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ETSI

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

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

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

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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:

- 32.601: "Configuration Management (CM); Basic CM Integration Reference Point (IRP); Requirements"
- 32.602: "Configuration Management (CM); Basic CM Integration Reference Point (IRP): Information Service (IS)"**
- 32.606: "Configuration Management (CM); Basic CM Integration Reference Point (IRP); Solution Set (SS) definitions"

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 a component of an Integration Reference Point (IRP) through which an 'IRP Agent' (typically an Element Manager or Network Element) can communicate basic Configuration Management related information to one or several 'IRP Managers' (typically Network Managers).

The function of this Basic CM IRP Information Service is to define an interface for the retrieval and modification of Configuration Management Information.

This Basic CM IRP IS is aligned with ITU-T M.3700 [15] in that ITU-T M.3700 is a subset of the Basic CM IRP IS in terms of the definitions of operations for the retrieval and modification of Configuration Management Information.

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.

- [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 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".
- [6] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".
- [7] ITU-T Recommendation X.710 (1997): "Common Management Information Service".
- [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 32.662: "Telecommunication management; Configuration Management (CM); Kernel CM Information Service (IS)".
- [12] ITU-T Recommendation X.720: "Information technology - Open Systems Interconnection - Structure of management information: Management information model".
- [13] 3GPP TS 32.622: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Network Resource Model (NRM)".

- [14] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and definitions".
- [15] ITU-T M.3700 (01/2010): 'Telecommunication Management, Including TMN and Network Maintenance; Integrated services digital networks; Common management services – Object management – Protocol neutral requirements and analysis'

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 [6].

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 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)

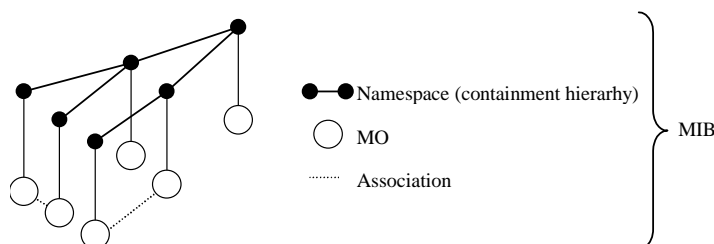


Figure 3.1: Relationships between a Name space and a number of participating MOs

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 3GPP TS 32.300 [5]) 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:

| | |
|-------|---|
| CMIS | Common Management Information Service |
| DN | Distinguished Name (see 3GPP TS 32.300 [5]) |
| IRP | Integration Reference Point |
| ITU-T | International Telecommunication Union, Telecommunication Sector |
| MIB | Management Information Base |
| MIM | Management Information Model |
| MO | Managed Object |
| NE | Network Element |
| NR | Network Resource |
| NRM | Network Resource Model |
| RDN | Relative Distinguished Name (see 3GPP TS 32.300 [5]) |
| SS | Solution Set |
| TMN | Telecommunications Management Network |
| UML | Unified Modelling Language |

4 System overview

4.1 System Context

The general definition of the System Context for the present IRP is found in 3GPP TS 32.150 [14] subclause 4.7.

In addition, the set of related IRP(s) relevant to the present IRP is shown in the two diagrams below.

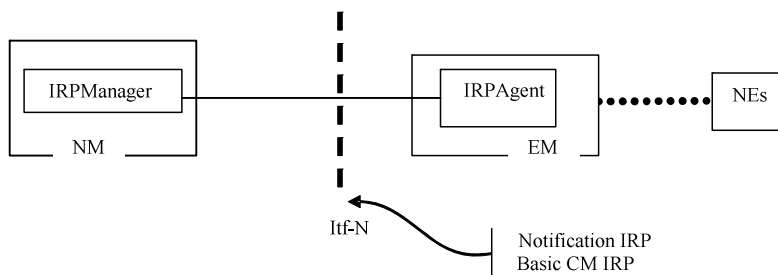


Figure 4.1: System Context A

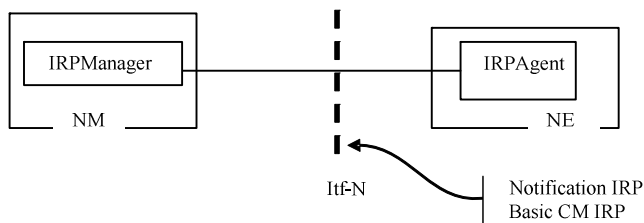


Figure 4.2: System Context B

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 3GPP TS 32.150 [14].

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 32.150 [14].

6 Model

6.1 Imported information entities and local labels

| Label reference | Local label |
|---|-------------------|
| 32.312 [4], information object class, ManagedGenericIRP | ManagedGenericIRP |

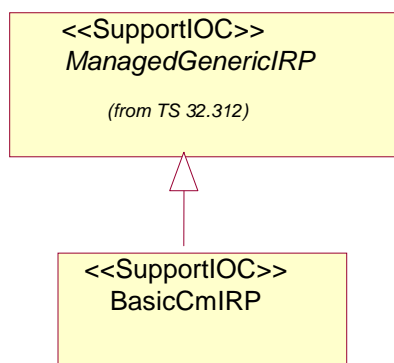
6.2 Class diagram

This clause introduces classes that relates to this interface specification. The intent is to identify the information required for the BasicCMIRP implementation of its operations and notification. This clause provides the overview of all classes in UML. Subsequent clauses provide more detailed specification of various aspects of these classes.

6.2.1 Relationships



6.2.2 Inheritance



6.3 Class Definitions

6.3.1 BasicCmIRP

6.3.1.1 Definition

The SupportIOC `BasicCmIRP` represents the basic configuration management capabilities specified by this specification. This class inherits from `ManagedGenericIRP` specified in TS 32.312 [4].

6.3.2 ManagedEntity

6.3.2.1 Definition

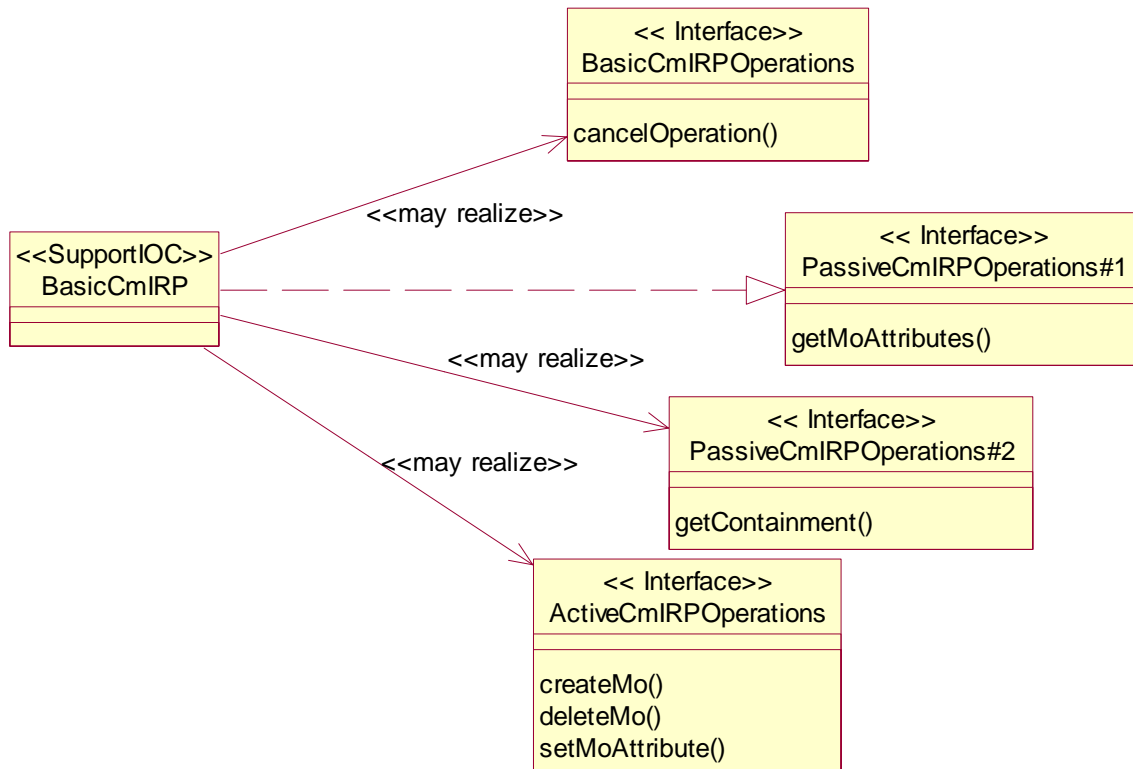
The ProxyClass `ManagedEntity` represents the role that can be played by an instance of an IOC defined in NRMs, e.g. Generic NRM, Core NRM, UTRAN NRM or GERAN NRM. `ManagedEntity` is used in the specification of Basic CM IRP operations to represent an instance of an IOC defined in these NRMs.

6.4 Information relationship definitions

6.4.1 Void

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 PassiveCmIRPOperations#1

7.3.1 getMoAttributes (M)

7.3.1.1 Definition

This operation is invoked by IRPManager to request the retrieval of management information (Managed Object attribute names and values) from the MIB maintained by IRPAgent. One or several Managed Objects may be retrieved - based on the containment hierarchy. This operation provides functionality that is similar to that provided by the M-GET service defined by CMIS (ITU-T Recommendation X.710 [7]).

A SS may choose to split this operation in several operations (e.g. operations to get "handlers" or "iterators" to Managed Objects fulfilling the `scope/filter` criteria and other operations to retrieve attribute names/values from these "handlers").

7.3.1.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|---------------------------------|-----------|---|--|
| <code>invokeIdentifierIn</code> | C | A unique identifier that is SS dependent. | This parameter identifies the current invocation. This parameter is used in the <code>cancelOperation</code> operation to cancel an on-going <code>getMOAttributes</code> operation. |
| <code>baseObjectInstance</code> | M | DN | The MO instance that is to be used as the starting point for the selection of managed objects to which the <code>filter</code> (when supplied) is to be applied. This is a full DN according to 3GPP TS 32.300 [5]. |
| <code>scope</code> | M | SEQUENCE < ENUM { BASE_ONLY, BASE_NTH_LEVEL, BASE_SUBTREE, BASE_ALL}, Level> Note: the Level contains valid information if BASE_NTH_LEVEL or BASE_SUBTREE is used. | This parameter defines how many levels of the containment hierarchy to select for the <code>filter</code> . The selection starts from the base object given by the <code>baseObjectInstance</code> parameter. Its level is considered to be at zero. The levels of selection that may be performed are: <ul style="list-style-type: none"> • BASE_ONLY: select the base object value of Level is ignored;; • BASE_NTH_LEVEL: select all <i>n</i>th level (indicated by the value of Level) subordinate objects; • BASE_SUBTREE: select the base object and all of its subordinates down to and including the <i>n</i>th level; • BASE_ALL: select the base object and all of its subordinates; value of Level is ignored. |
| <code>filter</code> | M | See Comment. | This parameter defines a <code>filter</code> test to be applied to the selected (see <code>scope</code>) MOs. If the <code>filter</code> is empty, all selected MOs are used. The actual syntax and capabilities of the <code>filter</code> is SS specific. However, each SS should support a <code>filter</code> consisting of one or several assertions that may be grouped using the logical operators AND, OR and NOT. Each assertion is a logical expression of attribute existence, attribute value comparison ("equal to X, less than Y" etc.) and MO Class. |
| <code>attributeListIn</code> | M | LIST OF attribute name. | This parameter identifies the attributes to be returned by this operation. An empty list means "Return all attributes". |

7.3.1.3 Output Parameters

| Name | Qualifier | Matching Information | Comment |
|---|-----------|--|---|
| invokeIdentifierOut | M (Note) | invokeIdentifierIn from the input parameters of this operation | This parameter identifies the current invocation in both IRPManager and IRPAgent. This parameter can be used together with the cancelOperation operation to cancel an on-going getMOAttributes operation. |
| managedObjectClass | M | ManagedEntity class | For each returned MO: The class of the MO. |
| managedObjectInstance | M | ManagedEntity DN | For each returned MO: The name of the MO. This is a full DN according to 3GPP TS 32.300 [5]. |
| attributeListOut | M | LIST OF SEQUENCE< attribute name, attribute value > | For each returned MO: A list of name/value pairs for MO. |
| status | M | ENUM (OperationSucceeded, OperationFailed) | An operation may fail because of a specified or unspecified reason. |
| NOTE: This parameter is meaningful only if the IRPAgent supports the cancelOperation. | | | |

7.3.1.4 Pre-condition

baseObjectExists

| Assertion Name | Definition |
|------------------|--|
| baseObjectExists | The ManagedEntity instance specified by the baseObjectInstance parameter exists. |

7.3.1.5 Post-condition

None specific

7.3.1.6 Exceptions

| Name | Definition |
|----------------------|--|
| operationFailed | Condition: Pre-condition is false or post-condition is false. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |
| duplicateInvocation | Condition: The invoke identifier specified was allocated to another operation Returned Information: The output parameter <i>status</i> . Exit state: Entry state. Note: This exception is conditional and applies only to SSs where it is meaningful. |
| resourceLimitation | Condition: Operation not performed due to resource limitation. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |
| operationCancelled | Condition: Operation cancelled by <code>cancelOperation</code> operation. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |
| complexityLimitation | Condition: Operation not performed because a parameter was too complex. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |

7.4 Interface PassiveCmlRPOperations#2

7.4.1 getContainment (O)

7.4.1.1 Definition

This operation is intended for retrieval of the containment relations from the MIB.

7.4.1.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|---------------------|-----------|---|--|
| invokeIdentifierIn | C | A unique identifier that is SS dependent. | This parameter identifies the current invocation in both IRPManager and IRPAgent. This parameter can be used together with the <code>cancelOperation</code> operation to cancel an on-going <code>getContainment</code> operation. |
| baseObject Instance | M | DN | The MO instance that is to be used as the starting point for the selection of managed objects to which the <code>filter</code> (when supplied) is to be applied. This is a full DN according to 3GPP TS 32.300 [5]. |
| scope | O | See corresponding parameter in <code>getMOAttributes</code> . | See corresponding parameter in <code>getMOAttributes</code> . |

7.4.1.3 Output Parameters

The output parameter `containment` of the operation shall contain a list of all Managed Object instances in the MIB maintained by IRPAgent (or a subset starting from a given base object) including containment information (naming tree).

The structure and format of the output parameter `containment` are SS dependent.

| Name | Qualifier | Matching Information | Comment |
|----------------------------------|-----------|---|---|
| | M | LIST OF <code>ManagedEntity</code> DN. | A list of DN of all Managed Object instances that satisfy the <code>scope</code> . |
| <code>invokeIdentifierOut</code> | M (Note) | <code>invokeIdentifierIn</code> from the input parameters of this operation | This parameter identifies the current invocation. . This parameter is used in <code>cancelOperation</code> operation to cancel an on-going <code>getContainment</code> operation. |
| <code>status</code> | M | ENUM (<code>OperationSucceeded</code> , <code>OperationFailed</code>) | An operation may fail because of a specified or unspecified reason. |

NOTE: This parameter is meaningful only if the IRPAgent supports the `cancelOperation`.

7.4.1.4 Pre-condition

`baseObjectExists`

| Assertion Name | Definition |
|-------------------------------|--|
| <code>baseObjectExists</code> | The <code>ManagedEntity</code> instance specified by the <code>baseObjectInstance</code> parameter exists. |

7.4.1.5 Post-condition

None specific

7.4.1.6 Exceptions

| Name | Definition |
|----------------------|--|
| operationFailed | Condition: Pre-condition is false or post-condition is false. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |
| duplicateInvocation | Condition: The invoke identifier specified was allocated to another operation Returned Information: The output parameter <i>status</i> . Exit state: Entry state. Note: This exception is conditional and applies only to SSs where it is meaningful. |
| resourceLimitation | Condition: Operation not performed due to resource limitation. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |
| operationCancelled | Condition: Operation cancelled by <code>cancelOperation</code> operation. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |
| complexityLimitation | Condition: Operation not performed because a parameter was too complex. Returned Information: The output parameter <i>status</i> . Exit state: Entry state. |

7.5 Interface BasicCmIRPOperations

7.5.1 cancelOperation (O)

7.5.1.1 Definition

IRPManager invokes this operation to cancel an on-going Basic CM IRP operation it issued before. Presently the Basic CM IRP operations that can be cancelled by invoking `cancelOperation` are `getMOAttributes` and `getContainment`.

7.5.1.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|---------------------------------|-----------|---|---|
| <code>invokeIdentifierIn</code> | M | A unique identifier that is SS dependent. | This parameter identifies an on-going Basic CM IRP operation to be cancelled. |

7.5.1.3 Output Parameters

| Name | Qualifier | Matching Information | Comment |
|---------------------|-----------|--|---|
| <code>status</code> | M | ENUM (OperationSucceeded, OperationFailed) | An operation may fail because of a specified or unspecified reason. |

7.5.1.4 Pre-condition

operationExits

| Assertion Name | Definition |
|----------------|---|
| operationExits | The operation identified by the <code>invokeIdentifierIn</code> is ongoing. |

7.5.1.5 Post-condition

operationCancelled

| Assertion Name | Definition |
|--------------------|---|
| operationCancelled | The operation identified by the <code>invokeIdentifierIn</code> is cancelled. |

7.5.1.6 Exceptions

| Name | Definition |
|-----------------|--|
| operationFailed | Condition: Pre-condition is false or post-condition is false. Returned Information: The output parameter <code>status</code> . Exit state: Entry state. |

7.6 Interface ActiveCmIRPOperations

7.6.1 createMO (O)

7.6.1.1 Definition

This operation is invoked by IRPManager to request the IRPAgent to create a Managed Object instance in the MIB maintained by the IRPAgent. This operation will create only one Managed Object instance. This operation provides functionality that is similar to that provided by the M-CREATE service defined by CMIS (ITU-T Recommendation X.710 [7]).

The IRPManager supplies the values of all attributes that are supported, i.e. a) attribute whose Support Qualifier is M and b) attribute whose Support Qualifier is O and supported by the agreement between IRPManager and IRPAgent, except in the following cases:

- 1) If the attribute has a default value specified. In such case, if IRPManager supplies a value, the supplied value is used; otherwise, the default value is used; else
- 2) if the attribute is specified as capable of carrying a null value or carrying no information. In such case, if IRPManager supplies a (non-null) value, the supplied value is used; otherwise, the null value is used; else
- 3) if the attribute does not have a default value specified and is specified as incapable of carrying null value or incapable of carrying no information. In such case, if there is a vendor defined default value, then that value will be used.

7.6.1.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|-------------------------|-----------|--|--|
| managedObjectClass | M | class | This parameter specifies the class of the new managed object instance. |
| managedObjectInstance | M | DN | This parameter specifies the instance of the managed object that is to be created and registered. This is a full DN according to 3GPP TS 32.300 [5]. |
| referenceObjectInstance | O | SS dependant | This parameter may have a null value. When this parameter is supplied, it must specify an existing instance of a managed object, called the reference object, of the same class as the new object to be created. Attribute values associated with the reference object instance become the default values for those not specified by the <code>attributeListIn</code> parameter. |
| attributeListIn | M | LIST OF SEQUENCE< attribute name, attribute value> | This parameter may have a null value. When this parameter is supplied, it contains a list of name/value pairs specifying attribute identifiers and their values to be assigned to the new managed object. These values override the values for the corresponding attributes derived from either the reference object (if the <code>referenceObjectInstance</code> parameter is supplied) or the default value set specified in the definition of the managed object's class. |

7.6.1.3 Output Parameters

| Name | Qualifier | Matching Information | Comment |
|------------------|-----------|--|--|
| attributeListOut | M | LIST OF SEQUENCE< attribute name, attribute value> | This list of name/value pairs contains the attributes of the new managed object and the actual value assigned to each. |
| status | M | ENUM (OperationSucceeded, OperationFailed) | An operation may fail because of a specified or unspecified reason. |

7.6.1.4 Pre-condition

managedEntityDoesNotExist

| Assertion Name | Definition |
|---------------------------|--|
| managedEntityDoesNotExist | A ManagedEntity instance with the same DN as the object specified for creation does not exist. |

7.6.1.5 Post-condition

managedEntityCreated AND objectCreationNotificationEmitted

| Assertion Name | Definition |
|-----------------------------------|---|
| managedEntityCreated | The ManagedEntity instance has been created with the supplied DN. |
| objectCreationNotificationEmitted | An object creation notification (as defined in TS 32.662 [11]) is emitted for the created instance, if notifiable. Notifiable here means that the notification is supported and not suppressed. |

7.6.1.6 Exceptions

| Name | Definition |
|-------------------------------------|--|
| operationFailed | <p>Condition: Pre-condition is false or post-condition is false. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| objectClassSpecificationMissmatched | <p>Condition: The object class named by ObjectClassIdentifier input parameter does not match the object class of the managed object specified by a non-null referenceObjectInstance input parameter. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| InvalidObjectInstance | <p>Condition: The object instance name specified implied a violation of the naming rules; Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| createNotAllowed | <p>Condition: The object to be created may not be created over the ltf-N. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| noSuchObjectClass | <p>Condition: The class of the specified managed object is not recognized. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| classInstanceConflict | <p>Condition: The specified managed object instance may not be created as member of the specified class. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| noSuchAttribute | <p>Condition: A specified attribute is not recognized or is not valid for specified object class. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| invalidAttributeValue | <p>Condition: Value specified for an attribute is not valid for that attribute. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| missingAttributeValue | <p>Condition: One or more required attribute values were not supplied and default values are not available. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |
| parentObjectDoesNotExist | <p>Condition: The parent MO instance of the ManagedEntity specified to be created does not exist. Returned Information: The output parameter <i>status</i>. Exit state: Entry state.</p> |

7.6.2 deleteMO (O)

7.6.2.1 Definition

This operation is invoked by IRPManager to request the deletion of one or more Managed Object instances from the MIB maintained by IRPAgent. This operation provides functionality that is similar to that provided by the M-DELETE service defined by CMIS (ITU-T Recommendation X.710 [7]).

7.6.2.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|--------------------|-----------|---|--|
| baseObjectInstance | M | DN | The MO instance that is to be used as the starting point for the selection of managed objects to which the filter (when supplied) is to be applied. This is a full DN according to 3GPP TS 32.300 [5]. |
| scope | M | See corresponding parameter in getMOAttributes. | See corresponding parameter in getMOAttributes. |
| filter | M | See comment. | See corresponding parameter in getMOAttributes. |

7.6.2.3 Output Parameters

| Name | Qualifier | Matching Information | Comment |
|--------------|-----------|---|---|
| deletionList | M | LIST OF SEQUENCE< ManagedEntity DN, ManagedEntity class name> | If the base object alone is specified, then this parameter is optional; otherwise it contains a list of managedObjectInstance/managedObjectClass pairs identifying the managed objects deleted. |
| status | M | ENUM (OperationSucceeded, OperationFailed, OperationPartiallySucceeded) | An operation may fail because of a specified or unspecified reason. The operation is partially successful if some, but not all, objects selected to be deleted are actually deleted. |

In lieu of a synchronization parameter, best effort synchronization will apply; that is, all managed objects selected for this operation will perform the operation if possible regardless of whether some managed objects fail to perform it.

7.6.2.4 Pre-condition

baseObjectExists AND allChildrenOfObjectsToBeDeletedSpecifiedForDeletion

| Assertion Name | Definition |
|---|---|
| baseObjectExists | The ManagedEntity instance specified by the baseObjectInstance parameter exists. |
| allChildrenOfObjectsToBeDeletedSpecifiedForDeletion | For any ManagedEntity instance specified for deletion, all of its dependant ManagedEntity instances must be specified for deletion. |

7.6.2.5 Post-condition

(selectedObjectsDeleted OR someSelectedObjectsDeleted) AND objectDeletionNotificationEmitted

| Assertion Name | Definition |
|-----------------------------------|--|
| selectedObjectsDeleted | All of the ManagedEntity instances selected for deletion are deleted. |
| someSelectedObjectsDeleted | Some but not all of the selected ManagedEntity instances were deleted and for any of the ManagedEntity instances deleted all of the child ManagedEntity instances of that ManagedEntity instance is deleted. |
| objectDeletionNotificationEmitted | An object deletion notification (as defined in TS 32.662 [11]) is emitted for each notifiable deleted object. Notifiable here means that the notification is supported and not suppressed. An object deletion notification of a managed object containing a sub-tree implies deletion of all managed objects in the sub-tree. IRPAgent should make the best effort to reduce the number of object deletion notifications, for example by sending only one notification for the sub-tree root object in the event of a successful deletion of an entire sub-tree. |

7.6.2.6 Exceptions

| Name | Definition |
|-----------------------|---|
| operationFailed | Condition: Pre-condition is false or post-condition is false. Returned Information: The output parameter status. Exit state: Entry state. |
| invalidObjectInstance | Condition: The object instance name specified implied a violation of the naming rules; Returned Information: The output parameter status. Exit state: Entry state. |
| deleteNotAllowed | Condition: Some of the object instances to be deleted may not be deleted over the Itf-N. Returned Information: The output parameter status. Exit state: Entry state. |
| resourceLimitation | Condition: Operation not performed due to resource limitation. Returned Information: The output parameter status. Exit state: Entry state. |
| complexityLimitation | Condition: Operation not performed because a parameter was too complex. Returned Information: The output parameter status. Exit state: Entry state. |

7.6.3 setMOAttributes (O)

7.6.3.1 Definition

This operation is invoked by IRPManager to request the modification of management information (Managed Object attribute values) in the MIB maintained by IRPAgent. Attributes of one or several Managed Objects may be modified - based on the containment hierarchy. This operation provides functionality that is similar to that provided by the M-SET service defined by CMIS (ITU-T Recommendation X.710 [7]).

7.6.3.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|--------------------|-----------|--|---|
| baseObjectInstance | M | DN | The MO instance that is to be used as the starting point for the selection of managed objects to which the <code>filter</code> (when supplied) is to be applied. This is a full DN according to 3GPP TS 32.300 [5]. |
| scope | M | See corresponding parameter in <code>getMOAttributes</code> . | See corresponding parameter in <code>getMOAttributes</code> . |
| filter | M | See comment | See corresponding parameter in <code>getMOAttributes</code> . |
| modificationList | M | LIST OF SEQUENCE <attribute identifier, [attribute values], ENUM(replace, add values, remove values, set to default)> See Comment for when attribute values are require and when they are optional. | <p>This parameter contains a set of attribute modification specifications, each of which contains:</p> <ol style="list-style-type: none"> 1). attribute identifier: the identifier of the attribute whose value(s) is(are) to be modified. 2). attribute value: the value(s) to be used in the modification of the attribute. The use of this parameter is defined by the modify operator. This parameter is optional when the set to default modify operator is specified and if supplied, shall be ignored. 3). modify operator: the way in which the attribute values(s) (if supplied) is(are) to be applied to the attribute. The possible operators are: <ul style="list-style-type: none"> a) replace: the attribute value(s) specified shall be used to replace the current values(s) of the attribute; b) add values: the attribute values(s) specified shall be added to the current value(s) of the of the attribute. This operator shall only be applied to a set-valued attribute and shall perform a set union (in the mathematical sense) between the current values(s) of the attribute and the attribute value(s) specified. Value(s) specified in the attribute value parameter which is(are) already in the current values of the attribute shall not cause an error to be returned. c) remove values: the attribute value(s) specified shall be removed from the current values(s) of the attribute. This operator shall only be applied to a set-valued attribute and shall perform a set difference (in the mathematical sense) between the current value(s) of the attribute and the attribute values(s) specified. Value(s) specified in the attribute value parameter which is(are) not in the current value(s) of the attribute shall not cause an error to be returned; d) set to default: when this operator is applied to a single-valued attribute, the value of the attribute shall be set to its default value. When this operator is applied to a set-valued attribute, the value(s) of the attribute shall be set to their default value(s) and only as many values as defined by the default shall be assigned. If there is no default value defined, an error shall be returned. <p>Note: Set is used here in the mathematical sense so that a set-valued attribute is an unordered set of unique values.</p> <p>The modify operator is optional, and if it is not specified, the replace operator shall be assumed.</p> <p>The <code>modificationList</code> parameter contains a single set of attribute modification specifications</p> |

| | | | |
|--|--|--|---|
| | | | and this same set is applied to each MO instance to be modified.. |
| | | | |

7.6.3.3 Output Parameters

| Name | Qualifier | Matching Information | Comment |
|---------------------|-----------|---|--|
| modificationListOut | M | LIST OF SEQUENCE< ManagedEntity DN, ManagedEntity class, LIST OF SEQUENCE< attribute name, attribute value >> | This parameter will provide for each managed object instance the full DN of the managed object instance, the managedObjectClass, and a list of name/value pairs with the values of all the attributes of the modified managed object instance after modification. The form of this information is SS dependant and may be provided in one or many data structures. |
| status | M | ENUM (OperationSucceeded, OperationFailed, OperationPartiallySucceeded) | An operation may fail because of a specified or unspecified reason and no attributes have been updated. The operation is only successful if all specified attributes of all selected objects are actually modified. Otherwise, the operation is partially successful. |

In lieu of a synchronization parameter, best effort synchronization will apply; that is, all managed objects selected for this operation will perform the operation if possible regardless of whether some managed objects fail to perform it.

7.6.3.4 Pre-condition

baseObjectExists

| Assertion Name | Definition |
|------------------|--|
| baseObjectExists | The ManagedEntity instance specified by the baseObjectInstance parameter exists. |

7.6.3.5 Post-condition

(selectedObjectsModified OR someSelectedObjectsModified) AND attributeValueChangeNotificationEmitted

| Assertion Name | Definition |
|---|--|
| selectedObjectsModified | All of the attributes of all of the ManagedEntity instances selected for modification are modified as specified. |
| someSelectedObjectsModified | Some attributes of some of the selected ManagedEntity instances were modified but not all attributes of all selected ManagedEntity instances. |
| attributeValueChangeNotificationEmitted | A notifyAttributeValueChange notification (as defined in TS 32.662 [11]) is emitted for the notifiable attributes of each modified object instance. Notifiable here means that the notification is supported and not suppressed. |

7.6.3.6 Exceptions

| Name | Definition |
|-----------------------|---|
| operationFailed | <p>Condition: Pre-condition is false or post-condition is false.</p> <p>Returned Information: The output parameter <i>status</i>.</p> <p>Exit state: Entry state.</p> |
| modifyNotAllowed | <p>Condition: The object to be modified may not be modified over the Itf-N.</p> <p>Returned Information: The output parameter <i>status</i>.</p> <p>Exit state: Entry state.</p> |
| noSuchAttribute | <p>Condition: A specified attribute is not recognized or is not valid for specified object class.</p> <p>Returned Information: The output parameter <i>status</i>.</p> <p>Exit state: Entry state.</p> |
| invalidAttributeValue | <p>Condition: Value specified for an attribute is not valid for that attribute.</p> <p>Returned Information: The output parameter <i>status</i>.</p> <p>Exit state: Entry state.</p> |
| missingAttributeValue | <p>Condition: One or more required attribute values were not supplied and default values are not available.</p> <p>Returned Information: The output parameter <i>status</i>.</p> <p>Exit state: Entry state.</p> |
| resourceLimitation | <p>Condition: Operation not performed due to resource limitation.</p> <p>Returned Information: The output parameter <i>status</i>.</p> <p>Exit state: Entry state.</p> |
| complexityLimitation | <p>Condition: Operation not performed because a parameter was too complex.</p> <p>Returned Information: The output parameter <i>status</i>.</p> <p>Exit state: Entry state.</p> |

Annex A (informative): Change history

| Change history | | | | | | | |
|----------------|-------|-----------|-----|-----|--|--------|---------------|
| Date | TSG # | TSG Doc. | CR | Rev | Subject/Comment | Old | New |
| Jun 2001 | SA_12 | SP-010283 | -- | -- | New document 32.602 based on 32.106-5 V3.1.0 Approved at TSG SA #12 and placed under Change Control | 2.0.0 | 4.0.0 |
| Sep 2001 | SA_13 | SP-010476 | 001 | -- | Replace the current parameter invokeIdentifier with the two parameters invokeIdentifierIn and invokeIdentifierOut in the operations getMoAttributes() and getContainment() | 4.0.0 | 4.1.0 |
| Sep 2002 | SA_17 | SP-020483 | 002 | -- | Add Active CM and new methodology, Remove CM Notifications (moved to Kernel CM - 32.66x) | 4.1.0 | 5.0.0 |
| Mar 2002 | SA_19 | SP-030144 | 003 | -- | Add post-condition for notifications of each activeCM operation and one exception for createMO | 5.0.0 | 5.1.0 |
| Dec 2003 | SA_22 | SP-030630 | 005 | -- | Correction of System Context | 5.1.0 | 5.2.0 |
| Mar 2004 | SA_23 | SP-040119 | 007 | -- | Correction of System Context | 5.2.0 | 5.3.0 |
| Mar 2004 | SA_23 | SP-040105 | -- | -- | Automatic upgrade to Rel-6 (no CR) | 5.3.0 | 6.0.0 |
| Mar 2005 | SA_27 | SP-050044 | 008 | -- | Apply Generic System Context | 6.0.0 | 6.1.0 |
| Jun 2007 | SA_36 | -- | -- | -- | Automatic upgrade to Rel-7 (no CR) at freeze of Rel-7. Deleted reference to CMIP SS, discontinued from R7 onwards. | 6.1.0 | 7.0.0 |
| Dec 2008 | SA_42 | -- | -- | -- | Upgrade to Release 8 | 7.1.0 | 8.0.0 |
| Dec 2009 | SA_46 | SP-090718 | 010 | -- | Clarify scope parameter for getMoAttributes operation | 8.0.0 | 8.1.0 |
| Dec 2009 | SA_46 | SP-090719 | 009 | -- | Align with standard usage of inheritance in class diagram | 8.1.0 | 9.0.0 |
| 2011-03 | - | - | - | - | Update to Rel-10 version (MCC) | 9.0.0 | 10.0.0 |
| 2012-09 | - | - | - | - | Update to Rel-11 version (MCC) | 10.0.0 | 11.0.0 |
| 2012-12 | SA_58 | SP-120783 | 011 | - | add reference to ITU-T Rec | 11.0.0 | 11.1.0 |
| 2013-03 | SA_59 | SP-130060 | 012 | 1 | Correct getMoAttributes operation description | 11.1.0 | 11.2.0 |
| | | SP-130058 | 013 | 1 | Clarify create object operation | 11.2.0 | 12.0.0 |

History

| Document history | | |
|-------------------------|--------------|-------------|
| V12.0.0 | October 2014 | Publication |
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