

ETSI TS 132 532 V8.2.0 (2011-01)

Technical Specification

**Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Software management (SwM);
Integration Reference Point (IRP);
Information Service (IS)
(3GPP TS 32.532 version 8.2.0 Release 8)**



Reference

RTS/TSGS-0532532v820

Keywords

LTE, UMTS

ETSI

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

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

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

http://portal.etsi.org/chaicor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2011.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™**, **TIPHON™**, the TIPHON logo and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

LTE™ is a Trade Mark of ETSI currently being registered

for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://webapp.etsi.org/IPR/home.asp>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Contents

Intellectual Property Rights	2
Foreword.....	2
Foreword.....	6
Introduction	6
1 Scope	7
2 References	7
3 Definitions and abbreviations.....	7
3.1 Definitions	7
3.2 Abbreviations	7
4 Information Object Classes	8
4.1 Imported information entities and local labels	8
4.2 Class diagram	8
4.2.1 Attributes and relationships	8
4.2.2 Inheritance	9
4.3 Information object class definitions	10
4.3.1 GenManCapability	10
4.3.1.1 Definition	10
4.3.1.2 Attributes.....	10
4.3.1.3 Notifications.....	10
4.3.2 GenManProfile	11
4.3.2.1 Definition	11
4.3.2.2 Attributes.....	11
4.3.2.3 Notifications.....	11
4.3.3 GenManProcess	12
4.3.3.1 Definition	12
4.3.3.2 Attributes.....	12
4.3.3.3 Notifications.....	12
4.3.4 SwMCapability	13
4.3.4.1 Definition	13
4.3.4.2 Attributes.....	13
4.3.4.3 Attribute constraints	13
4.3.4.4 Notifications.....	13
4.3.5 SwMProfile.....	14
4.3.5.1 Definition	14
4.3.5.2 Attributes.....	14
4.3.5.3 Attribute constraints	14
4.3.5.4 Notifications.....	14
4.3.6 SwMProcess	15
4.3.6.1 Definition	15
4.3.6.2 Attributes.....	15
4.3.6.3 Notifications.....	15
4.3.7 SwMIRP.....	16
4.3.7.1 Definition	16
4.3.7.2 Attributes.....	16
4.3.7.3 Notifications.....	16
4.4 Information relationship definitions	16
4.4.1 relation-swMIRP-swMCapability (M).....	16
4.4.1.1 Definition	16
4.4.1.2 Roles	16
4.4.1.3 Constraints	16
4.4.2 relation-SwmIRP-swMProfile (M)	17
4.4.2.1 Definition	17
4.4.2.2 Roles	17

4.4.2.3	Constraints	17
4.4.3	relation-swMIRP-swMProcess (M)	17
4.4.3.1	Definition	17
4.4.3.2	Roles	17
4.4.3.3	Constraints	17
4.4.4	relation-swMCapabilites-swMProfile (M)	18
4.4.4.1	Definition	18
4.4.4.2	Roles	18
4.4.4.3	Constraints	18
4.4.5	relation swMProfile-swMProcess (M)	18
4.4.5.1	Definition	18
4.4.5.2	Roles	18
4.4.5.3	Constraints	18
4.5	Information attribute definitions	19
4.5.1	Definition and legal values	19
4.5.2	Constraints	21
5	IRP descriptions: Interface Definitions	22
5.1	Class diagram representing interfaces	22
5.2	Generic rules	22
5.3	SwMIRPOperations_1 Interface (M)	23
5.3.1	Operation listSwMCapabilities (M)	23
5.3.1.1	Definition	23
5.3.1.2	Input parameters	23
5.3.1.3	Output parameters	23
5.3.1.4	Post-condition	23
5.3.1.5	Exceptions	23
5.3.1.5.1	operation_failed	23
5.3.2	Operation listSwMProfiles (M)	24
5.3.2.1	Definition	24
5.3.2.2	Input parameters	24
5.3.2.3	Output parameters	24
5.3.3	Operation createSwMProfile (M)	24
5.3.3.1	Definition	24
5.3.3.2	Input parameters	25
5.3.3.3	Output parameters	25
5.3.4	Operation deleteSwMProfile (M)	25
5.3.4.1	Definition	25
5.3.4.2	Input parameters	25
5.3.4.3	Output parameters	25
5.3.5	Operation listSwMProcesses (M)	26
5.3.5.1	Definition	26
5.3.5.2	Input parameters	26
5.3.5.3	Output parameters	26
5.3.6	Operation resumeSwMProcess (M)	26
5.3.6.1	Definition	26
5.3.6.2	Input parameters	26
5.3.6.3	Output parameters	27
5.3.7	Operation swFallback (M)	27
5.3.7.1	Definition	27
5.3.7.2	Input parameters	27
5.3.7.3	Output parameters	27
5.3.8	Operation terminateSwMProcess (M)	28
5.3.8.1	Definition	28
5.3.8.2	Input parameters	28
5.3.8.3	Output parameters	28
5.4	SwMIRPOperations_2 Interface (O)	29
5.4.1	Operation changeSwMProfile (O)	29
5.4.1.1	Definition	29
5.4.1.2	Input parameters	29
5.4.1.3	Output parameters	29

5.4.1.4	Constraints	29
5.5	SwMIRPNotifications_1 Interface (M)	30
5.5.1	Notification notifySwMProfileCreation (M)	30
5.5.1.1	Definition	30
5.5.1.2	Input parameters	30
5.5.2	Notification notifySwMProfileDeletion (M)	30
5.5.2.1	Definition	30
5.5.2.2	Input parameters	30
5.5.3	Notification notifySwMProcessCreation (M)	31
5.5.3.1	Definition	31
5.5.3.2	Input parameters	31
5.5.4	Notification notifySwMProcessStage (M)	31
5.5.4.1	Definition	31
5.5.4.2	Input parameters	31
5.5.5	Notification notifySwMProcessDeletion (M)	32
5.5.5.1	Definition	32
5.5.5.2	Input parameters	32
5.5.6	Notification notifyNewSwAvailability (M)	32
5.5.6.1	Definition	32
5.5.6.2	Input parameters	32
5.6	SwMIRPNotifications_2 Interface (O)	33
5.6.1	Notification notifySwMProfileChange (C/O)	33
5.6.1.1	Definition	33
5.6.1.2	Input parameters	33
Annex A (informative):	Change history	34
History		35

Foreword

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

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

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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:

- 32.531: Software management; Concepts and Integration Reference Point (IRP) Requirements
- 32.532: Software management Integration Reference Point (IRP); Information Service (IS)**
- 32.533: Software management Integration Reference Point (IRP); Common Object Request Broker Architecture (CORBA) Solution Set (SS)

1 Scope

The present document contains the Software Management Interface IRP Information Services descriptions.

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] 3GPP TS 21.905: "Vocabulary for 3GPP Specifications".
 - [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 32.531: "Telecommunication management; Software management; Concepts and Integration Reference Point (IRP) Requirements".
 - [7] 3GPP TS 32.622: "Telecommunication management; Generic network resources Integration Reference Point (IRP); Network Resource Model (NRM)".
 - [8] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management: Information Services".
-

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 [4] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TS 32.531 [6], TS 32.101 [1], TS 32.102 [2] and TS 21.905 [4], in that order.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [4], TS 32.531 [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 32.531 [6].

4 Information Object Classes

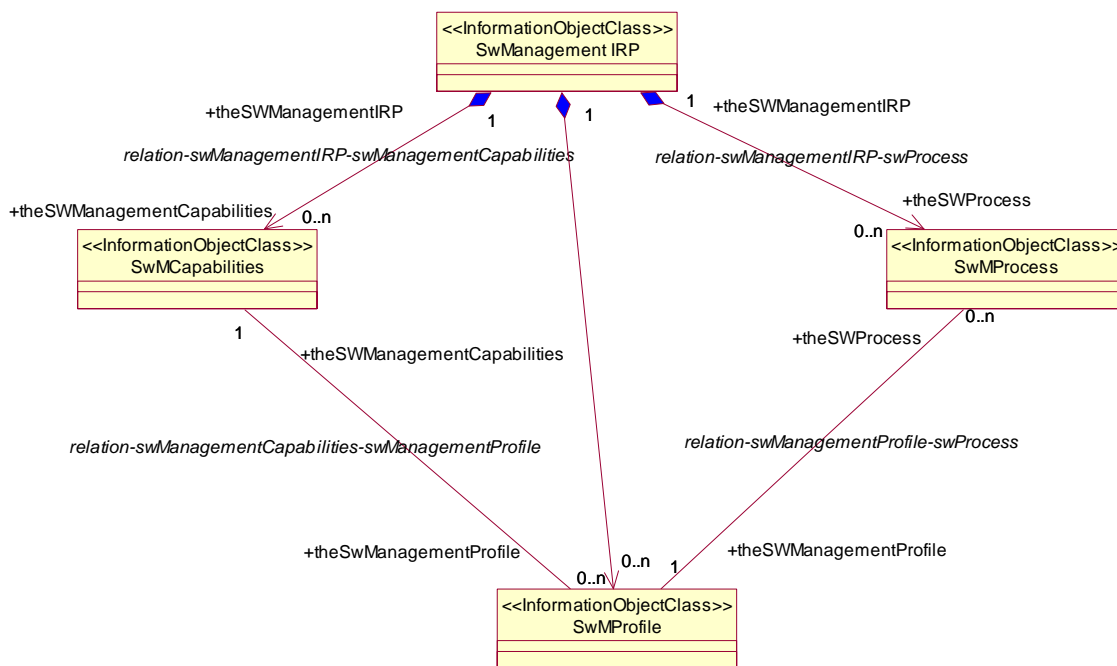
4.1 Imported information entities and local labels

Label reference	Local label
3GPP TS 32.622 [7], information object class, Top	top
3GPP TS 32.312 [8], information object class, managedGenericIRP	managedGenericIRP

4.2 Class diagram

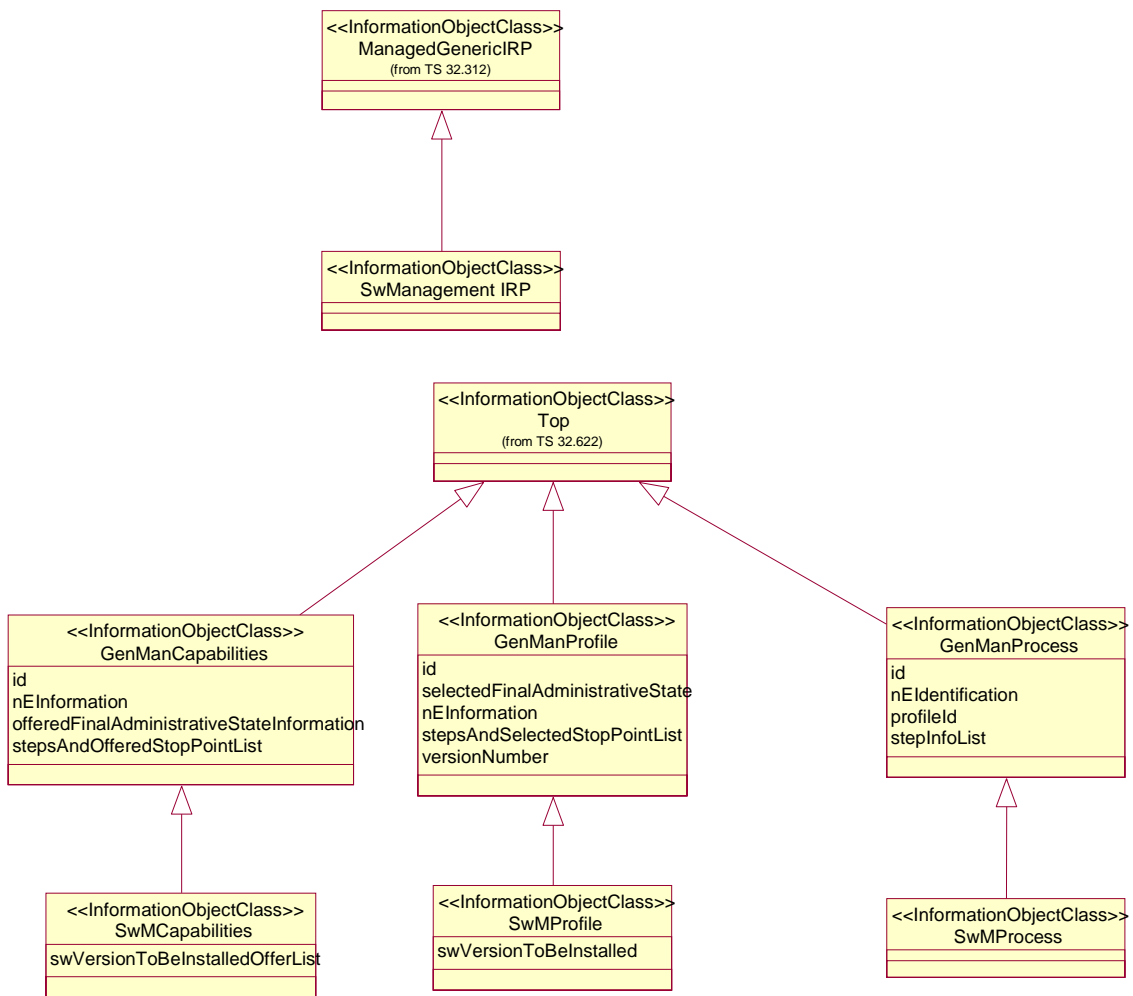
4.2.1 Attributes and relationships

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



4.2.2 Inheritance

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



4.3 Information object class definitions

4.3.1 GenManCapability

4.3.1.1 Definition

This object class is a support object class. Sub-classes of this IOC represent the IRPAgent's capability in support of automated management.

It is created by the IRPAgent and cannot be modified by the IRPManager.

An instance of a sub-class of `genManCapability` object is valid for a certain NE type or a set of NE types.

Multiple `genManCapability` 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 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.

b) the final `administrativeState` (ITU-T X.731) of the NE after successful self-configuration.

4.3.1.2 Attributes

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
<code>id</code>	M	M	-
<code>nEInformation</code>	M	M	-
<code>stepsAndOfferedStopPointList</code>	M	M	-
<code>offeredFinalAdministrativeStateInformation</code>	M	M	-

4.3.1.3 Notifications

None.

4.3.2 GenManProfile

4.3.2.1 Definition

This object class is a support object class. Sub-classes of this IOC represent the IRPManager's decision related to automated management.

An instance of a sub-class of `GenManProfile` is valid for a certain NE type or a set of NE types. For an NE starting its self-configuration process (see `genManProcess`) there shall be no ambiguity which instance of a sub-class of `GenManProfile` is valid for a certain NE type or a set of NE types. Multiple instances of sub-classes of `GenManProfile` objects may be instantiated in the IRPAgent.

By using an instance of a sub-class of this object the IRPManager decides which of the possible stop points offered in the related instance of a sub-class of `genManCapability` are used to suspend the automated management process of the specified NE type (or set of NE types) and which of the `offeredFinalAdministrativeStateInformation` is selected.

4.3.2.2 Attributes

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
<code>id</code>	M	M	-
<code>versionNumber</code>	M	M	-
<code>nEInformation</code>	M	M	-
<code>stepsAndSelectedStopPointList</code>	M	M	-
<code>selectedFinalAdministrativeState</code>	M	M	-

4.3.2.3 Notifications

None.

4.3.3 GenManProcess

4.3.3.1 Definition

This object class is a support object class. Sub-classes of this IOC describe the automated management process for an NE. They allow the IRPManager to be informed about the current progress of the process and where stop points are set. No intervention of the IRPManager is foreseen except resume after a stop point was reached or termination of the self-configuration.

When the automated management process for an NE starts, an instance of the sub-class of `genManProcess` is created automatically.

The steps in the `stepInfoList` shall conform to the content of the relevant sub-class of `genManProfile` instance.

Example:

If the `stepsAndOfferedStopPointList` of a sub-class instance of `genManProfile` indicates `stopPointCanBeSetBeforeThisStep` for step X, then the entry for step X in the `stepInfoList` of the sub-class instance of `genManProcess` can only have the value `stopPointIsNotSet`.

When there is no relevant `genManProfile` at creation time of `genManProcess`, then the IRPAgent creates the `genManProcess` based on the relevant `genManCapability`. 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 `genManProcess` instance is deleted automatically.

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

4.3.3.2 Attributes

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
<code>id</code>	M	M	-
<code>nEIdentification</code>	M	M	-
<code>profileId</code>	M	M	-
<code>stepInfoList</code>	M	M	-

4.3.3.3 Notifications

None.

4.3.4 SwMCapability

4.3.4.1 Definition

This object class is a sub-class of `genManCapability` and represents the IRPAgent's capability in support of SWM.

It is created by the IRPAgent and cannot be modified by the IRPManager.

A `SwMManagementCapability` object is valid for a certain NE type or a set of NE types with a certain SW version or set of versions. For an NE there shall be no ambiguity which `SwMManagementCapability` object is valid for the NE.

Multiple `SwMManagementCapability` 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 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.

b) the final `administrativeState` of the NE after successful self-configuration.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_SWM_FUN_5	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_1	

4.3.4.2 Attributes

All attributes inherited from IOC `GenManCapability`.

Additional attributes:

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
<code>swVersionToBeInstalledOfferList</code>	CM *)	M	-

*) Condition: `objectClass_is_swMCapability`

4.3.4.3 Attribute constraints

Name	Definition
<code>objectClass_is_swMCapability</code>	<code>objectClass</code> is equal to <code>swMCapabilities</code>

4.3.4.4 Notifications

Name	Qualifier	Notes
<code>notifyNewSwAvailability</code>	M	

4.3.5 SwMProfile

4.3.5.1 Definition

This object class is a sub-class of `genManProfile`. It allows the IRPManager to select from the stop points offered in the `swMCapabilities` object those which should be used to stop the SW management process for NEs, which fit to the `neInformation` and `swVersionToBeInstalled`, and which of the `offeredFinalAdministrativeStateInformation` is selected.

For an NE starting its SWM process there shall be no ambiguity which `swMManagementProfile` is valid for the NE. Therefore the `neInformation` of different `swMProfile` instances shall not intersect. Example for a not allowed intersection: profile 1 has `neInformation=(neType=eNB)`, profile 2 has `neInformation=((neType=eNB) and (Id=1))`.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_1	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_3	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_4	

4.3.5.2 Attributes

All attributes inherited from IOC `GenManProfile`.

Additional attributes:

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
<code>swVersionToBeInstalled</code>	CM	M	-

Condition: `objectClass_is_swMProfile`

4.3.5.3 Attribute constraints

Name	Definition
<code>objectClass_is_swMProfile</code>	<code>objectClass</code> is equal to <code>swMProfile</code>

4.3.5.4 Notifications

Name	Qualifier	Notes
<code>notifySwMProfileCreation</code>	M	
<code>notifySwMProfileChange</code>	CM	Condition: Present if operation <code>changeSwMProfile</code> is supported.
<code>notifySwMProfileDeletion</code>	M	

4.3.6 SwMProcess

4.3.6.1 Definition

This object class is a sub-class of `genManProcess`. It describes the SW management process for an NE. It allows the IRPManager to be informed about the current progress of the SWM 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 `swMProcess` is created automatically.

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

The steps in the `stepInfoList` shall conform to the content of the relevant `swMProfile` instance.

Example:

If the `stepsAndOfferedStopPointList` of `swMProfile` indicates `stopPointCanBeSetBeforeThisStep` for step X, then the entry for step X in the `stepInfoList` of `swMProcess` can only have the value `stopPointIsNotSet`.

When there is no relevant `swMProfile` at creation time of `swMProcess`, then the IRPAgent creates the `swMProcess` based on the relevant `swMCapability`. 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 `swMProcess` instance is deleted automatically.

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

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_3	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_4	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_5	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_6	

4.3.6.2 Attributes

All attributes inherited from IOC `GenManProcess`.

Additional attributes: None.

4.3.6.3 Notifications

Name	Qualifier	Notes
<code>notifySwMProcessCreation</code>	M	
<code>notifySwMProcessStage</code>	M	
<code>notifySwMProcessDeletion</code>	M	

4.3.7 SwMIRP

4.3.7.1 Definition

This information object represents a Software Management IRP. It inherits from IOC managedGenericIRP.

4.3.7.2 Attributes

All attributes inherited from IOC managedGenericIRP.

Additional attributes: None.

4.3.7.3 Notifications

All notifications inherited from IOC managedGenericIRP.

Additional notifications: None.

4.4 Information relationship definitions

4.4.1 relation-swMIRP-swMCapability (M)

4.4.1.1 Definition

This represents the relationship between SwMIRP and SwMCapability.

4.4.1.2 Roles

Name	Definition
theSwmIRP	It represents the SwmIRP.
theSwMCapability	It represents the SwMCapability

4.4.1.3 Constraints

There is no constraint for this relationship.

4.4.2 relation-SwmIRP-swMProfile (M)

4.4.2.1 Definition

This represents the relationship between SwmIRP and SwMProfile.

4.4.2.2 Roles

Name	Definition
theSwmIRP	It represents the SwmIRP .
theSwMProfile	It represents the SwMProfile .

4.4.2.3 Constraints

There is no constraint for this relationship.

4.4.3 relation-swMIRP-swMProcess (M)

4.4.3.1 Definition

This represents the relationship between SwmIRP and SwMProcess.

4.4.3.2 Roles

Name	Definition
theSwMIRP	It represents the SwMIRP .
theSwMProcess	It represents the SwMProcess .

4.4.3.3 Constraints

There is no constraint for this relationship.

4.4.4 relation-swMCapabilites-swMProfile (M)

4.4.4.1 Definition

This represents the relationship between `swMCapability` and `swMProfile`.

4.4.4.2 Roles

Name	Definition
<code>theSwMCapability</code>	It represents the <code>swMCapability</code> .
<code>theSwMProfile</code>	It represents the <code>swMProfile</code> .

4.4.4.3 Constraints

A relation can only exist between a `SwMProfile` and a `SwMCapability` when

a) all steps which are entries in the `stepsAndSelectedStopPointList` of `SwMProfile` have `stopPointCanBeSetBeforeThisStep = Yes` in the `stepsAndOfferedStopPointList` of the `SwMCapability`.
 b) `nEInformation` of `SwMProfile` is a subset of `nEInformation` of `SwMCapability`.

4.4.5 relation swMProfile-swMProcess (M)

4.4.5.1 Definition

This represents the relationship between `SwMProfile` and `SwMProcess`.

4.4.5.2 Roles

Name	Definition
<code>theSwMProfile</code>	It represents the <code>theSwMProfile</code> .
<code>theSwMProcess</code>	It represents the <code>SwMProcess</code> .

4.4.5.3 Constraints

A `SwMProcess` shall perform all self-configuration steps according to `stepsAndOfferedStopPointList` of `SwMProfile`.

A relation can only exist between a `SwMProcess` and a `SwMProfile` when `nEIdentification` of `SwMProcess` falls into `nEInformation` of `SwMProfile`.

4.5 Information attribute definitions

4.5.1 Definition and legal values

Attribute Name	Definition	Legal Values
id	It identifies uniquely an instance of its object class.	
nEIdentification	This attribute identifies the NE for which the self management activity is done.	
nEInformation	This attribute defines the neType or NE instance/s - with optional software identification information - , for which this capability/profile instance is valid.	'NE instance/s' only applies for instance/s already known to the IRPManager, e.g. in case of re-configuration or SW update.
startStepName	nameOfStep, this attribute defines the start step for resume operation.	The legal value of startStepName could be one of the step which defined in stepsAndOfferedStopPointList
swVersionToBeInstalled	This attribute describes which SW identification information shall be used at the end of self management in NEs for which this swMCapability/swMProfile applies.	
stepsAndOfferedStopPointList	Each entry in the list contains for each step the following information: <ul style="list-style-type: none"> nameOfStep: This list shall be exhaustive; if a certain step is not visible or not supported in the SWM process, then it shall not be shown (listed) in the stepsAndOfferedStopPointList. sequenceNumberInProcess stopPointCanBeSetBeforeThisStep 	nameOfStep: swDownload, swInstallation, swActivation More values for nameOfStep may be used by other IRPs. All steps may be offered as stop points. sequenceNumberInProcess: Positive Integer stopPointCanBeSetBeforeThisStep: Yes, No
stepsAndSelectedStopPointList	Each entry in the list contains for each step the following information: <ul style="list-style-type: none"> nameOfStep: sequenceNumberInProcess stopPointSetIndication 	nameOfSwMStep, sequenceNumberInProcess: see stepsAndOfferedStopPointList stopPointSetIndication: stopPointIsSetBeforeThisStep, stopPointIsNotSet

stepInfoList	<p>This list attribute contains information about all steps and how far they have progressed. Each entry in the list contains:</p> <ul style="list-style-type: none"> • nameOfStep • sequenceNumberInProgress • stopPointSetIndication • stepProgress 	<p>nameOfSwMStep, sequenceNumberInProgress: see stepsAndOfferedStopPointList</p> <p>stopPointSetIndication: see stepsAndSelectedStopPointList</p> <p>stepProgress: notYetStarted, running, completed, awaitingResume, failure, terminated</p>
swMprocessList	<p>This attribute contains information about the instances of swMProcess . Each entry in the list contains (SET OF):</p> <ul style="list-style-type: none"> • id • nEIdentification • stepInfoList 	See individual definitions of the list entry content.
offeredFinalAdministrativeStateInformation	It describes which selection is offered regarding the administrativeState of the NE after successful automated management: If it may have the value locked or unlocked or if the value of the administrativeState may be determined by the configuration data which is uploaded in the course of the automated management.	<p>One or more of the following values: locked, unlocked, determinedByConfigurationData The value unlocked should always be present.</p>
selectedFinalAdministrativeState	Determines which of the offers made regarding the administrativeState of the NE after successful self-configuration is taken.	<p>One of the following values: locked, unlocked, determinedByConfigurationData Default value is value unlocked.</p>
swVersionToBeInstalledOfferList	This list describes for which SW version/s the capability object is valid.	Minimum size of list: 1 entry
versionNumber	This number is the version number of a profile. Its value is 1 when a profile is created. It is incremented by 1 each time a profile is successfully changed.	Integer
profileId	<p>This parameter records the identification of the profile used by the process. It consists of two data:</p> <ul style="list-style-type: none"> • id (of the profile) • versionNumber 	See versionNumber
matchingNEInformation	This parameter records the information of the NE which was matching with the nEInformation of the profile when determining which profile is to be used for the process.	See nEInformation

result	This parameter records the result of an operation.	<p>success, failure, stepNameNotMatch: The current process step doesn't match the startStepName in the operation. nEInformationIntersection : There shall be no ambiguity which swMManagementProfile is valid for the NE. Therefore the nEInformation of different swMProfile instances shall not intersect. Example for a not allowed intersection: profile 1 has nEInformation= (neType=eNB), profile 2 has nEInformation= ((neType=eNB) and (Id=1)).</p>
--------	--	---

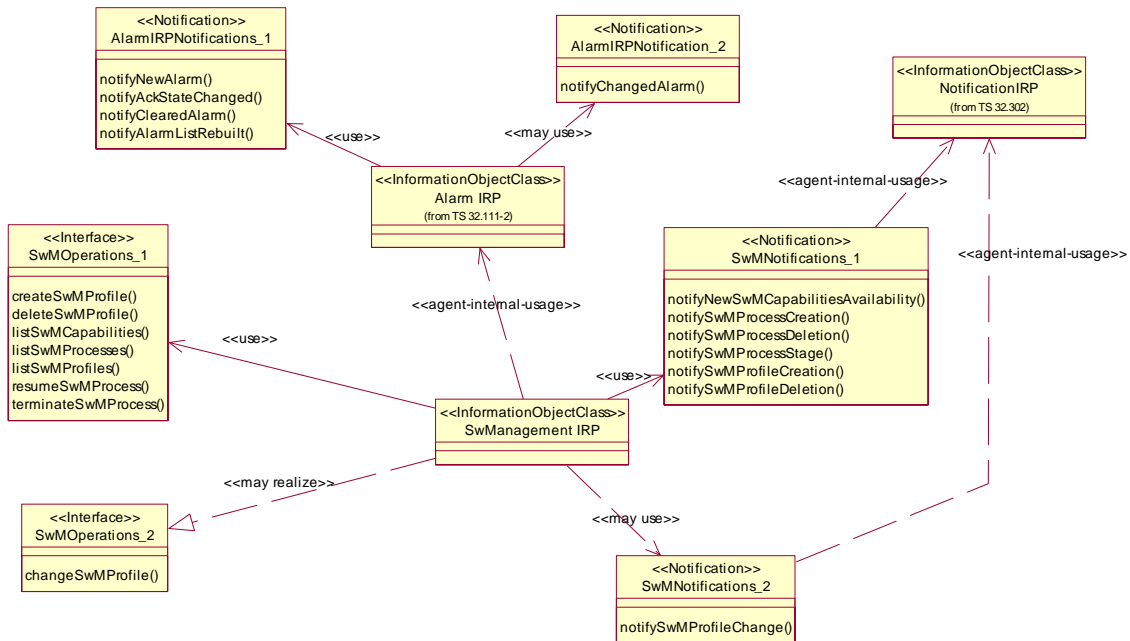
4.5.2 Constraints

Name	Definition
FFS	

5 IRP descriptions: Interface Definitions

5.1 Class diagram representing interfaces

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



5.2 Generic rules

- **Rule 1:** each operation with at least one input parameter supports a pre-condition `valid_input_parameter` which indicates that all input parameters shall be valid with regards to their information type. Additionally, each such operation supports an exception `operation_failed_invalid_input_parameter` which is raised when pre-condition `valid_input_parameter` is false. The exception has the same entry and exit state.
- **Rule 2:** each operation with at least one optional input parameter supports a set of pre-conditions `supported_optional_input_parameter_xxx` where "xxx" is the name of the optional input parameter and the pre-condition indicates that the operation supports the named optional input parameter. Additionally, each such operation supports an exception `operation_failed_unsupported_optional_input_parameter_xxx` which is raised when (a) the pre-condition `supported_optional_input_parameter_xxx` is false and (b) the named optional input parameter is carrying information. The exception has the same entry and exit state.
- **Rule 3:** each operation shall support a generic exception `operation_failed_internal_problem` which is raised when an internal problem occurs and that the operation cannot be completed. The exception has the same entry and exit state.

NOTE: These rules are mapped at the solution set level. Pre-conditions and exceptions, generated by these rules, need not appear explicitly in the present document.

5.3 SwMIRPOperations_1 Interface (M)

5.3.1 Operation listSwMCapabilities (M)

5.3.1.1 Definition

This operation allows the IRPManager to determine on the Itf-N interface which steps in the SW management 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 software download halts and waits for a continuation request by the IRPManager.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_1	

5.3.1.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
nEInformation	M	swM.nEInformation	If this input parameter contains no information, all (offered) SwMCapability instances are to be listed in the output.

5.3.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
capabilityList	M	swM.capabilityList	Each entry in the list contains: <ul style="list-style-type: none"> • Id of SwMCapability • nEInformation of SwMCapability • swVersionToBeInstalledOfferList of SwMCapability • stepsAndOfferedStopPointList of SwMCapability • offeredFinalAdministrativeStateInformation of SwMCapability
result	M	swM.result	result=success and empty swMcapabilityList mean: No instance found.

5.3.1.4 Post-condition

Assertion Name	Definition
dataDelivered	The requested data is delivered.

5.3.1.5 Exceptions

5.3.1.5.1 operation_failed

Exception Name	Definition
operation_failed	Condition: Pre-condition is false or post-condition is false. Returned Information: The output parameter result. Exit state: Entry state.

5.3.2 Operation listSwMProfiles (M)

5.3.2.1 Definition

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

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_1	
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.3.2.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
nEInformation	M	swM.nEInformation	If this input parameter contains no information, all profile instances are to be listed in the output.

5.3.2.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
swMprofileList	M	swM.swMprofileList	Each entry in the list contains: <ul style="list-style-type: none"> • Id of profile • versionNumber of swMprofile • nEInformation of profile • stepsAndSelectedStopPointList of profile • selectedFinalAdministrativeState of profile • conditionally*) swVersionToBeInstalled of swMprofile
result	M	swM.result	

*) condition see §4.3.5.3

5.3.3 Operation createSwMProfile (M)

5.3.3.1 Definition

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

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.3.3.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
id	O	swM.id	Identifier of swMprofile
nEInformation	M	swM.nEInformation	See 4.5
swVersionToBeInstalled	M	swM.swVersionToBeInstalled	See 4.5
stepsAndSelectedStopPointList	M	swM.stepsAndSelectedStopPointList	See 4.5
selectedFinalAdministrativeState	M	swM.selectedFinalAdministrativeState	See 4.5

5.3.3.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
id	O *)	swM.id	*) See below
result	M	swM.result	If result = success , then parameter id contains the id of the created swMProfile. If result = failure , then parameter id is absent. If result = nEInformationIntersection, then parameter id contains the id of a swMProfile whose nEInformation would intersect with the proposed nEInformation for the new swMProfile, which was not created in this case.

5.3.4 Operation deleteSwMProfile (M)

5.3.4.1 Definition

This operation allows the IRPManager to delete an instance of swMProfile.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.3.4.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
id	M	swM.id	Identifier of swMprofile

5.3.4.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
result	M	swM.result	

5.3.5 Operation `listSwMProcesses` (M)

5.3.5.1 Definition

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

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_4	

5.3.5.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
<code>nEIdentification</code>	O	<code>swM.nEIdentification</code>	It describes for which NE the <code>swMprocess</code> is to be listed. If this parameter is not present, all <code>swMprocess</code> instances are to be listed in the output.

5.3.5.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
<code>swMprocessList</code>	M	<code>swM.swMprocessList</code>	See 4.5
<code>result</code>	M	<code>swM.result</code>	<code>result=success</code> and empty <code>swMprocessList</code> mean: No instance found

5.3.6 Operation `resumeSwMProcess` (M)

5.3.6.1 Definition

This operation allows the IRPManager to resume a SW management process which currently has stopped at a stop point step.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_3	

5.3.6.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
<code>id</code>	M	<code>swM.id</code>	Identifier of <code>swMprocess</code>
<code>startStepName</code>	M	<code>swM.NameOfStep</code>	The start step for the resume operation. If the current process step is equal to the <code>startStepName</code> value, the process will start from <code>startStepName</code> . If the current process step does not match the <code>startStepName</code> value, then it will be indicated in the <code>result</code> of the operation. Not matching <code>startStepName</code> value can either be the case that the process has already started from the specified step (i.e. request is too late) or that the process has not yet reached the specified step (i.e request is too early).

5.3.6.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
result	M	swM.result	

5.3.7 Operation swFallback (M)

5.3.7.1 Definition

This operation enables the IRPManager to initiate a SW fallback.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_SWM_FUN_6	

5.3.7.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
filter	M	swM.filter	To describe properties of the NEs to be selected.

5.3.7.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
nEList	M	swM.nEList	Each entry in the list contains: nEIdentification swFallbackStatus (values: fallbackSuccessful, fallbackUnsuccessful)
result	M	swM.result	<ul style="list-style-type: none"> • Success, • Partly successful - swFallbackStatus is fallbackUnsuccessful for at least one NE and fallbackSuccessful for at least one other NE • Failure <p>Empty nEList and Result=Success means: No NEs fulfilling filter were found.</p>

5.3.8 Operation terminateSwMProcess (M)

5.3.8.1 Definition

This operation allows the IRPManager to terminate a SW management process which is currently ongoing.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_6	

5.3.8.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
id	M	swM.id	Identifier of swMprocess .

5.3.8.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
result	M	swM.result	

5.4 SwMIRPOperations_2 Interface (O)

5.4.1 Operation changeSwMProfile (O)

5.4.1.1 Definition

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

A change in a profile which was already used at the start of an swMProcess does not affect that swMProcess (which is run to its completion according to the former version of the profile.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.4.1.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
id	M	swM.id	Identifier of swMprofile
nEInformation	M	swM.nEInformation	See 4.5
swVersionToBeInstalled	CM *)	swM.swVersionToBeInstalled	See 4.5
stepsAndSelectedStopPointList	M	swM.stepsAndSelectedStopPointList	See 4.5
selectedFinalAdministrativeState	M	swM.selectedFinalAdministrativeState	See 4.5

*) See §4.3.5.2

5.4.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
result	M	swM.result	If result = success or failure, then parameter id may be absent or contain the id of the changed swMprofile. If result = nEInformationIntersection, then parameter conflictingProfileId contains the id of a swMprofile 'A' whose nEInformation would intersect with the proposed nEInformation for the swMprofile 'B' = input parameter id. swMprofile 'B' will not be changed in this case.
versionNumber	M	swM.versionNumber	See 4.5. This parameter has value 0 when result <> success.
conflictingProfileId	C *)	swM.conflictingProfileId	See definition of result above.

*) Condition: result is nEInformationIntersection

5.4.1.4 Constraints

Name	Definition
result_is_nEInformationIntersection	result is equal to nEInformationIntersection

5.5 SwMIRPNotifications_1 Interface (M)

5.5.1 Notification notifySwMProfileCreation (M)

5.5.1.1 Definition

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

5.5.1.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
id	M,Y	swM.id	Identifier of swMprofile
versionNumber	M, Y	swM.versionNumber	See 4.5
nEInformation	M,Y	swM.nEInformation	See 4.5
swVersionToBeInstalled	CM,Y*)	swM.swVersionToBeInstalled	See 4.5
stepsAndSelectedStopPointList	M,N	swM.stepsAndSelectedStopPointList	See 4.5
selectedFinalAdministrativeState	M,N	swM.selectedFinalAdministrativeState	See 4.5

*) See §4.3.5.2

5.5.2 Notification notifySwMProfileDeletion (M)

5.5.2.1 Definition

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

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.5.2.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
id	M,Y	swM.id	Identifier of swMprofile

5.5.3 Notification notifySwMProcessCreation (M)

5.5.3.1 Definition

This notification conveys information about the creation of an instance of IOC *swMProcess*.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.5.3.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
id	M,Y	swM.id	Identifier of swMprocess
nEIdentification	M,Y	swM.nEIdentification	see 4.5
profileId	M,N	swM.profileId	see 4.5
matchingNEInformation	M,N	swM.matchingNEInformation	see 4.5
stepInfoList	M,N	swM.stepInfoList	see 4.5

5.5.4 Notification notifySwMProcessStage (M)

5.5.4.1 Definition

This notification conveys information about the stage of an instance of IOC *swMProcess* that has been completed or at which that process has been stopped (based on pre-set stop points).

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_5	

5.5.4.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
id	M,Y	swM.id	Identifier of swMprocess
stepInfoList	M,N	swM.stepInfoList	see 4.5

5.5.5 Notification notifySwMProcessDeletion (M)

5.5.5.1 Definition

This notification conveys information about the deletion of an instance of IOC `swMProcess`

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.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.5.5.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
id	M, Y	swM.id	Identifier of swMprocess
triggerForDeletion	M, Y	swM.triggerForDeletion	This parameter describes what triggered the deletion of the swMprocess instance: triggerForDeletion: irpAgentTermination, irpManagerTermination, automatedSWMSuccessfullyConcluded
additionalInformation	O, N	swM.additionalInformation	

5.5.6 Notification notifyNewSwAvailability (M)

5.5.6.1 Definition

This notification conveys information about the availability of new SW.

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.5.6.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
nEandSWversion	M, Y	swM.NEandSWversion	Informs about new available SW, SW version and NE / NE version (types) for which it is valid

5.6 SwMIRPNotifications_2 Interface (O)

5.6.1 Notification notifySwMProfileChange (C/O)

5.6.1.1 Definition

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

Information on Requirements Traceability:

Referenced TS	Requirement label	Comment
3GPP TS 32.531 [6]	REQ_ASWM_FUN_2	

5.6.1.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
id	M,Y	swM.id	Identifier of swMprofile
versionNumber	M,Y	swM.versionNumber	See 4.5
nEInformation	M,Y	swM.nEInformation	See 4.5
swVersionToBeInstalled	CM,N *)	swM.swVersionToBeInstalled	See 4.5
stepsAndSelectedStopPointList	M,N	swM.stepsAndSelectedStopPointList	See 4.5
selectedFinalAdministrativeState	M	swM.selectedFinalAdministrativeState	See 4.5

*) See §4.3.5.2

Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2008-12	SP-42	SP-080717			Submitted to SA#42 for information and approval	1.0.0	8.0.0
2009-06	SP-44	SP-090408	001	--	Correction of naming errors	8.0.0	8.1.0
2009-06	SP-44	SP-090408	002	--	Add missing start step parameter for resume operation	8.0.0	8.1.0
2010-12	SP-50	SP-100831	028	1	Correcting requirements traceability and presence qualifier of notifyNewSwAvailability	8.1.0	8.2.0

History

Document history		
V8.0.0	February 2009	Publication
V8.1.0	July 2009	Publication
V8.2.0	January 2011	Publication