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*Technical Specification*

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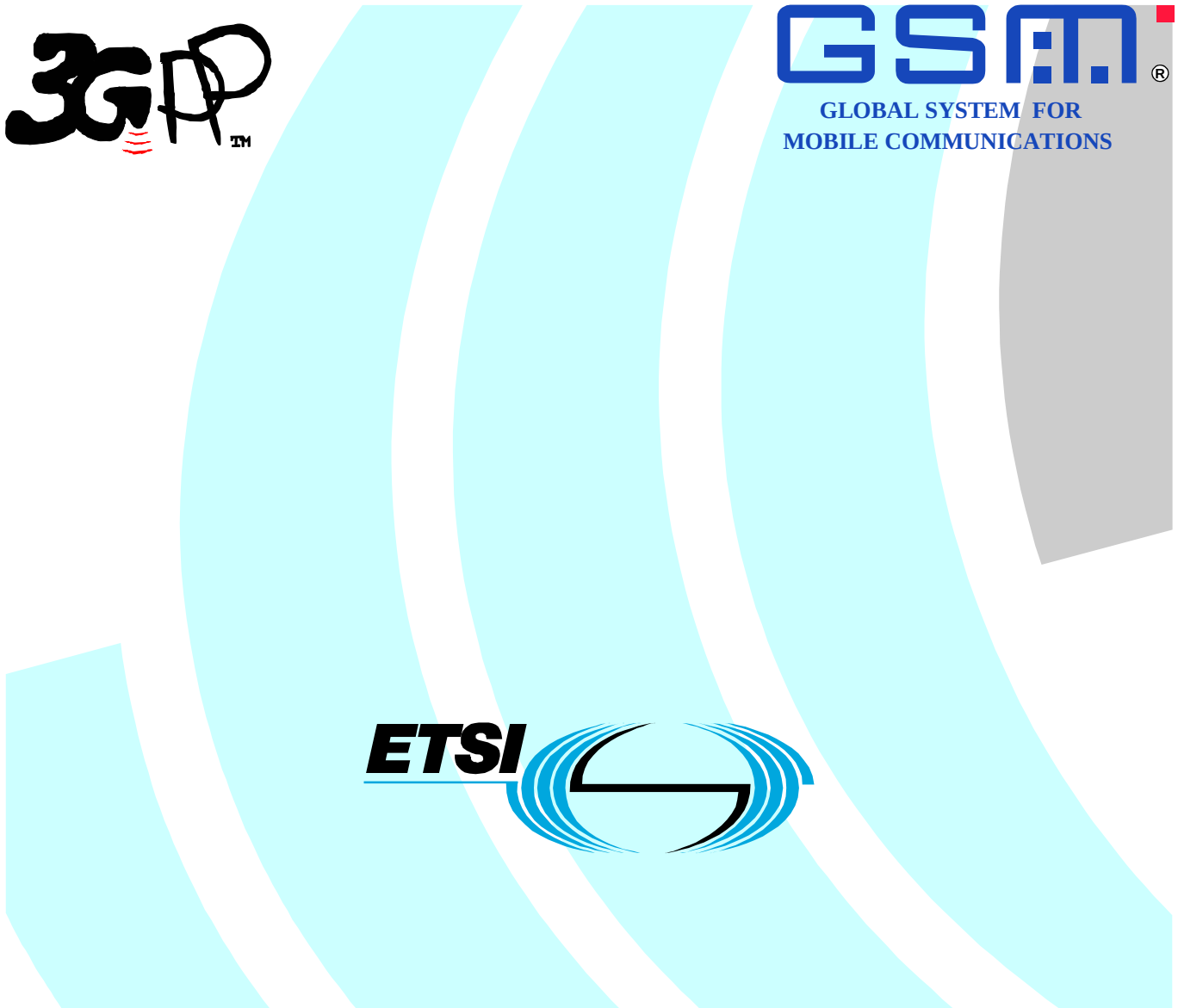
**Universal Mobile Telecommunications System (UMTS);**
**Telecommunication management;**
**Configuration Management (CM);**
**Basic Configuration Management**
**Integration Reference Point (IRP) information service**
**(3GPP TS 32.602 version 5.1.0 Release 5)**



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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:

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# Introduction

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 'IRPAgent' (typically an Element Manager or Network Element) can communicate basic Configuration Management related information to one or several 'IRPManagers' (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.

# 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; Part 2: Notification Integration Reference Point (IRP); Information service".

[4] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management; Information service".

[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".

# 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)

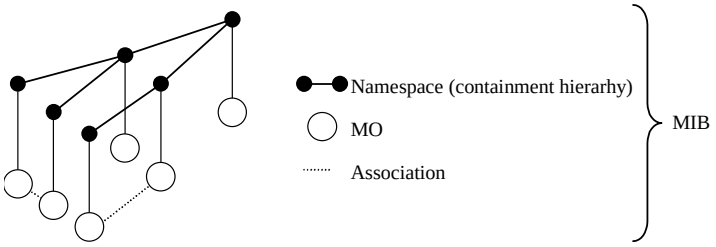



**Figure 3.1: Relationships between a Name space and a number of participating MOs**

**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:

| | |
|---|---|
| CMIP | Common Management Information Protocol |
| CMIS | Common Management Information Service |
| CN | Core Network |
| CORBA | Common Object Request Broker Architecture |
| DN | Distinguished Name (see 3GPP TS 32.300 [5]) |
| 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 3GPP TS 32.300 [5]) |
| SNMP | Simple Network Management Protocol |
| SS | Solution Set |
| TMN | Telecommunications Management Network |
| UML | Unified Modelling Language |
| UMTS | Universal Mobile Telecommunications System |

# 4 System overview

## 4.1 System context

Figure 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 3GPP 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 is not the subject of this IRP.

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

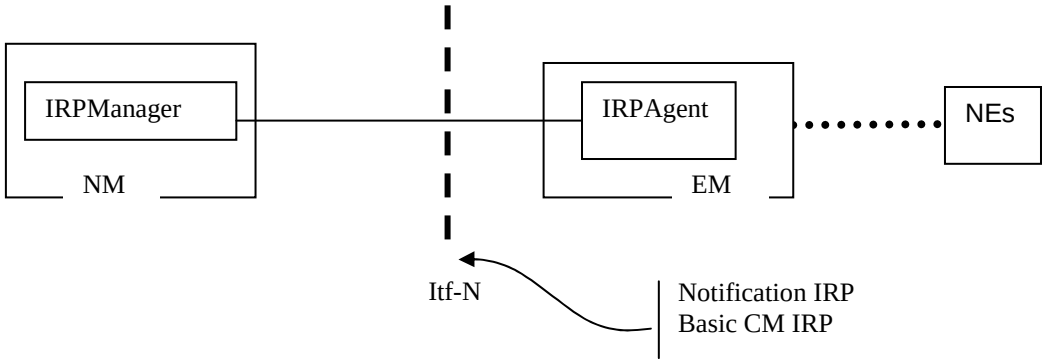



**Figure 4.1: System Context A**

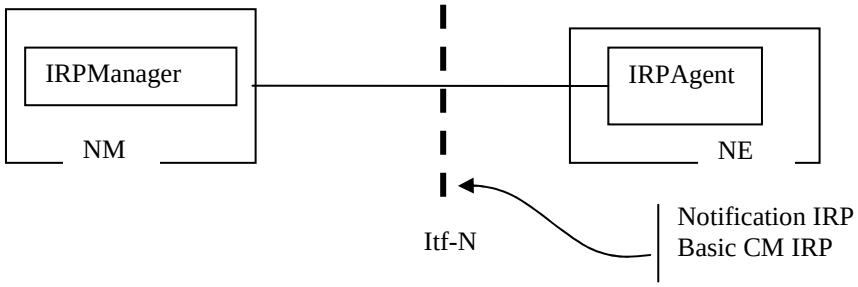



**Figure 4.2: System Context B**

## 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 32.102 [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 3GPP 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 Basic 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 X.710 [7] and ITU-T X.721 [8] (M-GET etc.). Note however, that the Information Service of the subject IRP is focused on the operations and notifications needed for basic CM purposes and thus only covers a subset of the operations/notifications defined in ITU-T X.710 [7]/ITU-T 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

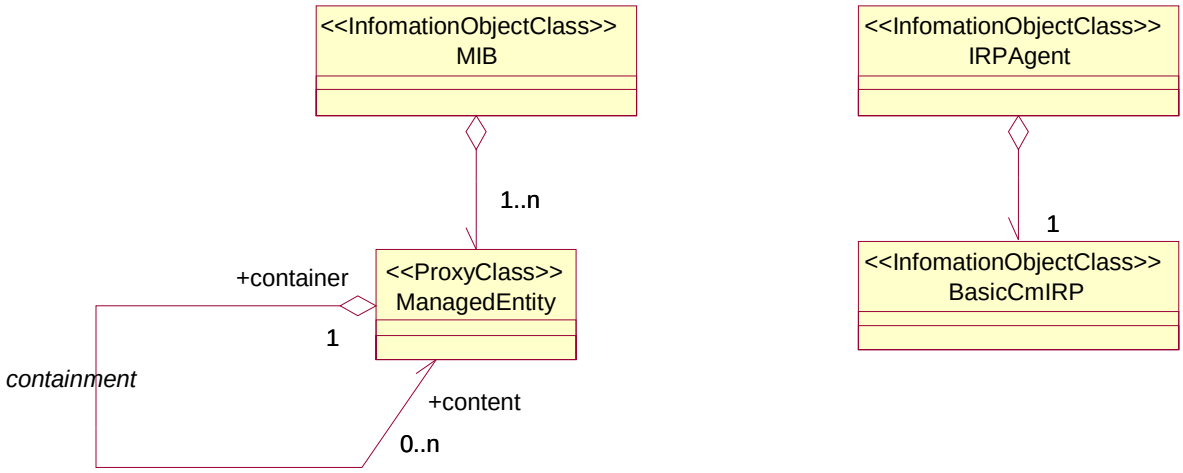
## 6.1 Imported information entities and local labels

| Label reference | Local label |
|---|---|
| 32.622, information object class, Top | Top |
| 32.622, information object class, IRPAgent | IRPAgent |
| 32.622, information object class, GenericIRP | GenericIRP |
| 32.312, information object class, ManagedGenericIRP | ManagedGenericIRP |

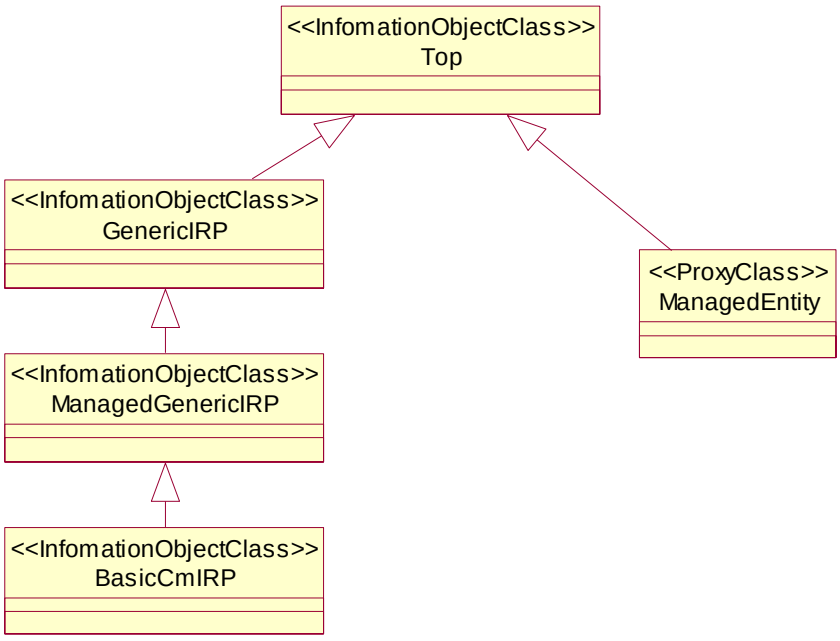
## 6.2 Class diagram

This subclause introduces the set of Information Object Classes (IOCs) that encapsulate information within the IRPAgent. The intent is to identify the information required for the BasicCmIRP 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 BasicCmIRP

#### 6.3.1.1 Definition

BasicCmIRP is the representation of the basic configuration management capabilities specified by this specification. 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. ManagedEntity is used in the specification of Basic CM IRP operations to represent an instance of an IOC defined in these Network Resource Models.

## 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 Rec X.720 [].

#### 6.4.1.2 Role

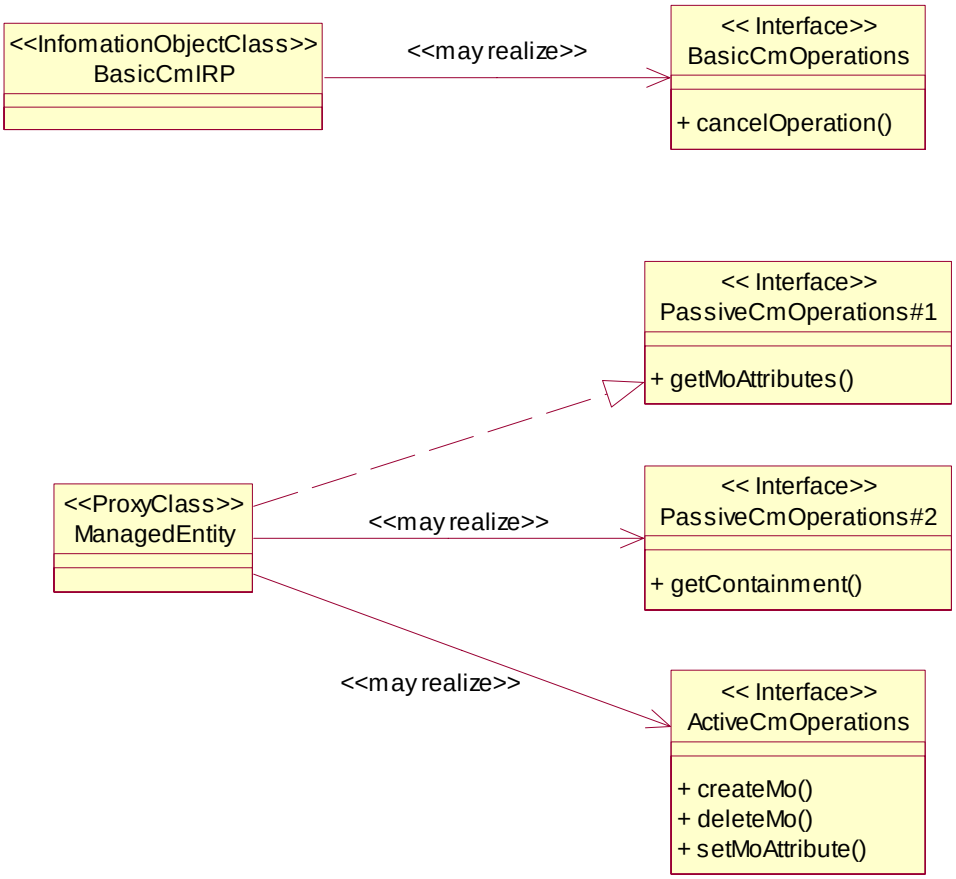
| Name | Definition |
|---|---|
| container | It represents the capability, for an instance of a ManagedEntity, to contain other objects. |
| content | It represents the capability, for an instance of a ManagedEntity, to be contained in another object. |

#### 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 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 X.710 [7]).
A Solution Set 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 |
|---|---|---|---|
| invokeIdentifierIn | C | A unique identifier that is Solution Set dependent. | This parameter identifies the current invocation. This parameter is used in the 'cancelOperation' operation to cancel an on-going 'getMOAttributes' operation. |
| baseObjectInstance | M | DistinguishedName | 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 Distinguished Name according to 3GPP TS 32.300 [5]. |
| scope | M | SEQUENCE <<br>ENUM {<br>BASE_OBJECT_ONLY,<br>NTH_LEVEL_SUBORDINATES,<br>BASE_NTH_LEVEL,<br>BASE_ALL},<br>theLevel><br><br>Note: theLevel contains valid information if NTH_LEVEL_SUBORDINATES or BASE_NTH_LEVEL is used. | This parameter defines how many levels of the containment hierarchy to select for the filter defined below. The selection starts from the MO given by the `baseObjectInstance` parameter. The levels of selection that may be performed are:<br><br>BASE OBJECT ONLY: the base object alone (default);<br>NTH LEVEL SUBORDINATES: the n-th level subordinates of the base object;<br>BASE NTH LEVEL: the base object and all of its subordinates down to and including the n-th level;<br>BASE ALL: the base object and all of its subordinates. |
| filter | M | See Comment | This parameter defines a filter test to be applied to the scoped Managed Object(s). If the filter is empty, all of the managed objects included by the scope are selected.<br>The actual syntax and capabilities of the filter is Solution Set specific. However, each Solution Set should support a filter 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. |
| attributeListIn | M | LIST OF AttributeName | This parameter identifies the attributes to be returned by this operation. In R99, only the semantics "Return all attributes" shall be supported. An empty list means "Return all attributes". For future releases the possibility to specify a list of attributes is expected. |

#### 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.objectClass | For each returned MO: The class of the MO. |
| managedObjectInstance | M | ManagedEntity.distinguishedName | For each returned MO: The name of the MO. This is a full Distinguished Name according to 3GPP TS 32.300[5]. |
| attributeListOut | M | LIST OF SEQUENCE<name OF ManagedEntity.anAttribute, value OF ManagedEntity.anAttribute> | 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.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| duplicateInvocation | **Condition:** The invoke identifier specified was allocated to another operation<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state.<br>**Note:** This exception is conditional and applies only to Solution Sets where it is meaningful. |
| resourceLimitation | **Condition:** Operation not performed due to resource limitation.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| operationCancelled | **Condition:** Operation cancelled by cancelOperation operation.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| complexityLimitation | **Condition:** Operation not performed because a parameter was too complex.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |

## 7.4 Interface PassiveCmIRPOperations#2

### 7.4.1 getContainment (O)

#### 7.4.1.1 Definition

This (optional) operation is only 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 Solution Set dependent. | 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 'getContainment' operation. |
| baseObject Instance | M | DistinguishedName | 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 Distinguished Name according to 3GPP TS 32.106-8 [5]. |
| scope | O | See corresponding parameter in getMOAttributes. | See corresponding parameter in getMOAttributes. |

#### 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 Solution Set dependent.

| Name | Qualifier | Matching Information | Comment |
|---|---|---|---|
| containment | M | LIST OF ManagedEntity.distinquishedName | A list of DN of all Managed Object instances that satisfy the scope. |
| invokeIdentifierOut | M (Note) | invokeIdentifierIn from the input parameters of this operation | This parameter identifies the current invocation. . This parameter is used in 'cancelOperation' operation to cancel an on-going 'getContainment' operation. |
| 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. | | | |

#### 7.4.1.4 Pre-condition

baseObjectExists

| Assertion Name | Definition |
|---|---|
| baseObjectExists | The ManagedEntity instance specified by the baseObjectInstance 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.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| duplicateInvocation | **Condition:** The invoke identifier specified was allocated to another operation<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state.<br>**Note:** This exception is conditional and applies only to Solution Sets where it is meaningful. |
| resourceLimitation | **Condition:** Operation not performed due to resource limitation.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| operationCancelled | **Condition:** Operation cancelled by cancelOperation operation.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| complexityLimitation | **Condition:** Operation not performed because a parameter was too complex.<br>**Returned Information:** The output parameter status.<br>**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 |
|---|---|---|---|
| invokeIdentifierIn | M | A unique identifier that is Solution Set 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 |
|---|---|---|---|
| status | 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 invokeIdentifierIn is ongoing. |

#### 7.5.1.5 Post-condition

operationCancelled

| Assertion Name | Definition |
|---|---|
| operationCancelled | The operation identified by the invokeIdentifierIn is cancelled. |

#### 7.5.1.6 Exceptions

| Name | Definition |
|---|---|
| operationFailed | **Condition:** Pre-condition is false or post-condition is false.<br>**Returned Information:** The output parameter status.<br>**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 X.710 [7]).

#### 7.6.1.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|---|---|---|---|
| managedObjectClass | M | ObjectClassIdentifier | This parameter specifies the class of the new managed object instance. |
| managedObjectInstance | M | DistinguishedName | This parameter specifies the instance of the managed object that is to be created and registered. This is a full Distinguished Name according to 3GPP TS 32.300 [5]. |
| referenceObjectInstance | O | Solution Set 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 attributeListIn 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 referenceObjectInstance 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<br>name OF ManagedEntity.anAttribute,<br>value OF ManagedEntity.anAttribute> | 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 |
|---|---|
| managedEntityDoesNot Exist | A ManagedEntity instance with the same Distinguished Name 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 of the specified object class has been created with the specified Distinquished Name. |
| objectCreationNotificationEmitted | An object creation notification (as defined in TS 32.662 [11]) is emitted for the created object, if notifiable. Notifiable here means that the notification is supported and not suppressed. "Emitted" here corresponds to the association stereotyped as <<emits>> in 3GPP TS 32.662 [11]. |

#### 7.6.1.6 Exceptions

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

### 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 X.710 [7]).

### 7.6.2.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|---|---|---|---|
| baseObjectInstance | M | DistinguishedName | 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 Distinguished Name 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.distinguishedName, ManagedEntity.objectClass> | 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. “Emitted” here corresponds to the association stereotyped as <<emits>> in 3GPP TS 32.662 [11]. 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.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| invalidObjectInstance | **Condition:** The object instance name specified implied a violation of the naming rules;<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| deleteNotAllowed | **Condition:** Some of the object instances to be deleted may not be deleted over the Itf-N.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| resourceLimitation | **Condition:** Operation not performed due to resource limitation.<br>**Returned Information:** The output parameter status.<br>**Exit state:** Entry state. |
| complexityLimitation | **Condition:** Operation not performed because a parameter was too complex.<br>**Returned Information:** The output parameter status.<br>**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 X.710 [7]).

### 7.6.3.2 Input Parameters

| Name | Qualifier | Information Type | Comment |
|---|---|---|---|
| baseObjectInstance | M | DistinguishedName | 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 Distinguished Name 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. |
| modificationList | M | LIST OF SEQUENCE <attribute identifier, [attribute values], ENUM( replace, add values, remove values, set to default)><br><br>See Comment for when attribute values are require and when they are optional. | This parameter contains a set of attribute modification specifications, each of which contains:<br>1. attribute identifier: the identifier of the attribute whose value(s) is(are) to be modified.<br>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.<br>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:<br><br>replace: the attribute value(s) specified shall be used to replace the current values(s) of the attribute;<br><br>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.<br><br>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;<br><br>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.<br>Note: Set is used here in the mathematical sense so that a set-valued attribute is an unordered set of unique values.<br>The modify operator is optional, and if it is not specified, the replace operator shall be assumed.<br>The modificationList parameter contains a single set of attribute modification specifications and this same set is applied to each managed object instance to be modified. |

### 7.6.3.3 Output Parameters

| Name | Qualifier | Matching Information | Comment |
|---|---|---|---|
| modificationListOut | M | LIST OF SEQUENCE< ManagedEntity.distinguishedName, ManagedEntity.objectClass, LIST OF SEQUENCE<name OF ManagedEntity.anAttribute, value OF ManagedEntity.anAttribute>> | This parameter will provide for each managed object instance the full Distinguished Name 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 solution set 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. “Emitted” here corresponds to the association stereotyped as <<emits>> in 3GPP TS 32.662 [11]. |

#### 7.6.3.6 Exceptions

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

# Annex A (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| Jun 2001 | S_12 | SP-010283 | -- | -- | New document 32.602 based on 32.106-5 V3.1.0<br>Approved at TSG SA #12 and placed under Change Control | 2.0.0 | 4.0.0 |
| Sep 2001 | S_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 | S_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 | S_19 | SP-030144 | 003 | -- | Add post-condition for notifications of each activeCM operation and one exception for createMO | 5.0.0 | 5.1.0 |
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# History

| Document history | | |
|---|---|---|
| V5.0.0 | September 2002 | Publication |
| V5.1.0 | March 2003 | Publication |
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