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Technical Specification

Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
Telecommunication management;
Configuration Management (CM);
Generic network resources Integration Reference Point (IRP):
Network Resource Model (NRM)
(3GPP TS 32.622 version 6.7.1 Release 6)

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Foreword

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Contents

Foreword

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

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Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; as identified below:

32.621: "Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Requirements".

32.622: "Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Network Resource Model (NRM)".

32.623: "Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)";

32.624: "Configuration Management (CM); Generic network resources: Integration Reference Point (IRP): Common Management Information Protocol (CMIP) Solution Set (SS)".

32.625: "Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Bulk CM eXtensible Markup Language (XML) file format definition".

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].

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: "Telecommunication management; Principles and high level requirements".

[2] 3GPP TS 32.102: "Telecommunication management; Architecture".

[3] 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Information Service (IS)".

[4] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and Definitions".

[5] Void.

[6] Void.

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

[8] Void.

[9] Void.

[10] Void.

[11] 3GPP TS 32.111-2: "Telecommunication management; Fault Management; Part 2: Alarm Integration Reference Point (IRP): Information Service (IS)".

[13] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[14] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".

[15] Void.

[16] Void.

[17] 3GPP TS 32.662: "Telecommunication management; Configuration Management (CM); Kernel CM Information Service (IS)".

[18] 3GPP TS 32.152: "Telecommunication management; Integration Reference Point (IRP) Information Service (IS) Unified Modelling Language (UML) repertoire".

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.

Information Object Class (IOC): Within the context of all IRP IS specifications, IOC is the term used instead of MOC for a managed object class. MOC is used on the SS level. See also the definition of **Managed Object.**

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. See also the def. of MO in TS 32.101 [1]. The MO is instance of a MO class (MOC) defined in a MIM/NRM. This class, within the context of this Information Service specification called **Information Object Class (IOC),** 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 3.1 depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

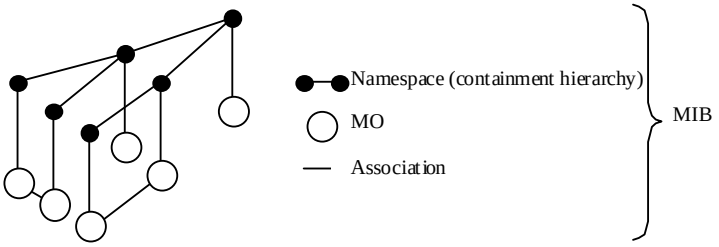


Figure 3.1: Relationships between a Name space and a number of participating MOs

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
IOC	Information Object Class
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 Compliance rules

The following defines the meaning of Mandatory and Optional IOC attributes and associations between IOCs, in Solution Sets to the IRP IS defined by the present document:

- 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 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

See 3GPP TS 32.102 [2] clause 10.

6 Information Object Class (IOC) definitions

6.1 Information Object Classes

6.1.1 Imported Information entities and local labels

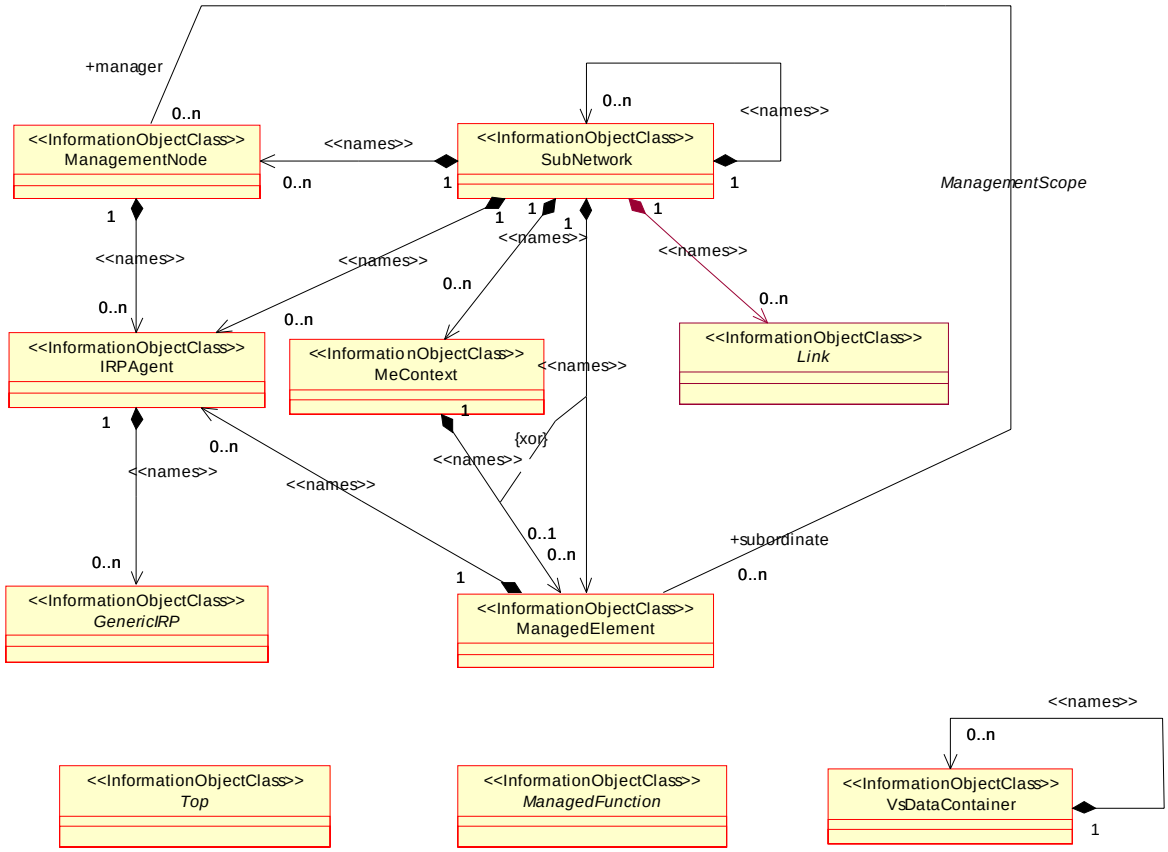
Label reference	Local label
3GPP TS 32.111-2 [11], notification, `notifyAckStateChanged`	`notifyAckStateChanged`
3GPP TS 32.662 [17], notification, `notifyAttributeValueChanged`	`notifyAttributeValueChanged`
3GPP TS 32.111-2 [11], notification, `notifyChangedAlarm`	`notifyChangedAlarm`
3GPP TS 32.111-2 [11], notification, `notifyClearedAlarm`	`notifyClearedAlarm`
3GPP TS 32.111-2 [11], notification, `notifyComments`	`notifyComments`
3GPP TS 32.111-2 [11], notification, `notifyNewAlarm`	`notifyNewAlarm`
3GPP TS 32.662 [17], notification, `notifyObjectCreation`	`notifyObjectCreation`
3GPP TS 32.662 [17], notification, `notifyObjectDeletion`	`notifyObjectDeletion`

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 clauses provide more detailed specification of various aspects of these information object classes.

Figure 6.1 shows the containment/naming hierarchy and the associations of the generic information object classes defined in the present document.

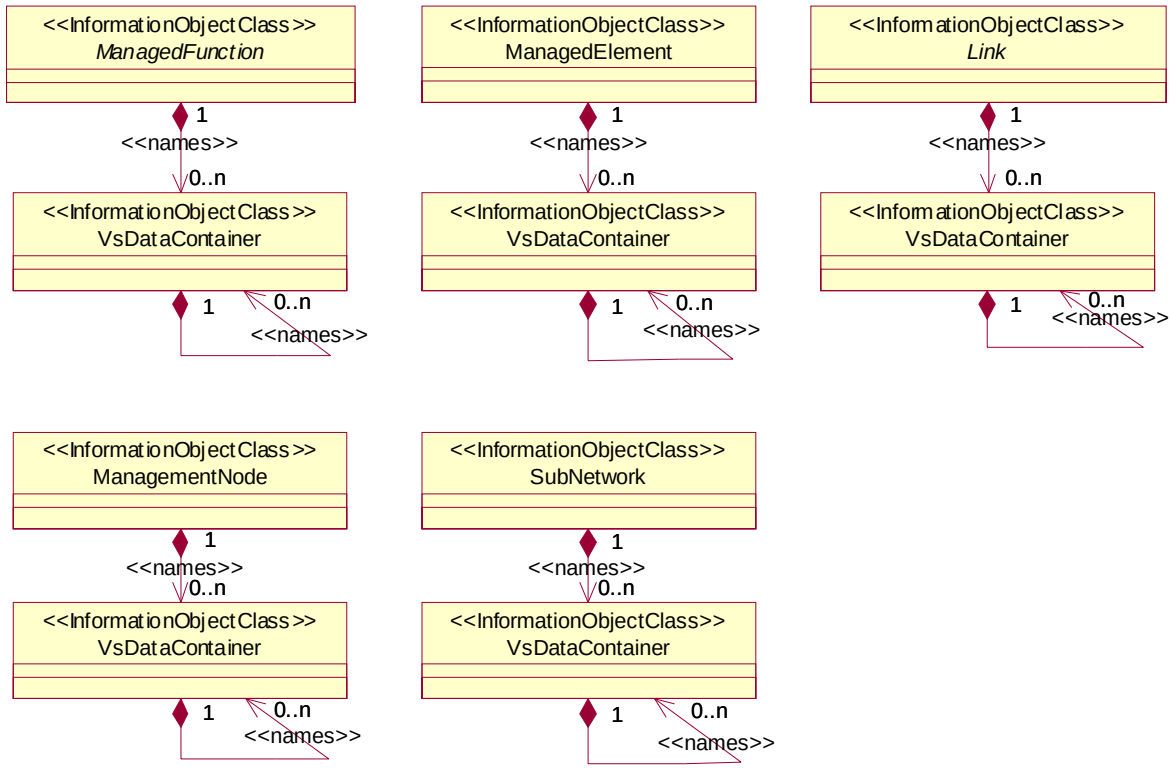


NOTE 1: `ManagedElement` may be contained in either a `SubNetwork` or a `MeContext` instance (also shown by the {xor} constraint), or have no parent instance at all.
NOTE 2: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.
NOTE 3: Each instance of the `VsDataContainer` shall only be contained under one IOC. The `VsDataContainer` can be contained under IOCs defined in other NRMs.
NOTE 4: If the configuration contains several instances of `SubNetwork`, exactly one `SubNetwork` instance shall directly or indirectly contain all the other `SubNetwork` instances.
NOTE 5: The `SubNetwork` instance not contained in any other instance of `SubNetwork` is referred to as "the root `SubNetwork` instance".
NOTE 6: `ManagementNode` shall be contained in the root `SubNetwork` instance.
NOTE 7: If contained in a `SubNetwork` instance, `IRPAgent` shall be contained in the root `SubNetwork` instance.
NOTE 8: For a clarification on the choice of containment of the `IRPAgent` (since it has three possible parents), see the def. of `IRPAgent`.

Figure 6.1: 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.



NOTE 1: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

NOTE 2: Each instance of the VsDataContainer shall only be contained under one IOC. The VsDataContainer can be contained under IOCs defined in other NRMs by virtue of inheritance from the GENERIC NRM.

Figure 6.2: VsDataContainer Containment/Naming and Association in GENERIC NRM diagram

The VsDataContainer is only used for the Bulk CM IRP.

6.1.2.2 Inheritance

This clause depicts the inheritance relationships that exist between information object classes.

Figure 6.3 shows the inheritance diagram.

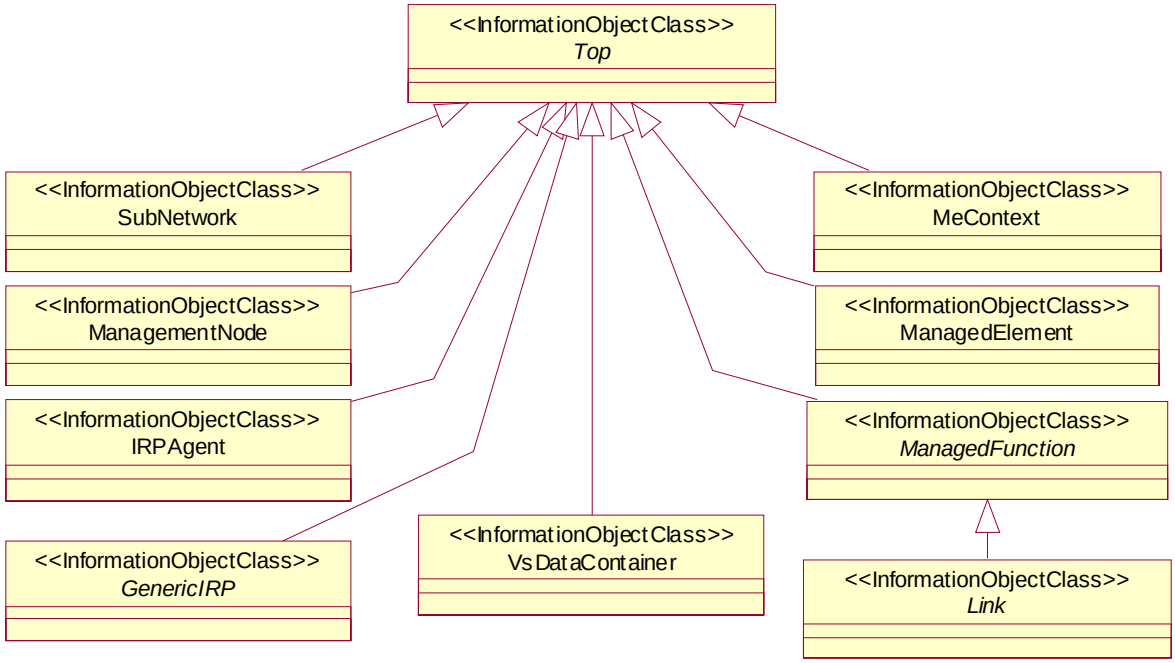


Figure 6.3: Generic Network Resource Model IRP Inheritance Hierarchy

6.1.3 Information object class definitions

6.1.3.1 GenericIRP

6.1.3.1.1 Definition

This IOC 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

Attributes of `GenericIRP`

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
`iRPId`	M	M	-

6.1.3.2 `IRPAgent`

6.1.3.2.1 Definition

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

The `IRPAgent` will be contained under an IOC 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

Attributes of IRPAgent

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
iRPAgentId	M	M	-
systemDN	C	M	-

6.1.3.2.3 Void

6.1.3.3 ManagedElement

6.1.3.3.1 Definition

This IOC 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".

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

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

Single function ManagedElement IOC instances will have a 1..1 containment relationship to a function IOC instance (in this context a function IOC instance is an instance of an IOC derived from the ManagedFunction IOC). Multiple function ManagedElement instances will have a 1..N containment relationship to function IOC instances.

NOTE: For some specific functional IOCs a 1..N containment relationship is permitted. The specific functional entities are identified in the NRMs that define subclasses of ManagedFunction.

6.1.3.3.2 Attributes

Attributes of ManagedElement

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
managedElementId	M	M	-
dnPrefix	M	M	-
managedElementType	M	M	-
userLabel	M	M	M
vendorName	M	M	-
userDefinedState	M	M	M
locationName	M	M	-
swVersion	M	M	-
managedBy	M	M	-

6.1.3.3.3 Attribute constraints

Attribute constrains for dnPrefix: The attribute dnPrefix shall be supported if an instance of ManagedElement is the local root instance of the MIB. Otherwise the attribute shall be absent or carry no information.

6.1.3.3.4 Void

6.1.3.4 ManagedFunction

6.1.3.4.1 Definition

This IOC is provided for sub-classing only. It provides attribute(s) that are common to functional IOCs. Note that a `ManagedElement` 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

Attributes of `ManagedFunction`

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
`userLabel`	M	M	M

6.1.3.5 ManagementNode

6.1.3.5.1 Definition

This IOC represents a telecommunications management system (EM) within the TMN that contains functionality for managing a number of `ManagedElements` (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

Attributes of `ManagementNode`

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
`managementNodeId`	M	M	-
`userLabel`	M	M	M
`vendorName`	M	M	-
`userDefinedState`	M	M	M
`locationName`	M	M	-
`swVersion`	M	M	-
`managedElements`	M	M	-

6.1.3.5.3 Void

6.1.3.6 `MeContext`

6.1.3.6.1 Definition

This IOC 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 IOC instances under those MEs. One way could be to set different `dnPrefix` 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

Attributes of MeContext

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
meContextId	M	M	-
dnPrefix	M	M	-

6.1.3.6.3 Attribute constraints

Attribute constrains for dnPrefix: The attribute dnPrefix shall be supported if an instance of MeContext is the local root instance of the MIB. Otherwise the attribute shall be absent or carry no information.

6.1.3.6.4 Void

6.1.3.7 SubNetwork

6.1.3.7.1 Definition

This IOC 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).

The SubNetwork instance not contained in any other instance of SubNetwork is referred to as "the root SubNetwork instance".

6.1.3.7.2 Attributes

Attributes of SubNetwork

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
subNetworkId	M	M	-
dnPrefix	M	M	-
userLabel	M	M	M
userDefinedNetworkType	M	M	-
setOfMcc	M	M	-

6.1.3.7.3 Attribute constraints

Attribute constrains for dnPrefix: The attribute dnPrefix shall be supported if an instance of SubNetwork is the local root instance of the MIB. Otherwise the attribute shall be absent or carry no information.

Attribute constrains for setOfMcc: If there may be more than one MCC value in the SubNetwork instance, the attribute setOfMcc is mandatory. Otherwise it is optional.

6.1.3.7.4 Void

6.1.3.8 Top

6.1.3.8.1 Definition

This IOC 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

Attributes of Top

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
objectClass	M	M	-
objectInstance	M	M	-

6.1.3.9 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 IOC shall only be used by the Bulk CM IRP for all the NRMs.

6.1.3.9.2 Attribute

Attributes of VsDataContainer

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
vsDataContainerId	M	M	-
vsDataType	M	M	-
vsData	M	M	O
vsDataFormatVersion	M	M	-

6.1.3.10 Link

6.1.3.10.1 Definition

This IOC represents a communication link or reference point between two network entities. The Link IOC does not indicate whether the represented communication link or reference point is a physical or logical entity.

This IOC cannot be instantiated. It is defined for sub-classing purposes.

For the subclasses of Link, the following rules apply:

1. The subclass names shall have the form "Link_<X>_<Y>", where <X> is a string that represents the IOC at one end of the association related to the particular Link subclass, and <Y> is a string that represents the IOC at the other end of the association. For the order of the two strings, <X> shall come alphabetically before <Y>.

2. In case <X> and <Y> are YyyFunction IOCs (inheriting from ManagedFunction and on first level below ManagedElement), the <X> and <Y> strings shall have the same form as the legal values of the managedElementType attribute (see clause 6.5.1), e.g. "Auc". Otherwise <X> and <Y> shall be the full IOC names.

Thus, two valid examples of Link subclass names would be: Link_As_Cscf and Link_Mrfc_Mrfp.

6.1.3.10.2 Attributes

Attributes of `Link`

Attribute Name	Support Qualifier	Read Qualifier	Write Qualifier
`linkId`	M	M	-
`userLabel`	M	M	M
`aEnd`	M	M	-
`zEnd`	M	M	-
`linkType`	O	M	-
`protocolName`	O	M	-
`protocolVersion`	O	M	-

6.1.3.10.3 Void

6.1.4 Information relationship definitions

6.1.4.1 ManagementScope **(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 Manager and Subordinate. The role Manager models the fact that a `ManagementNode` is responsible for managing zero or more MEs, and the role Subordinate models the fact that an ME is managed by zero or one `ManagementNode`. Each role is in the IOC definition mapped to a reference attribute with the same name.

6.1.4.1.2 Roles

The roles involved in the relation ManagementScope are listed in the following table.

Roles of the relation ManagementScope

Name	Definition
Manager	This role represents the `ManagementNode's` capability to identify the set of related `ManagedElements`. This role is modelled by a reference attribute named `managedElements`. `ManagementNode.managedElements` shall carry the set of `ManagedElement` DN(s).
Subordinate	This role represents the `ManagedElement's` capability to identify the set of related `managementNode(s)`. This role is modelled by a reference attribute named `managedBy`. `ManagedElement.managedBy` shall carry the set of `ManagementNode` DN(s).

6.1.4.1.3 Constraints

Name	Definition
-	-

6.1.5 Information attribute definitions

6.1.5.1 Definitions and legal values

The following table defines the attributes that are present in several information object classes of the present document.

Attributes

Attribute Name	Definition	Legal Values
aEnd	The value of this attribute shall be the 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. Note that if the <X> and <Y> substrings as part of the Link subclass name are the same (e.g., Link_Bgcf_Bgcf), no ordering can be implied.	Single DN string as defined in TS 32.300 [13]
dnPrefix	It carries the DN Prefix information as defined in Annex C of 32.300 [13] or no information.	
linkId	An attribute whose 'name+value' can be used as an RDN when naming an instance of the link object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	Values to be conformant with TS 32.300 [13]
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 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.	The legal 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. If a ManagedElement contains multiple instances of a ManagedFunction this attribute will not contain repeated values. The capitalisation (usage of upper/lower case) of characters in this attribute is insignificant. Thus, the IRPManager should be case insensitive when reading these values. Two examples of legal values are: • NodeB; • HLR,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.	

Attribute Name	Definition	Legal Values
linkType	This attribute defines the type of the link.	Signalling, Bearer, OAM&P, Other or multiple combinations of the above types.
locationName	The physical location of this entity (e.g. an address).	
managedElements	Models the role Manager – see clause 6.1.4.1.2. This attribute contains a list of the DN(s) of the related ManagedElement instance(s).	
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.	
managedBy	Models the role Subordinate – see clause 6.1.4.1.2. This attribute contains a list of the DN(s) of the related ManagementNode instance(s).	
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.	
protocolName	Name(s) and additional descriptive information for the protocol(s) used for the associated communication link. Syntax and semantic is not specified.	
protocolVersion	Versions(s) and additional descriptive information for the protocol(s) used for the associated communication link. Syntax and semantic is not specified.	
setOfMcc	Set of Mobile Country Code (MCC). The MCC uniquely identifies the country of domicile of the mobile subscriber. MCC is part of the IMSI (Ref. 3GPP TS 23.003). This list contains all the MCC values in subordinate object instances to this SubNetwork instance. Every unique value of MCC shall only appear once in the list.	
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 ManagementNode or ManagedElement (this is used for determining which version of the vendor specific information is valid for the ManagementNode or ManagedElement).	
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 (and user assignable) 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 algorithm parameters, cell specific parameters for power control or re-selection or a timer. The type itself is also vendor specific.	

Attribute Name	Definition	Legal Values
zEnd	The value of this attribute shall be the 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. Note that if the <X> and <Y> substrings as part of the Link subclass name are the same (e.g., Link_Bgcf_Bgcf), no ordering can be implied.	Single DN string as defined in TS 32.300 [13]

6.1.5.2 Constraints

Name	Definition
-	-

6.1.6 Common Notifications

Notifications

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	
notifyComments	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAlarmListRebuilt	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyPotentialFaultyAlarmList	See Alarm IRP (3GPP TS 32.111-2 [11])	

The Notifications provided in the above table do not apply the following IOCs*:*

- `GenericIRP`
- `ManagedFunction`
- `Top`
- `VsDataContainer`

Note that these notifications are issued based on occurrences on the `IRPAgent` IOC and not on occurrences on other IOCs.

6.1.7 Particular information configurations

Not applicable.

Annex A (informative):
Void

Annex B (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Cat**	**Old**	**New**
Jun 2001	SA_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	--	2.0.0	4.0.0
Sep 2001	SA_13	SP-010479	0001	--	Add the notification notifyComments in all MOCs that support alarms and correct the list of allowed members of the attribute managedElementType of the MOC managedElement	F	4.0.0	4.1.0
Sep 2001	SA_13	SP-010479	0002	--	Correction of Generic NRM Containment/Naming and Association diagram	F	4.0.0	4.1.0
Sep 2001	SA_13	SP-010479	0003	--	Correct description of swVersion attribute	F	4.0.0	4.1.0
Mar 2002	SA_15	SP-020020	0004	--	Addition of managedElementType value for GSM Radio Access Network support	F	4.1.0	4.2.0
Jun 2002	SA_16	SP-020299	0005	--	Remove R99-inherited restriction of self-containment for MOC SubNetwork	F	4.2.0	4.3.0
Sep 2002	SA_17	SP-020488	0006	--	Upgrade to Rel-5 (Add new IS method, MOC name convention)	C	4.3.0	5.0.0
Jun 2003	SA_20	SP-030280	0008	--	Correction of Notifications for IOCs	A	5.0.0	5.1.0
Dec 2003	SA_22	SP-030643	0010	--	Add Missing VsDataContainer for ManagedFunction & ManagedElement and Other IOCs (Version 2)	F	5.1.0	5.2.0
Dec 2003	SA_22	SP-030644	0011	--	Correction of UML diagram and other corrections	F	5.1.0	5.2.0
Dec 2003	SA_22	SP-030648	0012	--	Add SetofMcc attribute in Generic NRM IOCs for NRM alignment	B	5.2.0	6.0.0
Mar 2004	SA_23	SP-040128	0014	--	Addition of missing attributes for the managementScope association	A	6.0.0	6.1.0
Jun 2004	SA_24	SP-040249	0016	--	Add missing attribute constraints for dnPrefix	A	6.1.0	6.2.0
Jun 2004	SA_24	SP-040251	0018	--	Correction of legal values for managedElementType attribute	A	6.1.0	6.2.0
Dec 2004	SA_26	SP-040808	0020	--	Correct the write qualification for VsDataContainer.vsData	F	6.2.0	6.3.0
Dec 2004	SA_26	SP-040808	0021	--	Correction of modelling of Media GateWay (MGW)	F	6.2.0	6.3.0
Mar 2005	SA_27	SP-050046	0022	--	Add Link class to generic NRM Information Service	B	6.3.0	6.4.0
Mar 2005	--	--	--	--	MCC removed reference [16] TS 32.642 as NOT used in body text	--	6.3.0	6.4.0
Dec 2005	SA_30	SP-050712	0023	--	Correct Compliance rules	F	6.4.0	6.5.0
Dec 2005	SA_30	SP-050716	0024	--	Delete Annex A (moved to 32.300)	F	6.4.0	6.5.0
Dec 2005	SA_30	SP-050724	0025	--	Apply IS Template - Align with 32.151 and 32.152	F	6.4.0	6.5.0
Sep 2006	SA_33	SP-060535	0027	--	Extend the usage of VsDataContainer by BulkCMIRP to all 3GPP NRMs	F	6.5.0	6.6.0
Dec 2006	SA_34	SP-060711	0028	--	Clarify and correct errors in Link IOC related definitions	F	6.6.0	6.7.0
Jan 2007	--	--	--	--	Editorial: added missing right-hand parenthesis/bracket, in the zEnd attribute definition, last row of table 6.5.1.	--	6.7.0	6.7.1

History

Document history		
V6.3.0	December 2004	Publication (Withdrawn)
V6.3.1	March 2005	Publication
V6.4.0	March 2005	Publication
V6.5.0	December 2005	Publication
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V6.7.1	December 2006	Publication