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**Universal Mobile Telecommunications System (UMTS);**
**LTE;**
**Telecommunication management;**
**Self-configuration of network elements**
**Integration Reference Point (IRP);**
**Information Service (IS)**
**(3GPP TS 32.502 version 12.1.0 Release 12)**

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# Contents

# 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:

32.501: Self-Configuration of Network Elements; Concepts and Integration Reference Point (IRP) Requirements

**32.502: Self-Configuration of Network Elements Integration Reference Point (IRP); Information Service (IS)**

32.503: Self-Configuration of Network Elements Integration Reference Point (IRP); Common Object Request Broker Architecture (CORBA) Solution Set (SS)

# 1 Scope

The present document defines the Information Service (IS) part of the Self-Configuration IRP (SCIRP).
It describes the semantics of the information and the interactions visible across Itf-N in a protocol independent way. The information is specified by means of Information Object Classes (IOCs) and the interactions by means of operations and notifications. The present document does not specify the syntax (encoding) of the information.

The scope of this version of the TS is restricted to self-configuration of eNBs.

The present documents also describes how already defined Itf-N functionalities are used in the context of Self-Configuration.

# 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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".

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

[4] Void.

[5] 3GPP TR 32.816: "Telecommunication management; Study on Management of Evolved Universal Terrestrial Radio Access Network (E-UTRAN) and Evolved Packet Core (EPC)".

[6] 3GPP TS 32.501: "Telecommunication management; Self-Configuration of Network Elements; Concepts and Requirements".

[7] 3GPP TS 32.532: "Telecommunication management; Software management Integration Reference Point (IRP); Information Service (IS)".

[8] 3GPP TS 32.622: "Telecommunication management; Generic network resources Integration Reference Point (IRP); Network Resource Model (NRM)".

[9] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management: Information Services".

[10] 3GPP TS 32.612: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP): Information Services (IS)".

[11] 3GPP TS 32.642: "Telecommunication management; Configuration Management (CM); UTRAN network resources Integration Reference Point (IRP): Information Network Resource Model (NRM)".

[12] 3GPP TS 32.342: "Telecommunication management; File Transfer (FT) Integration Reference Point (IRP): Information Service (IS)".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 32.101 [2], TS 32.102 [3] and TR 21.905 [1], 32.501 [6] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TS 32.501 [6], TS 32.101 [2], TS 32.102 [3] and TS 21.905 [1], in that order.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [4], TS 32.501 [6] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [4] and TS 32.501 [6].

DNS Domain Name System

# 4 Stage 2 descriptions

## 4.1 General

For the logical/Physical architecture of functional blocs and their interactions see in TR 32.816 [5] and TS 32.501 [6].

## 4.2 Management and Monitoring of Self-Configuration

### 4.2.1 Usage of Itf-N

For specifically defined interface see 6.4.1.

#### 4.2.1.1 Usage of alarmIRP

AlarmIRP is re-used for alarm reporting of self-establishment.

Specific definitions:

##### 4.2.1.1.2 Usage of information object classes

No specific definitions.

##### 4.2.1.1.2 Usage of notifications

No specific definitions.

##### 4.2.1.1.3 Usage of notifications

For notification without sub-clause no specific definitions exist.

###### 4.2.1.1.3.1 Usage of notifyNewAlarm

The parameter “probableCause” shall use one of the values
“softwareDownloadFailure” (already defined),
“softwareInstallationError” or
“softwareFallbackError” (the latter two values need to be introduced)

For parameter alarmType the value “ProcessingErrorAlarm” should be used.

Parameters trendIndication and thresholdInfo should not be used.

###### 4.2.1.1.3.2 Usage of notifyObjectCreation/-deletion/-attributeValueChange

For notifyObjectCreation/-deletion/-attributeValueChange notifications which are triggered by a self-configuration functionality the value SON_operation shall be used for parameter sourceIndicator. The parameter additionalInformation may indicate that this was triggerd by self-configuration.

## 4.3 Inventory Update

### 4.3.1 Usage of Itf-N

#### 4.3.1.1 Usage of Inventory Management IRP NRM (32.69n)

The Inventory Management NRM IRP shall be used.

# 5 Information Object Classes

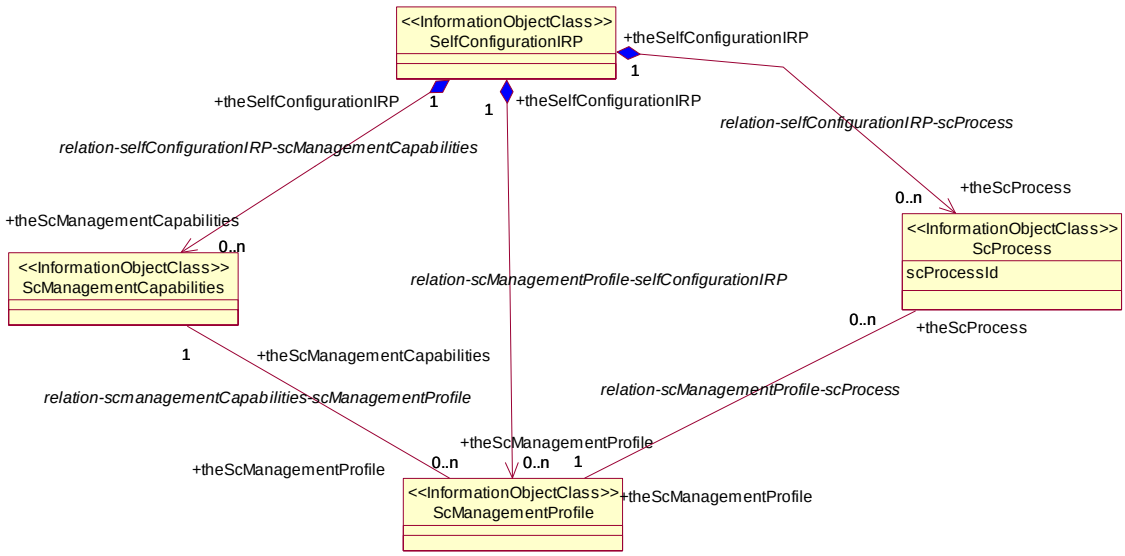
## 5.1 Imported information entities and local labels

| Label reference | Local label |
|---|---|
| 32.532 [7], information object class, SwMCapabilities | SwMCapabilities |
| 32.532 [7], information object class, SwMProfile | SwMProfile |
| 32.532 [7], information object class, SwMProcess | SwMProcess |
| 3GPP TS 32.622 [8], information object class, Top | Top |
| 3GPP TS 32.312 [9], information object class, ManagedGenericIRP | ManagedGenericIRP |

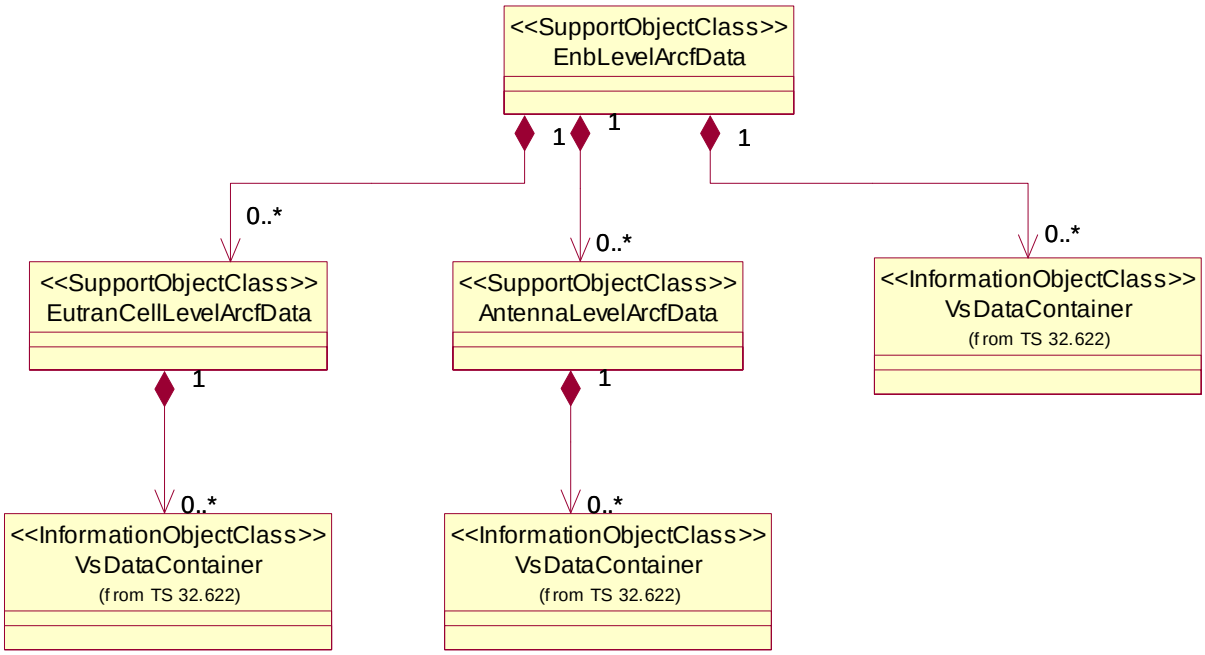
## 5.2 Class diagram

### 5.2.1 Attributes and relationships

The diagram reflects the definitions in the text of the following clauses. In case of conflict text takes precedence.

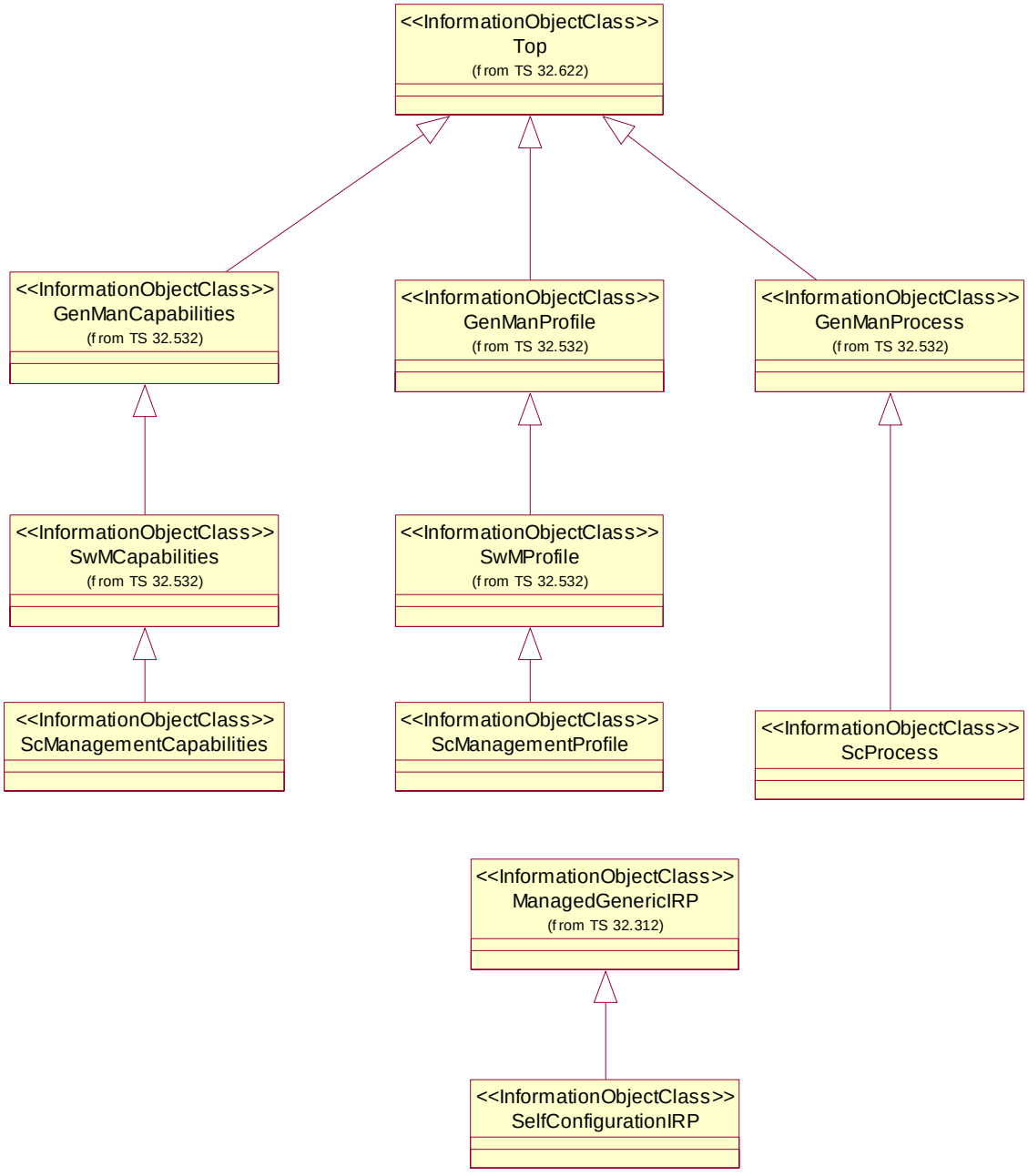



The following UML diagram describes the objects required for ARCF.

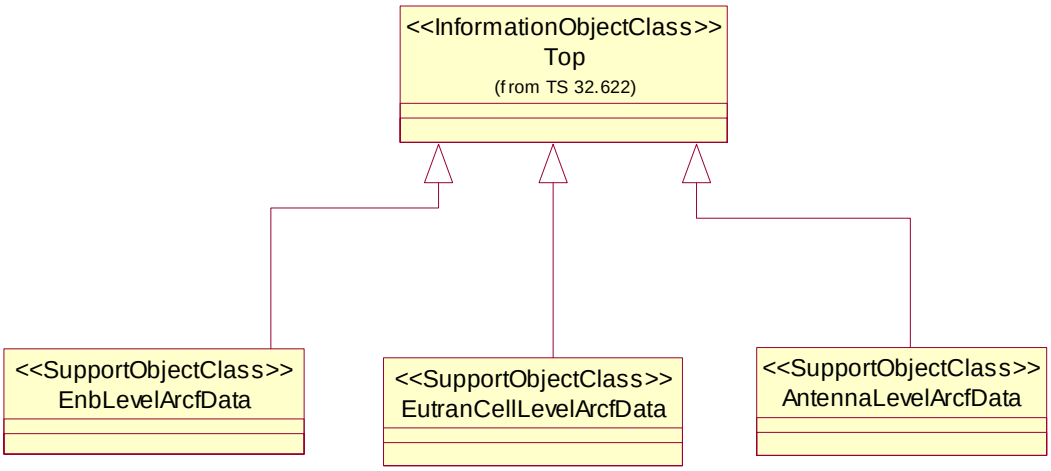

<<SupportObjectClass>>
EnbLevelArcfData
1
1
1
0..*
0..*
0..*
<<SupportObjectClass>>
EutranCellLevelArcfData
<<SupportObjectClass>>
AntennaLevelArcfData
<<InformationObjectClass>>
VsDataContainer
(from TS 32.622)
1
1
0..*
0..*
<<InformationObjectClass>>
VsDataContainer
(from TS 32.622)
<<InformationObjectClass>>
VsDataContainer
(from TS 32.622)

## 5.2.2 Inheritance

The diagram reflects the definitions in the text of the following clauses. In case of conflict text takes precedence.




The following UML diagram describes the inheritance of the objects required for ARCF.


<<InformationObjectClass>>
Top
(from TS 32.622)
<<SupportObjectClass>>
EnbLevelArcfData
<<SupportObjectClass>>
EutranCellLevelArcfData
<<SupportObjectClass>>
AntennaLevelArcfData

# 5.3 Information object class definitions

## 5.3.1 ScManagementCapability

### 5.3.1.1 Definition

This object class is a sub-class of swMCapability and represents the IRPAgent's capabilities in support of self configuration.

It is created by the IRPAgent and cannot be modified by the IRPManager.
A ScManagementCapability object is valid for a certain NE type or a set of NE types. For an NE there shall be no ambiguity which ScManagementCapability object is valid for the NE.
Multiple ScManagementCapability objects may be instantiated in the IRPAgent.

The object identifies
a) the sequence of the self-configuration steps
and for each step
a.1) the NE behavior in case the step does not perform normally
a.2) the possibility, whether before the step a stop point can be selected, such that the self-configuration step is suspended and waits for a request by the IRPManager to resume.

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_1 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_4 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_5 | |

### 5.3.1.2 Attributes

All attributes inherited from IOC swMCapability.

Additional attributes: None

### 5.3.1.3 Notifications

| Name | Qualifier | Notes |
|---|---|---|
| notifyNewScManagementAvailability | O | |

## 5.3.2 ScManagementProfile

### 5.3.2.1 Definition

This object class is a sub-class of swMProfile. It represents the IRPManager decision related to self configuration.

A ScManagementProfile object is valid for a certain NE type or a set of NE types.
For an NE starting its self-configuration process (see ScProcess) there shall be no ambiguity which ScManagementProfile is valid for the NE.
Multiple ScManagementProfile objects may be instantiated in the IRPAgent.

By using this object the IRPManager decides which of the possible stop points offered in scManagementCapability are used to suspend the self-configuration process of the specified NE type (or set of NE types).

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_1 | |
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_2 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_3 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_5 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_6 | |

#### 5.3.2.2 Attributes

All attributes inherited from IOC `swMProfile.`

Additional attributes: None.

#### 5.3.2.3 Notifications

| Name | Qualifier | Notes |
|---|---|---|
| `notifyScManagementProfileCreation` | M | |
| `notifyScManagementProfileChanged` | CM | Condition: Present if operation `changeScManagementProfile` is supported. |
| `notifyScManagementProfileDeletion` | M | |

### 5.3.3 `ScProcess`

#### 5.3.3.1 Definition

This object class is a sub-class of `genManProcess` . It describes the Self Configuration process for an NE. It allows the IRPManager to be informed about the current progress of the Self Configuration process and where stop points are set. No intervention of the IRPManager is foreseen except to provide indication to resume after a stop point was reached or to abort the self-configuration.

When the automated management process for an NE starts, an instance of the `scProcess` is created automatically.

The `id` of the `scProcess` shall be identical to the identifier of the NE and identify the `scProcess` instance uniquely.

The steps in the `stepInfoList` shall conform to the content of the relevant `scManagementProfile` instance.
Examples:
1. If the `stepsAndSelectedStopPointList` of `scManagementProfile` indicates `stopPointCanBeSetBeforeThisStep=No` for step X, then the entry for step X in the `stepInfoList` of `scProcess` can only have the value `stopPointIsNotSet` .
2. All steps within the `stepInfoList` shall have the same `sequenceNumberInScProcess` as in the `scStepList` of `scManagementProfile.`

When there is no relevant `scManagementProfile` at creation time of `scProcess`, then the IRPAgent creates the `scProcess` based on the relevant `scManagementCapability`. In this case preferably no stop point shall be set in the self configuration process.

When the last step of the self configuration process is completed successfully, the `scProcess` instance is deleted automatically.

When self configuration process is terminated by the IRPManager, the `scProcess` instance is deleted automatically.

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_3 | |
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_4 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_2 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_4 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_5 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_6 | |

#### 5.3.3.2 Attributes

All attributes inherited from IOC `GenManProcess`.

No additional attributes.

#### 5.3.3.3 Notifications

| Name | Qualifier | Notes |
|---|---|---|
| `notifyScProcessCreation` | M | |
| `notifyScProcessStage` | M | |
| `notifyScProcessDeletion` | M | |

### 5.3.4 `SelfConfigurationIRP`

#### 5.3.4.1 Definition

This information object represents a self-configuration IRP. It inherits from IOC `managedGenericIRP`.

#### 5.3.4.2 Attributes

All attributes inherited from IOC `managedGenericIRP`.

Additional attributes: None.

#### 5.3.4.3 Notifications

All notifications inherited from IOC `managedGenericIRP`.

Additional notifications: None.

### 5.3.5 `ENBLevelArcfData`

#### 5.3.5.1 Definition

This IOC represents the eNB level data defined only for the ARCF Handling.

#### 5.3.5.2 Attributes

| Attribute name | Support Qualifier | Read Qualifier | Write Qualifier |
|---|---|---|---|
| `identifierInArcfContext` | M | - | - |

#### 5.3.5.3 Notifications

None.

### 5.3.6 EUtranCellLevelArcfData

#### 5.3.6.1 Definition

This IOC represents the E-Utran Cell level data defined only for the ARCF Handling.

#### 5.3.6.2 Attributes

| Attribute name | Support Qualifier | Read Qualifier | Write Qualifier |
|---|---|---|---|
| identifierInArcfContext | M | - | - |
| cellIdentity | M | - | - |
| pci | M | - | - |
| pciList | CM | - | - |
| qRxLevMin | M | - | - |
| threshXHigh | M | - | - |
| threshXLow | M | - | - |
| maxTxPower | M | - | - |
| tac | CM | - | - |
| qOffSetCell | M | - | - |
| nrt | CM | - | - |

For the conditions relevant to the attributes with CM qualifier see §5.5.1.

#### 5.3.6.3 Notifications

None.

### 5.3.7 AntennaLevelArcfData

#### 5.3.7.1 Definition

This IOC represents the Antenna level data defined only for the ARCF Handling.

#### 5.3.7.2 Attributes

| Attribute name | Support Qualifier | Read Qualifier | Write Qualifier |
|---|---|---|---|
| identifierInArcfContext | M | - | - |
| antennaAzimuth | M | - | - |
| antennaTilt | M | - | - |

#### 5.3.7.3 Notifications

None.

## 5.4 Information relationship definitions

### 5.4.1 relation-SelfConfigurationIRP-scManagementCapability (M)

#### 5.4.1.1 Definition

This represents the relationship between SelfConfigurationIRP and ScManagementCapability.

#### 5.4.1.2 Roles

| Name | Definition |
|---|---|
| theSelfConfigurationIRP | It represents the SelfConfigurationIRP. |
| theScManagementCapability | It represents the ScManagementCapability |

#### 5.4.1.3 Constraints

There is no constraint for this relationship.

### 5.4.2 relation-SelfConfigurationIRP-scManagementProfile (M)

#### 5.4.2.1 Definition

This represents the relationship between SelfConfigurationIRP and ScManagementProfile.

#### 5.4.2.2 Roles

| Name | Definition |
|---|---|
| theSelfConfigurationIRP | It represents the SelfConfigurationIRP. |
| theScManagementProfile | It represents the ScManagementProfile. |

#### 5.4.2.3 Constraints

There is no constraint for this relationship.

### 5.4.3 relation-SelfConfigurationIRP-scProcess (M)

#### 5.4.3.1 Definition

This represents the relationship between SelfConfigurationIRP and ScProcess.

#### 5.4.3.2 Roles

| Name | Definition |
|---|---|
| theSelfConfigurationIRP | It represents the SelfConfigurationIRP. |
| theScProcess | It represents the ScProcess. |

#### 5.4.3.3 Constraints

There is no constraint for this relationship.

## 5.4.4 relation-ScManagementCapabilites-scManagementProfile (M)

### 5.4.4.1 Definition

This represents the relationship between ScManagementCapability and ScManagementProfile.

### 5.4.4.2 Roles

| Name | Definition |
|---|---|
| theScManagementCapability | It represents the ScManagementCapability. |
| theScManagementProfile | It represents the ScManagementProfile. |

### 5.4.4.3 Constraints

A relation can only exist between a ScManagementProfile and a ScManagementCapability when a) all steps which are entries in the stepsAndSelectedStopPointList of ScManagementProfile have stopPointCanBeSetBeforeThisStep = Yes in the stepsAndOfferedStopPointList of the ScManagementCapability.b) nEInformation of ScManagementProfile is a subset of nEInformation of ScManagementCapability.

## 5.4.5 relation scManagementProfile-scProcess (M)

### 5.4.5.1 Definition

This represents the relationship between ScManagementProfile and ScProcess.

### 5.4.5.2 Roles

| Name | Definition |
|---|---|
| theScManagementProfile | It represents the theScManagementProfile. |
| theScProcess | It represents the ScProcess. |

### 5.4.5.3 Constraints

A ScProcess shall perform all self-configuration steps according to stepsAndOfferedStopPointList of ScManagementProfile.

A relation can only exist between a ScProcess and a ScManagementProfile when nEIdentification of ScProcess falls into nEInformation of ScManagementProfile.

# 5.5 Information attribute definitions

## 5.5.1 Definition and legal values

| Attribute Name | Definition | Legal Values |
|---|---|---|
| id | It identifies uniquely an instance of its object class. | |
| nEIdentification | See 32.532 | |
| nEInformation | See 32.532 | |
| swVersionToBeInstalled | See 32.532 | |
| stepsAndOfferedStopPointList | See 32.532 | See 32.532<br>The following values for nameOfStep can be used additionally to those defined in 32.532:<br>prepareBasicConfigurationAndOAMLink<br>retrieveConfigurationData<br>setUpPreConfiguredSignallingLinks<br>setFinalStateOfNE<br>All steps may be offered as stop points. |
| stepsAndSelectedStopPointList | See 32.532 | |
| scProcessList | This attribute contains information about the instances of scProcess. Each entry in the list contains (SET OF):<br>• id (of the process)<br>• nEIdentification<br>• stepInfoList | See individual definitions of the list entry content. |
| stepInfoList | See 32.532 | |
| suspendBehaviour | See 32.532 | |
| offeredFinalAdministrativeStateInformation | See 32.532 | |
| selectedFinalAdministrativeState | See 32.532 | |
| swVersionToBeInstalledOfferList | See 32.532 | |
| versionNumber | See 32.532 | |
| matchingProfileIdentification | See 32.532 | |
| matchingNEInformation | See 32.532 | |

| Attribute Name | Definition | Legal Values |
|---|---|---|
| antennaAzimuth | Amount of change compared to the bearing of the antenna in degrees clockwise.<br>For required coordination see MaxTxPower | |
| antennaTilt | The actual tilt is the sum of mechanicalOffset and retTiltValue in antennaFunction (see 32.642 [11])<br>For required coordination see MaxTxPower | See TS 32.642 |
| cellIdentity | See 32.762<br>Required coordination: Unique in context of PLMN; component local cell Id needs to be unique in context of eNB | See 32.762 |
| identifierInArcfContext | This attribute allows to identify the ARCF data set, e.g. in order to correlate it with the self-configuring NE. | String |
| maxTxPower | maximumTransmissionPower in TS 32.672<br>Required coordination: Needs to be aligned with neighbor cells to fulfill operator policies like allowed coverage overlap, maximum cell radius etc. | See TS 32.762 |
| nrt | Neighbor Relation Table. This is a structure of the following attributes: tCI,<br>isRemoveAllowed,<br>isHOAllowed<br>Required coordination: | |
| pci | See 32.762 and PhysicalCellId (TS 36.331) / PhysicalCellIdRange (TS 36.331)<br>Required coordination: The finally chosen PHY-CID must be collision and confusion free. When changing this parameter a cell shutdown is needed, hence this will cause a service interruption. Therefore the number of reconfigured cells should be kept to a minimum | 0..503, see 32.762 |
| pciList | See 32.762 and PhysicalCellIdRange (TS 36.331)<br>Required coordination: The finally chosen PHY-CID must be collision and confusion free. When changing this parameter a cell shutdown is needed, hence this will cause a service interruption. Therefore the number of reconfigured cells should be kept to a minimum<br><br>Condition: pci / pciList are not subject to ARCF if a distributed algorithm using the full pciRange list is available in IRPAgent. | 0..503, list thereof, see 32.762 |
| qOffSetCell | QoffSet….. See 36.304, 36.331<br>Required coordination: The finally chosen PHY-CID must be collision and confusion free. | dB -24 .. dB 24 by step of 2dB |
| qRxLevMin | Q-RxLevMin: Miniumum required receiver level in the cell in dBm. See 36.331<br>Required coordination: Needs to be aligned with neighbor cells to fulfill operator policies regarding inter-RAT cell re-selection. Other parameters in the same context: threshX-high, threshX-low | -70 .. -22 see 36.331. |

| Attribute Name | Definition | Legal Values |
|---|---|---|
| tac | Tracking Area Code (see 23.003, "tac" in 32.762)<br>Required coordination: TAC assigned to new eNB must not be used in another MME pool area than the one of the new eNB.<br>Changing TAC will cause a cell to shutdown and so it leads to service interruptions.<br><br>Condition: TAC assigned to new eNB must not be used in another MME pool area than the one of the new eNB. | See 32.762 |
| threshXHigh | Threshold to reselect towards a higher priority RAT. See TS 36.304<br>Required coordination: See Q-RxLevMin | See 36.304 |
| threshXLow | Threshold to reselect towards a lower priority RAT. See TS 36.304<br>Required coordination: See Q-RxLevMin | See 36.304 |

### 5.5.2 Constraints

None.

## 5.6 Common Notifications

None.

## 5.7 Void

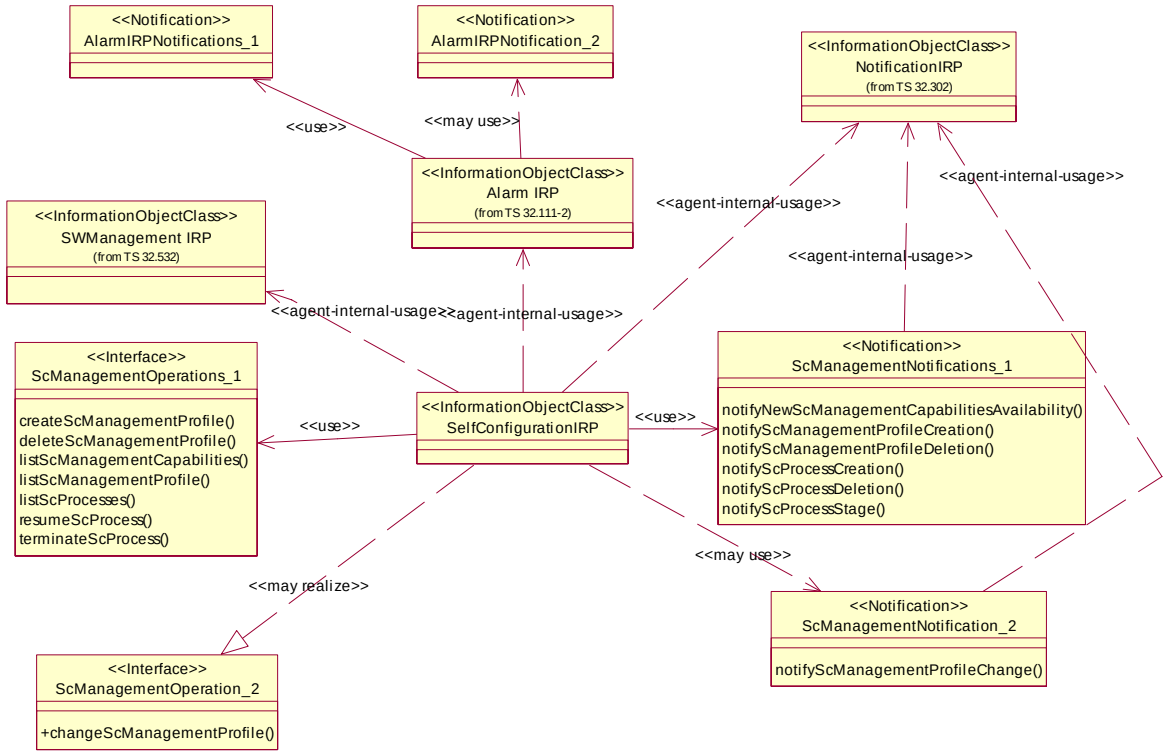
# 6 IRP descriptions: Interface Definitions

## 6.1 Imported information entities and local labels

| Label reference | Local label |
|---|---|
| 32.532 [7], operation, listSwmCapabilities | listScManagementCapabilities |
| 32.532 [7], operation, listSwmProfiles | listScManagementProfiles |
| 32.532 [7], operation, createSwmProfile | createScManagementProfile |
| 32.532 [7], operation, deleteSwmProfile | deleteScManagementProfile |
| 32.532 [7], operation, listSwmProcesses | listScManagementProcesses |
| 32.532 [7], operation, resumeSwmProcess | resumeScManagementProcess |
| 32.532 [7], operation, swFallback | swFallback |
| 32.532 [7], operation, changeSwmProfile | changeScManagementProfile |
| 32.532 [7], operation, terminateSwmProcess | terminateScManagementProcess |
| 32.532 [7], notification, notifySwmProfileCreation | notifyScManagementProfileCreation |
| 32.532 [7], notification, notifySwmProfileDeletion | notifySManagementProfileDeletion |
| 32.532 [7], notification, notifySwmProcessCreation | notifySManagementProcessCreation |
| 32.532 [7], notification, notifySwmProcessStage | notifyScManagementProcessStage |
| 32.532 [7], notification, notifySwmProcessDeletion | notifySManagementProcessDeletion |
| 32.532 [7], notification, notifySwmProfileChange | notifyScManagementProfileChange |

## 6.2 Class diagram representing interfaces

The diagram reflects the definitions in the text of the following clauses. In case of conflict text takes precedence.




## 6.3 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_yyy where "yyy" 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_yyy which is raised when (a) the pre-condition supported_optional_input_parameter_yyy 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 which is raised when an internal problem occurs and that the operation cannot be completed. The exception has the same entry and exit state.

## 6.4 SCManagementOperations_1 Interface (M)

### 6.4.1 Operation `listScManagementCapabilities` (M)

#### 6.4.1.1 Definition

This operation allows the IRPManager to determine on the Itf-N interface in which sequence the self-configuration steps are performed in NEs of a certain type, what is done by the NE in case a step does not

perform normally and before which steps a stop point can be set, such that the self-configuration step halts and waits for a continuation request by the IRPManager.

This operation imports from operation `listSwmCapabilities` defined in 32.532[7]. It delivers instances of scManagementCapability.

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_1 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_4 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_5 | |

### 6.4.1.2 Input parameters

Same as operation `listSwmCapabilities` defined in 32.532[7].

### 6.4.1.3 Output parameters

| Parameter Name | Qualifier | Matching Information | Comment |
|---|---|---|---|
| `capabilitiesList` | M | `swm.scManagementCapabilitiesList` | List of `scManagementCapability` instances and their content. Each entry in the list contains:<br>• `Id of scManagementCapability`<br>• `nEInformation of scManagementCapability`<br>• optionally `swVersionToBeInstalledOfferList of scManagementCapability`<br>• `stepsAndOfferedStopPointList of scManagementCapability`<br>• `offeredFinalAdministrativeStateInformation of scManagementCapability` |
| `Result` | M | `swm.result` | result=success and empty `capabilitiesList` mean: No instance found. |

Same as operation `listSwmCapabilities` defined in 32.532[7]. The entries in the `capabilityList` refer to instances of `scManagementCapability`.

### 6.4.1.4 Pre-condition

Same as operation `listSwmCapabilities` defined in 32.532[7].

### 6.4.1.5 Post-condition

Same as operation `listSwmCapabilities` defined in 32.532[7].

### 6.4.1.6 Exceptions

Same as operation `listSwmCapabilities` defined in 32.532[7].

## 6.4.2 Operation `listScManagementProfiles` (M)

### 6.4.2.1 Definition

This operation allows the IRPManager to find out which instances of `scManagementProfile` are valid for NEs of a certain type.

This operation imports from operation `listSwmProfiles` defined in 32.532[7]. It delivers instances of scManagementProfiles.

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_1 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_2 | |

### 6.4.2.2 Input parameters

Same as operation `listSwmProfiles` defined in 32.532[7].

### 6.4.2.3 Output parameters

Same as operation `listSwmProfiles` defined in 32.532[7].

### 6.4.2.4 Pre-condition

Same as operation `listSwmProfiles` defined in 32.532[7].

### 6.4.2.5 Post-condition

Same as operation `listSwmProfiles` defined in 32.532[7].

### 6.4.2.6 Exceptions

#### 6.4.2.6.1 exceptionName

Same s operation `listSwmProfiles` defined in 32.532[7].

## 6.4.3 Operation `createScManagementProfile` (M)

### 6.4.3.1 Definition

This operation allows the IRPManager to establish an instance of `scManagementProfile` to be valid for NEs of a certain type.

This operation imports from operation `createSwmProfile` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_2 | |

#### 6.4.3.2 Input parameters

Same as operation `createSwmProfile` defined in 32.532[7].

#### 6.4.3.3 Output parameters

Same as operation `createSwmProfile` defined in 32.532[7].

#### 6.4.3.4 Pre-condition

Same as operation `createSwmProfile` defined in 32.532[7].

#### 6.4.3.5 Post-condition

Same as operation `createSwmProfile` defined in 32.532[7].

#### 6.4.3.6 Exceptions

##### 6.4.3.6.1 exceptionName

Same as operation `createSwmProfile` defined in 32.532[7].

### 6.4.4 Operation `deleteScManagementProfile` (M)

#### 6.4.4.1 Definition

This operation allows the IRPManager to delete an instance of `scManagementProfile`.

This operation imports from operation `deleteSwmProfile` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_2 | |

#### 6.4.4.2 Input parameters

Same as operation `deleteSwmProfile` defined in 32.532[7].

#### 6.4.4.3 Output parameters

Same as operation `deleteSwmProfile` defined in 32.532[7].

#### 6.4.4.4 Pre-condition

Same as operation `deleteSwmProfile` defined in 32.532[7].

#### 6.4.4.5 Post-condition

Same as operation `deleteSwmProfile` defined in 32.532[7].

#### 6.4.4.6 Exceptions

##### 6.4.4.6.1 exceptionName

Same as operation `deleteSwmProfile` defined in 32.532[7].

### 6.4.5 Operation `listScProcesses` (M)

#### 6.4.5.1 Definition

This operation allows the IRPManager to find out the status of one or several `scProcess` instances.

This operation imports from operation `listSwmProcesses` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_4 | |

#### 6.4.5.2 Input parameters

Same as operation `listSwmProcesses` defined in 32.532[7].

#### 6.4.5.3 Output parameters

Same as operation `listSwmProcesses` defined in 32.532[7].

#### 6.4.5.4 Pre-condition

Same as operation `listSwmProcesses` defined in 32.532[7].

#### 6.4.5.5 Post-condition

Same as operation `listSwmProcesses` defined in 32.532[7].

#### 6.4.5.6 Exceptions

##### 6.4.5.6.1 exceptionName

Same as operation `listSwmProcesses` defined in 32.532[7].

### 6.4. Operation `resumeScProcess` (M)

#### 6.4.6.1 Definition

This operation allows the IRPManager to resume a self-configuration process which currently has been suspended at a stop point.

This operation imports from operation `resumeSwmProcess` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_3 | |

#### 6.4.6.2 Input parameters

Same as operation `resumeSwmProcess` defined in 32.532[7].

#### 6.4.6.3 Output parameters

Same as operation `resumeSwmProcess` defined in 32.532[7].

#### 6.4.6.4 Pre-condition

Same as operation `resumeSwmProcess` defined in 32.532[7].

#### 6.4.6.5 Post-condition

Same as operation `resumeSwmProcess` defined in 32.532[7].

#### 6.4.6.6 Exceptions

##### 6.4.6.6.1 exceptionName

Same as operation `resumeSwmProcess` defined in 32.532[7].

### 6.4.7 Operation `terminateScProcess` (M)

#### 6.4.7.1 Definition

This operation allows the IRPManager to terminate a self-configuration process which is currently ongoing.

After termination it is not possible to resume the terminated self-configuration process again.

This operation imports from operation `terminateSwmProcess` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_4 | |

#### 6.4.7.2 Input parameters

Same as operation `terminateSwmProcess` defined in 32.532[7].

#### 6.4.7.3 Output parameters

Same as operation `terminateSwmProcess` defined in 32.532[7].

#### 6.4.7.4 Pre-condition

Same as operation `terminateSwmProcess` defined in 32.532[7].

#### 6.4.7.5 Post-condition

Same as operation `terminateSwmProcess` defined in 32.532[7].

#### 6.4.7.6 Exceptions

##### 6.4.7.6.1 exceptionName

Same as operation `terminateSwmProcess` defined in 32.532[7].

### 6.4.8 Operation `resumeScProcessWithArcfData` (M)

#### 6.4.8.1.1 Definition

This operation allows the IRPManager deliver ARCF parameter values to a IRPAgent which it had requested the `notifycProcessStage` notification and to resume the self-configuration process which has been suspended at a stop point and is waiting for the ARCF data.

At reception of this operation request the IRPAgent validates the received ARCF parameter values. If the validation fails, an error is reported in the operation's `result`.

This operation is an import of operation `resumeSwmProcess` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ-ARCF-FUN-1 | |
| 3GPP TS 32.501 [6] | REQ-ARCF-FUN-2 | |
| 3GPP TS 32.501 [6] | REQ-ARCF-FUN-3 | |

#### 6.4.8.1.2 Input parameters

Same as operation `resumeSwmProcess` defined in 32.532[7]. In addition the following parameters are defined:

| Parameter Name | Qualifier | Information type | Comment |
|---|---|---|---|
| `valuesOfNeeded-RadioParameter` | M | `List of (radioParameterName; radioParameterValue)` | If the fileLocation carries no information and IRPManager is providing requested radio parameters values, then this shall contain the requested radio parameters values.<br><br>(For the requested radio parameters see input parameter `listOfNeededRadioParameters` of notification `notifycProcessStage`). |
| `fileLocation` | M | `FileLocation` | If the valuesOfNeededRadioParameters is carrying no information and IRPManager is providing requested radio parameters values, then this shall contain the location of a file where the requested radio parameter values can be found. |

#### 6.4.8.1.3 Output parameters

Same as operation `resumeSwmProcess` defined in 32.532[7], with the addition of the possibility to indicate a validationError, see table below:

| Parameter Name | Qualifier | Matching Information | Comment |
|---|---|---|---|
| validationErrorInfo | CM *) | Information indicating why validation failed and which parameter/s could not be validated. Reasons for validation error: ParameterNotSupported, InvalidParameter, ValueNotSupported, MissingParameterValue, ConflictingParamterValue, SemanticsError, OtherError | |

*) Condition: result = validationError

#### 6.4.8.1.4 Pre-condition

irpAgentDoesNotKnowSomeArcfData.

| Assertion Name | Definition |
|---|---|
| irpAgentDoesNotKnowSomeArcfData | The IRPAgent does not know some ARCF data. |

#### 6.4.8.1.5 Post-condition

irpAgentKnowsTheArcfData

| Assertion Name | Definition |
|---|---|
| irpAgentKnowsTheArcfData | The IRPAgent knows the ARCF data and has validated them. |

#### 6.4.8.1.6 Exceptions

| Name | Definition |
|---|---|
| operation_failed | **Condition:** Pre-condition is false or post-condition is false.<br>**Returned Information:** The output parameter result and in case of a validation error additionally validationErrorInfo.<br>**Exit state:** Entry state. |

# 6.5 SCManagementOperations_2 Interface (O)

## 6.5.1 Operation changeScManagementProfile (O)

### 6.5.1.1 Definition

This operation allows the IRPManager to change an instance of scManagementProfile.

This operation imports from operation changeSwmProfile defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_6 | |

### 6.5.1.2 Input parameters

Same as operation changeSwmProfile defined in 32.532[7].

### 6.5.1.3 Output parameters

Same as operation changeSwmProfile defined in 32.532[7].

### 6.5.1.4 Pre-condition

Same as operation changeSwmProfile defined in 32.532[7].

### 6.5.1.5 Post-condition

Same as operation changeSwmProfile defined in 32.532[7].

### 6.5.1.6 Exceptions

#### 6.5.1.6.1 exceptionName

Same as operation changeSwmProfile defined in 32.532[7].

# 6.6 SCManagementNotification_1 Interface (M)

## 6.6.1 Notification notifyScManagementProfileCreation (M)

### 6.6.1.1 Definition

This notification conveys information about a creation of an instance of IOC scManagementProfile.

This operation imports from notification notifySwmProfileCreation defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_2 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_3 | |

#### 6.6.1.2 Input parameters

Same as notification `notifySwmProfileCreation` defined in 32.532[7].

#### 6.6.1.3 Triggering event

##### 6.6.1.3.1 From state

Same as notification `notifySwmProfileCreation` defined in 32.532[7].

##### 6.6.1.3.2 To state

Same as notification `notifySwmProfileCreation` defined in 32.532[7].

### 6.6.2 Notification `notifyScManagementProfileDeletion` (M)

#### 6.6.2.1 Definition

This notification conveys information about the deletion of an instance of IOC scManagementProfile.

This operation imports from notification `notifySwmProfileDeletion` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMAN_FUN_2 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_3 | |

#### 6.6.2.2 Input parameters

Same as notification `notifySwmProfileDeletion` defined in 32.532[7].

#### 6.6.2.3 Triggering event

##### 6.6.2.3.1 From state

Same as notification `notifySwmProfileDeletion` defined in 32.532[7].

##### 6.6.2.3.2 To state

Same as notification `notifySwmProfileDeletion` defined in 32.532[7].

### 6.6.3 Notification `notifyScProcessCreation` (M)

#### 6.6.3.1 Definition

This notification conveys information about the creation of an instance of IOC `scProcess`.

This operation imports from notification `notifySwmProcessCreation` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_5 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_6 | |

#### 6.6.3.2 Input parameters

Same as notification `notifySwmProcessCreation` defined in 32.532[7].

#### 6.6.3.3 Triggering event

##### 6.6.3.3.1 From state

Same as notification `notifySwmProcessCreation` defined in 32.532[7].

##### 6.6.3.3.2 To state

Same as notification `notifySwmProcessCreation` defined in 32.532[7].

### 6.6.4 Notification `notifyScProcessStage` (M)

#### 6.6.4.1 Definition

This notification conveys information about progress of a self configuration. It also reports the arrival at a stopPoint (`stepProgress` of a step in `stepInfoList` changed value to `awaitingResume`) or leaving a stop point (`stepProgress` of a step in `stepInfoList` changed value from `awaitingResume` ).

This notification also can carry

a request for radio parameters values that are needed to complete the radio configuration;

information which can be relevant for IRPManager to determine the values of the radio parameters requested and

a time limit within which the IRPManager must supply the requested radio parameters values, otherwise, the process will be terminated.

This notification is an import of from notification `notifySwmProcessStage` defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_2 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_5 | |
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_6 | |
| 3GPP TS 32.501 [6] | REQ_SCOCE_FUN_2 | |

#### 6.6.4.2 Input parameters

Same as notification `notifySwmProcessStage` defined in 32.532[7]. In addition, the following parameters are defined:

| Parameters | Qualifiers | Matching Information | Comment |
|---|---|---|---|
| listOfNeededRadioParameters | O,N | -- | This list specifies a list of radio parameters whose values are needed.<br><br>If this list is empty, then all radio parameters values are requested.<br><br>If this list carries no information, then no radio parameter value is requested.<br><br>For possible radio parameters see TS 32.501 [6] |
| inputForRadioParameter-Determination | O,N | -- | This parameter carries information which IRPManager may use to select the values for listOfNeededRadioParameters.<br><br>If listOfNeededRadioParameters carries no information, then this parameter shall also carry no information or not be present. |

If this notification is used to ask for ARCF data, then the listOfNeededRadioParameters shall be present, inputForRadioParameterDetermination may be present.

#### 6.6.4.3 Triggering event

##### 6.6.4.3.1 From state

| | |
|---|---|
| | |

Same as notification notifySwmProcessStage defined in 32.532[7].

##### 6.6.4.3.2 To state

Same as notification notifySwmProcessStage defined in 32.532[7].

### 6.6.5 Notification notifyScProcessDeletion (M)

#### 6.6.5.1 Definition

This notification conveys information about the deletion of an instance of IOC scProcess and what triggered the deletion.

IRPAgent shall also send out this notification in case of a process termination caused by an exception, for example IRP Agent terminates the process because it had to wait too long after a suspend operation.

This operation imports from notification notifySwmProcessDeletion defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCMON_FUN_5 | |
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_6 | |

#### 6.6.5.2 Input parameters

Same as notification `notifySwmProcessDeletion` defined in 32.532[7].

#### 6.6.5.3 Triggering event

##### 6.6.5.3.1 From state

Same as notification `notifySwmProcessDeletion` defined in 32.532[7].

##### 6.6.5.3.2 To state

Same as notification `notifySwmProcessDeletion` defined in 32.532[7].

## 6.6.6 Notification notifyNewScManagementCapabilityAvailability (M)

### 6.6.6.1 Definition

This notification conveys information about the availability of a new `scManagementCapability` instance.

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_5 | |

### 6.6.6.2 Input parameters

| Parameter Name | Qualifiers | Matching Information | Comment |
|---|---|---|---|
| `Id` | M,Y | `swm.id` | See 32.532 |
| `nEInformation` | M,Y | `swm.nEInformation` | See 32.532 |
| `stepsAndOfferedStopPointList` | M,N | `swm.stepsAndOfferedStopPointList` | See 32.5325 |
| `offeredFinalAdministrative StateInformation` | M,N | `swm. offeredFinalAdministrative StateInformation` | See 32.532 |
| `swVersionToBeInstalledOfferList` | CM, N | `swVersionToBeInstalledOfferList` | See 32.532 |

*) See 32.532 §4.3.4.2

### 6.6.6.3 Triggering event

#### 6.6.6.3.1 From state

| Assertion Name | Definition |
|---|---|
| `newCapabilityAvailable` | A new self-configuration capability is available. |

#### 6.6.6.3.2 To state

| Assertion Name | Definition |
|---|---|
| `irpManagersInformed` | IRPManager are informed about the new capabily. |

# 6.7 SCManagementNotification_2 Interface (O)

## 6.7.1 Notification notifyScManagementProfileChange (O)

### 6.7.1.1 Definition

This notification conveys information about a change of an instance of IOC scManagementProfile.

This operation imports from notification notifySwmProfileChange defined in 32.532[7].

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ_SCSW_FUN_6 | |

### 6.7.1.2 Input parameters

Same as notification notifySwmProfileChange defined in 32.532[7].

### 6.7.1.3 Triggering event

#### 6.7.1.3.1 From state

Same as notification notifySwmProfileChange defined in 32.532[7].

#### 6.7.1.3.2 To state

Same as notification notifySwmProfileChange defined in 32.532[7].

# 6.8 Operations to transport ARCF data (M)

The following three options are defined to allow the transport of ARCF data (see [6]). At least one option needs to be supported for ARCF.

Information on Requirements Traceability:

| Referenced TS | Requirement label | Comment |
|---|---|---|
| 3GPP TS 32.501 [6] | REQ-ARCF-FUN-1 | |
| 3GPP TS 32.501 [6] | REQ-ARCF-FUN-2 | |
| 3GPP TS 32.501 [6] | REQ-ARCF-FUN-3 | |

## 6.8.1 Operation `resumeScProcessWithArcfData` (O)

See §6.4.8

## 6.8.2 Re-use of bulk CM IRP (O)

In order to transfer the ARCF data to the IRPAgent the IRPManager can use the operations `download`, `pre-activate` and `activate` defined in the Bulk CM IRP [10].

For validation of the ARCF data transferred via Bulk CM IRP operations, the operation `validate` (see [10]) may be used.

## 6.8.3 Re-use of FT IRP (O)

In order to transfer the ARCF data to the IRPAgent the IRPManager can use the File Transfer IRP [12].

# Annex A (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 2008-12 | SP-42 | SP-080714 | | | Submitted to SA#42 for information and approval | 1.0.0 | 8.0.0 |
| 2009-03 | SP-43 | SP-090207 | 001 | -- | Usage of create-/delete-/change-notifications in context of self-configuration | 8.0.0 | 8.1.0 |
| 2009-12 | SP-46 | SP-090718 | 002 | -- | Correct reference for NotifyScManagementProfileDeletion | 8.1.0 | 8.2.0 |
| 2009-12 | - | - | - | -- | Update to Rel-9 version | 8.2.0 | 9.0.0 |
| 2010-03 | SP-47 | SP-100035 | 004 | -- | Clarifying Editor's Notes in TS 32.502 | 9.0.0 | 9.1.0 |
| 2010-03 | SP-47 | SP-100035 | 005 | -- | Introducing ARCF (Automatic Radio Configuration Function) | 9.0.0 | 9.1.0 |
| 2010-03 | SP-47 | SP-100036 | 003 | -- | Incorrect section numbering | 9.1.0 | 10.0.0 |
| 2010-06 | SP-48 | SP-100264 | 006 | -- | Correction of errors in references and section referencing. | 10.0.0 | 10.1.0 |
| 2012-09 | - | - | - | - | Update to Rel-11 version (MCC) | 10.1.0 | 11.0.0 |
| 2014-10 | - | - | - | - | Update to Rel-12 version (MCC) | 11.0.0 | 12.0.0 |

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2019-09 | SA#85 | SP-190839 | 0008 | - | A | Update incorrect information | 12.1.0 |

# History

| Document history | | |
|---|---|---|
| V12.0.0 | October 2014 | Publication |
| V12.1.0 | October 2019 | Publication |
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