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Technical Specification

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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.

Introduction

The interface Itf-N, defined in 3GPP TS 32.102 [2], is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999.

In addition to the restructuring, the need to define some new IRPs for CM, compared to Release 1999, has also been identified. Firstly, a new IRP for the Bulk CM, and secondly, one for each of the NRM parts (Generic, Core Network, UTRAN and GERAN NRM).

Finally, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-8	Name convention for Managed Objects	32.300	**Name convention for Managed Objects**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP (Intro & IS part) CORBA SS	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP (Intro & IS part) CMIP SS	32.601-4	Basic CM IRP: CMIP SS
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS (not yet produced)
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP (Generic NRM part) CORBA SS	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (Generic NRM part) CMIP SS	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP (CN NRM part) CORBA SS	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (CN NRM part) CMIP SS	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP (UTRAN NRM part) CORBA SS	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (UTRAN NRM part) CMIP SS	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-	GERAN Network Resources IRP: CORBA SS

		3	
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is Part 2 of 32.620 - "Generic Network Resources IRP: Network Resource Model".

1 Scope

The present document (Generic Network Resources IRP: Network Resource Model) defines an Integration Reference Point (IRP) through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate Network Management related information to one or several 'IRPManagers' (typically Network Managers).

The present document specifies a generic Network Resource Model, NRM (also referred to as a Management Information Model - MIM) with definitions of Managed Object Classes.

The Configuration Management (CM) area is very large. The intention is to split the specification of the related interfaces in several IRPs. In addition to the subject IRP, it is expected that IRPs will be defined for functional areas like Security management, Software management, Network & Service provisioning, etc. An important aspect of such a split is that the Network Resource Models (NRMs) defined in different IRPs are consistent. The Generic Network Resources IRP here provides a base for all resource modelling.

To summarize, the Generic Network Resources IRP main purpose is to define a generic Network Resource Model that constitutes a base from which other (more specialized) resource models can inherit or have associations with.

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] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-2: "Telecommunication Management; Configuration Management; Part 2: Notification Integration Reference Point; Information Service Version 1".

[4] ITU-T Recommendation M.3100 (07/95): "Generic Network Information Model".

[5] ITU-T Recommendation M.3100 Corrigendum 1 (07/98)".

[6] ITU-T Recommendation M.3100 Amendment 1 (03/99)".

[7] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[8] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[9] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[10] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[11] 3GPP TS 32.111-2: "Telecommunication Management; Fault Management; Part 2: Alarm Integration Reference Point; Information Service Version 1".

[13] 3GPP TS 32.300: "Name Convention for Managed Objects".

[14] 3GPP TS 32.600: "3G Configuration Management: Concepts and requirements".

[15] 3GPP TS 23.002: “Network Architecture”.

[16] 3GPP TS 32.622-2: “UTRAN Network Resources IRP : Network Resource Model”.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [14].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings,

(2) reference attributes, and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams). Currently however, all (non-containment) associations are modelled by means of reference attributes of the participating MOs.

Managed Element (ME): An instance of the Managed Object Class ManagedElement.

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. An MO class has attributes that provide information used to characterize the objects that belong to the class (the term “attribute” is taken from TMN and corresponds to a “property” according to CIM). Furthermore, an MO class can have operations that represent the behaviour relevant for that class (the term “operation” is taken from TMN and corresponds to a “method” according to CIM). An MO class may support notifications that provide information about an event occurrence within a network resource.

Management Information Base (MIB): A MIB is an instance of an NRM and has some values on the defined attributes and associations specific for that instance. In the context of the present document, an MIB consists of:

(1) a Name space (describing the MO containment hierarchy in the MIB through Distinguished Names),

(2) a number of Managed Objects with their attributes and

(3) a number of Associations between these MOs. Also note that TMN (ITU-T Recommendation X.710 [7]) defines a concept of a Management Information Tree (also known as a Naming Tree) that corresponds to the name space (containment hierarchy) portion of this MIB definition. Figure 1 depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

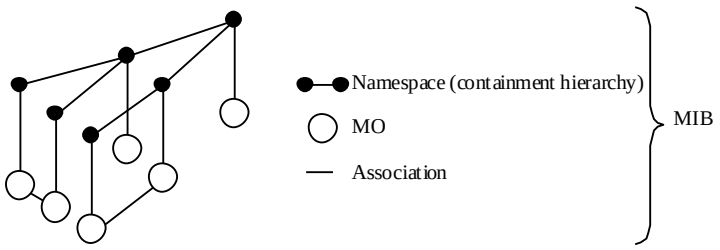


Figure 1: Relationships between a Name space and a number of participating MOs

Management Information Model (MIM): Also referred to as NRM – see the definition below.

Name space: A name space is a collection of names. The IRP name convention (see 3GPP TS 32.300 [13]) restricts the name space to a hierarchical containment structure, including its simplest form - the one-level, flat name space. All Managed Objects in a MIB shall be included in the corresponding name space and the MIB/name space shall only support a strict hierarchical containment structure (with one root object). A Managed Object that contains another is said to be the superior (parent); the contained Managed Object is referred to as the subordinate (child). The parent of all MOs in a single name space is called a Local Root. The ultimate parent of all MOs of all managed systems is called the Global Root.

Network Resource Model (NRM): A model representing the actual managed telecommunications network resources that a System is providing through the subject IRP. An NRM describes Managed Object Classes, their associations, attributes and operations. The NRM is also referred to as "MIM" (see above), which originates from the ITU-T TMN.

Node B: A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment. It terminates the Iub interface towards the RNC.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AUC	AUthentication Centre
BG	Border Gateway
CIM	Common Information Model
CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CN	Core Network
CORBA	Common Object Request Broker Architecture
DMTF	Distributed Management Task Force
DN	Distinguished Name (see 3GPP TS 32.300 [13])
EIR	Equipment Identity Register
EM	Element Manager
FM	Fault Management
GDMO	Guidelines for the Definition of Managed Objects
GGSN	Gateway GPRS Support Node
GMSC	Gateway MSC
GPRS	General Packet Radio System
HLR	Home Location Register
IDL	Interface Definition Language
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Sector
Iub	Interface between RNC and Node B
LDAP	Lightweight Directory Access Protocol
ME	Managed Element
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MO	Managed Object
MOC	Managed Object Class
MOI	Managed Object Instance
MSC	Mobile Services Switching Centre
NE	Network Element
NM	Network Manager
NR	Network Resource

NRM	Network Resource Model
OSI	Open Systems Interconnection
PM	Performance Management
RDN	Relative Distinguished Name (see 3GPP TS 32.300 [13])
RNC	Radio Network Controller
SGSN	Serving GPRS Support Node
SMI	Structure of Management Information
SMS	Short Message Service
SMS-GMSC	SMS Gateway MSC
SMS-IWMSC	SMS Interworking MSC
SNMP	Simple Network Management Protocol
SS	Solution Set
TMN	Telecommunications Management Network
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System
VLR	Visitor Location Register
WBEM	Web-Based Enterprise Management
XML	eXtensible Mark-up Language

4 System overview

4.1 System context

Figure and Figure identify system contexts of the subject IRP in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see 3GPP TS 32.102 [2].

The IRPAgent implements and supports the Generic Network Resources IRP. The IRPAgent can be an Element Manager (EM) or a mediator that interfaces one or more NEs (see

Figure), or it can be a Network Element (NE) (see Figure). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not subject of this IRP.

An IRPManager using this IRP shall choose one of the two System Contexts defined here, for each NE. For instance, if an EM is responsible for managing a number of NEs, the NM shall access this IRP through the EM and not directly to those NEs. For another IRP though, the System Context may be different.

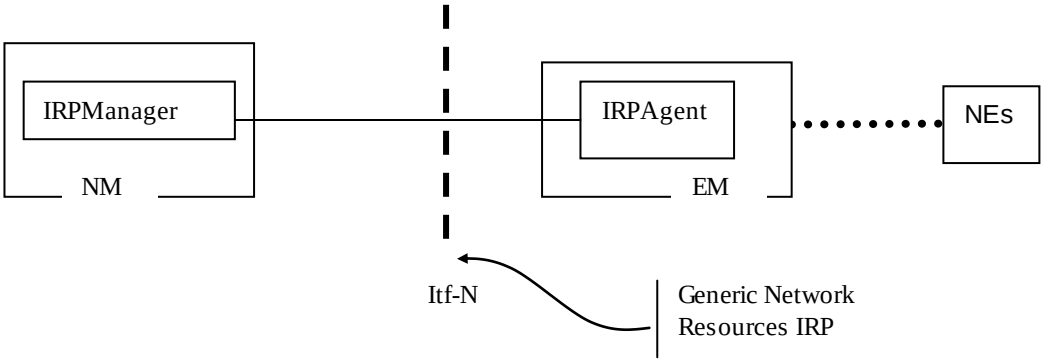


Figure 2: System Context A

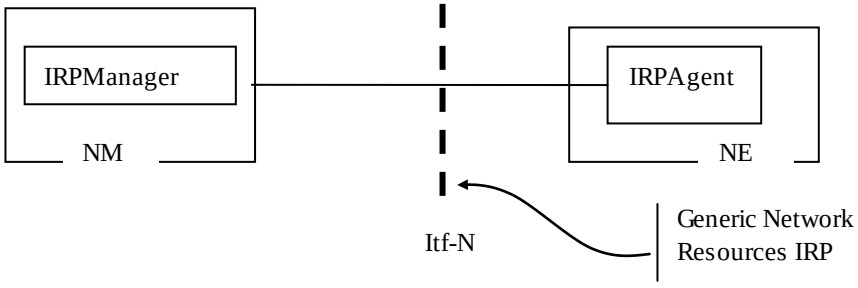


Figure 3: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations, notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.102 [2].

The following defines the meaning of Mandatory and Optional MOC attributes and associations between MOCs, in Solution Sets to the Basic CM IRP:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.
- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional managed object classes, attributes, associations, operations, parameters and notifications without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that in Release 4/5 the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

5 Modelling approach

This clause identifies the modelling approach adopted and used in this IRP.

As previously described, this IRP is structured in:

(1) requirements for a generic Network Resources Model, and

(2) an IRP Network Resource Model (the subject document) that specifies the interface in a protocol neutral manner, and

(3) a number of IRP Solution Sets that provide the actual definitions of object classes defined in the IRP Network Resources Model for each protocol environment.

Figure 4 shows the structure of the Generic Network Resources IRP (including a number of possible Solution Sets).

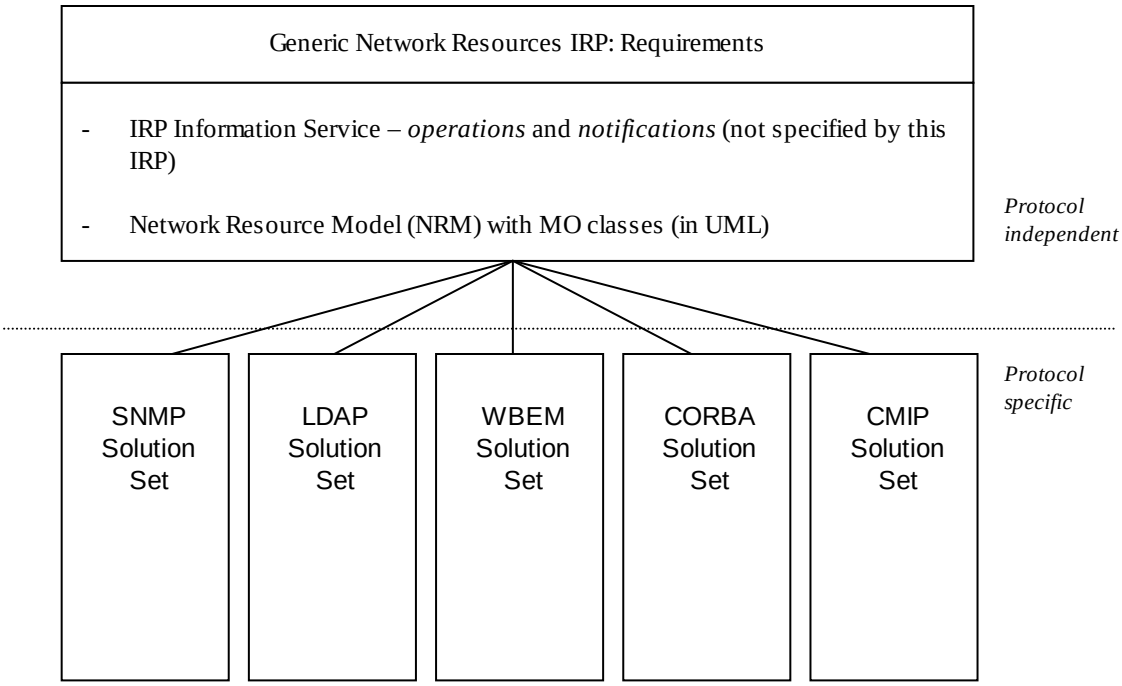


Figure 4: Generic Network Resources IRP Structure with example Solution Sets

The Network Resource Model (NRM)
is a protocol-independent model that specifies a number of Managed Object classes (with attributes and associations), which are relevant in the context of the subject IRP. Each Solution Set shall provide an implementation of this resource model with:

a) references to standard models that are applicable for the corresponding protocol environment, and

b) extensions to these standard models for the parts of the NRM that are not covered.

The NRM defined in the subject IRP bases its design mainly on work captured in ITU-T M.3100 [4], [5], [6]. However, as described in the Scope of the present document (clause 1): The model is highly simplified for the purpose of the NM, based on the assumption that all of the detailed CM actions, including fault correction after one or more alarms, are

performed by an Element Manager which knows the vendor-specific NRM and configuration, and which is launched by the NM when necessary.

Moreover, the classes defined herein are very basic, only for the necessary support of Fault Management (FM) and Performance Management (PM), which means that they contain very few attributes – basically only for naming.

In addition, also some basic associations between some of the classes are defined.

Detailed mapping to the actual standard model is described in each Solution Set. It is important to note that if one selects a specific management protocol, one should also as base use existing *de-facto* conventions and standard resource models that are applicable to that protocol environment. Examples:

- SNMP Solution Sets (SMI-specifications) should be consistent with existing standard SNMP MIB-modules in order to function in an SNMP environment.
- CMIP Solution Sets (GDMO-specifications) should be based on standard models like ITU-T X.721 [8] and ITU-T M.3100 [4], [5], [6] in order to function in an OSI/TMN environment.
- WBEM Solution Sets (MOF/XML-specifications) should be based on CIM to function in a WBEM environment.

NOTE: CORBA Solution Sets are special in the sense that no such corresponding de-facto standard models exist, and CORBA/IDL is transparent to any model. Thus, one has full freedom to choose the same model for the CORBA Solution Set to this IRP, as the IRP Information Model defined herein.

Finally, all solution sets shall of course be consistent with the IRP Network Resource Model defined herein.

Clause 6 below defines an information model in terms of Information Object Classes (IOCs), attributes and relationships, according to the modelling approach described in TS 32.102 [2]. Clause 7 defines a management information model in terms of Managed Object Classes (MOCs), according to the modelling approach used in Release 99.

6 Information Object Class definitions

6.1 Information object classes

6.1.1 Information entities imported local labels

None.

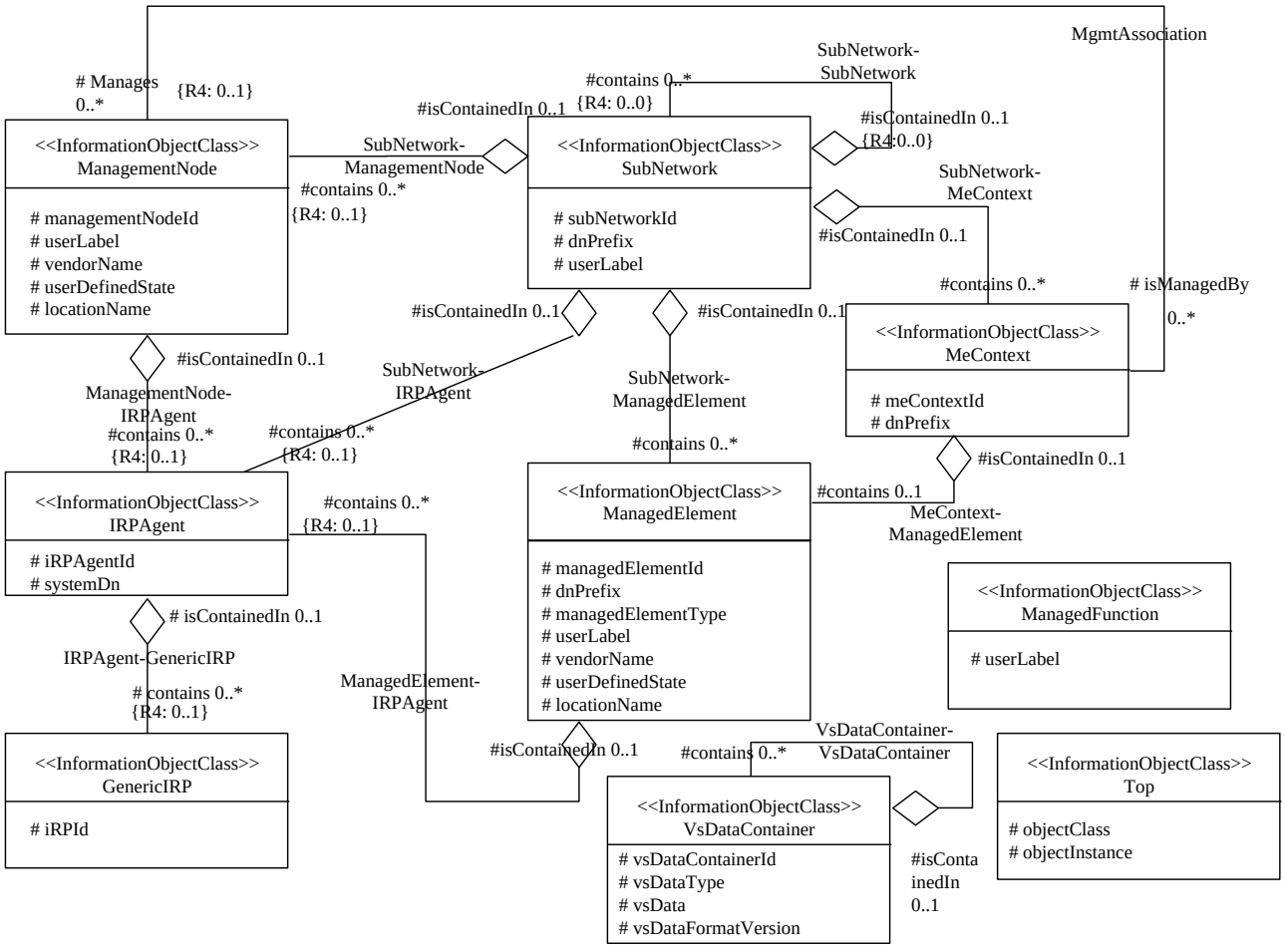
6.1.2 Class diagram

6.1.2.1 Attributes and relationships

This sub-clause depicts the set of IOCs that encapsulate information relevant for this service. This sub-clause provides the overview of all information object classes in UML. Subsequent sub-clauses provides more detailed specification of various aspects of these information object classes.

Figure 5 shows the containment/naming hierarchy and the associations of the generic information object classes defined in this TS.

NOTE: The information objet containment relationships are, in the diagram(s) below, indicated by UML "Aggregation by reference" ("hollow diamonds").



NOTE 1: ManagedElement may be contained in either a SubNetwork or an MeContext instance, or have no parent instance at all.
NOTE 2: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.
NOTE 3: Each instance of the vsDataContainer shall only be contained under one MOC. The vsDataContainer can be contained under MOCs defined in other NRMs.

Figure 5: Generic NRM Containment/Naming and Association diagram

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a ManagedElement instance could have a format like:

```
SubNetwork=Sweden,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1.
```

6.1.2.2 Inheritance

This sub-clause depicts the inheritance relationships that exists between information object classes.

Figure 6 shows the inheritance diagram.

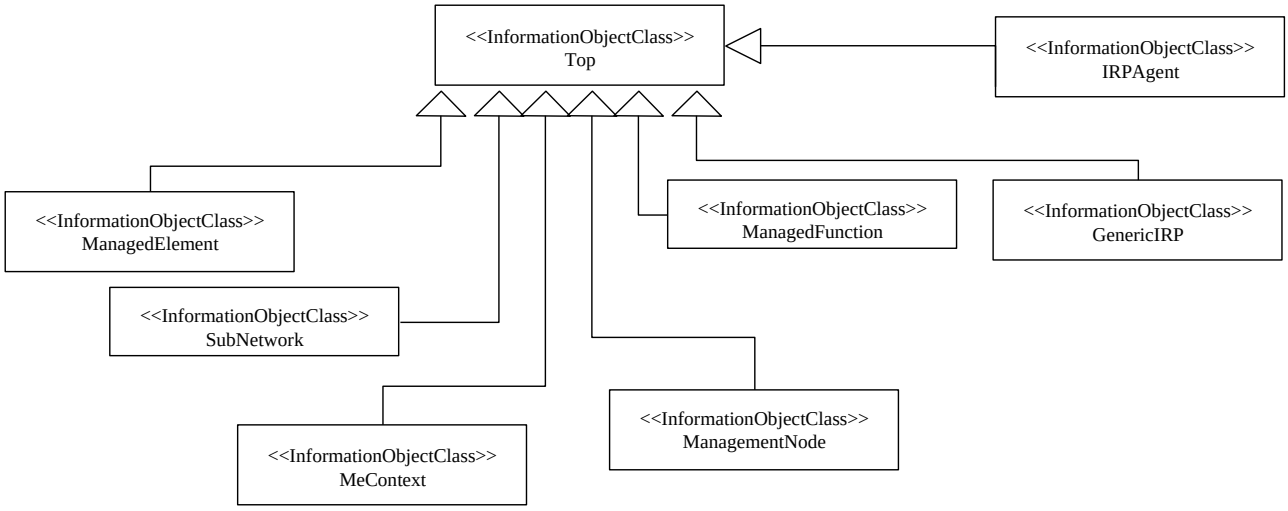


Figure 6: Generic Network Resources Model Inheritance Hierarchy

6.1.3 Information object class definitions

6.1.3.1 GenericIRP

6.1.3.1.1 Definition

This information Object Class represents the IRP capability associated with each IRPAgent. This IOC cannot be instantiated. It is defined for sub-classing purposes. At least one instance of a sub-class of GenericIRP shall be present for every IRPAgent instance.

6.1.3.1.2 Attributes

Table 1: Attributes of `GenericIRP`

Attribute Name	Support Qualifier
IRPId	M

6.1.3.2 IRPAgent

6.1.3.2.1 Definition

This information Object Class represents the functionality of an IRPAgent. It shall be present. For a definition of IRPAgent, see 3GPP TS 32.102 [2].

Restriction in R4: The IRPAgent will be contained under a managed object as follows (only one of the options shall be used):

1. ManagementNode, if the configuration contains a ManagementNode;
2. SubNetwork, if the configuration contains a SubNetwork and no ManagementNode;
3. ManagedElement, if the configuration contains no ManagementNode or SubNetwork.

6.1.3.2.2 Attributes

Table 2: Attributes of `IRPAgent`

Attribute Name	Support Qualifier
`irpAgentId`	M
`systemDN`	C

6.1.3.3 ManagedElement

6.1.3.3.1 Definition

This information Object Class represents telecommunications equipment or TMN entities within the telecommunications network that performs Managed Element (ME) functions, i.e. provides support and/or service to the subscriber.
An ME communicates with a manager (directly or indirectly) over one or more interfaces for the purpose of being monitored and/or controlled. MEs may or may not additionally perform element management functionality.
An ME contains equipment that may or may not be geographically distributed. An ME is often referred to as a "Network Element". This class is similar to the `Managed Element` class specified in ITU-T M.3100 [4], [5], [6].

A ManagedElement may be contained in either a SubNetwork or in an MeContext instance. A single ManagedElement seen over the Itf-N may also exist stand-alone with no parent at all.

The ManagedElement MOC may be used to represent combined ME functionality (as indicated by the managedElementType attribute and the contained instances of different functional MOCs).

Single function ManagedElement managed object instances will have a 1..1 containment relationship to a function Managed Object (in this context a function MO is an MO derived from the ManagedFunction MOC). Multiple function ManagedElement managed object instances will have a 1..N containment relationship to function Managed Objects.

6.1.3.3.2. Attributes

Table 3: Attributes of ManagedElement

Attribute Name	Support Qualifier
managedElementId	M
dnPrefix	C
managedElementType	M
userLabel	M
vendorName	M
userDefinedState	M
locationName	M
swVersion	M

6.1.3.4 ManagedFunction

6.1.3.4.1 Definition

This information Object Class is provided for sub-classing only. It provides attribute(s) that are common to functional Information Object Classes. Note that a Managed Element may contain several managed functions. The ManagedFunction may be extended in the future if more common characteristics to functional objects are identified.

6.1.3.4.2 Attributes

Table 4: Attributes of `ManagedFunction`

Attribute Name	Support Qualifier
userLabel	M

6.1.3.5 ManagementNode

6.1.3.5.1 Definition

This information Object Class represents a telecommunications management system (EM) within the TMN that contains functionality for managing a number of Managed Elements (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 ManagementNode has a special association to the managed elements that it is responsible for managing.

6.1.3.5.2 Attributes

Table 5: Attributes of `ManagementNode`

Attribute Name	Support Qualifier
managementNodeId	M
userLabel	M
VendorName	M
UserDefinedState	M
LocationName	M
swVersion	M

6.1.3.6 MeContext

6.1.3.6.1 Definition

This information Object Class is introduced for naming purposes. It may support creation of unique DNs in scenarios when some MEs have the same RDNs due to the fact that they have been manufacturer pre-configured.
If some MEs have the same RDNs (for the above mentioned reason) and they are contained in the same SubNetwork instance, some measure shall be taken in order to assure the global uniqueness of DNs for all MOIs under those MEs. One way could be to set different DnPrefixes for those NEs, but that would require either that:

a) all LDNs or DNs are locally modified using the new DnPrefix for the upper portion of the DNs, or

b) a mapping (translation) of the old LDNs or DNs to the new DNs every time they are used externally, e.g. in alarm notifications.

As both the two alternatives above may involve unacceptable drawbacks (as the old RDNs for the MEs then would have to be changed or mapped to new values), using MeContext offers a new alternative to resolve the DN creation. Using MeContext as part of the naming tree (and thus the DN) means that the DnPrefix, including a unique MeContext for each ME, may be directly concatenated with the LDNs, without any need to change or map the existing ME RDNs to new values.

MeContext have 0..N instances. It may exist even if no SubNetwork exists. Every instance of MeContext contains exactly one ManagedElement during steady-state operations.

6.1.3.6.2 Attributes

Table 6: Attributes of `MeContext`

Attribute Name	Support Qualifier
meContextId	M
dnPrefix	C

6.1.3.7 SubNetwork

6.1.3.7.1 Definition

This information object class represents a set of managed entities as seen over the Itf-N.

There may be zero or more instances of a SubNetwork. It shall be present if either a ManagementNode or multiple ManagedElements are present (i.e. ManagementNode and multiple ManagedElement instances shall have SubNetwork as parent). Restriction in R4: N=1.

6.1.3.7.2 Attributes

Table 7: Attributes of `SubNetwork`

Attribute Name	Support Qualifier
subNetworkId	M
dnPrefix	C
UserLabel	M
userDefinedNetworkType	M

6.1.3.8 Top

6.1.3.8.1 Definition

This information object class is introduced for generalisation purposes. All information object classes defined in all TS that claim to be conformant to 32.102[2] shall inherit from Top.

6.1.3.8.2 Attributes

Table 8: Attributes of `Top`

Attribute Name	Support Qualifier
objectClass	M
objectInstance	M

6.1.3.9 Class VsDataContainer

6.1.3.9.1 Definition

The 'VsDataContainer' managed object is a container for vendor specific data. The number of instances of the 'VsDataContainer' can differ from vendor to vendor. This MOC shall only be used by the Bulk CM IRP for the UTRAN and GERAN object models.

6.1.3.9.2 Attribute

Table 9: Attributes of `VsDataContainer`

Name	Qualifier
vsDataContainerId	M
vsDataType	M
vsData	M
vsDataFormatVersion	M

6.1.4 Information relationship definitions

6.1.4.1 MgmtAssociation (M)

6.1.4.1.1 Definition

This association is used to represent relationships between one or more MEs and the ManagementNode that is responsible for managing the MEs. It has two roles, named Manages and ManagedBy. The role '`Manages`' models the fact that a ManagementNode is responsible for managing zero or more MEs, and the role ManagedBy models the fact that an ME is managed by zero or one ManagementNode. Each role is in the MOC definition mapped to a reference attribute with the same name.

6.1.4.1.2 Roles

The roles involved in the relation MgmtAssociation are listed in this table.

Table 10: Roles of the relation MgmtAssociation

Name	Definition
Manages	This role refers to a list of the DN(s) of the related ManagedElement instance(s).

	This is a reference attribute modelling the role (of the association MgmtAssociation) that this managementNode is responsible for managing zero or more MEs.
IsManagedBy	This role refers to the DN of the related managementNode instance. This is a reference attribute modelling the role (of the association MgmtAssociation) that this ME is managed by zero or one managementNode.

6.1.4.1.3 Constraints

There is no constraint for this relationship.

6.1.4.2 SubNetwork-ManagementNode

6.1.4.2.1 Definition

This represents the containment relationship between SubNetwork and ManagementNode.

6.1.4.2.2 Roles

Name	Definition
contains	This role is played by objects of the information object class ManagementNode.
isContainedIn	This role is played by objects of the information object class SubNetwork.

6.1.4.2.3 Constraints

There is no constraint for this relationship.

6.1.4.3 SubNetwork-MeContext

6.1.4.3.1 Definition

This represents the containment relationship between SubNetwork and MeContext.

6.1.4.3.2 Roles

Name	Definition
contains	This role is played by objects of the information object class MeContext.
isContainedIn	This role is played by objects of the information object class SubNetwork.

6.1.4.3.3 Constraints

There is no constraint for this relationship.

6.1.4.4 SubNetwork-SubNetwork

6.1.4.4.1 Definition

This represents the containment relationship between SubNetwork and SubNetwork.

6.1.4.4.2 Roles

Name	Definition
contains	This role is played by objects of the information object class SubNetwork.
isContainedIn	This role is played by objects of the information object class SubNetwork.

6.1.4.4.3 Constraints

Name	Definition
Rel4SubNetworkSubNetworkRestriction	" In Release 4, this relationship cannot be instantiated, due to the fact that the maximum number of instances of the SubNetwork IOC is 1. "

6.1.4.5 SubNetwork-IRPAgent

6.1.4.5.1 Definition

This represents the containment relationship between SubNetwork and IRPAgent.

6.1.4.5.2 Roles

Name	Definition
contains	This role is played by objects of the information object class IRPAgent.
isContainedIn	This role is played by objects of the information object class SubNetwork.

6.1.4.5.3 Constraints

There is no constraint for this relationship.

6.1.4.6 SubNetwork-ManagedElement

6.1.4.6.1 Definition

This represents the containment relationship between SubNetwork and ManagedElement.

6.1.4.6.2 Roles

Name	Definition
contains	This role is played by objects of the information object class ManagedElement.
isContainedIn	This role is played by objects of the information object class SubNetwork.

6.1.4.6.3 Constraints

There is no constraint for this relationship.

6.1.4.7 MeContext-ManagedElement

6.1.4.7.1 Definition

This represents the containment relationship between `MeContext` and `ManagedElement`.

6.1.4.7.2 Roles

Name	Definition
`Contains`	This role is played by objects of the information object class ManagedElement.
`IsContainedIn`	This role is played by objects of the information object class MeContext.

6.1.4.7.3 Constraints

There is no constraint for this relationship.

6.1.4.8 ManagedElement-IRPAgent

6.1.4.8.1 Definition

This represents the containment relationship between `ManagedElement` and `IRPAgent`.

6.1.4.8.2 Roles

Name	Definition
`Contains`	This role is played by objects of the information object class IRPAgent.
`IsContainedIn`	This role is played by objects of the information object class ManagedElement.

6.1.4.8.3 Constraints

There is no constraint for this relationship.

6.1.4.9 IRPAgent-GenericIRP

6.1.4.9.1 Definition

This represents the containment relationship between `IRPAgent` and `GenericIRP`.

6.1.4.9.2 Roles

Name	Definition
`Contains`	This role is played by objects of the information object class GenericIRP.
`IsContainedIn`	This role is played by objects of the information object class IRPAgent.

6.1.4.9.3 Constraints

There is no constraint for this relationship.

6.1.5 Information attribute definitions

6.1.5.1 Definitions and legal values

The table below defines the attributes that are present in several information object classes of this TS.

Table 11: Attributes

Attribute Name	Definition	Legal Values
dnPrefix	It carries the DN Prefix information as defined in Annex C of 32.300 [13]. It shall only be specified if the instance of the information object class supporting this attribute is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.	
managedElementId	An attribute whose 'name+value' can be used as an RDN when naming an instance of the ManagedElement object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
managedElementType	The type of managed element. It is a multi-valued attribute with one or more elements. Thus, it may represent one ME functionality, e.g. an RNC, or a combination of more than one functionality e.g. an MSC/HLR. The actual syntax and encoding of this attribute is Solution Set specific.	RNC, NodeB, MSC, HLR, VLR, AUC, EIR, SMS-IWMSC, SMS-GMSC, GMSC, SGSN, GGSN,BG, BS, CBC, CGF, EIR, GGSN, GMLC, GMSC, GMSC Server, HLR, IWF, MGW, MNP-SRF, MSC, MSC Server, NPDB, R-SGW, SCF, SGSN, SMLC, SMS-GMSC, SMS-IWMSC, SRF, SSF, VLR.
irpAgentId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
irpId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
locationName	The physical location of this entity (e.g. an address).	
managementNodeId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
meContextId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
objectClass	An attribute which captures the name of the class from which the object instance is an occurrence of.	
objectInstance	An information which captures the Distinguished Name of any object.	

subNetworkId	An attribute whose 'name+value' can be used as an RDN when naming an instance of the SubNetwork object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
swVersion	The software version of the management node (this is used for determining which version of the vendor specific information is valid for the management node).	
systemDN	The Distinguished Name (DN) of IRPAgent. defined in 3GPP TS.32.300.	
userDefinedNetworkType	Textual information regarding the type of network, e.g. UTRAN.	
userDefinedState	An operator defined state for operator specific usage. (See also Note below)	
userLabel	A user-friendly name of this object.	
vendorName	The name of the vendor.	
vsData	Vendor specific attributes of the type vsDataType. The attribute definitions including constraints (value ranges, data types, etc.) are specified in a vendor specific data format file.	
vsDataContainerId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
vsDataFormatVersion	Name of the data format file, including version.	
vsDataType	Type of vendor specific data contained by this instance, e.g. relation specific algorithem parameters, cell specific parameters for pewer control or re-selection or a timer. The type itself is also vendor specific.	

7 Mapping from IOCs to MOCs

7.1 IOC to MOC mapping

This table provides a mapping table between Information Object Classes and Managed Object Classes.

Table 12: Information Object Class mapping

Information Object Class	Managed Object Class
GenericIRP	No mapping (GenericIRP is provided for sub-classing only).
IRPAgent	IRPAgent
ManagedElement	ManagedElement
ManagedFunction	ManagedFunction
ManagementNode	ManagementNode
MeContext	MeContext

SubNetwork	SubNetwork
Top	No mapping (Top is provided for sub-classing only)
No mapping due to different modelling approaches. Transient situation.	BasicCmIRP
No mapping due to different modelling approaches. Transient situation.	AlarmIRP
No mapping due to different modelling approaches. Transient situation.	NotificationIRP

7.2 Information relationship mapping

This table provides a mapping table between Information Relationships and the Managed Object Classes model.

Table 13: Information Relationship mapping

Information Relationship	Equivalent in the Managed Object Class Model
MgmtAssociation	MgmtAssociation
SubNetwork-ManagementNode	Mapped on naming / containment relationship.
SubNetwork-MeContext	Mapped on naming / containment relationship.
SubNetwork-SubNetwork	Mapped on naming / containment relationship.
SubNetwork-IRPAgent	Mapped on naming / containment relationship.
SubNetwork-ManagedElement	Mapped on naming / containment relationship.
MeContext-ManagedElement	Mapped on naming / containment relationship.
ManagedElement-IRPAgent	Mapped on naming / containment relationship.
IRPAgent-GenericIRP	Mapped on naming / containment relationship.

7.3 Information attribute mapping

This table provides a mapping table between Information Attributes and the Managed Object Classes model.

Table 14: Information Attribute mapping

Information Relationship	Equivalent in the Managed Object Class Model
dnPrefix	dnPrefix
managedElementId	managedElementId
subNetworkId	subNetworkId
managedElementType	managedElementType

irpAgentId	irpAgentId
irpId	irpId
locationName	locationName
managementNodeId	managementNodeId
meContextId	meContextId
objectClass	No explicit mapping. Solution set dependent.
objectInstance	Managed object DN.
systemDN	systemDN
userDefinedState	userDefinedState
userLabel	userLabel
vendorName	vendorName

8 Managed Object Class definitions

8.1 Introduction

As already introduced in the clause 5, the present clause defines the Generic Network ResourcesIRP Network Resource Model.

The corresponding Solution Set specifications provide protocol dependent object models. They provide the actual definitions of the managed object classes defined in this subclause in each protocol environment. One may find that the class names defined in the protocol-neutral model differ from those defined in the Solution Sets (e.g. due to mappings to existing standard models that are applicable for a specific Solution Set).

8.2 Generic Network Resource Model (NRM)

This subclause defines the generic managed object classes supporting the Generic Network Resources IRP. These object classes are protocol environment neutral and the model does not define the syntax or encoding of the classes and attributes.

The model described in this subclause allows for Managed Elements to be defined for management purposes according to the functionality contained within them. As an example, a single implementation of a combined MSC and VLR may be required. However, in the implementation it is required to create a single interface for the management of this element. This is expected to be achieved by instantiating a `ManagedElement` MOC that contains the "mscFunction" MOC, the "vlrFunction" MOC (as in the GSM 12.xx-series of specifications), and other generic or non-UMTS specific MOCs as appropriate to define the manageable capability of that managed element. See also the `managedElementType` attribute in the `ManagedElement` MOC definition.

It should be noted that, although this model allows for combined managed element functionality as described above, in this subclause only the high-level and generic MOCs are defined. UMTS MOCs modelling more specific managed element functionality are defined in IRPs defining NRM.

8.2.1 Managed Object Class (MOC) diagrams

8.2.1.1 Inheritance hierarchy

Figure 7 shows the inheritance hierarchy for the generic MO classes defined in this IRP.

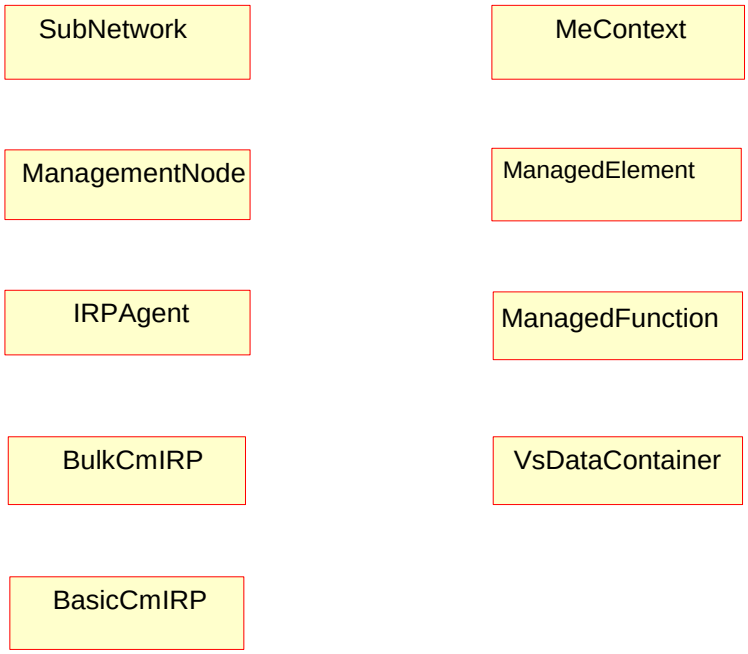
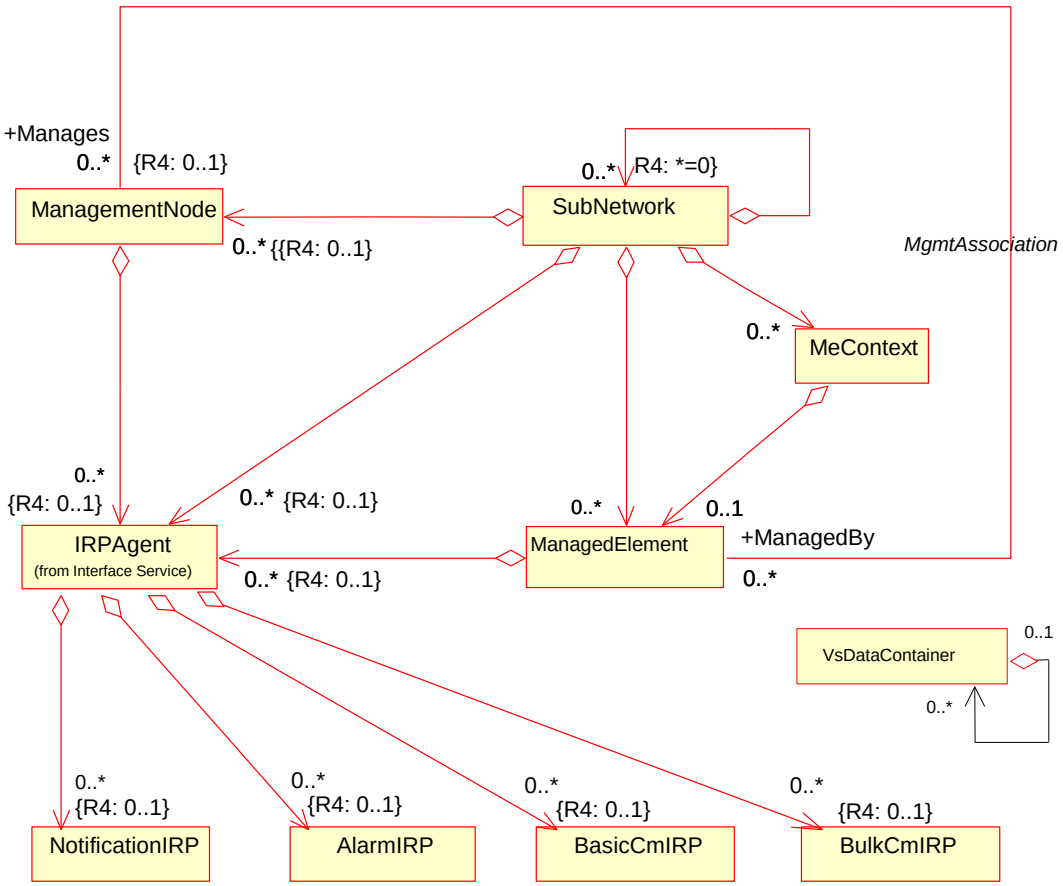


Figure 7: Generic NRM Inheritance Hierarchy

8.2.1.2 Containment/Naming and Association diagram

Figure 8 shows the containment/naming hierarchy and the associations of the generic MO classes defined by this IRP.

NOTE: The Managed Object containment/naming relationships are in the diagram(s) below indicated by UML "Aggregation by reference" ("hollow diamonds").



NOTE 1: ManagedElement may be contained in either a SubNetwork or an MeContext instance, or have no parent instance at all.

NOTE 2: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

NOTE 3: Each instance of the vsDataContainer shall only be contained under one MOC. The vsDataContainer can be contained under MOCs defined in other NRMs.

Figure 8: Generic NRM Containment/Naming and Association diagram

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a Managed Element instance could have a format like:

```
SubNetwork=Sweden,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1.
```

Note : Both the NotificationIRP MOC and the AlarmIRP MOC are not defined in the present document. The corresponding IOCs are defined respectively in TS 32.301-2 and TS 32.111-2.

8.2.2 Managed Object Class (MOC) definitions

A general note regarding all the notification tables defined for each MOC below: Each MOC may potentially send the notifications listed in the notification table for the MOC. The notifications with qualifier (M) shall be supported by the MOC, and the notifications with qualifier (O) may be supported by the MOC.
For example, if Notification notifyObjectCreation defined in Basic CM IRP has the qualifier (M), then if a MOC is defined such that it emits such a notification, this notification shall be emitted when appropriate (i.e. when a new object is created). If Notification notifyChangedAlarm has the qualifier (O) in Alarm IRP (see 3GPP TS 32.111-2 [11]), then if a MOC is defined such that it emits such a notification, this notification may or may not be emitted when appropriate. Further, if a notification in the qualifier column (of the MOC notification tables) has a reference to another specification, it means that the qualifier for the notification is specified in the referred specification.

8.2.2.1 MOC `SubNetwork`

This Managed Object Class represents a set of managed entities as seen over the Itf-N.

A SubNetwork may have 0...N instances. It shall be present if either a ManagementNode or multiple ManagedElements are present (i.e. ManagementNode and multiple ManagedElement instances shall have SubNetwork as parent). Restriction in R4: N=1.

Table 15: Attributes of `SubNetwork`

Name	Qualifier	Description
`subNetworkId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of the SubNetwork object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`dnPrefix`	READ- ONLY, C	It carries the DN Prefix information as defined in Annex C of 32.300 [13]. It shall only be specified if the instance of SubNetwork is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.
`userLabel`	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object.
`userDefinedNetworkType`	READ-ONLY, M	Textual information regarding the type of network, e.g. UTRAN.

Table 16: Notifications of `SubNetwork`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

8.2.2.2 MOC `ManagedElement`

This Managed Object Class represents telecommunications equipment or TMN entities within the telecommunications network that performs Managed Element (ME) functions, i.e. provides support and/or service to the subscriber.
An ME communicates with a manager (directly or indirectly) over one or more interfaces for the purpose of being monitored and/or controlled. MEs may or may not additionally perform element management functionality.
An ME contains equipment that may or may not be geographically distributed. An ME is often referred to as a "Network Element". This class is similar to the `Managed Element` class specified in ITU-T M.3100 [4], [5], [6].

A ManagedElement may be contained in either a SubNetwork or in an MeContext instance. A single ManagedElement seen over the Itf-N may also exist stand-alone with no parent at all.

The ManagedElement MOC may be used to represent combined ME functionality (as indicated by the managedElementType attribute and the contained instances of different functional MOCs).

Single function ManagedElement managed object instances will have a 1..1 containment relationship to a function Managed Object (in this context a function MO is an MO derived from the ManagedFunction MOC). Multiple function ManagedElement managed object instances will have a 1..N containment relationship to function Managed Objects.

Table 17: Attributes of ManagedElement

Name	Qualifier	Description
managedElementId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of the ManagedElement object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
dnPrefix	READ- ONLY, C	It carries the DN Prefix information as defined in Annex C of 32.300 [13]. It shall only be specified if the instance of ManagedElement is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.
managedElementType	READ-ONLY, M	The type of managed element. It is a multi-valued attribute with one or more elements. Thus, it may represent one ME functionality, e.g. an RNC, or a combination of more than one functionality e.g. an MSC/HLR. The allowed members of this attribute are: RNC, NodeB, MSC, HLR, VLR, AUC, EIR, SMS-IWMSC, SMS-GMSC, GMSC, SGSN, GGSN, BG, BS, CBC, CGF, EIR, GGSN, GMLC, GMSC, GMSC Server, HLR, IWF, MGW, MNP-SRF, MSC, MSC Server, NPDB, R-SGW, SCF, SGSN, SMLC, SMS-GMSC, SMS-IWMSC, SRF, SSF, VLR. The actual syntax and encoding of this attribute is Solution Set specific.
userLabel	READ-WRITE, M	A user-friendly name of this object.
vendorName	READ-ONLY, M	The name of the ManagedElement vendor.
userDefinedState	READ-WRITE, M	An operator defined state for operator specific usage. (See also Note below)
locationName	READ-ONLY, M	The physical location of this entity (e.g. an address).
swVersion	READ-ONLY, M	The software version of the management node (this is used for determining which version of the vendor specific information is valid for the management node).
managedBy	READ-ONLY, M	The value of this attribute shall be the DN of the related managementNode instance. This is a reference attribute modelling the role (of the association MgmtAssociation) that this ME is managed by 0-1 managementNode.
NOTE: In addition to the userDefinedState, state management attributes are expected to be included in the next release.		

Table 18: Notifications of `ManagedElement`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

8.2.2.3 MOC `MeContext`

This Managed Object Class (MOC) is introduced for naming purposes. It may support creation of unique DNs in scenarios when some MEs have the same RDNs due to the fact that they have been manufacturer pre-configured. If some MEs have the same RDNs (for the above mentioned reason) and they are contained in the same SubNetwork instance, some measure shall be taken in order to assure the global uniqueness of DNs for all MOIs under those MEs. One way could be to set different DnPrefixes for those NEs, but that would require either that:

a) all LDNs or DNs are locally modified using the new DnPrefix for the upper portion of the DNs, or

b) a mapping (translation) of the old LDNs or DNs to the new DNs every time they are used externally, e.g. in alarm notifications.

As both the two alternatives above may involve unacceptable drawbacks (as the old RDNs for the MEs then would have to be changed or mapped to new values), using MeContext offers a new alternative to resolve the DN creation. Using MeContext as part of the naming tree (and thus the DN) means that the DnPrefix, including a unique MeContext for each ME, may be directly concatenated with the LDNs, without any need to change or map the existing ME RDNs to new values.

MeContext have 0..N instances. It may exist even if no SubNetwork exists. Every instance of MeContext contains exactly one ManagedElement during steady-state operations.

Table 19: Attributes of `MeContext`

Name	Qualifier	Description
meContextId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
dnPrefix	READ- ONLY, C	It carries the DN Prefix information as defined in Annex C of 3GPP TS 32.300 [13]. It shall only be specified if the instance of MeContext is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.

Table 20: Notifications of `MeContext`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

8.2.2.4 MOC ManagementNode

This Managed Object Class represents a telecommunications management system (EM) within the TMN that contains functionality for managing a number of Managed Elements (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 ManagementNode has a special association to the managed elements that it is responsible for managing.

Table 21: Attributes of ManagementNode

Name	Qualifier	Description
managementNodeId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-WRITE, M	A user-friendly name of this object.
vendorName	READ-ONLY, M	The name of the ManagementNode vendor.
userDefinedState	READ-WRITE, M	An operator defined state for operator specific usage.
locationName	READ-ONLY, M	The physical location of this entity (e.g. an address).
swVersion	READ-ONLY, M	The software version of the management node (this is used for determining which version of the vendor specific information is valid for the management node).
manages	READ-ONLY, M	The value of this attribute shall be a list of the DN(s) of the related ManagedElement instance(s). This is a reference attribute modelling the role (of the association MgmtAssociation) that this managementNode is responsible for managing 0-N MEs.

Table 22: Notifications of ManagementNode

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

8.2.2.5 MOC ManagedFunction

This Managed Object Class is similar to the class gsmManagedFunction defined in GSM 12.20 [12] and is provided for sub-classing only. It provides the attributes that are common to functional MO classes. Note that a Managed Element may contain several managed functions. The ManagedFunction may be extended in the future if more common characteristics to functional objects are identified.

Table 23: Attributes of ManagedFunction

Name	Qualifier	Description
userLabel	READ-WRITE, M	A user-friendly name of the associated object.

8.2.2.6 MOC IRPAgent

This Managed Object Class represents the functionality of an IRPAgent. It shall be present. For a definition of IRPAgent, see 3GPP TS 32.102 [2].

Restriction in R4: The IRPAgent will be contained under a managed object as follows (only one of the options shall be used):

4. ManagementNode, if the configuration contains a ManagementNode;

5. SubNetwork, if the configuration contains a SubNetwork and no ManagementNode;

6. ManagedElement, if the configuration contains no ManagementNode or SubNetwork.

Table 24: Attributes of `IRPAgent`

Name	Qualifier	Description
`irpAgentId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`systemDN`	READ-ONLY, C	The Distinguished Name (DN) of IRPAgent. Defined in 3GPP TS 32.301-2 [3].

Table 25: Notifications of `IRPAgent`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

Note that these notifications are issued based on occurrences on the IRPAgent MOC and not on occurrences on other Basic CM IRP managed objects.

8.2.2.7 MOC VsDataContainer

The 'VsDataContainer' managed object is a container for vendor specific data. The number of instances of the 'VsDataContainer' can differ from vendor to vendor. This MOC shall only be used by the Bulk CM IRP for the UTRAN and GERAN object models.

Table 26: Attributes of `VsDataContainer`

Name	Qualifier	Description
`vsDataContainerId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`vsDataType`	READ-ONLY, M	Type of vendor specific data contained by this instance, e.g. relation specific algorithem parameters, cell specific parameters for pewer control or re-selection or a timer. The type itself is also vendor specific.
`vsData`	READ-WRITE, M	Vendor specific attributes of the type vsDataType. The attribute definitions including constraints (value ranges, data types, etc.) are specified in a vendor specific data format file.
`vsDataFormatVersion`	READ- ONLY,M	Name of the data format file, including version.

8.2.2.8 MOC NotificationIRP

This Managed Object Class represents the Notification IRP capability associated with each IRPAgent. At least one instance shall be present for every IRPAgent instance. Restriction in R4: Number of instances = 1.

Table 27: Attributes of NotificationIRP

Name	Qualifier	Description
notificationIRPId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
irpVersion	READ-ONLY, M	One or more Notification IRP version entries.

8.2.2.9 MOC AlarmIRP

This Managed Object Class represents the Alarm IRP (see 3GPP TS 32.111-2 [11]) capability associated with each IRPAgent. Restriction in R4: Number of instances = 0..1.

Table 28: Attributes of AlarmIRP

Name	Qualifier	Description
alarmIRPId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
irpVersion	READ-ONLY, M	One or more Alarm IRP (see 3GPP TS 32.111-2 [11]) version entries.

Table 29: Notifications of AlarmIRP

Name	Qualifier	Notes
notifyAlarmListRebuilt	See Alarm IRP (3GPP TS 32.111-2 [11])	

8.2.2.10 MOC BasicCmIRP

This Managed Object Class represents the Basic CM IRP capability associated with each IRPAgent. Restriction in R4: Number of instances = 0..1.

Table 30: Attributes of BasicCmIRP

Name	Qualifier	Description
basicCmIRPId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
irpVersion	READ-ONLY, M	One or more Basic CM IRP version entries.

8.2.2.11 MOC BulkCmIRP

This Managed Object Class represents the Bulk CM IRP capability associated with each IRPAgent. Restriction in Rel-4: Number of instances = 0..1.

Table 31: Attributes of `BulkCmIRP`

Name	Qualifier	Description
`bulkCmIRPId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`irpVersion`	READ-ONLY, M	One or more Bulk CM IRP version entries.

Table 32: Notifications of BulkCm`IRP`

Name	Qualifier	Notes
`notifySessionStateChange`	M	
`notifySessionLogStatus`	M	

8.3.3 Associations

8.3.3.1 Association `MgmtAssociation` (M)

This association is used to represent relationships between one or more MEs and the ManagementNode that is responsible for managing the MEs. It has two roles, named Manages and ManagedBy. The role 'Manages' models the fact that a ManagementNode is responsible for managing zero or more MEs, and the role ManagedBy models the fact that an ME is managed by zero or one ManagementNode. Each role is in the MOC definition mapped to a reference attribute with the same name.

Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0