

# ETSI TS 132 591 V10.2.0 (2011-06)

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*Technical Specification*

**LTE;  
Telecommunication management;  
Home enhanced Node B (HeNB) Operations, Administration,  
Maintenance and Provisioning (OAM&P);  
Concepts and requirements for Type 1 interface HeNB  
to HeNB Management System (HeMS)  
(3GPP TS 32.591 version 10.2.0 Release 10)**

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**Reference**

RTS/TSGS-0532591va20

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**Keywords**

LTE

**ETSI**

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Sous-Préfecture de Grasse (06) N° 7803/88

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## Foreword

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## Introduction

The present document is part of a TS-family covering the 3<sup>rd</sup> Generation Partnership Project Technical Specification Group Services and System Aspects, Telecommunication Management; as identified below:

- 3GPP TS 32.591: "Telecommunications management; Home eNode B (HeNB) Operations, Administration, Maintenance and Provisioning (OAM&P); Concepts and requirements for Type 1 interface HeNB to HeNB Management System (HeMS)".
- 3GPP TS 32.592: "Telecommunications management; Home eNode B (HeNB) Operations, Administration, Maintenance and Provisioning (OAM&P); Information model for Type 1 interface HeNB to HeNB Management System (HeMS)".
- 3GPP TS 32.593: "Telecommunications management; Home eNode B (HeNB) Operations, Administration, Maintenance and Provisioning (OAM&P); Procedure flows for Type 1 interface HeNB to HeNB Management System (HeMS)".
- 3GPP TS 32.594: "Telecommunications management; Home eNode B (HeNB) Operations, Administration, Maintenance and Provisioning (OAM&P); Data definitions for Type 1 interface HeNB to HeNB Management System (HeMS)".

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# 1 Scope

The present document describes the concepts and requirements of OAM for Home eNodeB (HeNB). The requirements captured in this document shall be met via Type 1 interface between HeNB and HeMS.

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# 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] TR-069 Amendment 2, CPE WAN Management Protocol v1.1, Broadband Forum.
- [5] 3GPP TS 32.435: "Performance Measurement, eXtensible Markup Language (XML) file format definition".
- [6] 3GPP TS 32.111-2: "Telecommunication management; Fault Management; Alarm Integration Reference Point (IRP): Information Service (IS)".
- [7] 3GPP TS 22.220: "Service requirements for Home Node B (HNB) and Home eNode B (HeNB)".
- [8] 3GPP TS 33.320: "Security of Home Node B (HNB) / Home evolved Node B (HeNB)".

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# 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 [2], TS 32.102 [3] and TS 21.905 [1], 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].

## 3.2 Abbreviations

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

HeMS	Home eNodeB Management System
HeNB	Home eNodeB

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## 4 Concepts and background

Home eNodeB has the following characteristics:

- The quantity of Home eNodeBs is likely to be large
- There may be many Home eNodeB vendors
- The location of Home eNodeB could be in a private residence which may not be accessible for frequent on-site maintenance

Based on the above characteristics, this specification defines the functionalities needed for the management of Home eNodeB over a Type 1 interface.

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## 5 Business level requirements

### 5.1 Requirements

#### 5.1.1 Configuration Management

**REQ-OAMP\_CM-CON-001** The HeNB shall be able to automatically, i.e. without human operator on-line interaction or attention, configure itself to be ready for service when powered up and connected to HeMS.

**REQ-OAMP\_CM-CON-002** The HeNB shall be able to automatically, i.e. without human operator on-line interaction or attention, configure itself to be in service when powered up and connected to HeMS.

**REQ-OAMP\_CM-CON-003** The HeNB shall be able to automatically, i.e. without human operator on-line interaction or attention, upgrade its software/firmware and configuration.

**REQ-OAMP\_CM-CON-004** The HeNB auto-configuration shall be done in such way that the performance of the surrounding macro cells is not adversely affected.

**REQ-OAMP\_CM-CON-005** The HeNB auto-configuration function should be adaptive to react to change in the network and changes in the radio environment.

**REQ-OAMP\_CM-CON-006** The operator shall be able to remotely reboot the HeNB.

**REQ-OAMP\_CM-CON-007** The operator shall be able to remotely start/stop the radio transmission of the HeNB.

**REQ-OAMP\_CM-CON-008** In case IPsec is used, the system should be engineered to ensure that the HeNB IP address changes as minimally as possible.

**REQ-OAMP\_CM-CON-009** The operator shall be able to remotely reconfigure the frequency and radio bandwidth of HeNB to adapt to changes in the radio environment and required bandwidth.

**REQ-OAMP\_CM-CON-010** The HeNB should allow configuration of the IPsec or non-IPsec usage option based on the operator's policy [8].

#### 5.1.2 Performance Management

**REQ-OAMP\_PM-CON-001** The HeNB may have the capability to collect its performance related data.

**REQ-OAMP\_PM-CON-002** The HeNB shall send performance data based on operator configured policy.

**REQ-OAMP\_PM-CON-003** Operator shall be able to retrieve performance data file from the HeNB.

### 5.1.3 Fault Management

**REQ-OAMP\_FM-CON-001** The HeNB shall support Fault Management to enable the operator to monitor and manage the HeNB.

**REQ-OAMP\_FM-CON-002** The HeNB shall provide alarm related information only on demand by the operator or based on operator configured policy.

### 5.1.4 Security Management

**REQ-OAMP\_SM-CON-001** The HeNB shall have the capability to protect itself against Denial of Service attack over the Type 1 interface.

## 5.2 Actor roles

Not defined in this version.

## 5.3 Telecommunications resources

Not defined in this version.

## 5.4 High level use cases

Not defined in this version.

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# 6 Specification level requirements

## 6.1 Requirements

### 6.1.1 Configuration Management

The requirements for configuration management are as follows:

**REQ-OAMP\_CM-FUN-001** The HeNB configuration shall be administered by the HeMS utilising the TR-069 CWMP Protocol, reference [4].

**REQ-OAMP\_CM-FUN-002** HeMS shall be able to reboot the HeNB.

**REQ-OAMP\_CM-FUN-003** HeMS shall have remote access to the HeNB to start/stop the radio transmission.

**REQ-OAMP\_CM-FUN-004** HeMS shall have remote access to the HeNB to start/stop the radio transmission on the frequencies specified by HeMS.

**REQ-OAMP\_CM-FUN-005** HeMS shall maintain the configuration data of the HeNB.

**REQ-OAMP\_CM-FUN-006** When the HeNB is initially powered up and connected to the HeMS, HeMS shall send the initially needed configuration data to the HeNB.

**REQ-OAMP\_CM-FUN-007** If the inner IPsec tunnel IP address of the HeNB changes and HeNB is connected to HeMS via IPsec Tunnel then the HeNB shall notify the HeMS using TR-069.

**REQ-OAMP\_CM-FUN-008** The HeMS shall specify which parameters it needs to be notified of when the HeNB changes their values through auto-configuration. The HeNB shall notify the HeMS of changes in the values of any such auto-configured parameters.

**REQ-OAMP\_CM-FUN-009** The HeNB shall inform the HeMS of its ability to auto-configure parameters or groups of parameters that are relevant to the HeMS.



**REQ-OAMP\_CM-FUN-010** HeMS shall be able to specify a value, or a valid range of values, for any parameter that is auto-configurable by the HeNB.

**REQ-OAMP\_CM-FUN-011** Configuration management capability for the HeNB shall be supported by means of TR-069 RPCs SetParameterValues, AddObject and DeleteObject . Optionally a bulk configuration management file may be supported. In this case the TR-069 manager uses the RPC download method to trigger a CM file download from a file server.

**REQ-OAMP\_CM-FUN-012** The HeNB shall provide a capability allowing the HeMS to manage downloading of HeNB software/firmware image files and provide mechanisms for version identification and notification to the HeMS of the success or failure of a file download.

**REQ-OAMP\_CM-FUN-013** In normal operation, the HeNB shall maintain its configuration data following a HeNB reboot.

**REQ-OAMP\_CM-FUN-014** The HeNB shall support capabilities to inform the HeMS about the results of specific actions triggered by the HeMS.

**REQ-OAMP\_CM-FUN-015** It shall be possible to initiate a management connection at the request of either the HeNB or the HeMS.

**REQ-OAMP\_CM-FUN-016** The HeNB shall be able to inform the HeMS of the changes in radio environment and required radio bandwidth.

**REQ-OAMP\_CM-FUN-017** The operator shall be able to remotely reconfigure the frequency and radio bandwidth of HeNB.

**REQ-OAMP\_CM-FUN-018** If the HeNB is unable to offer service for an operator configured time period it will deactivate the air interface.

**REQ-OAMP\_CM-FUN-019** The HeNB shall support a capability to allow the HeMS to activate Local IP Access.

**REQ-OAMP\_CM-FUN-020** The HeNB shall support a capability to allow the HeMS to deactivate Local IP Access.

**REQ-OAMP\_CM-FUN-021** The HeMS should be able to securely configure the HeNB according to the operator's policy, whether or not to use IPsec for subsequent connections.

## 6.1.2 Performance Management

The HeNB may support Performance Management to enable the operator to monitor the HeNB network based on the business level requirements.

The requirements for performance management are as follows.

**REQ-OAMP\_PM-FUN-001** The HeNB may have the Performance Management capabilities administered by the HeMS.

**REQ-OAMP\_PM-FUN-002** The HeNB shall support the retrieval of the Performance Information from the HeNB utilising the file transfer option of TR-069 CWMP Protocol, reference [4].

**REQ-OAMP\_PM-FUN-003** The HeNB shall be configurable by the HeMS to produce an XML File at regular intervals which contains the HeNB performance Information and then upload the XML File.

**REQ-OAMP\_PM-FUN-004** The XML File Formats produced by the HeNB shall adhere to the 3GPP XML Performance Management File Formats, reference [5].

**REQ-OAMP\_PM-FUN-005** The HeNB shall upload PM files using TR-069 compliant file transfer protocols.

**REQ-OAMP\_PM-FUN-006** HeMS shall have the ability to configure policies for the HeNB performance data file upload.

## 6.1.3 Fault Management

**REQ-OAMP\_FM-FUN-001** The HeNB shall have the Fault Management capabilities administered through the HeMS.

**REQ-OAMP\_FM-FUN-002** The HeNB shall have the ability to send alarm related information to HeMS according to operator configured policy.

**REQ-OAMP\_FM-FUN-003** The alarm related information to be sent to the HeMS by the HeNB shall support the inclusion of the appropriate Information attributes, as defined in 3GPP TS.32.111-2, reference [6].

**REQ-OAMP\_FM-FUN-004** The HeNB shall maintain the following information:

- a. Alarm Management Information – which contains the alarm management and reporting parameters configurable by the HeMS
- b. Alarms List – Alarms currently active on the HeNB
- c. Alarm History – contains the alarms previously created by the HeNB.
- d. Pending Delivery Queue – contains the alarms queued to be sent to the HeMS on the next management connection

**REQ-OAMP\_FM-FUN-005** The HeNB shall support the following ways of alarm handling:

- a. Expedited handling– the HeNB connects to the HeMS immediately to raise the alarm and logs the alarm in the Alarm History.
- b. Queued handling – the HeNB queues the alarm internally pending connection to the HeMS, logs the alarm in the Alarm History, and delivers the alarm on the next connection to the HeMS
- c. Logged handling – the HeNB does not send the alarm to the HeMS and logs the alarm in the Alarm History.
- d. Disabled handling– the HeNB does not send the alarm to the HeMS and will not log the alarm in the Alarm History

**REQ-OAMP\_FM-FUN-006** The HeMS may configure the alarm handling for each type of HeNB alarm according to the HeNB alarm handling capabilities and the default handling if not specified by the HeMS shall be 'Logged handling'.

**REQ-OAMP\_FM-FUN-007** The HeMS shall have the ability to throttle the sending of alarms from the HeNB to the HeMS

**REQ-OAMP\_FM-FUN-008** The HeMS shall have the capability to retrieve alarm related information from the HeNB using TR-069 RPC Method Calls.

**REQ-OAMP\_FM-FUN-009** The HeMS shall have the capability to completely purge on the HeNB the Alarms List and the Pending Delivery Queue and may have the capability to completely purge on the HeNB the history of Alarms.

**REQ-OAMP\_FM-FUN-010** The HeMS shall have the capability to activate and deactivate the alarm reporting by the HeNB.

**REQ-OAMP\_FM-FUN-011** The HeMS shall be able to define the frequency of passive reporting.

**REQ-OAMP\_FM-FUN-012** The HeMS shall be informed immediately of alarms (raised, changed, cleared) classified as expedited notifications only.

**REQ-OAMP\_FM-FUN-013** The HeNB shall provide a capability allowing the HeMS to access information that it may use to diagnose and resolve connectivity or service issues.

## 6.1.4 Security Management

**REQ-OAMP\_SM-FUN-001.** The HeNB shall have the capability to communicate with the HeMS via TR-069 CWMP, reference [4], through the support of one of the two security mechanisms determined by the Network Operator's Security Policies:

- utilising SSL/TLS outside the IPsec Tunnel
- within the IPsec Tunnel with the option to utilise SSL/TLS within the IPsec Tunnel for additional end-to-end security

TR-069 CPE devices are currently factory programmed with a Bootstrap HeMS URL only and therefore the HeNB capable CPEs requiring to utilise IPsec for connection to the HeMS either require to be factory programmed with Bootstrap Security Gateway/IPsec Information or this information is supplied outside of the IPsec tunnel before tunnel establishment utilising SSL/TLS.

**REQ-OAMP\_SM-FUN-002** The HeNB shall provide a capability to prevent tampering with the interactions that take place between the HeNB and the HeMS as well as management functions of a HeNB.

**REQ-OAMP\_SM-FUN-003** The HeNB shall provide a capability allowing the HeMS to authenticate the HeNBs.

**REQ-OAMP\_SM-FUN-004** The HeNB shall be able to authenticate the HeMS prior to responding to interaction triggered by the HeMS.

**REQ-OAMP\_SM-FUN-005** The HeNB shall provide a capability supporting confidentiality for interaction taking place between the HeNB and the HeMS.

## 6.2 Actor roles

Not defined in this version.

## 6.3 Telecommunications resources

Not defined in this version.

## 6.4 Use cases

Not defined in this version.

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## Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2009	SA#44	SP-090304	--	--	Presentation to SA for information	--	1.0.0
Mar 2010	SA#47	SP-100057	--	--	Presentation to SA for approval	1.0.0	2.0.0
Mar 2010	--	--	--	--	Publication of SA approved version	2.0.0	9.0.0
Jun 2010	SA#48	SP-100264	001	--	Missing Requirement for an operator"s defined time period at the HeNB	9.0.0	10.0.0
Mar 2011	SA#51	SP-110099	002	1	Add LIPA management requirements	10.0.0	10.1.0
May 2011	SA#52	SP-110288	004	2	Correction of requirements for HeNB non-IPsec usage - alignment with 33.320	10.1.0	10.2.0

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## History

<b>Document history</b>		
V10.1.0	April 2011	Publication
V10.2.0	June 2011	Publication