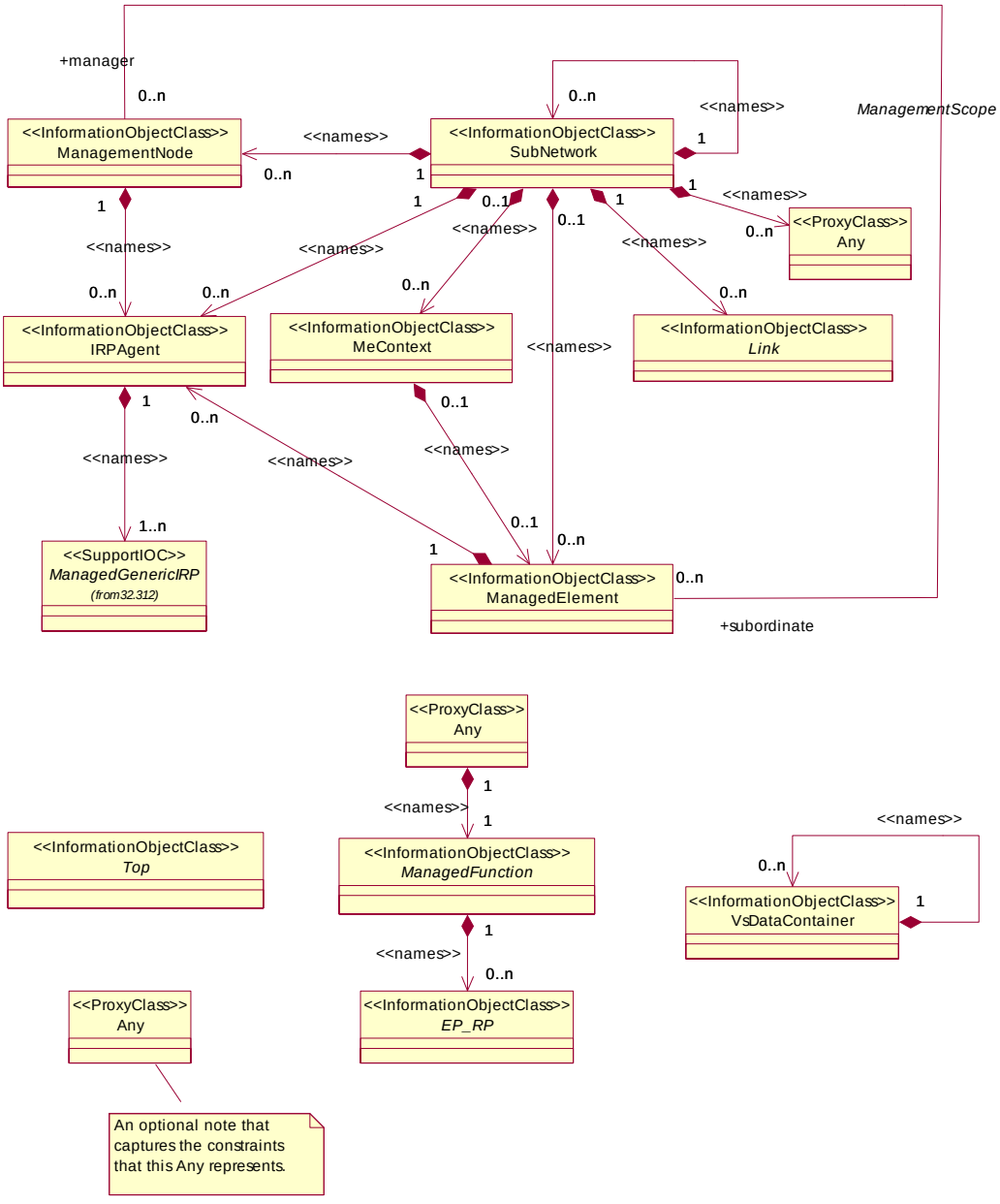


Figure 3: Containment tree of 3GPP TS 32.622 Generic network resources IRP: NRM [5]

Annex B (informative): Extract from MTOSI documents

This appendix provides the collection of SID/MTOSI currently defined classes as candidates for inclusion in UIM.

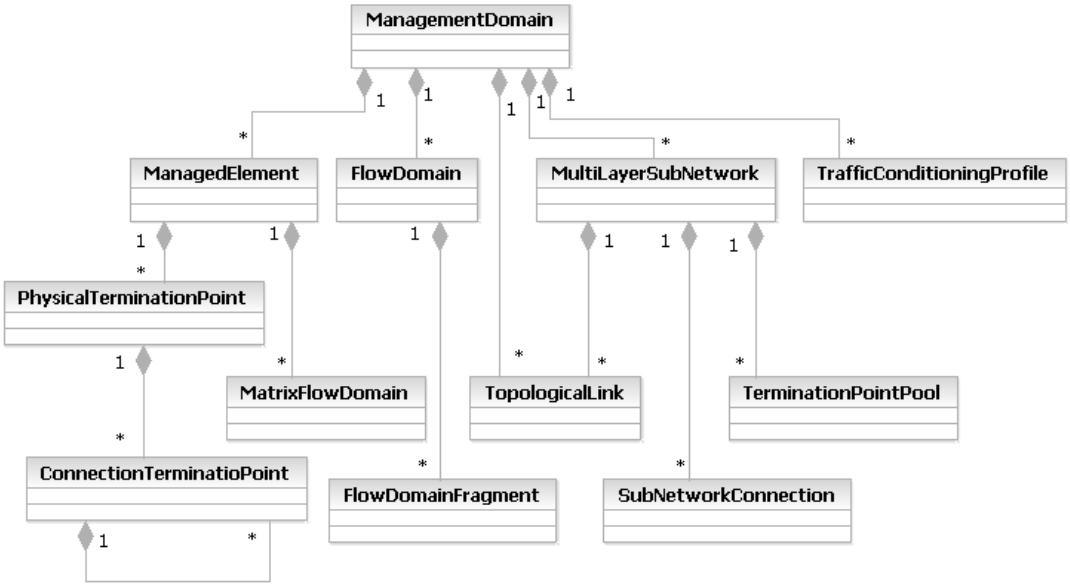


Figure 4: MTOSI/MTNM Containment

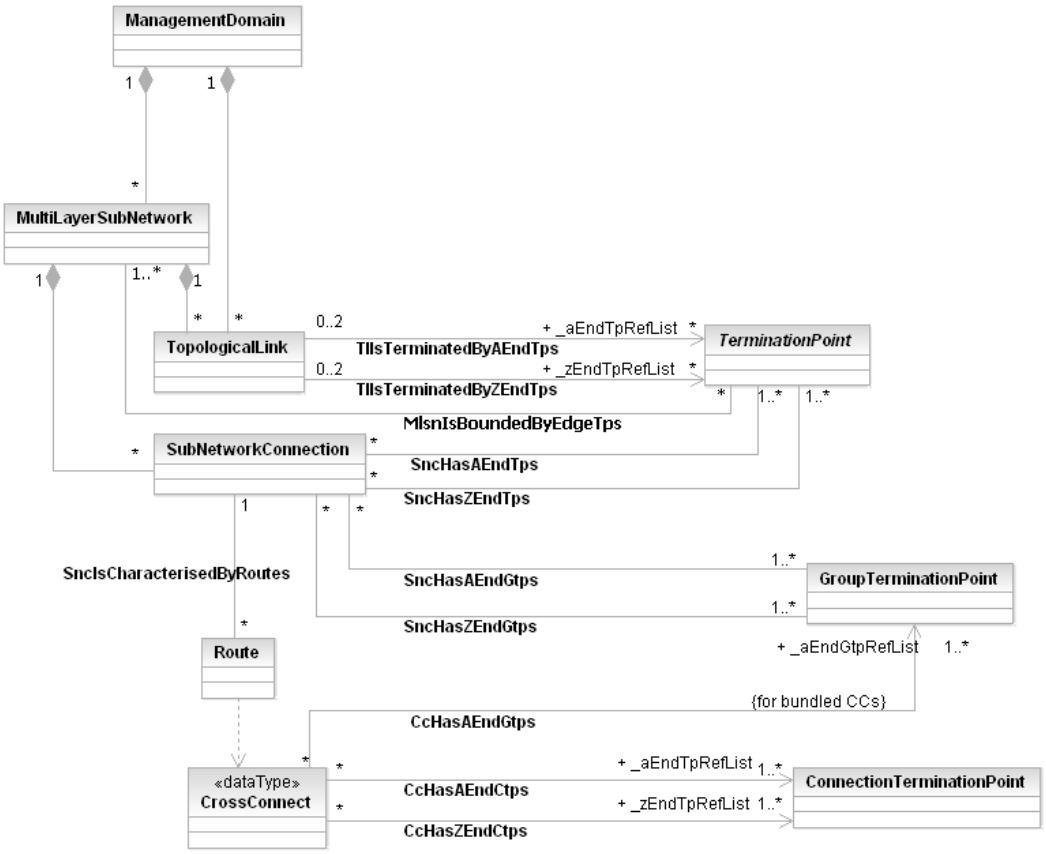


Figure 5: MTOSI/MTNM Connection-oriented Class Diagram

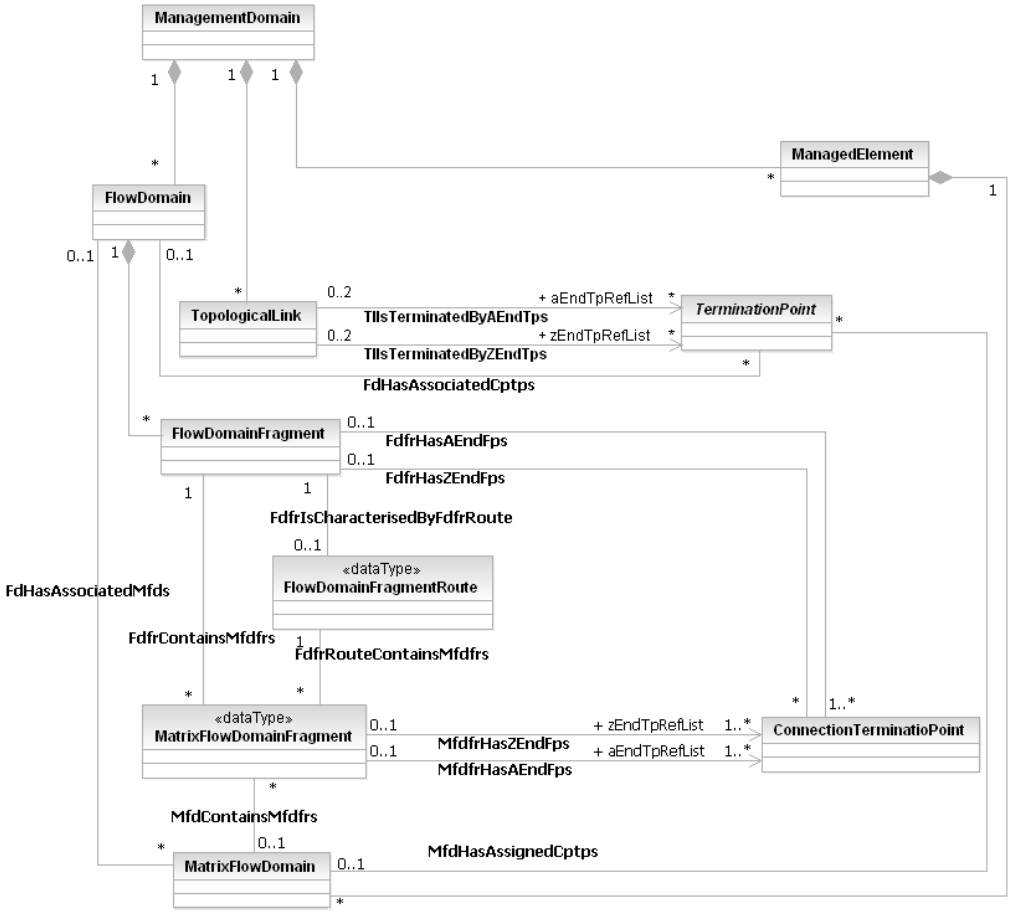


Figure 6: MTOSI/MTNM Connectionless Class Diagram

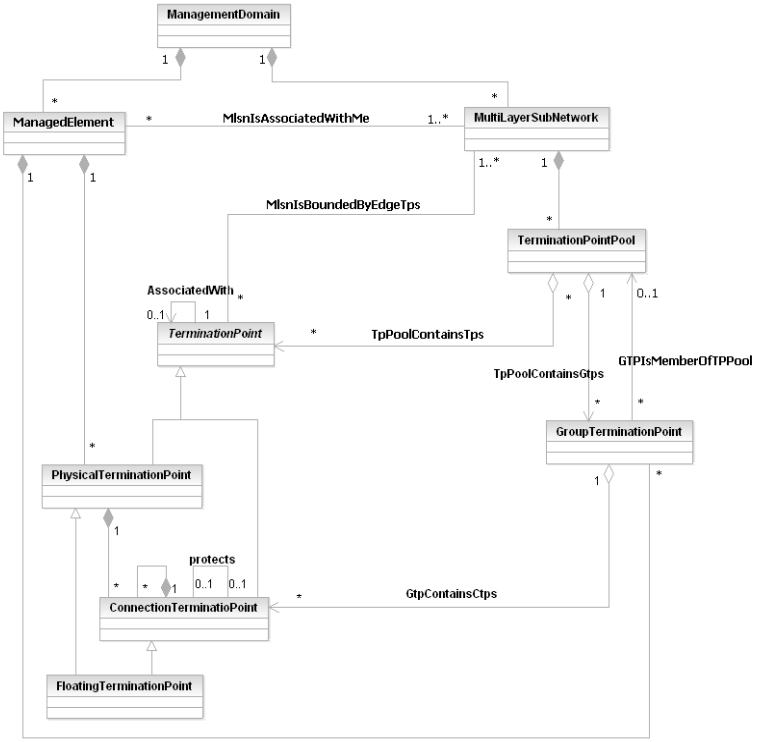


Figure 7: MTOSI/MTNM Termination Point Model

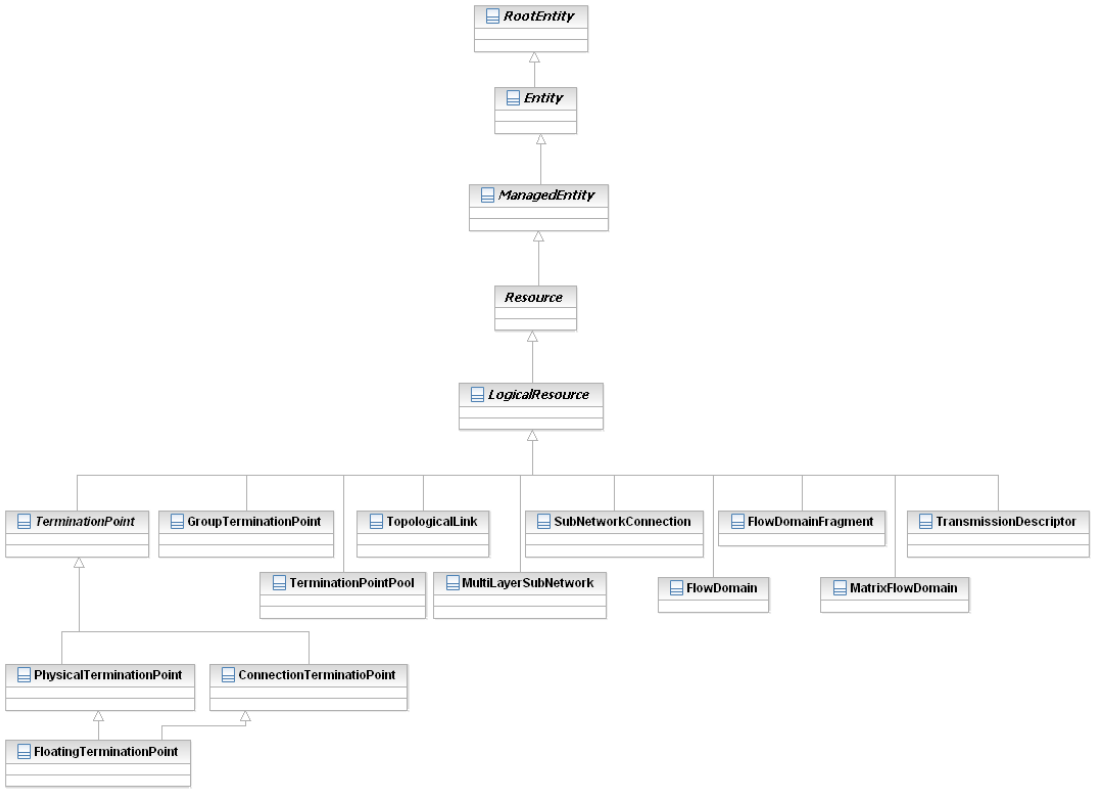


Figure 8: MTOSI/MTNM Inheritance Class Diagram

Figure 9: MTOSI/MTNM Inheritance Class Diagram with Attributes

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 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.

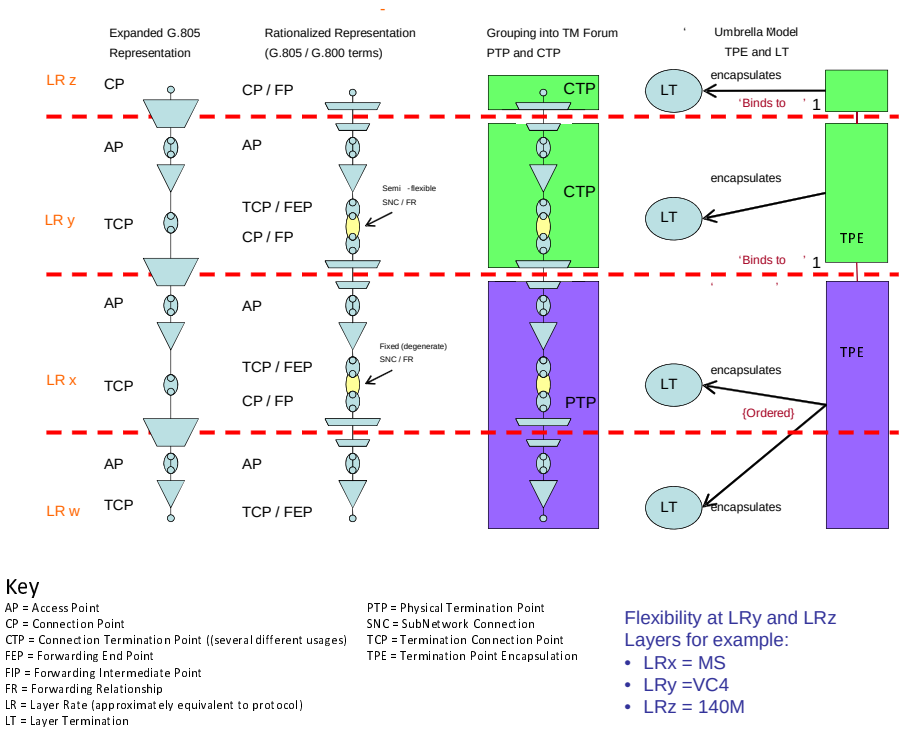
Usage

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**
2017-03	SA#75	-	-	-	Promotion to Release 14 without technical change	13.0.0	**14.0.0**

History

Document history		
V14.0.0	April 2017	Publication