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**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Configuration Management (CM);
Basic CM Integration Reference Point (IRP);
Solution Set (SS) definitions
(3GPP TS 32.606 version 15.0.0 Release 15)**



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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 purpose of this document is to define the mapping of the Basic CM IRP: IS (see 3GPP TS 32.602 [8]) to the protocol specific details necessary for implementation of this IRP in a CORBA/IDL environment and in a SOAP/WSDL environment.

This document defines NRM independent data types and methods.

This Solution Set specification is related to 3GPP TS 32.602 V14.0.X [8].

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 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".
- [4] 3GPP TS 32.306: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Solution Set (SS) definitions".
- [5] 3GPP TS 32.311: "Telecommunication management; Generic Integration Reference Point (IRP) management; Requirement".
- [6] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management; Information Service (IS)".
- [7] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".
- [8] 3GPP TS 32.602: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP) Information Service (IS)".
- [9] 3GPP TS 32.666: "Telecommunication management; Configuration Management (CM); Kernel CM Integration Reference Point (IRP): Solution Set (SS) definitions".
- [10] OMG Notification Service, Version 1.0.
- [11] W3C SOAP 1.1 specification (<http://www.w3.org/TR/2000/NOTE-SOAP-20000508/>)
- [12] W3C WSDL 1.1 specification (<http://www.w3.org/TR/2001/NOTE-wsdl-20010315>)
- [13] W3C XPath 1.0 specification (<http://www.w3.org/TR/1999/REC-xpath-19991116>)
- [14] W3C SOAP 1.2 specification (<http://www.w3.org/TR/soap12-part1/>)

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.600 [7] and 3GPP TS 32.602 [8].

IRP document version number string

The IRP document version number (sometimes called "IRPVersion" or "SS version number") string is used to identify this specification. The string is derived using a rule described in 3GPP TS 32.311 [5].

This string (or sequence of strings, if more than one version is supported) is returned in getBasicCmIRPVersion method.

3.2 Abbreviations

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

CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
IS	Information Service
IDL	Interface Definition Language (OMG)
IRP	Integration Reference Point
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set
WSDL	Web Service Description Language

4 Solution Set Definitions

This specification defines the following 3GPP Basic CM IRP Solution Set Definitions:

Annex A provides the CORBA Solution Set.

Annex B provides the SOAP Solution Set.

Annex A (normative): CORBA Solution Set

This annex specifies the CORBA Solution Set for the IRP whose semantics are specified in 3GPP TS 32.602 [8].

A.1 Architectural features

The overall architectural feature of Basic Configuration Management IRP is specified in 3GPP TS 32.602 [8]. This clause specifies features that are specific to the CORBA SS.

A.1.1 Syntax for Distinguished Names and Versions

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [3].

The version of this IRP is represented as a string (see also clause 3.1).

A.1.2 IRP document version number string

The IRP document version number (sometimes called "IRPVersion" or "SS version number") string is used to identify this specification. The string is derived using a rule described in 3GPP TS 32.312: [6].

This string (or sequence of strings, if more than one version is supported) is returned in `getBasicCmIRPVersion` method.

A.1.3 Filter language

The filter language used in the SS is the Extended Trader Constraint Language (see *OMG Notification Service* [10]). IRPAgents may throw a `FilterComplexityLimit` exception when a given filter is too complex. However, for 3GPP Release 99 an "empty filter" shall be used i.e. a filter that satisfies all MOs of a scoped search (this does not affect the filter for notifications as defined in the Notification IRP – see 3GPP TS 32.306 [4]).

A.2 Mapping

A.2.1 General mappings

The IS parameter name `managedObjectInstance` is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called "reference attributes") are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as an `MOReference`. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type `MOReferenceSet`, which contains a sequence of MO references.

If a reference attribute is changed, an `AttributeValueChange` notification (see TS 32.666 [9]) is emitted.

A.2.2 Operation mapping

The Basic CM IRP: IS (see 3GPP TS 32.602 [8]) defines semantics of operation visible across the Basic Configuration Management IRP. Table A.2.2 indicates mapping of these operations to their equivalents defined in this SS.

Table A.2.2: Mapping from IS Operation to SS equivalents

IS Operation (3GPP TS 32.602 [8])	SS Method	Qualifier
<code>getMoAttributes</code>	<code>BasicCmIrpOperations::find_managed_objects</code> <code>BasicCmInformationIterator::next_basic_cm_informations</code>	M
<code>getContainment</code>	<code>BasicCmIrpOperations::find_managed_objects</code> <code>BasicCmInformationIterator::next_basic_cm_informations</code>	O
<code>cancelOperation</code>	<code>BasicCmInformationIterator::destroy</code>	O
<code>createMo</code>	<code>BasicCmIrpOperations::create_managed_object</code>	O
<code>deleteMo</code>	<code>BasicCmIrpOperations::delete_managed_objects</code> <code>DeleteResultIterator::next_basic_cm_informations</code> <code>DeleteResultIterator::next_delete_errors</code>	O
<code>setMoAttributes</code>	<code>BasicCmIrpOperations::modify_managed_objects</code> <code>ModifyResultIterator::next_basic_cm_informations</code> <code>ModifyResultIterator::next_modification_errors</code>	O

A.2.3 Operation parameter mapping

The Basic CM IRP: IS (see 3GPP TS 32.602 [8]) defines semantics of parameters carried in operations across the Basic Configuration Management IRP. Tables A.2.3.1 through A.2.3.6 indicate the mapping of these parameters, as per operation, to their equivalents defined in this SS.

The SS operation `find_managed_objects` is equivalent to the IS operation `getMoAttributes` when called with `ResultContents` set to `NAMES_AND_ATTRIBUTES`. Iterating the `BasicCmInformationIterator` is used to fetch the result.

Table A.2.3.1: Mapping from IS `getMoAttributes` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
<code>invokeIdentifier</code>	- (No equivalence)	-
<code>invokeIdentifierOut</code>	Return value of type <code>BasicCmInformationIterator</code>	M
<code>baseObjectInstance</code>	<code>GenericIRPManagementConstDefs::DN base_object</code>	M
<code>scope</code>	<code>SearchControl search_control</code> (<code>SearchControl.type</code> and <code>SearchControl.level</code>)	M
<code>filter</code>	<code>SearchControl search_control</code> (<code>SearchControl.filter</code>)	M
<code>attributeListIn</code>	<code>AttributeNameSet requested_attributes</code>	M
<code>managedObjectClass</code> <code>managedObjectInstance</code> <code>attributeListOut</code>	Return value of type <code>BasicCmInformationIterator</code> - parameter out ResultSet fetched_elements of method <code>next_basic_cm_informations</code>	M
<code>status</code>	Exceptions: <code>FindManagedObjects</code> , <code>GenericIRPManagementSystem::InvalidParameter</code> , <code>UndefinedMOException</code> , <code>IllegalDNFormatException</code> , <code>UndefinedScopeException</code> , <code>IllegalScopeTypeException</code> , <code>IllegalScopeLevelException</code> , <code>IllegalFilterFormatException</code> , <code>FilterComplexityLimit</code>	M

The SS operation `find_managed_objects` is equivalent to the IS operation `getContainment` when called with `ResultContents` set to `NAMES`. Iterating the `BasicCmInformationIterator` is used to fetch the result.

Table A.2.3.2: Mapping from IS getContainment parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
invokelIdentifier	- (No equivalence)	-
invokelIdentifierOut	Return value of type BasicCmInformationIterator	M
baseObjectInstance	GenericIRPManagementConstDefs::DN base_object	M
scope	SearchControl search_control (SearchControl.type and SearchControl.level)	O
Not specified in IS	SearchControl search_control (SearchControl.filter)	M
containment	Return value of type BasicCmInformationIterator - parameter out ResultSet fetched_elements of method next_basic_cm_informations	M
status	Exceptions: FindManagedObjects, GenericIRPManagementSystem::OperationNotSupported, GenericIRPManagementSystem::ParameterNotSupported, GenericIRPManagementSystem::InvalidParameter, GenericIRPManagementSystem::ValueNotSupported, UndefinedMOException, IllegalDNFormatException, UndefinedScopeException, IllegalScopeTypeException, IllegalScopeLevelException, IllegalFilterFormatException, FilterComplexityLimit	M

Table A.2.3.3: Mapping from IS cancelOperation parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
invokelIdentifier	- (Not applicable, the BasicCmInformationIterator instance identifies the ongoing operation)	M
status	Exceptions: GenericIRPManagementSystem::OperationNotSupported, DestroyException	M

Table A.2.3.4: Mapping from IS createMo parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
managedObjectClass managedObjectInstance	GenericIRPManagementConstDefs::DN object_name	M
referenceObjectInstance	GenericIRPManagementConstDefs::DN reference_object	O
attributeListIn attributeListOut	GenericIRPManagementConstDefs::MoAttributeSet attributes	M
status	AttributeErrorSeq attribute_errors Exceptions: CreateManagedObject, GenericIRPManagementSystem::OperationNotSupported, GenericIRPManagementSystem::ParameterNotSupported, GenericIRPManagementSystem::InvalidParameter, UndefinedMOException, IllegalDNFormatException, DuplicateMO, CreateNotAllowed, ObjectClassMismatch, NoSuchObjectClass, ParentObjectDoesNotExist	M

Table A.2.3.5: Mapping from IS deleteMo parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
baseObjectInstance	GenericIRPManagementConstDefs::DN base_object	M
scope	SearchControl search_control (SearchControl.type and SearchControl.level)	M
filter	SearchControl search_control (SearchControl.filter)	M
deletionList	Return value of type DeleteResultIterator - parameter out ResultSet fetched_elements of method next_basic_cm_informations	M
status	Return value of type DeleteResultIterator - parameter out DeleteErrorSeq fetched_delete_errors of method next_delete_errors Exceptions: DeleteManagedObjects, GenericIRPManagementSystem::OperationNotSupported, GenericIRPManagementSystem::InvalidParameter, UndefinedMoException, IllegalDNFormatException, UndefinedScopeException, IllegalScopeTypeException, IllegalScopeLevelException, IllegalFilterFormatException, FilterComplexityLimit	M

Table A.2.3.6: Mapping from IS setMoAttributes parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
baseObjectInstance	GenericIRPManagementConstDefs::DN base_object	M
scope	SearchControl search_control (SearchControl.type and SearchControl.level)	M
filter	SearchControl search_control (SearchControl.filter)	M
modificationList	AttributeModificationSet modifications	M
modificationListOut	Return value of type ModifyResultIterator - parameter out ResultSet fetched_elements of method next_basic_cm_informations	M
status	Return value of type ModifyResultIterator - parameter out ModifyAttributeErrorsSeq fetched_modify_errors of method next_modify_errors Exceptions: ModifyManagedObjects, GenericIRPManagementSystem::OperationNotSupported, GenericIRPManagementSystem::InvalidParameter, UndefinedMoException, IllegalDNFormatException, UndefinedScopeException, IllegalScopeTypeException, IllegalScopeLevelException, IllegalFilterFormatException, FilterComplexityLimit	M

A.3 Solution Set definitions

A.3.1 IDL definition structure

Clause A.3.2 defines the constants and types used by the Basic CM IRP.

Clause A.3.3 defines the operations which are performed by the Basic CM IRP agent.

A.3.2 IDL specification "BasicCMIRPConstDefs.idl"

```
//File: BasicCMIRPConstDefs.idl

#ifndef _BASIC_CM_IRP_CONST_DEFS_IDL_
#define _BASIC_CM_IRP_CONST_DEFS_IDL_

#include <GenericIRPManagementConstDefs.idl>

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

/* ## Module: BasicCMIRPConstDefs
This module contains commonly used definitions for BasicCMIRP.
=====
*/
module BasicCMIRPConstDefs
{
    /**
     * Defines the name of a Managed Object Class
     */
    typedef string MOClass;

    /**
     *
     * In this version the only allowed filter value is "TRUE" i.e. a filter that
     * matches everything.
     */
    typedef string Filter;

    /**
     * ResultContents is used to tell how much information to get back
     * from the find_managed_objects operation.
     *
     * NAMES: Used to get only Distinguished Name
     *         for MOs.
     *         The name contains both the MO class
     *         and the names of all superior objects in the naming
     *         tree.
     *
     * NAMES_AND_ATTRIBUTES: Used to get both NAMES plus
     *         MO attributes (all or selected).
     */
    enum ResultContents
    {
        NAMES,
        NAMES_AND_ATTRIBUTES
    };

    /**
     * ScopeType defines the kind of scope to use in a search
     * together with SearchControl.level, in a SearchControl value.
     *
     * SearchControl.level is always >= 0. If a level is bigger than the
     * depth of the tree there will be no exceptions thrown.
     */
    enum ScopeType
    {
        BASE_ONLY,
        BASE_NTH_LEVEL,
        BASE_SUBTREE,
        BASE_ALL
    };

    /**
     * SearchControl controls the find_managed_object search,
     * and contains:
     * the type of scope ("type" field),
     * the level of scope ("level" field), level 0 means the "baseObject",
     * level 1 means baseobject including its sub-ordinates etc..
     * the filter ("filter" field),
     * the result type ("contents" field).
     * The type, level and contents fields are all mandatory.
     * The filter field contains the filter expression.
     * The string "TRUE" indicates "no filter",
     * i.e. a filter that matches everything.
     */

```

```

*/
struct SearchControl
{
    ScopeType type;
    unsigned long level;
    Filter filter_;
    ResultContents contents;
};

struct Result
{
    GenericIRPManagementConstDefs::DN mo;
    GenericIRPManagementConstDefs::MOAttributeSet attributes;
};

typedef sequence <Result> ResultSet;

/**
 * AttributeErrorCategory defines the categories of errors, related to
 * attributes, that can occur during creation or modification of MOs.
 *
 * NO_SUCH_ATTRIBUTE: The specified attribute does not exist.
 * INVALID_ATTRIBUTE_VALUE: The specified attribute value is not valid.
 * MISSING_ATTRIBUTE_VALUE: An attribute value is required but none was
 * provided and no default value is defined for the attribute.
 * INVALID_MODIFY_OPERATOR: The specified modify operator is not valid
 * (e.g. operator ADD_VALUES applied to a non multi-valued attribute
 * or operator SET_TO_DEFAULT applied where no default value is defined).
 * MODIFY_NOT_ALLOWED: The modification of the attribute is not allowed.
 * MODIFY_FAILED: The modification failed because of an unspecified reason.
 */
enum AttributeErrorCategory
{
    NO_SUCH_ATTRIBUTE,
    INVALID_ATTRIBUTE_VALUE,
    MISSING_ATTRIBUTE_VALUE,
    INVALID_MODIFY_OPERATOR,
    MODIFY_NOT_ALLOWED,
    MODIFY_FAILED
};

/**
 * DeleteErrorCategory defines the categories of errors that can occur
 * during deletion of MOs.
 *
 * SUBORDINATE_OBJECT: The MO cannot be deleted due to subordinate MOs.
 * DELETE_NOT_ALLOWED: The deletion of the MO is not allowed.
 * DELETE_FAILED: The deletion failed because of an unspecified reason.
 */
enum DeleteErrorCategory
{
    SUBORDINATE_OBJECT,
    DELETE_NOT_ALLOWED,
    DELETE_FAILED
};

/**
 * AttributeError represents an error, related to an attribute, that occurred
 * during creation or modification of MOs.
 * It contains:
 * - the name of the indicted attribute ("name" field),
 * - the category of the error ("error" field),
 * - optionally, the indicted attribute value ("value" field),
 * - optionally, additional details on the error ("reason" field).
 */
struct AttributeError
{
    GenericIRPManagementConstDefs::MOAttributeName name;
    AttributeErrorCategory error;
    GenericIRPManagementConstDefs::MOAttributeValue value;
    string reason;
};

typedef sequence <AttributeError> AttributeErrorSeq;

/**
 * DeleteError represents an error that occurred during deletion of MOs.

```



```

* It contains:
* - the distinguished name of the indicted MO ("object_name" field),
* - the category of the error ("error" field),
* - optionally, additional details on the error ("reason" field).
*/
struct DeleteError
{
    GenericIRPManagementConstDefs::DN object_name;
    DeleteErrorCategory error;
    string reason;
};

typedef sequence <DeleteError> DeleteErrorSeq;

/**
* ModifyAttributeErrors represents errors that occurred during
* modification of attributes of a MO.
* It contains:
* - the distinguished name of the indicted MO ("object_name" field),
* - a sequence containing the attribute errors ("errors" field).
*/
struct ModifyAttributeErrors
{
    GenericIRPManagementConstDefs::DN object_name;
    AttributeErrorSeq errors;
};

typedef sequence <ModifyAttributeErrors> ModifyAttributeErrorsSeq;

typedef sequence < GenericIRPManagementConstDefs::MOAttributeName> AttributeNameSet;

/**
* ModifyOperator defines the way in which an attribute value is to be
* applied to an attribute in a modification of MO attributes.
*
* REPLACE: replace the current value with the provided value
* ADD_VALUES: for a multi-valued attribute, add the provided values to the
* current list of values
* REMOVE_VALUES: for a multi-valued attribute, remove the provided values
* from the current list of values
* SET_TO_DEFAULT: set the attribute to its default value
*/
enum ModifyOperator
{
    REPLACE,
    ADD_VALUES,
    REMOVE_VALUES,
    SET_TO_DEFAULT
};

/**
* AttributeModification defines an attribute value and the way it is to
* be applied to an attribute in a modification of MO attributes.
* It contains:
* - the name of the attribute to modify ("name" field),
* - the value to apply to this attribute ("value" field),
* - the way the attribute value is to be applied to the attribute
* ("operator" field).
*/
struct AttributeModification
{
    GenericIRPManagementConstDefs::MOAttributeName name;
    GenericIRPManagementConstDefs::MOAttributeValue value;
    ModifyOperator operator;
};

typedef sequence <AttributeModification> AttributeModificationSet;
};

#endif // _BASIC_CM_IRP_CONST_DEFS_IDL_

```

A.3.3 IDL specification "BasicCMIRPSystem.idl"

```

//File: BasicCMIRPSystem.idl
#ifndef _BASIC_CM_IRP_SYSTEM_IDL_
#define _BASIC_CM_IRP_SYSTEM_IDL_

#include <GenericIRPManagementSystem.idl>
#include <GenericIRPManagementConstDefs.idl>
#include <BasicCMIRPConstDefs.idl>

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

module BasicCmIRPSystem
{
    exception IllegalFilterFormatException {
        string reason;
    };
    exception IllegalDNFormatException {
        string reason;
    };
    exception IllegalScopeTypeException {
        string reason;
    };
    exception IllegalScopeLevelException {
        string reason;
    };
    exception UndefinedMOException {
        string reason;
    };

    exception UndefinedScopeException {
        string reason;
    };

    exception FilterComplexityLimit {
        string reason;
    };

    exception DuplicateMO {};

    exception CreateNotAllowed {};

    exception ObjectClassMismatch {};

    exception NoSuchObjectClass {
        BasicCMIRPConstDefs::MOClass objectClass;
    };

    exception ParentObjectDoesNotExist {};

    /**
     * System otherwise fails to complete the operation. System can provide
     * reason to qualify the exception. The semantics carried in reason
     * is outside the scope of this IRP.
     */
    exception NextBasicCmInformations { string reason; };
    exception NextDeleteErrors { string reason; };
    exception NextModifyErrors { string reason; };
    exception DestroyException { string reason; };
    exception GetBasicCmIRPVersion { string reason; };
    exception GetBasicCmIRPOperationProfile { string reason; };
    exception GetBasicCmIRPNotificationProfile { string reason; };
    exception FindManagedObjects { string reason; };
    exception CreateManagedObject { string reason; };
    exception DeleteManagedObjects { string reason; };
    exception ModifyManagedObjects { string reason; };

    /**
     The BasicCmInformationIterator is used to iterate through a snapshot of
     Managed Object Information when IRPManager invokes find_managed_objects.
     IRPManager uses it to pace the return of Managed Object Information.

     IRPAgent controls the life-cycle of the iterator. However, a destroy
     operation is provided to handle the case where IRPManager wants to stop
     the iteration procedure before reaching the last iteration.

```

```

*/
interface BasicCmInformationIterator
{
    /**
    This method returns between 1 and "how_many" Managed Object information.
    The IRPAgent may return less than "how_many" items even if there are
    more items to return. "how_many" must be non-zero. Return TRUE if there
    may be more Managed Object information to return. Return FALSE if there
    are no more Managed Object information to be returned.

    If FALSE is returned, the IRPAgent will automatically destroy the
    iterator.

    @parm how_many how many elements to return in the "fetched_elements" out
    parameter.
    @parm fetched_elements the elements.
    @returns A boolean indicating if any elements are returned.
    "fetched_elements" is empty when the BasicCmInformationIterator is
    empty.
    */

    boolean next_basic_cm_informations (
        in unsigned short how_many,
        out BasicCMIRPCConstDefs::ResultSet fetched_elements
    )
    raises (
        NextBasicCmInformations,
        GenericIRPManagementSystem::InvalidParameter,
        GenericIRPManagementSystem::OperationNotSupported);

    /**
    This method destroys the iterator.
    */
    void destroy ()
    raises (
        DestroyException,
        GenericIRPManagementSystem::OperationNotSupported);
}; // end of BasicCmInformationIterator

/**
The DeleteResultIterator is used to iterate through the list of deleted MOs
when IRPManager invokes method "delete_managed_objects".
IRPManager uses it to pace the return of Managed Object Information.

IRPAgent controls the life-cycle of the iterator. However, a destroy
operation is provided to handle the case where IRPManager wants to stop
the iteration procedure before reaching the last iteration.
*/
interface DeleteResultIterator : BasicCmInformationIterator
{
    /**
    Inherited method "next_basic_cm_informations" has the same behaviour as
    for interface BasicCmInformationIterator, except that:
    - The Managed Object information returned in parameter
    "fetched_elements" contains only the DNS of the deleted MOs
    (no attributes are returned).
    - If FALSE is returned, the IRPAgent will not automatically destroy the
    iterator.
    */

    /**
    This method returns between 0 and "how_many" deletion errors. The
    IRPAgent may return less than "how_many" items even if there are more
    items to return. "how_many" must be non-zero. Return TRUE if there are
    more deletion errors to return. Return FALSE if there are no more
    deletion errors to be returned.

    If FALSE is returned and last call to inherited method
    "next_basic_cm_informations" also returned FALSE (i.e. no more Managed
    Object information to be returned), the IRPAgent will automatically
    destroy the iterator.

    @parm how_many: how many deletion errors to return in the
    "fetched_delete_errors" out parameter.
    @parm fetched_delete_errors: the deletion errors.
    @returns: a boolean indicating if any deletion errors are returned.
    */
}

```

```

    boolean next_delete_errors (
        in unsigned short how_many,
        out BasicCMIRPConstDefs::DeleteErrorSeq fetched_delete_errors
    )
    raises (
        NextDeleteErrors,
        GenericIRPManagementSystem::InvalidParameter);
}; // end of DeleteResultIterator

/**
The ModifyResultIterator is used to iterate through the list of modified
MOs when IRPManager invokes method "modify_managed_objects".
IRPManager uses it to pace the return of Managed Object Information.

IRPAgent controls the life-cycle of the iterator. However, a destroy
operation is provided to handle the case where IRPManager wants to stop
the iteration procedure before reaching the last iteration.
*/
interface ModifyResultIterator : BasicCmInformationIterator
{
    /**
    Inherited method "next_basic_cm_informations" has the same behaviour as
    for interface BasicCmInformationIterator, except that:
    - The Managed Object information returned in parameter
      "fetched_elements" contains DNS and attributes of the modified MOs.
    - If FALSE is returned, the IRPAgent will not automatically destroy the
      iterator.
    */

    /**
    This method returns between 0 and "how_many" modification errors. The
    IRPAgent may return less than "how_many" items even if there are more
    items to return. "how_many" must be non-zero. Return TRUE if there are
    more modification errors to return. Return FALSE if there are no more
    modification errors to be returned.

    If FALSE is returned and last call to inherited method
    "next_basic_cm_informations" also returned FALSE (i.e. no more Managed
    Object information to be returned), the IRPAgent will automatically
    destroy the iterator.

    @parm how_many: how many modification errors to return in the
      "fetched_modify_errors" out parameter.
    @parm fetched_modify_errors: the modification errors.
    @returns: a boolean indicating if any modification errors are returned.
    */

    boolean next_modification_errors (
        in unsigned short how_many,
        out BasicCMIRPConstDefs::ModifyAttributeErrorsSeq
        fetched_modify_errors
    )
    raises (
        NextModifyErrors,
        GenericIRPManagementSystem::InvalidParameter);
}; // end of ModifyResultIterator

/**
* The BasicCmIrpOperations interface.
* Supports a number of Resource Model versions.
*/

interface BasicCmIrpOperations : GenericIRPManagementSystem::
    GenericIRPManagement
{
    /**
    * Performs a containment search, using a SearchControl to
    * control the search and the returned results.
    *
    * All MOs in the scope constitute a set that the filter works on.
    * The result BasicCmInformationIterator contains all matched MOs,
    * with the amount of detail specified in the SearchControl.
    * For the special case when no managed objects are matched in

```

```

* find_managed_objects, the BasicCmInformationIterator will be returned.
* Executing the next_basicCmInformations in the
* BasicCmInformationIterator will return FALSE for
* completion.
*
* @parm base_object The start MO in the containment tree.
* @parm search_control the SearchControl to use.
* @parm requested_attributes defines which attributes to get.
*   If this parameter is empty (""), all attributes shall
*   be returned. In this version this is the only supported semantics.
*   Note that this argument is only
*   relevant if ResultContents in the search control is
*   specified to NAMES_AND_ATTRIBUTES.
*
* @raises GenericIRPManagementSystem::ValueNotSupported if a valid but
* unsupported parameter value is passed. E.g. the contents
* field in the searchcontrol parameter contains the value NAMES and
* the optional getContainment IS operation is not supported.
* @raises UndefinedMOException The MO does not exist.
* @raises IllegalDNFormatException The dn syntax string is
* malformed.
* @raises IllegalScopeTypeException The ScopeType in scope contains
* an illegal value.
* @raises IllegalScopeLevelException The scope level is negative
* (<0).
* @raises IllegalFilterFormatException The filter string is
* malformed.
* @raises FilterComplexityLimit if the filter syntax is correct,
* but the filter is too complex to be processed by the IRPAgent.
* @see SearchControl
* @see BasicCmInformationIterator
*/
BasicCmInformationIterator find_managed_objects(
    in GenericIRPManagementConstDefs::DN base_object,
    in BasicCMIRPCConstDefs::SearchControl search_control,
    in BasicCMIRPCConstDefs::AttributeNameSet requested_attributes)
raises (
    FindManagedObjects,
    GenericIRPManagementSystem::ParameterNotSupported,
    GenericIRPManagementSystem::InvalidParameter,
    GenericIRPManagementSystem::ValueNotSupported,
    GenericIRPManagementSystem::OperationNotSupported,
    UndefinedMOException,
    IllegalDNFormatException,
    UndefinedScopeException,
    IllegalScopeTypeException,
    IllegalScopeLevelException,
    IllegalFilterFormatException,
    FilterComplexityLimit);

/**
* Performs the creation of a MO instance in the MIB maintained
* by the IRPAgent.
*
* @parm object_name: the distinguished name of the MO to create.
* @parm reference_object: the distinguished name of a reference MO.
* @parm attributes: in input, initial attribute values for the MO to
* create; in output, actual attribute values of the created MO.
* @parm attribute_errors: errors, related to attributes, that caused the
* creation of the MO to fail.
*
* @raises GenericIRPManagementSystem::OperationNotSupported: The operation
* is not supported.
* @raises GenericIRPManagementSystem::ParameterNotSupported: An optional
* parameter is not supported.
* @raises GenericIRPManagementSystem::InvalidParameter: An invalid
* parameter value has been provided.
* @raises UndefinedMOException: The MO does not exist.
* @raises IllegalDNFormatException: The DN syntax string is malformed.
* @raises DuplicateMO: A MO already exist with the same DN as the one
* to create.
* @raises CreateNotAllowed: The creation of the MO is not allowed.
* @raises ObjectClassMismatch: The object class of the MO to create does
* not match with the object class of the provided reference MO.
* @raises NoSuchObjectClass: The class of the object to create is not
* recognized.
* @raises ParentObjectDoesNotExist: The parent MO instance of the
* ManagedEntity specified to be created does not exist.

```

```

*/
void create_managed_object (
    in GenericIRPManagementConstDefs::DN object_name,
    in GenericIRPManagementConstDefs::DN reference_object,
    inout GenericIRPManagementConstDefs::MOAttributeSet attributes,
    out BasicCMIRPConstDefs::AttributeErrorSeq attribute_errors
)
raises (
    CreateManagedObject,
    GenericIRPManagementSystem::OperationNotSupported,
    GenericIRPManagementSystem::ParameterNotSupported,
    GenericIRPManagementSystem::InvalidParameter,
    UndefinedMOException,
    IllegalDNFormatException,
    DuplicateMO,
    CreateNotAllowed,
    ObjectClassMismatch,
    NoSuchObjectClass,
    ParentObjectDoesNotExist);

/**
 * Performs the deletion of one or more MO instances from the MIB
 * maintained by the IRPagent, using a SearchControl to control the
 * instances to be deleted.
 *
 * All MOs in the scope constitute a set that the filter works on.
 * All matched MOs will be deleted by this operation.
 * The returned DeleteResultIterator is used to retrieve the DNs of the
 * MOs deleted and the errors that may have occurred preventing deletion
 * of some MOs.
 * For the special case when no managed objects are matched in
 * delete_managed_objects, the DeleteResultIterator will be returned.
 * Executing the next_basicCmInformations in the DeleteResultIterator
 * will return FALSE for completion.
 *
 * @parm base_object: the start MO in the containment tree.
 * @parm search_control: the SearchControl to use; field "contents" has no
 * meaning here and shall be ignored.
 * @returns: a DeleteResultIterator (see above).
 *
 * @raises GenericIRPManagementSystem::OperationNotSupported: The operation
 * is not supported.
 * @raises GenericIRPManagementSystem::InvalidParameter: An invalid
 * parameter value has been provided.
 * @raises UndefinedMOException: The MO does not exist.
 * @raises IllegalDNFormatException: The DN syntax string is malformed.
 * @raises IllegalScopeTypeException: The ScopeType in scope contains
 * an illegal value.
 * @raises IllegalScopeLevelException: The scope level is negative (<0).
 * @raises IllegalFilterFormatException: The filter string is malformed.
 * @raises FilterComplexityLimit: The filter syntax is correct,
 * but the filter is too complex to be processed by the IRPagent.
 */
DeleteResultIterator delete_managed_objects (
    in GenericIRPManagementConstDefs::DN base_object,
    in BasicCMIRPConstDefs::SearchControl search_control
)
raises (
    DeleteManagedObjects,
    GenericIRPManagementSystem::OperationNotSupported,
    GenericIRPManagementSystem::InvalidParameter,
    UndefinedMOException,
    IllegalDNFormatException,
    UndefinedScopeException,
    IllegalScopeTypeException,
    IllegalScopeLevelException,
    IllegalFilterFormatException,
    FilterComplexityLimit);

/**
 * Performs the modification of MO attributes. One or more MOs attributes
 * may be modified according to a SearchControl.
 *
 * All MOs in the scope constitute a set that the filter works on.
 * All matched MOs will have their attributes modified by this operation.
 * The returned ModifyResultIterator is used to retrieve the DNs of the
 * modified MOs together with the values of the modified attributes, and
 * the errors that may have occurred preventing modification of some

```

```
* attributes.
* For the special case when no managed objects are matched in
* modify_managed_objects, the ModifyResultIterator will be returned.
* Executing the next_basicCmInformations in the ModifyResultIterator
* will return FALSE for completion.
*
* @parm base_object: the start MO in the containment tree.
* @parm search_control: the SearchControl to use; field "contents" has no
*   meaning here and shall be ignored.
* @parm modifications: the values for the attributes to modify and
*   the way those values are to be applied to the attributes.
* @returns: a ModifyResultIterator (see above).
*
* @raises GenericIRPManagementSystem::OperationNotSupported: The operation
*   is not supported
* @raises GenericIRPManagementSystem::InvalidParameter: An invalid
*   parameter value has been provided
* @raises UndefinedMOException: The MO does not exist.
* @raises IllegalDNFormatException: The DN syntax string is malformed.
* @raises IllegalScopeTypeException: The ScopeType in scope contains
*   an illegal value.
* @raises IllegalScopeLevelException: The scope level is negative (<0).
* @raises IllegalFilterFormatException: The filter string is malformed.
* @raises FilterComplexityLimit: The filter syntax is correct,
*   but the filter is too complex to be processed by the IRPAgent.
*/
ModifyResultIterator modify_managed_objects (
    in GenericIRPManagementConstDefs::DN base_object,
    in BasicCMIRPConstDefs::SearchControl search_control,
    in BasicCMIRPConstDefs::AttributeModificationSet modifications
)
raises (
    ModifyManagedObjects,
    GenericIRPManagementSystem::OperationNotSupported,
    GenericIRPManagementSystem::InvalidParameter,
    UndefinedMOException,
    IllegalDNFormatException,
    UndefinedScopeException,
    IllegalScopeTypeException,
    IllegalScopeLevelException,
    IllegalFilterFormatException,
    FilterComplexityLimit);
};

};

#endif // _BASIC_CM_IRP_SYSTEM_IDL_
```

Annex B (normative): SOAP Solution Set

This annex specifies the SOAP Solution Set for the IRP whose semantics are specified in 3GPP TS 32.602 [8].

B.1 Architectural features

The overall architectural feature of Basic Configuration Management IRP is specified in 3GPP TS 32.602 [8]. This clause specifies features that are specific to the SOAP SS.

B.1.1 Syntax for Distinguished Names and Versions

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [3].

The version of this IRP is represented as a string (see also clause 3.1).

B.1.2 Supported W3C specifications

The SOAP 1.1 specification [11] and WSDL 1.1 specification [12] are supported.

The SOAP 1.2 specification [14] is supported optionally.

This specification uses "document" style in the WSDL description.

This specification uses "literal" encoding style in the WSDL description.

B.1.3 Prefixes and namespaces

This specification uses a number of namespace prefixes throughout that are listed in Table B.1.3.

Table B.1.3: Prefixes and Namespaces used in this specification

Prefix	Namespace
http	http://schemas.xmlsoap.org/wsdl/http/
soap	http://schemas.xmlsoap.org/wsdl/soap/
SOAP-ENV	http://schemas.xmlsoap.org/soap/envelope/
SOAP-ENC or soapenc	http://schemas.xmlsoap.org/soap/encoding/
xs or xsd	http://www.w3.org/2001/XMLSchema
xsi	http://www.w3.org/2001/XMLSchema-instance
basicCMIRPSystem	http://www.3gpp.org/ftp/specs/archive/32_series/32606#BasicCMIRPSystem
basicCMIRPData	http://www.3gpp.org/ftp/specs/archive/32_series/32606#BasicCMIRPData
genericIRPSystem	http://www.3gpp.org/ftp/specs/archive/32_series/32316#GenericIRPSystem

B.1.4 Filter language

The filter language used in the SS is the XPath Language (see W3C XPath 1.0 specification [13]). IRP Agents may throw a FilterComplexityLimit fault when a given filter is too complex.

B.2 Mapping

B.2.1 General mappings

The IS parameter name `managedObjectInstance` is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called "reference attributes") are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as a `MOReference`. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type `MOReferenceSet`, which contains a sequence of MO references.

If a reference attribute is changed, an `AttributeValueChange` notification (see 3GPP TS 32.666 [9]) is emitted.

B.2.2 Operation mapping

The Basic CM IRP: IS (see 3GPP TS 32.602 [8]) defines semantics of operation visible across the Basic Configuration Management IRP. Table B.2.2 indicates mapping of these operations to their equivalents defined in this SS.

Table B.2.2: Mapping from IS Operation to SS equivalents

IS Operation (3GPP TS 32.602 [8])	SS Operation	Qualifier
<code>getMoAttributes</code>	<code>getMOAttributes</code>	M
<code>getContainment</code>	<code>getContainment</code>	O
<code>cancelOperation</code> (see note 1)	N/A	N/A
<code>createMO</code>	<code>createMO</code>	O
<code>deleteMO</code>	<code>deleteMO</code>	O
<code>setMOAttributes</code>	<code>setMOAttributes</code>	O
<code>getIRPVersion</code> (see note 2)	<code>getIRPVersion</code>	M
<code>getOperationProfile</code> (see note 2)	<code>getOperationProfile</code>	O
<code>getNotificationProfile</code> (see note 2)	<code>getNotificationProfile</code>	O
NOTE 1: This operation is NOT mapped because it's useful for one-request-and-multiple-responses operations, which are not used in this Solution Set.		
NOTE 2: This operation is of IOC <code>ManagedGenericIRP</code> specified in [6]. The IOC <code>BasicCmIRP</code> of [8] inherits from it.		

B.2.3 Operation parameter mapping

The Basic CM IRP: IS (see 3GPP TS 32.602 [8]) defines semantics of parameters carried in operations across the Basic Configuration Management IRP. The following tables show the mapping of these parameters, as per operation, to their equivalents defined in the present document.

B.2.3.1 Operation `getMoAttributes`

B.2.3.1.1 Input parameters

Mapping from IS `getMoAttributes` input parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
<code>invokelIdentifierIn</code>	string <code>invokelIdentifierIn</code>	M
<code>baseObjectInstance</code> , <code>scope</code> , <code>filter</code> , <code>attributeListIn</code>	string <code>queryXPathExp</code>	M

Here is the XML schema fragment of the `getMOAttributes` request:

```
<!-- getMOAttributes Request -->
<element name="getMOAttributes">
  <complexType>
    <sequence>
      <element name="invokeIdentifierIn" type="string"/>
      <element name="queryXPathExp" type="string"/>
    </sequence>
  </complexType>
</element>
```

B.2.3.1.2 Output parameters

Mapping from IS `getMoAttributes` output parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
<code>invokelIdentifierOut</code>	string <code>invokelIdentifierOut</code>	M
<code>managedObjectClass</code> , <code>managedObjectInstance</code> , <code>attributeListOut</code>	basicCMIRPData:MOSequenceType <code>moiListOut</code>	M
<code>status</code>	basicCMIRPData: <code>getMOAttributesFault</code>	M

The specific “`attributeListOut`” definition depends on the corresponding NRM XML definition.

Here is the XML schema fragment of the `getMOAttributes` response:

```
<!-- getMoAttributes Response -->
<element name="getMoAttributesResponse">
  <complexType>
    <sequence>
      <element name="invokeIdentifierOut" type="string"/>
      <element name="moiListOut" type="basicCMIRPData:MOSequenceType"/>
    </sequence>
  </complexType>
</element>
```

B.2.3.1.3 Fault definition

```
<!-- getMoAttributes Fault -->
<element name="getMOAttributesFault">
  <complexType>
    <choice>
      <element name="getMOAttributesFault" type="string"/>
      <element name="resourceLimitationFault" type="string"/>
      <element name="operationCancelledFault" type="string"/>
      <element name="complexityLimitationFault" type="string"/>
    </choice>
  </complexType>
</element>
```

```

        <element ref="basicCMIRPData:InvalidParameterFault"/>
    </choice>
</complexType>
</element>

```

B.2.3.2 Operation getContainment

B.2.3.2.1 Input parameters

Mapping from IS getContainment input parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
invokelIdentifierIn	string invokelIdentifierIn	M
baseObjectInstance, scope	string queryXPathExp	M

Here is the XML schema fragment of the getContainment request:

```

<!-- getContainment Request -->
<element name="getContainment">
  <complexType>
    <sequence>
      <element name="invokeIdentifierIn" type="string"/>
      <element name="queryXPathExp" type="string"/>
    </sequence>
  </complexType>
</element>

```

B.2.3.2.2 Output parameters

Mapping from IS getContainment output parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
invokelIdentifierOut	string invokelIdentifierOut	M
containment	string topContainerLoc	M
status	basicCMIRPData:getContainmentFault	M

Here is the XML schema fragment of the getContainment response:

```

<!-- getContainment Response -->
<element name="getContainmentResponse">
  <complexType>
    <sequence>
      <element name="invokeIdentifierOut" type="string"/>
      <element name="topContainerLoc" type="string"/>
      <!--each element contains only id attribute and other MO it contains -->
      <any minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
  </complexType>
</element>

```

B.2.3.2.3 Fault definition

```

<!-- getContainment Fault -->
<element name="getContainmentFault">
  <complexType>
    <choice>
      <element name="getContainmentFault" type="string"/>
      <element name="resourceLimitationFault" type="string"/>
      <element name="operationCancelledFault" type="string"/>
      <element name="complexityLimitationFault" type="string"/>
      <element ref="basicCMIRPData:OperationNotSupportedFault"/>
      <element ref="basicCMIRPData:InvalidParameterFault"/>
    </choice>
  </complexType>
</element>

```

B.2.3.3 Operation createMO

B.2.3.3.1 Input parameters

Mapping from IS createMO input parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
managedObjectClass, managedObjectInstance	string mOIElementLoc	M
referenceObjectInstance	string referenceObjectInstance	O
attributeListIn	basicCMIRPData:AnyMOType mO	M

The specific “attributeListIn” definition depends on the corresponding NRM XML definition. Here is the XML schema fragment of the createMO request:

```
<!-- createMO Request -->
<element name="createMO">
  <complexType>
    <sequence>
      <element name="mOIElementLoc" type="string"/>
      <element name="referenceObjectInstance" type="string" minOccurs="0"/>
      <element name="mO" type="basicCMIRPData:AnyMOType"/>
    </sequence>
  </complexType>
</element>
```

B.2.3.3.2 Output parameters

Mapping from IS createMO output parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
attributeListOut	basicCMIRPData:AnyMOType mO	M
status	basicCMIRPData:createMOFault	M

The specific “attributeListOut” definition depends on the corresponding NRM XML definition. Here is the XML schema fragment of the createMO response:

```
<!-- createMO Response -->
<element name="createMOResponse">
  <complexType>
    <sequence>
      <element name="mO" type="basicCMIRPData:AnyMOType"/>
    </sequence>
  </complexType>
</element>
```

B.2.3.3.3 Fault definition

```
<!-- createMO Fault -->
<element name="createMOFault">
  <complexType>
    <choice>
      <element name="createMOFault" type="string"/>
      <element name="objectClassSpecificationMismatchedFault" type="string"/>
      <element name="InvalidObjectInstanceFault" type="string"/>
      <element name="createNotAllowedFault" type="string"/>
      <element name="noSuchObjectClassFault" type="string"/>
      <element name="classInstanceConflictFault" type="string"/>
      <element name="noSuchAttributeFault" type="string"/>
      <element name="invalidAttributeValueFault" type="string"/>
      <element name="missingAttributeValueFault" type="string"/>
      <element name="parentObjectDoesNotExistFault" type="string"/>
      <element ref="basicCMIRPData:OperationNotSupportedFault"/>
      <element ref="basicCMIRPData:InvalidParameterFault"/>
    </choice>
  </complexType>
</element>
```

B.2.3.4 Operation deleteMO

B.2.3.4.1 Input parameters

Mapping from IS deleteMO input parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
baseObjectInstance, scope, filter	string queryXPathExp	M

Here is the XML schema fragment of the deleteMO request:

```
<!-- deleteMO Request -->
<element name="deleteMO">
  <complexType>
    <sequence>
      <element name="queryXPathExp" type="string"/>
    </sequence>
  </complexType>
</element>
```

B.2.3.4.2 Output parameters

Mapping from IS deleteMO output parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
deletionList	basicCMIRPData:MOSequenceTypedeletionList	M
status	basicCMIRPData:deleteMOFault	M

Here is the XML schema fragment of the deleteMO response:

```
<!-- deleteMO Response -->
<element name="deleteMOResponse">
  <complexType>
    <sequence>
      <element name="deletionList" type="basicCMIRPData:MOSequenceType">
    </element>

    </sequence>
  </complexType>
</element>
```

B.2.3.4.3 Fault definition

```
<!-- deleteMO Fault -->
<element name="deleteMOFault">
  <complexType>
    <choice>
      <element name="deleteMOFault" type="string"/>
      <element name="invalidObjectInstanceFault" type="string"/>
      <element name="deleteNotAllowedFault" type="string"/>
      <element name="resourceLimitationFault" type="string"/>
      <element name="complexityLimitationFault" type="string"/>
      <element ref="basicCMIRPData:OperationNotSupportedFault"/>
      <element ref="basicCMIRPData:InvalidParameterFault"/>
    </choice>
  </complexType>
</element>
```

B.2.3.5 Operation setMOAttributes

B.2.3.5.1 Input parameters

Mapping from IS setMOAttributes input parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
baseObjectInstance, scope, filter, modificationList	stringqueryXPathExp	M
modificationList	basicCMIRPData:AttributeModificationSetType modificationList	M

Here is the XML schema fragment of the setMOAttributes request:

```
<!-- setMOAttributes Request -->
<element name="setMOAttributes">
  <complexType>
    <sequence>
      <element name="queryXPathExp" type="string"/>
      <element name="modificationList"
        type="basicCMIRPData:AttributeModificationSetType"/>
    </sequence>
  </complexType>
</element>

<complexType name="AttributeModificationSetType">
  <sequence>
    <element name="AttributeModification" maxOccurs="unbounded">
      <complexType>
        <sequence>
          <any/>
          <element name="operator" type="basicCMIRPData:ModifyOperatorType"/>
        </sequence>
      </complexType>
    </element>
  </sequence>
</complexType>

<simpleType name="ModifyOperatorType">
  <restriction base="string">
    <enumeration value="REPLACE"/>
    <enumeration value="ADDValues"/>
    <enumeration value="REMOVEValues"/>
    <enumeration value="SETToDefault"/>
  </restriction>
</simpleType>
```

B.2.3.5.2 Output parameters

Mapping from IS setMOAttributes output parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
modificationListOut	basicCMIRPData:MOSequenceTypemodificationListOut	M
status	basicCMIRPData:setMOAttributesFault	M

Here is the XML schema fragment of the setMOAttributes response:

```
<!-- setMOAttributes Response -->
<element name="setMOAttributesResponse">
  <complexType>
    <sequence>
      <element name="modificationListOut" type="basicCMIRPData:MOSequenceType"/>
    </sequence>
  </complexType>
</element>
```

B.2.3.5.3 Fault definition

```
<!-- setMOAttributes Fault -->
<element name="setMOAttributesFault">
  <complexType>
    <choice>
      <element name="setMOAttributesFault" type="string"/>
      <element name="modifyNotAllowedFault" type="string"/>
      <element name="noSuchAttributeFault" type="string"/>
      <element name="invalidAttributeValueFault" type="string"/>
      <element name="missingAttributeValueFault" type="string"/>
      <element name="resourceLimitationFault" type="string"/>
      <element name="complexityLimitationFault" type="string"/>
      <element ref="basicCMIRPData:OperationNotSupportedFault"/>
      <element ref="basicCMIRPData:InvalidParameterFault"/>
    </choice>
  </complexType>
</element>
```

B.3 Solution Set definitions

B.3.1 WSDL definition structure

Clause B.3.2 provides a graphical representation of the Basic CM IRP service.

Clause B.3.3 defines the services which are supported the Basic CM IRP agent.

B.3.2 Graphical Representation

The WSDL structure is presented in Figure B.3.2:

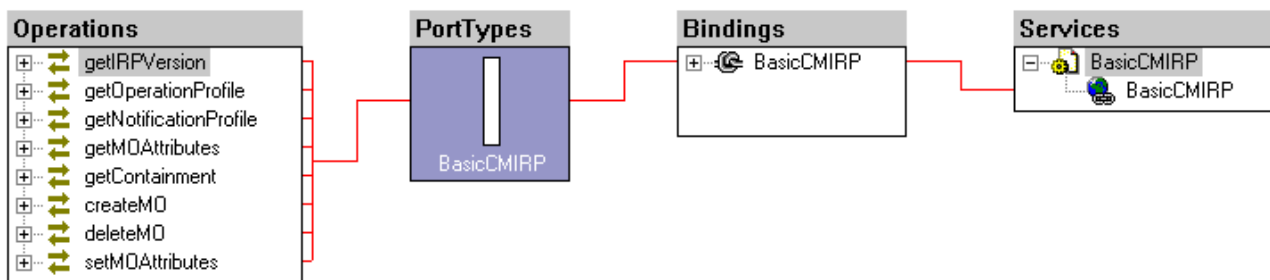


Figure B.3.2: BasicCM IRP SOAP Solution Set WSDL structure

B.3.3 WSDL specification "BasicCMIRPSystem.wsdl"

```

<?xml version="1.0" encoding="UTF-8"?>
<definitions xmlns="http://schemas.xmlsoap.org/wsdl/"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:http="http://schemas.xmlsoap.org/wsdl/http/" xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:basicCMIRPSystem="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#BasicCMIRPSystem"
xmlns:basicCMIRPData="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#BasicCMIRPData"
xmlns:genericIRPSystem="http://www.3gpp.org/ftp/specs/archive/32_series/32.316#GenericIRPSystem"
targetNamespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#BasicCMIRPSystem">
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.316#GenericIRPSystem"/>
  <types>
    <schema
targetNamespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#BasicCMIRPData"
xmlns="http://www.w3.org/2001/XMLSchema">
      <!-- getMOAttributes Request -->
      <element name="getMOAttributes">
        <complexType>
          <sequence>
            <element name="invokeIdentifierIn" type="string"/>
            <element name="queryXPathExp" type="string"/>
          </sequence>
        </complexType>
      </element>
      <!-- getMoAttributes Response -->
      <element name="getMoAttributesResponse">
        <complexType>
          <sequence>
            <element name="invokeIdentifierOut" type="string"/>
            <element name="moiListOut" type="basicCMIRPData:MOSequenceType"/>
          </sequence>
        </complexType>
      </element>
      <complexType name="AnyMOType">
        <sequence>
          <!--MO instance location in XPath expression-->
          <element name="moiLocation" type="string"/>
          <!--each MO-->
          <any/>
        </sequence>
      </complexType>
      <complexType name="MOSequenceType">
        <sequence>
          <element name="mo" type="basicCMIRPData:AnyMOType" minOccurs="0"
maxOccurs="unbounded"/>
        </sequence>
      </complexType>
      <!-- getMOAttributes Fault -->
      <element name="getMOAttributesFault">
        <complexType>
          <choice>
            <element name="getMOAttributesFault" type="string"/>
            <element name="resourceLimitationFault" type="string"/>
            <element name="operationCancelledFault" type="string"/>
            <element name="complexityLimitationFault" type="string"/>
            <element ref="basicCMIRPData:InvalidParameterFault"/>
          </choice>
        </complexType>
      </element>
      <!-- getContainment Request -->
      <element name="getContainment">
        <complexType>
          <sequence>
            <element name="invokeIdentifierIn" type="string"/>
            <element name="queryXPathExp" type="string"/>
          </sequence>
        </complexType>
      </element>
      <!-- getContainment Response -->
      <element name="getContainmentResponse">
        <complexType>
          <sequence>
            <!--top container element xpath location -->
            <element name="invokeIdentifierOut" type="string"/>
          </sequence>
        </complexType>
      </element>
    </schema>
  </types>

```

```

        <element name="topContainerLoc" type="string"/>
        <!--each element contains only id attribute and other MO it contains -->
        <any minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
</complexType>
</element>

<!-- getContainment Fault -->
<element name="getContainmentFault">
    <complexType>
        <choice>
            <element name="getContainmentFault" type="string"/>
            <element name="resourceLimitationFault" type="string"/>
            <element name="operationCancelledFault" type="string"/>
            <element name="complexityLimitationFault" type="string"/>
            <element ref="basicCMIRPData:OperationNotSupportedFault"/>
            <element ref="basicCMIRPData:InvalidParameterFault"/>
        </choice>
    </complexType>
</element>
<!-- createMO Request -->
<element name="createMO">
    <complexType>
        <sequence>
            <element name="mOIElementLoc" type="string"/>
            <element name="referenceObjectInstance" type="string" minOccurs="0"/>
            <element name="mO" type="basicCMIRPData:AnyMOType"/>
        </sequence>
    </complexType>
</element>
<!-- createMO Response -->
<element name="createMOResponse">
    <complexType>
        <sequence>
            <element name="mO" type="basicCMIRPData:AnyMOType"/>
        </sequence>
    </complexType>
</element>
<!-- createMO Fault -->
<element name="createMOFault">
    <complexType>
        <choice>
            <element name="createMOFault" type="string"/>
            <element name="objectClassSpecificationMissmatchedFault" type="string"/>
            <element name="InvalidObjectInstanceFault" type="string"/>
            <element name="createNotAllowedFault" type="string"/>
            <element name="noSuchObjectClassFault" type="string"/>
            <element name="classInstanceConflictFault" type="string"/>
            <element name="noSuchAttributeFault" type="string"/>
            <element name="invalidAttributeValueFault" type="string"/>
            <element name="missingAttributeValueFault" type="string"/>
            <element name="parentObjectDoesNotExistFault" type="string"/>
            <element ref="basicCMIRPData:OperationNotSupportedFault"/>
            <element ref="basicCMIRPData:InvalidParameterFault"/>
        </choice>
    </complexType>
</element>
<!-- deleteMO Request -->
<element name="deleteMO">
    <complexType>
        <sequence>
            <element name="queryXPathExp" type="string"/>
        </sequence>
    </complexType>
</element>
<!-- deleteMO Response -->
<element name="deleteMOResponse">
    <complexType>
        <sequence>
            <element name="deletionList" type="basicCMIRPData:MOSequenceType">
                </element>
            </sequence>
    </complexType>
</element>

<!-- deleteMO Fault -->
<element name="deleteMOFault">
    <complexType>

```

```

        <choice>
          <element name="deleteMOFault" type="string"/>
          <element name="invalidObjectInstanceFault" type="string"/>
          <element name="deleteNotAllowedFault" type="string"/>
          <element name="resourceLimitationFault" type="string"/>
          <element name="complexityLimitationFault" type="string"/>
          <element ref="basicCMIRPData:OperationNotSupportedFault"/>
          <element ref="basicCMIRPData:InvalidParameterFault"/>
        </choice>
      </complexType>
    </element>
    <!-- setMOAttributes Request -->
    <element name="setMOAttributes">
      <complexType>
        <sequence>
          <element name="queryXPathExp" type="string"/>
          <element name="modificationList"
type="basicCMIRPData:AttributeModificationSetType"/>
        </sequence>
      </complexType>
    </element>
    <simpleType name="ModifyOperatorType">
      <restriction base="string">
        <enumeration value="REPLACE"/>
        <enumeration value="ADDValues"/>
        <enumeration value="REMOVEValues"/>
        <enumeration value="SETToDefault"/>
      </restriction>
    </simpleType>
    <complexType name="AttributeModificationSetType">
      <sequence>
        <element name="AttributeModification" maxOccurs="unbounded">
          <complexType>
            <sequence>
              <any/>
              <element name="operator" type="basicCMIRPData:ModifyOperatorType"/>
            </sequence>
          </complexType>
        </element>
      </sequence>
    </complexType>
    <!-- setMOAttributes Response -->
    <element name="setMOAttributesResponse">
      <complexType>
        <sequence>
          <element name="modificationListOut" type="basicCMIRPData:MOSequenceType"/>
        </sequence>
      </complexType>
    </element>

    <!-- setMOAttributes Fault -->
    <element name="setMOAttributesFault">
      <complexType>
        <choice>
          <element name="setMOAttributesFault" type="string"/>
          <element name="modifyNotAllowedFault" type="string"/>
          <element name="noSuchAttributeFault" type="string"/>
          <element name="invalidAttributeValueFault" type="string"/>
          <element name="missingAttributeValueFault" type="string"/>
          <element name="resourceLimitationFault" type="string"/>
          <element name="complexityLimitationFault" type="string"/>
          <element ref="basicCMIRPData:OperationNotSupportedFault"/>
          <element ref="basicCMIRPData:InvalidParameterFault"/>
        </choice>
      </complexType>
    </element>
    <element name="OperationNotSupportedFault" type="string"/>
    <element name="InvalidParameterFault" type="string"/>
    <simpleType name="VersionNumberType">
      <restriction base="string"/>
    </simpleType>
    <complexType name="VersionNumberSetType">
      <sequence>
        <element name="versionNumber" type="basicCMIRPData:VersionNumberType"
maxOccurs="unbounded"/>
      </sequence>
    </complexType>
  </complexType name="ParameterSetType">

```

```

        <sequence>
          <element name="parameterName" type="string" maxOccurs="unbounded" />
        </sequence>
      </complexType>
    <complexType name="OperationType">
      <sequence>
        <element name="operationName" type="string" />
        <element name="parameterSet" type="basicCMIRPData:ParameterSetType" />
      </sequence>
    </complexType>
    <complexType name="OperationSetType">
      <sequence>
        <element name="operation" type="basicCMIRPData:OperationType"
maxOccurs="unbounded" />
      </sequence>
    </complexType>
    <complexType name="NotificationType">
      <sequence>
        <element name="notificationName" type="string" />
        <element name="parameterSet" type="basicCMIRPData:ParameterSetType" />
      </sequence>
    </complexType>
    <complexType name="NotificationSetType">
      <sequence>
        <element name="notification" type="basicCMIRPData:NotificationType"
maxOccurs="unbounded" />
      </sequence>
    </complexType>
  </schema>
</types>
<message name="getMOAttributesRequest">
  <part name="parameter" element="basicCMIRPData:getMOAttributes" />
</message>
<message name="getMOAttributesResponse">
  <part name="parameter" element="basicCMIRPData:getMoAttributesResponse" />
</message>
<message name="getMOAttributesFault">
  <part name="parameter" element="basicCMIRPData:getMOAttributesFault" />
</message>
<message name="getContainmentRequest">
  <part name="parameter" element="basicCMIRPData:getContainment" />
</message>
<message name="getContainmentResponse">
  <part name="parameter" element="basicCMIRPData:getContainmentResponse" />
</message>
<message name="getContainmentFault">
  <part name="parameter" element="basicCMIRPData:getContainmentFault" />
</message>

<message name="createMORequest">
  <part name="parameter" element="basicCMIRPData:createMO" />
</message>
<message name="createMOResponse">
  <part name="parameter" element="basicCMIRPData:createMOResponse" />
</message>
<message name="createMOFault">
  <part name="parameter" element="basicCMIRPData:createMOFault" />
</message>
<message name="deleteMORequest">
  <part name="parameter" element="basicCMIRPData:deleteMO" />
</message>
<message name="deleteMOResponse">
  <part name="parameter" element="basicCMIRPData:deleteMOResponse" />
</message>
<message name="deleteMOFault">
  <part name="parameter" element="basicCMIRPData:deleteMOFault" />
</message>
<message name="setMOAttributesRequest">
  <part name="parameter" element="basicCMIRPData:setMOAttributes" />
</message>
<message name="setMOAttributesResponse">
  <part name="parameter" element="basicCMIRPData:setMOAttributesResponse" />
</message>
<message name="setMOAttributesFault">
  <part name="parameter" element="basicCMIRPData:setMOAttributesFault" />
</message>
<portType name="BasicCMIRP">

```

```

    <operation name="getIRPVersion">
      <input message="genericIRPSystem:getIRPVersionRequest" />
      <output message="genericIRPSystem:getIRPVersionResponse" />
      <fault name="getIRPVersionFault" message="genericIRPSystem:getIRPVersionFault" />
    </operation>
    <operation name="getOperationProfile">
      <input message="genericIRPSystem:getOperationProfileRequest" />
      <output message="genericIRPSystem:getOperationProfileResponse" />
      <fault name="getOperationProfileFault"
message="genericIRPSystem:getOperationProfileFault" />
    </operation>
    <operation name="getNotificationProfile">
      <input message="genericIRPSystem:getNotificationProfileRequest" />
      <output message="genericIRPSystem:getNotificationProfileResponse" />
      <fault name="getNotificationProfileFault"
message="genericIRPSystem:getNotificationProfileFault" />
    </operation>
    <operation name="getMOAttributes">
      <input message="basicCMIRPSystem:getMOAttributesRequest" />
      <output message="basicCMIRPSystem:getMOAttributesResponse" />
      <fault name="getMOAttributesFault" message="basicCMIRPSystem:getMOAttributesFault" />
    </operation>
    <operation name="getContainment">
      <input message="basicCMIRPSystem:getContainmentRequest" />
      <output message="basicCMIRPSystem:getContainmentResponse" />
      <fault name="getContainmentFault" message="basicCMIRPSystem:getContainmentFault" />
    </operation>

    <operation name="createMO">
      <input message="basicCMIRPSystem:createMOREquest" />
      <output message="basicCMIRPSystem:createMOREsponse" />
      <fault name="createMOFault" message="basicCMIRPSystem:createMOFault" />
    </operation>
    <operation name="deleteMO">
      <input message="basicCMIRPSystem:deleteMOREquest" />
      <output message="basicCMIRPSystem:deleteMOREsponse" />
      <fault name="deleteMOFault" message="basicCMIRPSystem:deleteMOFault" />
    </operation>
    <operation name="setMOAttributes">
      <input message="basicCMIRPSystem:setMOAttributesRequest" />
      <output message="basicCMIRPSystem:setMOAttributesResponse" />
      <fault name="setMOAttributesFault" message="basicCMIRPSystem:setMOAttributesFault" />
    </operation>
  </portType>

  <binding name="BasicCMIRP" type="basicCMIRPSystem:BasicCMIRP">
    <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http" />
    <operation name="getIRPVersion">
      <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#getIRPVersion" />
      <input>
        <soap:body use="literal" />
      </input>
      <output>
        <soap:body use="literal" />
      </output>
      <fault name="getIRPVersionFault">
        <soap:fault name="getIRPVersionFault" use="literal" />
      </fault>
    </operation>
    <operation name="getOperationProfile">
      <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#getOperationProfile" />
      <input>
        <soap:body use="literal" />
      </input>
      <output>
        <soap:body use="literal" />
      </output>
      <fault name="getOperationProfileFault">
        <soap:fault name="getOperationProfileFault" use="literal" />
      </fault>
    </operation>
    <operation name="getNotificationProfile">
      <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#getNotificationProfile" />
      <input>
        <soap:body use="literal" />

```

```

        </input>
      </output>
      <soap:body use="literal"/>
    </output>
    <fault name="getNotificationProfileFault">
      <soap:fault name="getNotificationProfileFault" use="literal"/>
    </fault>
  </operation>
  <operation name="getMOAttributes">
    <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#getMOAttributes"/>
    <input>
      <soap:body use="literal"/>
    </input>
    <output>
      <soap:body use="literal"/>
    </output>
    <fault name="getMOAttributesFault">
      <soap:fault name="getMOAttributesFault" use="literal"/>
    </fault>
  </operation>
  <operation name="getContainment">
    <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#getContainment"/>
    <input>
      <soap:body use="literal"/>
    </input>
    <output>
      <soap:body use="literal"/>
    </output>
    <fault name="getContainmentFault">
      <soap:fault name="getContainmentFault" use="literal"/>
    </fault>
  </operation>

  <operation name="createMO">
    <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#createMO"/>
    <input>
      <soap:body use="literal"/>
    </input>
    <output>
      <soap:body use="literal"/>
    </output>
    <fault name="createMOFault">
      <soap:fault name="createMOFault" use="literal"/>
    </fault>
  </operation>
  <operation name="deleteMO">
    <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#deleteMO"/>
    <input>
      <soap:body use="literal"/>
    </input>
    <output>
      <soap:body use="literal"/>
    </output>
    <fault name="deleteMOFault">
      <soap:fault name="deleteMOFault" use="literal"/>
    </fault>
  </operation>
  <operation name="setMOAttributes">
    <soap:operation
soapAction="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#setMOAttributes"/>
    <input>
      <soap:body use="literal"/>
    </input>
    <output>
      <soap:body use="literal"/>
    </output>
    <fault name="setMOAttributesFault">
      <soap:fault name="setMOAttributesFault" use="literal"/>
    </fault>
  </operation>
</binding>
<service name="BasicCMIRP">
  <port name="BasicCMIRP" binding="basicCMIRPSystem:BasicCMIRP">

```

```
      <soap:address
location="http://www.3gpp.org/ftp/specs/archive/32_series/32.606#BasicCMIRP"/>
      </port>
    </service>
  </definitions>
```

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
05-2010	SA-48	SP-100273	--	--	Presentation to SA for information and approval	--	1.0.0
06-2010	SA-48	--	--	--	Publication	1.0.0	10.0.0
09-2010	SA-49	SP-100487	001	--	Syntax errors in WSDL schema	10.0.0	10.1.0
09-2010	SA-49	SP-100487	002	--	Correct the data type 'MOAttributeName' and inconsistency in BasicCMIRP Solution Set	10.0.0	10.1.0
09-2012	SA-57	-	-	-	Automatic upgrade from previous Release version 10.1.0	10.1.0	11.0.0
09-2014	SA-65	SP-140559	003	-	Update the link from Solution Set to Information Service due to the end of Release 12	11.0.0	12.0.0
2016-01	-	-	-	-	Update to Rel-13 version (MCC)	12.0.0	13.0.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2016-06	SA#72	SP-160407	0004	-	F	Update the link from IRP Solution Set to IRP Information Service	13.1.0
2017-04	SA#75	-	-	-	-	Promotion to Release 14 without technical change	14.0.0
2017-06	SA#76	SP-170502	0005	-	F	Update the link from IRP Solution Set to IRP Information Service	14.1.0
2018-06	-	-	-	-	-	Update to Rel-15 version (MCC)	15.0.0

History

Document history		
V15.0.0	July 2018	Publication