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Technical Specification

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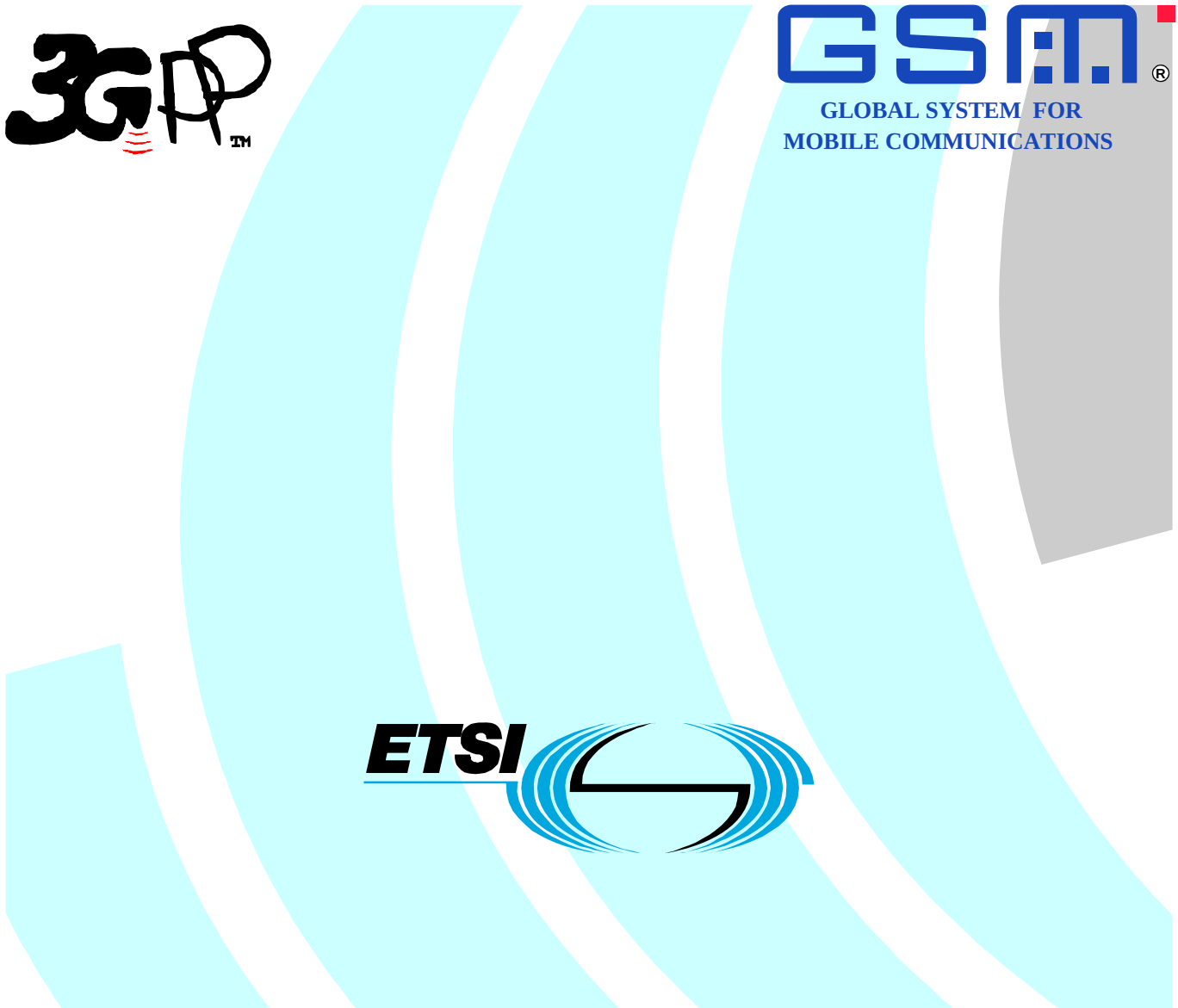
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Configuration Management (CM);
Kernel CM;
Information service (IS)
(3GPP TS 32.662 version 5.3.0 Release 5)



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

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

Siret N° 348 623 562 00017 - NAF 742 C
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Foreword

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Contents

Foreword

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

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

Version x.y.z

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  - 1 presented to TSG for information;
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- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part of the 32.66x-series covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Configuration Management (CM), as identified below:

32.661	Kernel CM requirements
32.662	**Kernel CM Information Service (IS)**
32.663	Kernel CM Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)
32.664	Kernel CM Integration Reference Point (IRP): Common Management Information Protocol (CMIP) Solution Set (SS)

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

1 Scope

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

The function of this Kernel CM IRP Information Service is to define an interface that provides the essential CM services. While it is not expected that the Kernel CM IRP alone will provide adequate CM capability, The Kernel CM IRP is expected to provide the common supporting capability required for other IRPs such as the Basic CM IRP or the Bulk CM IRP, each of which require the Kernel CM IRP.

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 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management; Information Service (IS)".

[5] 3GPP TS 32.622: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Network Resource Model (NRM)".

[6] Void.

[7] ITU-T Recommendation X.710 (1997): "Information technology - Open Systems Interconnection - Common Management Information Service".

[8] ITU-T Recommendation X.721 (1992): "Information technology - Open Systems Interconnection - Structure of Management Information: Definition of management information".

[9] ITU-T Recommendation X.730 (1992): "Information technology - Open Systems Interconnection - Systems Management: Object Management Function".

[10] ITU-T Recommendation X.733 (1992): "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[11] - [12] Void.

[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] ITU-T Recommendation X.720: "Information technology - Open Systems Interconnection - Structure of management information: Management information model".

[16] 3GPP TS 32.623: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)".

[17] 3GPP TS 32.643: "Telecommunication management; Configuration Management (CM); UTRAN network resources Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)".

[18] 3GPP TS 32.642: "Telecommunication management; Configuration Management (CM); UTRAN network resources Integration Reference Point (IRP): Network Resource Model (NRM)".

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 TS 32.101 [1], TS 32.102 [2] and 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): instance of the Managed Object Class G3ManagedElement

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. Furthermore, an MO class can have **operations** that represent the behaviour relevant for that class. 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).

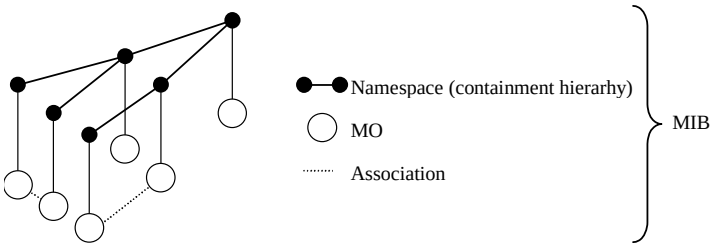


Figure 3.1: Relationships between a Name space and a number of participating MOs

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 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:

CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CN	Core Network
CORBA	Common Object Request Broker Architecture
DN	Distinguished Name (see TS 32.300 [13])
EM	Element Manager
FM	Fault Management
IDL	Interface Definition Language
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Sector
ME	Managed Element
MIB	Management Information Base
MIM	Management Information Model
MO	Managed Object
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
PM	Performance Management
RDN	Relative Distinguished Name (see TS 32.300 [13])
SNMP	Simple Network Management Protocol
SS	Solution Set
TMN	Telecommunications Management Network
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System
VSE	Vendor Specific Extensions

4 System overview

4.1 System context

Figures 4.1 and 4.2 identify system contexts of the IRP defined by the present specification in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see TS 32.102 [2].

The IRPAgent implements and supports this IRP. The IRPAgent can reside in an Element Manager (EM) or a Network Element (NE) (see also [2] clause 8). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not the subject of this IRP.

An NE can be managed via System Context A or B. The criterion for choosing System Context A or B, to manage a particular NE, is implementation dependent. An IRPAgent shall support one of the two System Contexts. By observing the interaction across the Itf-N, an IRPManager cannot deduce if the EM and NE are integrated in a single system or if they run in separate systems.

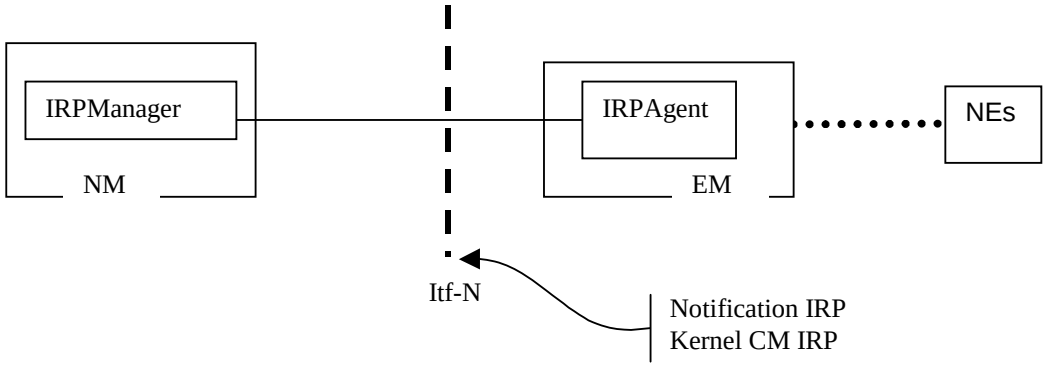


Figure 4.1: System Context A

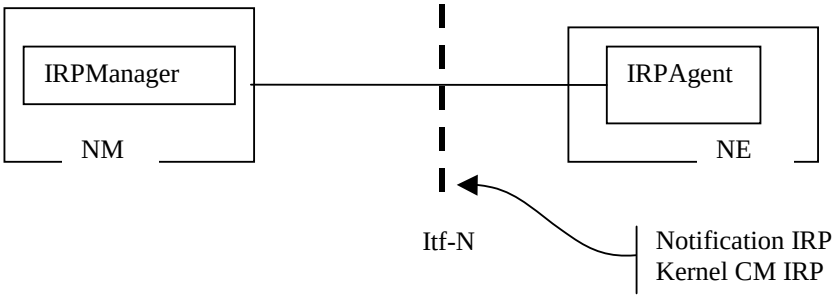


Figure 4.2: System Context B

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 TS 32.102 [2].

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 described in TS 32.101 [1], an IRP comprises the following components:

(1) an **IRP Information Model** that specifies the interface in a protocol neutral manner, defined as an Information Service and/or one or more Network Resource Models,

(2) a number of **IRP Solution Sets** that provide the actual realization of the operations and notifications defined in the IRP Information Model for each protocol environment.

The present document defines one such Information Service – the Kernel CM IRP: IS.

The IRP Information Service is a specification of the *operations* and *notifications* that are visible over the IRP. These operations/notifications are generic in the sense that they do not specify the Managed Objects that are retrieved/manipulated/informed about over the interface, and thus this IS is independent of the NRM being managed.

5.1 IRP Information Service modelling approach

The IRP Information Service of the subject IRP specifies a number of protocol-independent operations and notifications that are needed by an IRPManager to retrieve CM information from an IRPAgent.

The operations and notifications of the IRP Information Service are mainly based on the principles of the Common Management Information Service (CMIS) defined in ITU-T Recommendation X.710 [7] and ITU-T Recommendation X.721 [8] (M-GET etc.). Note however, that the Information Service of the subject IRP is focused on the essential operations and notifications needed for CM purposes and thus only covers a subset of the operations/notifications defined in ITU-T Recommendation X.710 [7]/ITU-T Recommendation X.721 [8].

It is expected that most Solution Sets will implement the operations and notifications by mapping them to standard operations (and possibly standard notifications) that are applicable in the corresponding protocol environment.
A CMIP Solution Set should for instance map the operations to the more generic operations defined in CMIS, an SNMP Solution Set should map the operations to applicable SNMP operations, and a CORBA Solution Set should map the operations to applicable OMG/CORBA services.

6 Information Object Classes (IOCs)

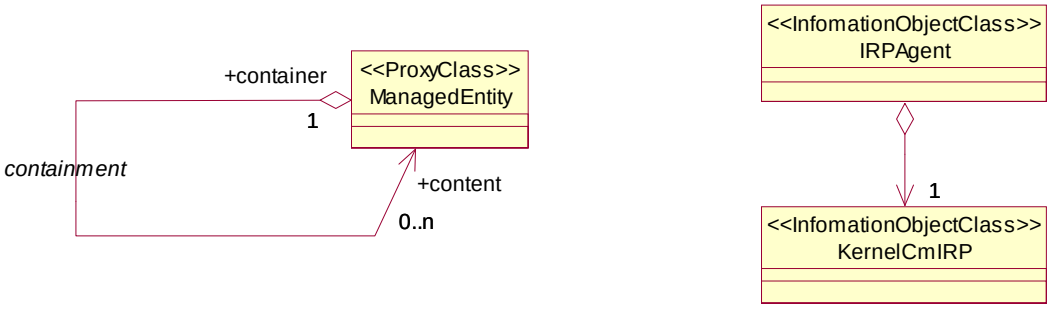
6.1 Imported Information entities and local labels

Label reference	Local label
32.622 [5], information object class, Top	Top
32.622 [5], information object class, IRPAgent	IRPAgent
32.622 [5], information object class, GenericIRP	GenericIRP
32.312 [4], information object class, ManagedGenericIRP	ManagedGenericIRP

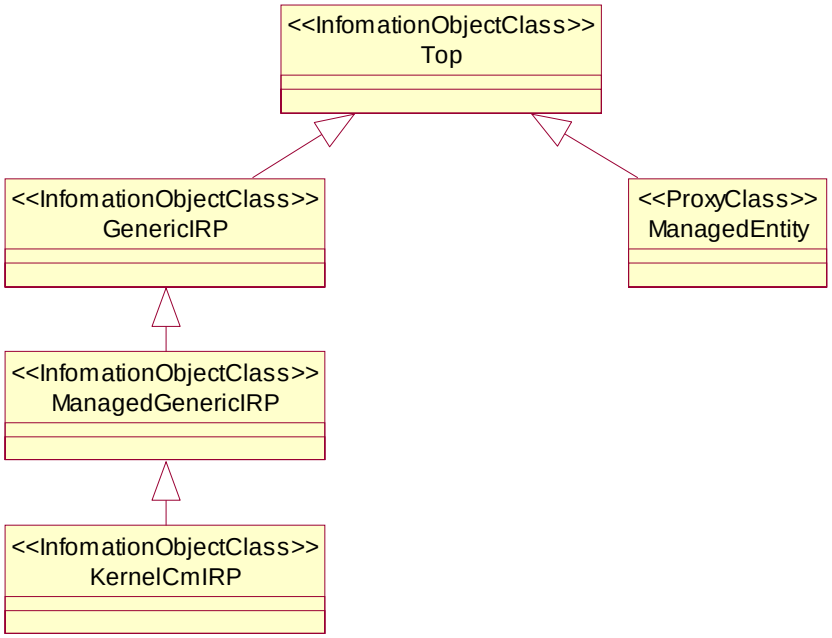
6.2 Class diagram

This sub-clause introduces the set of information object classes (IOCs) that encapsulate information within the `IRPAgent`. The intent is to identify the information required for the KernelCmIRP Agent implementation of its operations and notification emission. This sub-clause provides the overview of all support object classes in UML. Subsequent sub-clauses provide more detailed specification of various aspects of these support object classes.

6.2.1 Attributes and relationships



6.2.2 Inheritance



6.3 Information Object Class Definitions

6.3.1 KernelCmIRP

6.3.1.1 Definition

`KernelCmIRP` is the representation of the Kernel configuration management capabilities specified by the present document. This IOC inherits from `ManagedGenericIRP` IOC specified in TS 32.312 [4].

6.3.2 ManagedEntity

6.3.2.1 Definition

The IOC `ManagedEntity` represents the role that can be played by an instance of an IOC defined in Network Resources Models, e.g. Generic Network Resource Model, Core Network Resource Model, UTRAN Network Resource Model or GERAN Network Resource Model.

6.4 Information relationship definitions

6.4.1 containment (M)

6.4.1.1 Definition

This represents the relationship containment as defined in ITU-T Recommendation X.720 [15].

6.4.1.2 Role

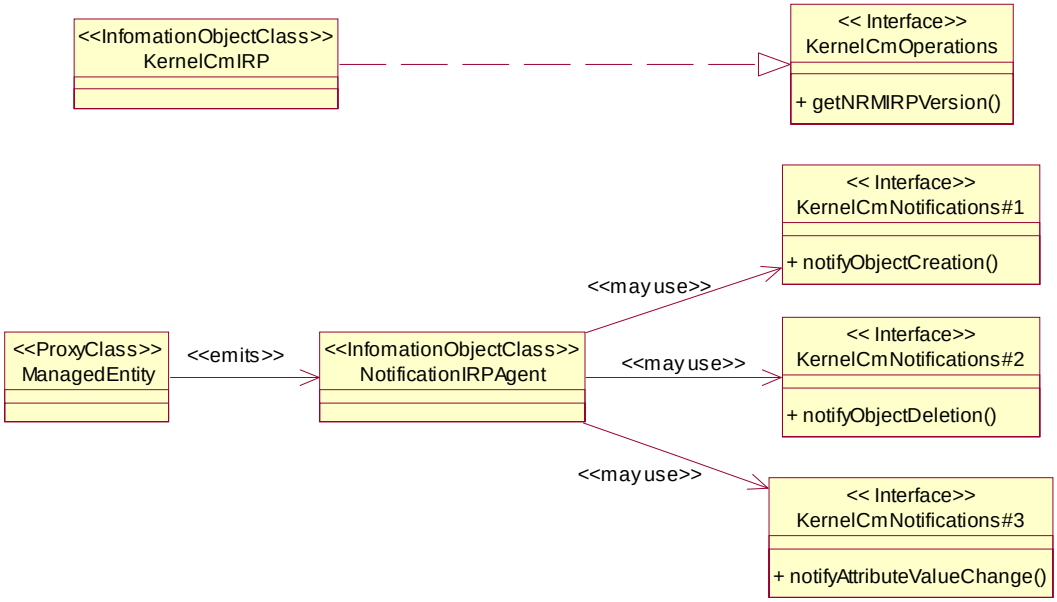
Name	Definition
container	It represents the capability, for an instance of a ManagedEntity, to contain other objects.
content	It represents the capability, for an instance of a ManagedEntity, to be contained in another object.

6.4.1.3 Constraint

Name	Definition
inv_noSelfContainment	No instance of the IOC ManagedEntity can play both roles container and content in the same instance of the relationship containment.

7 Interface Definition

7.1 Class diagram



7.2 Generic rules

Rule 1: Each operation with at least one input parameter supports a pre-condition valid_input_parameter which indicates that all input parameters shall be valid with regards to their information type. Additionally, each such operation supports an exception operation_failed_invalid_input_parameter which is raised when pre-condition valid_input_parameter is false. The exception has the same entry and exit state.

Rule 2: Each operation with at least one optional input parameter supports a set of pre-conditions supported_optional_input_parameter_xxx where "xxx" is the name of the optional input parameter and the pre-condition indicates that the operation supports the named optional input parameter. Additionally, each such operation supports an exception operation_failed_unsupported_optional_input_parameter_xxx which is raised when (a) the pre-condition supported_optional_input_parameter_xxx is false and (b) the named optional input parameter is carrying information. The exception has the same entry and exit state.

Rule 3: Each operation shall support a generic exception operation_failed_internal_problem that is raised when an internal problem occurs and that the operation cannot be completed. The exception has the same entry and exit state.

7.3 Interface KernelCmIRPOperations

7.3.1 Operation `getNRMIRPVersion` (M)

7.3.1.1 Definition

When the IRPManager invokes `getNRMIRPVersion` to find out the Network Resource IRP SS document versions (IRPVersions) supported by the IRPAgent, the IRPAgent shall respond, via the `versionNumberList` output parameter, with a list of supported Network Resource IRPversions. An example of this return value can contain two IRPVersions, where one indicates the 3GPP Generic Network Resource IRPVersion (e.g. "TS 32.623 V4.2" in case of CORBA implementation) while the other indicates the 3GPP UTRAN Network Resource IRPVersion (e.g. "TS 32.643 V4.1" in case of CORBA implementation).

It is expected that vendors may provide vendor-specific extended capabilities and features (VSE) that are based on a 3GPP published specification. It is further expected that the vendor will publish these VSE in a document with an unambiguous identification.

If an IRPAgent does not support VSE, the `vSEVersionNumberList` parameter shall contain no information.

If an IRPAgent supports VSE, the `vSEVersionNumberList` parameter shall contain identification of one or more documents published by the vendor. The `versionNumberList` shall contain the IRPVersions indicating the 3GPP Network Resource IRP specifications on which the VSE is based. The versionNumberList may only identify IRPVersions that are consistent with the requirements of clause 4.2 of the present document and similar requirements statements in all CM and Network Resource IRPs. The convention to identify the vendor-specific document is not a subject of the present document. It is recommended that the identification should include (a) the 3GPP IRPVersion on which the VSE is based (b) the name of the vendor and (c) the identification of the VSE document and/or its version. The inclusion of the part-(b) is to avoid possible name conflict in a multi-vendor environment. An example would be "TS 32.642 V4.0 Ericsson v.1". This sample indicates the identification of a document published by Ericsson that specifies a list of VSE that is based on the TS 32.642 V4.0.x". Note in this example, the IRPVersion "TS 32.642 V4.0" shall also be present in the `versionNumberList`.

The lists returned by `versionNumberList` and `vSEVersionNumberList` shall not contain duplicates.

7.3.1.2 Input parameters

None.

7.3.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
versionNumberList	M	ManagedGenericIRP.iRPVersion	It carries one or more SS version numbers supported by this IRP agent.
vSEVersionNumberList	M	ManagedGenericIRP.iRPVersion	It carries one or more identifications of vendor published documents containing VSE NRMs specifications.
status	M	ENUM (Operation succeeded, Operation failed)	If operation_failed_internal_problem status = OperationFailed.

7.3.1.4 Pre-condition

None specific.

7.3.1.5 Post-condition

None specific.

7.3.1.6 Exceptions

None specific.

7.4 Interface KernelCmIRPNotifications#1

7.4.1 notifyObjectCreation (O)

7.4.1.1 Definition

IRPAgent notifies the subscribed IRPManager that a new Managed Object has been created and that the new object satisfies the filter constraint expressed in IRPManager"s `subscribe` operation (see TS 32.302 [3]). This notification is based on the `objectCreation` notification type specified in ITU-T Recommendation X.721 [8] and ITU-T Recommendation X.730 [9] (difference compared to these specifications are indicated in the description below).

7.4.1.2 Input Parameters

Parameter Name	Qualifier	Matching Information	Comment
objectClass	M,F	ManagedEntity.objectClass	Notification header - see [3].
objectInstance	M,F	ManagedEntity.objectInstance.	Notification header - see [3].
notificationId	M	This carries the semantics of notification identifier.	Notification header - see [3].
eventTime	M,F	ManagedEntity.creationTime	Notification header - see [3].
systemDN	C,F	IRPAgent.systemDN where the IRPAgent is related to the KernelCmIRP.	Notification header - see [3].
notificationType	M,F	Mapped to notificationType in [3] – see annex A	Notification header - see [3].
correlatedNotifications	O	See comment.	A set of notifications that are correlated to the subject notification. Defined in ITU-T Recommendation X.733 [10].
additionalText	O	Text.	It can contain further information on the creation of the MO.
sourceIndicator	O	ENUM(Resource_operation, Management_operation, Unknown)	This parameter, when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values: resource operation: The notification was generated in response to an internal operation of the resource; management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; unknown: It is not possible to determine the source of the operation.
attributeList	O	LIST OF SEQUENCE <AttributeName, AttributeValue>	The attributes (name/value pairs) of the created MO.

NOTE: F in the Qualifier column denotes a Filterable Parameter.

7.4.1.3 Triggering Event

7.4.1.3.1 From-state

stateBeforeObjectCreation.

Assertion Name	Definition
stateBeforeObjectCreation	The number of instances of the IOC ManagedEntity is equal to N.

7.4.1.3.2 To-state

stateAfterObjectCreation.

Assertion Name	Definition
stateAfterObjectCreation	The number of instances of the IOC ManagedEntity is equal to N + 1.

7.5 Interface KernelCmIRPNotifications#2

7.5.1 notifyObjectDeletion (O)

7.5.1.1 Definition

IRPAgent notifies the subscribed IRPManager of a deleted Managed Object. The IRPAgent invokes this notification because the subject notification satisfies the filter constraint expressed in the IRPManager `subscribe` operation (see TS 32.302 [3]). This notification is based on the `objectDeletion` notification type specified in ITU-T Recommendation X.721 [8] and ITU-T Recommendation X.730 [9] (difference compared to these specifications are indicated in the description below).

Note that when a Managed Object is deleted, all subordinate Managed Objects (i.e. the complete sub-tree of the MIB) are also deleted. Furthermore, all associations where the Managed Object participates are deleted.

7.5.1.2 Input Parameters

Parameter Name	Qualifier	Matching Information	Comment
objectClass	M,F	ManagedEntity.objectClass	Notification header - see [3].
objectInstance	M,F	ManagedEntity.distinguishedName.	Notification header - see [3].
notificationId	M	This carries the semantics of notification identifier.	Notification header - see [3].
eventTime	M,F	ManagedEntity.deletionTime	Notification header - see [3].
systemDN	C,F	IRPAgent.systemDN where the IRPAgent is related to the KernelCmIRP.	Notification header - see [3].
notificationType	M,F	Mapped to notificationType in [3] – see annex A	Notification header - see [3].
correlatedNotifications	O	See comment	A set of notifications that are correlated to the subject notification. Defined in ITU-T Recommendation X.733 [10]..
additionalText	O	Text	It can contain further information on the deleted MO.
sourceIndicator	O	ENUM(Resource_operation, Management_operation, Unknown)	This parameter, when present, indicates the source of the operation that led to the generation of this notification type. It can have one of the following values: • resource operation: The notification was generated in response to an internal operation of the resource; • management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; • unknown: It is not possible to determine the source of the operation.
attributeList	O	LIST OF SEQUENCE <AttributeName, AttributeValue>	The attributes (name/value pairs) of the deleted MO.
NOTE: F in the Qualifier column denotes a Filterable Parameter.			

7.5.1.3 Triggering Event

7.5.1.3.1 From-state

stateBeforeObjectDeletion.

Assertion Name	Definition
StateBeforeObjectDeletion	The number of instances of the IOC ManagedEntity is equal to N.

7.5.1.3.2 To-state

stateAfterObjectDeletion.

Assertion Name	Definition
stateAfterObjectDeletion	The number of instances of the IOC ManagedEntity is equal to N - 1.

7.6 Interface KernelCmIRPNotifications#3

7.6.1 notifyAttributeValueChange (O)

7.6.6.1 Definition

IRPAgent notifies the subscribed IRPManager of a change of one or several attributes of a Managed Object in the NRM. The IRPAgent invokes this notification because the subject notification satisfies the filter constraint expressed in the IRPManager `subscribe` operation (see TS 32.302 [3]). This notification is based on the `attributeValueChange` notification type specified in ITU-T Recommendation X.721 [8] and ITU-T Recommendation X.730 [9] (difference compared to these specifications are indicated in the following table).

7.6.6.2 Input Parameters

Parameter Name	Qualifier	Matching Information	Comment
objectClass	M,F	ManagedEntity.objectClass	Notification header - see [3].
objectInstance	M,F	ManagedEntity.distinguishedName.	Notification header - see [3].
notificationId	M	This carries the semantics of notification identifier.	Notification header - see [3].
eventTime	M,F	ManagedEntity. AttributeValueChangedTime	Notification header - see [3].
systemDN	C,F	IRPAgent.systemDN where the IRPAgent is related to the KernelCmIRP.	Notification header - see [3].
notificationType	M,F	Mapped to notificationType in [3] – see annex A	Notification header - see [3].
correlatedNotifications	O	See comment	A set of notifications that are correlated to the subject notification. Defined in ITU-T Recommendation X.733 [10].
additionalText	O	Text.	It can contain further information on the attribute change of the MO.
sourceIndicator	O	ENUM(Resource_operation, Management_operation, Unknown)	This parameter, when present, indicates the source of the operation that led to the generation of this notification type. It can have one of the following values: resource operation: The notification was generated in response to an internal operation of the resource; management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; unknown: It is not possible to determine the source of the operation.
attributeValueChange	M	LIST OF SEQUENCE <AttributeName, NewAttributeValue, CHOICE [NULL, OldAttributeValue]>	The changed attributes (name/value pairs) of the MO (with both new and, optionally, old values).
NOTE: F in the Qualifier column denotes a Filterable Parameter.			

7.6.6.3 Triggering Event

7.6.6.3.1 From-state

stateBeforeAttributeValueChange.

Assertion Name	Definition
stateBeforeAttributeValueChange	The subject attribute has a value x.

7.6.6.6.2 To-state

stateAfterAttributeValueChange.

Assertion Name	Definition
stateAfterAttributeValueChange	The subject attribute has a value other than x.

Annex A (normative): Notification/Event Types

Notification IRP: Information Service [3] defines an attribute called `notificationType` that shall be present in all notifications. The present document defines an attribute called `eventType` that shall be present in all CM notifications defined herein. The mapping of this `eventType` to the `notificationType` is that they are semantically equal for the CM notifications. Thus, the event types described below (also the same as in Release 99) shall be mapped to the `notificationType` of the notification header.

This annex lists and explains Event Types used by Kernel CM IRP and then lists the Event Types valid for each notification in this IRP.

Encoding of `eventType` is Solution Set dependent. For example, the value of `eventType` may be encoded as an Object Identifier in the CMIP SS and as a numeric string in the CORBA SS.

The tables below may be extended in the future.

Table A.1: Event Types

Event Types	Explanation
Object creation	A notification of this type indicates that a new managed object instance has been created (as defined in ITU-T Recommendation X.721 [8] and ITU-T X.730 [9]).
Object deletion	A notification of this type indicates that a managed object instance has been deleted (as defined in ITU-T Recommendation X.721 [8] and ITU-T Recommendation X.730 [9]).
Attribute value change	A notification of this type indicates that the value(s) of one or more attributes have changed (as defined in ITU-T Recommendation X.721 [8] and ITU-T Recommendation X.730 [9]).

Table A.2: Event types applicable to each Notification

Notification	Event Type
notifyObjectCreation	Object creation
notifyObjectDeletion	Object deletion
notifyAttributeValueChange	Attribute value change

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Mar 2002	SP_15	SP-020034	--	--	Submitted to TSG SA #15 for Information	1.0.0	
Sep 2002	SP_17	SP-020465	--	--	Submitted to TSG SA #17 for Approval	2.0.0	5.0.0
Dec 2003	SP_22	SP-030630	002	--	Correction of System Context	5.0.0	5.1.0
Mar 2004	SP_23	SP-040119	004	--	Correction of System Context	5.1.0	5.2.0
Dec 2008	SP_42	SP-080851	0011	--	Add missing definition re notifyAttributeValueChange	5.2.0	5.3.0

History

Document history		
V5.0.0	September 2002	Publication
V5.1.0	December 2003	Publication
V5.2.0	March 2004	Publication
V5.3.0	January 2009	Publication