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Technical Specification

Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Self-Configuration of Network Elements;
Concepts and Integration Reference Point (IRP) Requirements
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Foreword

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Contents

Foreword

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

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

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
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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 describes the concepts how self-configuration works and what IRP requirements need to be met to support this functionality. The document also captures if a requirement shall be met via the Itf-N interface or via other protocols. This version of the TS is restricted to self-configuration of eNBs. The requirements in this document are not imposed on HNBs.

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

[5] 3GPP TS 32.531: "Telecommunication management; Architecture; Software Management Concepts and IRP Requirements ".

3 Definitions and abbreviations

For the purposes of the present document, the terms and definitions given in TS 32.101 [2], TS 32.102 [3] and TS 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TS 32.101 [1], TS 32.102 [2] and TS 21.905 [5], in that order.

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Self Configuration: The process which brings a network element into service requiring minimal human operator intervention or none at all.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] 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 [1].

SC Self Configuration

4 Concepts and background

Provide here an update of See TS 32.816 [4] §5.1.3.1.1 'Establishment of new eNodeB in network'

4.1 Self-Configuration Concept

4.1.1 Logical Function Blocs

4.1.1.1 Address Allocation Function (AAF):

This functional bloc supports the following functions: [SC1], [SC3].

4.1.1.2 OAM Connectivity Establishment Function (OAM CO_EF):

This functional bloc supports the following functions: [SC2], [SC3], [SC4], [SC5], [SC13].

4.1.1.3 Software Management Function (SW_MF):

This functional bloc supports the following functions: [SC3], [SC6], [SC7], [SC8], [SC20], [SC21].

4.1.1.4 Inventory Update Function (Inv_UF):

This functional bloc supports the following functions: [SC16].

4.1.1.5 Self-Test Function (ST_F):

This functional bloc supports the following functions: [SC17].

This function performs eNodeB self-tests.

4.1.1.6 Self-Configuration Monitoring and Management Function (SC_MMF):

This functional bloc supports the following functions: [SC18].

This function monitors the self-configuration process and provides the operator with this information. This function must be able to get information about all other functional blocs. In addition to this it allows the operator to control the execution of the self-configuration process.

4.1.1.6.1 Self-Configuration Monitoring and Management Function (SC_MMF_NM):

SC_MMF_NM (IRP Manager): representing the NM portion of SC_MMF (necessary monitoring and limited interaction capabilities to support an automated optimization), as well as related IRPManager functionality

4.1.1.6.2 Self-Configuration Monitoring and Management Function (SC_MMF_EM):

SC_MMF_EM (IRP Agent): representing the portion of SC_MMF operating below Itf-N, as well as related IRPAgent functionality

4.1.1.7 Call Processing Link (CPL) Set Up Function (CPL_SUF):

This functional bloc supports the following functions: [SC14], [SC15].

4.1.1.8 Radio Network Configuration Data Function (R_CD_F):

This functional bloc supports the following functions: [SC9], [SC11], [SC12].

4.1.1.9 Transport Network Configuration Data Function (T_CD_F):

This functional bloc supports the following functions: [SC9], [SC11], [SC12].

4.1.1.10 NRM IRP Update Function (NRM_UF):

This functional bloc supports the following functions: [SC19].

This function updates the E-UTRAN and EPC NRM IRP with information about the new eNodeB.

4.1.1.11 Radio Network and Transport Network Configuration Data Preparation Function

This functional bloc supports the following functions: [SC10].

5 Business Level Requirements

5.1 Self- Configuration of eNodeB"s

REQ_SCMAN_CON_1 The actor on NM level shall be able to manage the self-configuration process.

REQ_SCMON_CON_1 The actor on NM level shall be able to monitor the execution of the self-configuration process.

REQ_SCMON_CON_2 To support the monitoring of the execution of the self-configuration process, existing capabilities shall be reused as much as possible.

REQ_SCSW_CON_1 The software download, installation, activation and fallback should be automated as much as possible so that no or only minimal manual intervention is required.

REQ_SCSW_CON_1 see **REQ_SW_CON_4**

REQ_SCSW_CON_2 see **REQ_SW_CON_2**

REQ_SCOCE__CON_1 The OAM connectivity (incl. the IP address allocation) should be established in a fully automated manner.

REQ_SCOCE_CON_2 The amount of parameters that needs to be preconfigured should be minimized.

REQ_SCIU_CON_1 Inventory information about the new equipment shall be reported to the actor at NM level as part of the self-configuration process.

REQ_SCIU_CON_2 Inventory information shall be made available to the IRPManager reusing existing capabilities as much as possible.

REQ_SCRCD_CON_1 The radio configuration data shall be made available to the eNodeB as part of the self-configuration process.

REQ_SCTCD_CON_1 The transport configuration data shall be made available to the eNodeB as part of the self-configuration process.

REQ_SCCPLSU_CON_1 X2- and S1-interfaces shall be set up as part of the self-configuration process, based on the radio configuration, the transport configuration and Neighbour cell Relation information made available to the eNodeB.

Note: If there is no Neighbour cell Relation information provided, then no X2 interface is set up as part of the self-configuration process.

5.1.1 Actor roles

5.1.2 Telecommunications resources

5.1.3 High-level use cases

6 Specification level requirements

6.1 General

6.2 Actor roles

6.3 Telecommunications resources

6.4 Use cases

6.4.1 Use case Automatic Radio Network Configuration Data Preparation

FFS

6.4.2 Use case Self-configuration of a new eNodeB

This use case starts with the first initial self test and ends when the eNodeB is taken into operation.

Use Case Stage	Evolution / Specification	<<Uses>> Related use
Goal (*)	Put the eNodeB after physical installation into the operational state in an automated manner.	
Actors and Roles (*)	FFS	
Telecom resources	The E-UTRAN/EPC network including its OSS.	
Assumptions	IP network connectivity exists between the eNodeB and the OAM (sub) systems providing support for the self-configuration process.	
Pre conditions	The eNodeB is physically installed and physically connected to an IP network.	
Begins when	The field personnel start the self-configuration process. It is also possible that the process is triggered automatically after the completion of an eNodeB self-test.	
Step 1 (*) (M|O)	The order of the bullet points in the list below does not imply any statements on the order of execution. [SC1] An eNodeB IP address is allocated to the new eNodeB. [SC2] Basic information about the transport network (e. g. gateways) environment is provided to the eNodeB. With this information the eNodeB is able to exchange IP packets with other internet hosts. [SC3] The eNodeB provides information about its type, hardware and other relevant data about itself to the OAM (sub) systems providing support for the self-configuration process. [SC4] The address(es) of the OAM (sub) system(s) providing support for the self-configuration process (e.g. subsystem for software download, subsystem for configuration data download) is provided to the eNodeB. The address is equal to an IP address and a port number, or a DNS name and port number, or an URI. [SC5] The address(es) of the OAM (sub)system(s) providing support for normal OAM functions after completion of the self-configuration process are provided to the eNodeB. The address is equal to an IP address and a port number, or a DNS name and port number, or an URI. [SC6] The eNodeB connects to the OAM system providing support for the software download. [SC7] The decision which software or software packages have to be downloaded to the eNodeB is taken. [SC8] The software is downloaded into the eNodeB. [SC9] The eNodeB connects to the OAM system providing support for the configuration data download. [SC10] The (transport and radio) configuration data for the eNodeB is made available by either preparing it or making prepared configuration data available. [SC11] The (transport and radio) configuration data is downloaded into the eNodeB. [SC12] Dependent nodes (MMEs, eNodeBs) are updated with new configuration data as well (if required). [SC13] The eNodeB connects to the OAM (sub) system(s) providing support for normal OAM functions after completion of the self-configuration process. [SC14] The S1-links are be set up. [SC15] The (planned) X2-links are be set up. [SC16] The inventory system in the OAM is informed that a new eNodeB is in the field. [SC17] The eNodeB performs a self-test. Self-tests of different types can run at different places within the self-configuration procedure. [SC18] The operator is informed about the progess of the self-configuration process and important events occuring during the self-configuration process. [SC19] The network resource models visible over Itf-N are updated during and after the self-configuration process. [SC20] SW is installed, i.e. prepared in such a way, that the NE is ready to use it. For some implementations this step is done not at all or considered part of [SC21] or of [SC8]. [SC21] SW is activated, i.e. final provisions are done such that the NE is allowed to use the SW. For some implementations this step is considered part of [SC20] or of [SC8].	
Ends when (*)	Ends when all steps identified above are successfully completed or when an exception occurs.	
Exceptions	FFS.	
Post Conditions	The eNodeB is operational and able to carry traffic.	
Traceability (*)		

Editor's note: Security aspects are FFS.

6.5 Requirements

6.5.1 Automatic Radio Network Configuration Data Preparation

FFS

6.5.2 Self-configuration of a new eNodeB

The following requirements apply to the macro eNB only. Requirements for the HNB can be found in TR 32.821.

The way to make any information available to eNB is outside the scope of standardisation.

Conflict resolution in case of contradicting information made aware to the eNodeB is outside the scope of standardisation.

6.5.2.1 Self-Configuration Management and Monitoring

6.5.2.1.1 Management Part

REQ_SCMAN_FUN_1
It shall be possible for an IRPManager to retrieve
- information regarding how an NE or a group of NEs behaves during self-configuration, i.e. in which sequence the essential steps of self-configuration are executed
- information regarding where the IRPManager can interact with a self-configuration - by suspending the self-configuration process at one or more self-configuration stop points.
Steps, their sequence and their stop point qualification are not imposed by the standard.

REQ_SCMAN_FUN_2
If choices for stop points to suspend the SWM process are offered, then it shall be possible for an IRPManager to choose/select among them where it will suspend (stop) a self-configuration process (i.e. to ensure fulfillment of pre-conditions for the step like the fulfillment of the presence of required input data for the step).
The IRPManager shall be able to read or select or de-select the stop points offered.
The IRPManager shall be informed about creation and deletion of a profile which is a holder of information regarding the offered self configuration steps, the offered sequence of the steps and the configuration steps stop points.
The IRPManager should be able to change the content of a created profile and be informed about the change.

REQ_SCMAN_FUN_3
It shall be possible for an IRPManager to resume a suspended self-configuration for one or multiple NEs.

REQ_SCMAN_FUN_4
It shall be possible for an IRPManager to terminate an currently ongoing self-configuration for one or multiple NEs.
After a terminattion it is not possible to resume the self-configuration.

6.5.2.1.2 Monitoring Part

REQ_SCMON_FUN_1
The IRPAgent shall send an alarm in case of failures during the self-configuration process.

REQ_SCMON_FUN_2
The IRPAgent should report the progress of a self-configuration of one or multiple NEs to the IRPManager.

REQ_SCMON_FUN_3

When a self-configuration profile is created or deleted, then the IRPAgent shall inform the IRPManager about this creation and deletion.
When the optional change of a self-configuration profile is performed, then the IRPAgent shall inform the IRPManager about such a change.

REQ_SCMON_FUN_4
It shall be possible for IRPManager to retrieve information about the progress of a self-configuration.

REQ_SCMON_FUN_5
The IRPAgent shall send a notification about the start, stop, completion and optionally cancellation of a self-configuration.

REQ_SCMON_FUN_6
The IRPAgent shall inform the IRPManager whenever the self-configuration process has been suspended or resumed

6.5.2.2 Software Management

REQ_SCSW_FUN_1 see **REQ_SWM_FUN_1 in 32.531**

REQ_SCSW_FUN_2 see **REQ_SWM_FUN_2 in 32.531**

REQ_SCSW_FUN_3 see **REQ_SWM_FUN_4 in 32.531**

REQ_SCSW_FUN_4 see **REQ_SWM_FUN_5 in 32.531**

REQ_SCSW_FUN_5 see **REQ_ASWM_FUN_1 in 32.531**
REQ_SCSW_FUN_6 see **REQ_ASWM_FUN_2 in 32.531**
REQ_SCSW_FUN_7 see **REQ_ASWM_FUN_3 in 32.531**
REQ_SCSW_FUN_8 see **REQ_ASWM_FUN_4 in 32.531**
REQ_SCSW_FUN_9 see **REQ_ASWM_FUN_5 in 32.531**

6.5.2.3 Address Allocation and OAM Connectivity Establishment

REQ_SCOCE_FUN_1
The automatic establishment of the OAM connectivity shall be fully secured.

REQ_SCOCE_FUN_2
The IRPManager shall be informed that the eNB has reached OAM connectivity.

6.5.2.4 Inventory Update

Editor"s note: The details of the inventory information to be reported are FFS.

6.5.2.5 Self-Test

REQ_SCST_ffs_1 FFS

Editor"s note: The self-test may have to be separated out into a separate use case.

6.5.2.6 Radio Configuration Data

FFS

6.5.2.7 Transport Configuration Data

FFS

6.5.2.8 Call Processing Link Set-Up

FFS

6.5.2.9 NRM IRP Update

REQ_SCNRMU_FUN_1
The related E-UTRAN NRM IRP and EPC NRM IRP instances shall be created and updated.

7. Functions and Architecture

7.1 Self-Configuration Logical Architecture

The lines between the functional blocks do not indicate specific 3GPP interfaces.

For the abbreviations used, please see the headlines of chapter 4.

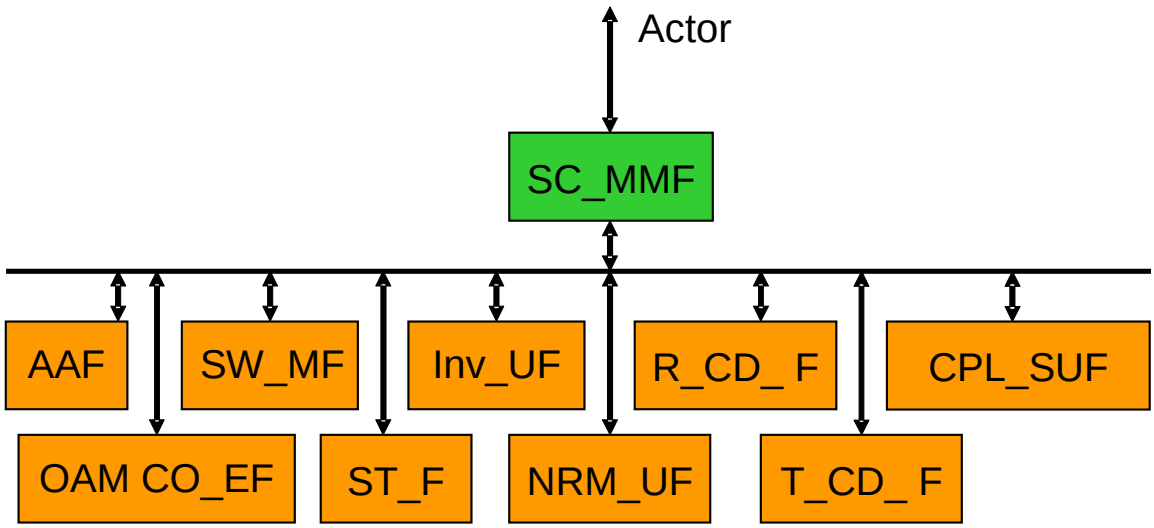

Figure 7.1-1: Self-Configuration Logical Architecture

7.2 Self-Configuration Reference Model

The SC_MMF has a part located in the EM and a part located at the NM.

For the abbreviations used, please refer to Chapter 4.

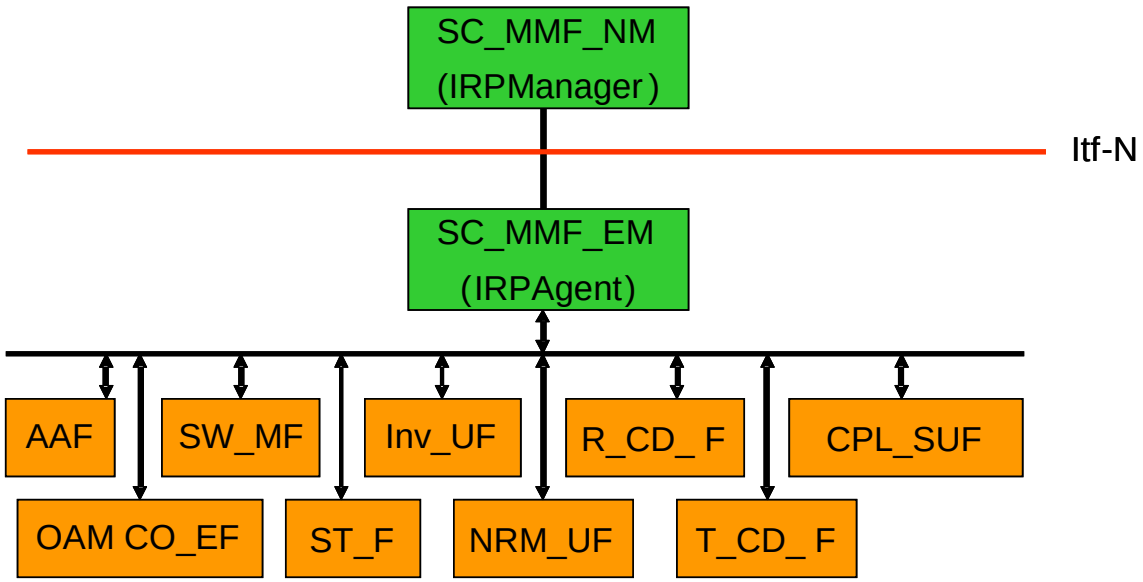

Figure 7.2-1: Self-Configuration Reference Model

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2008-12	SP-42	SP-080713	--	--	Submitted to SA#42 information and approval	1.0.0	8.0.0
2009-09	SP-45	SP-090627	001	--	Removal of inconsistency	8.0.0	9.0.0

History

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