

# ETSI TS 122 220 V15.0.0 (2019-07)



**Universal Mobile Telecommunications System (UMTS);  
Service requirements for Home Node B (HNB)  
and Home eNode B (HeNB)  
(3GPP TS 22.220 version 15.0.0 Release 15)**

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# Foreword

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# Introduction

In Rel-8, 3GPP has specified the basic functionalities for the support of Home Node B (HNB) and Home eNodeB (HeNB). The requirements for these basic functionalities were captured in TS 22.011.

From Rel-9 onward, it has been agreed to consolidate all the requirements from Rel-8 and further requirements for HNB and HeNB in a new TS, which is this specification.

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# 1 Scope

This specification defines the service requirements for the basic functionalities for the support of Home NodeB (HNB) and Home eNodeB (HeNB) – jointly referred to as H(e)NB – and the further functionalities that will enable the mobile operators to provide more advanced services as well as improving the user experience.

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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] Void
- [3] 3GPP TS 22.246: "Multimedia Broadcast/Multicast Service (MBMS) user services; Stage 1".
- [4] 3GPP TS 22.101: "Service Aspects; Service Principles".
- [5] TR-069 Amendment 2: "CPE WAN Management Protocol v1.1, Broadband Forum", viewable at <http://www.broadband-forum.org/technical/download/TR-069Amendment2.pdf>
- [6] 3GPP TS 25.304: "User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".
- [7] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".
- [8] 3GPP TS 22.115: "Service aspects; Charging and billing".
- [9] 3GPP TS 22.268: "Public Warning System (PWS) requirements".
- [10] 3GPP TS 22.011: "Service accessibility".
- [11] 3GPP TS 31.115: "Secured packet structure for (Universal) Subscriber Identity Module (U)SIM Toolkit applications".
- [12] 3GPP TS 31.116: "Remote APDU Structure for (U)SIM Toolkit applications".

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# 3 Definitions, symbols and abbreviations

## 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].

**Closed access mode:** H(e)NB provides services only to its associated CSG members.

**Home based network:** An IP based network in the same premises as, and is connected to, the H(e)NB.

**Hybrid access mode:** H(e)NB provides services to its associated CSG members and to non-CSG members.

**Open access mode:** H(e)NB operates as a normal NodeB or eNodeB.

**HNB:** A HNB is a Customer-premises equipment that connects a 3GPP UE over UTRAN wireless air interface to a mobile operator's network using a broadband IP backhaul.

**HeNB:** A HeNB is a Customer-premises equipment that connects a 3GPP UE over EUTRAN wireless air interface to a mobile operator's network using a broadband IP backhaul.

**H(e)NB Gateway:** H(e)NB Gateway is a mobile operator's equipment (usually physically located on mobile operator premises) through which the H(e)NB gets access to mobile operator's core network.

**H(e)NB Hosting Party:** A H(e)NB Hosting Party has a contractual relationship with the operator, related to the provision of access to the operator's network via one or more H(e)NBs.

NOTE: A H(e)NB Hosting Party is likely to have the billing relationship with the operator. A H(e)NB Hosting Party will typically be the "lead" user in a household but could be e.g. the corporate IT manager in an enterprise context.

**H(e)NB Subsystem:** A H(e)NB Subsystem consists of the H(e)NB and the H(e)NB Gateway.

## 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].

CSG	Closed Subscriber Group
HNB	Home NodeB
HeNB	Home eNodeB
H(e)NB	HNB and HeNB

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## 4 General

### 4.1 Description

Access to 3G and evolved 3G (EPS) services may be provided via UTRAN or E-UTRAN cellular base stations belonging to e.g. domestic, business, commercial enterprises. This type of access may be provided by the PLMN by means of HNB and HeNB (jointly referred to as H(e)NB). The H(e)NB provides services either only to a Closed Subscriber Group (CSG) or to other mobile subscribers too. The H(e)NB is connected to the mobile operator core network using IP via any suitable access technology.

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## 5 Common requirements for Home NodeB / Home eNodeB

### 5.1 HNB and HeNB Installation, identification and location requirements

- H(e)NB shall have a unique equipment identity.
- All the H(e)NBs serving the same CSG share the same unique (within the PLMN) identity called CSG Identity.

NOTE: CSGs of different PLMNs are considered different, even if the PLMNs are indicated to the UE as "equivalent PLMNs" [10].



- It shall be possible to support at least 125 million CSG Identities within a PLMN of an operator.
- The radio transmitter of a H(e)NB shall not be activated until configured and authorised by the operator.
- When installing, provisioning, configuring or re-configuring an H(e)NB the operator shall be able to:
  - verify the H(e)NB's identity.
  - obtain the geographical location of the H(e)NB.

NOTE: The scenario where a H(e)NB is connected to one operator's network and later changed to another operator's network is not required.

- The operator shall be able to determine that the H(e)NB is installed and operated in accordance with all relevant regulatory requirements.
- The operator shall be able to configure the settings of the H(e)NB. In the case where the H(e)NB has detrimental impact on the spectrum usage, the H(e)NB can be set to out-of-service by the operator.
- Installation and activation of a new H(e)NB shall require no reconfiguration of the operator's network.
- The impact of H(e)NB on the core network should be minimised.

## 5.2 OA&M Requirements

- H(e)NB shall support the automatic discovery of an operator's management platform.
- It shall be possible to make use of the operator's management platform to carry out OA&M functions for H(e)NB. The management connection between H(e)NB and the operator's management platform shall be end-to-end secure.
- H(e)NB shall support OA&M procedures which allow the operator to remotely configure the H(e)NB, deploy software upgrades, detect and report changes in RF conditions and perform general OA&M tasks. The OA&M procedures shall be as closely aligned as possible with those that are commonly used in broadband access networks such as defined in TR-069 Amendment 2 [5].
- If the connection between H(e)NB and the rest of the operator network is out of service, then it shall be possible within an operator's defined time period for the H(e)NB to deactivate the air-interface.
- When the H(e)NB Hosting Party authentication is required by the MNO, the H(e)NB shall not activate the air-interface unless the authentication of the H(e)NB Hosting Party has been performed successfully.

## 5.3 Access Control requirements

### 5.3.1 General

- Subject to operator and H(e)NB Hosting Party agreement, the operator shall be able to configure the H(e)NB with open, hybrid or closed access mode.
- When the H(e)NB is configured for open access mode, it shall be possible for the H(e)NB to provide services to subscribers of any PLMN, subject to roaming agreement.
- When the H(e)NB is configured for hybrid access mode, it shall be possible for the H(e)NB to provide services to:
  - its associated CSG members, and
  - subscribers of any PLMN not belonging to its associated CSG, subject to roaming agreement.
- When the H(e)NB is configured for closed access mode, only users that belong to its associated CSG shall be able to obtain services.

- CSG members may include subscriber of any PLMN subject to roaming agreement, defined as HPLMN CSG Roaming.
- The VPLMN may support VPLMN Autonomous CSG Roaming by providing CSG membership to the roaming subscriber without exchanging any CSG specific information with the HPLMN. The VPLMN shall disable VPLMN Autonomous CSG Roaming on a per HPLMN basis if requested by the home operator.

NOTE: VPLMN Autonomous CSG Roaming and HPLMN CSG Roaming can be active in the same VPLMN

- The CSG membership granted to the subscriber during his stay in the VPLMN may be retained by the VPLMN (e.g. in case the subscriber moves to another PLMN and subsequently returns to the VPLMN).

### 5.3.2 Closed Subscriber Group

- The CSG manager shall be able, under the operator supervision, to add, remove and view CSG membership

NOTE: the interaction of the user with the application that manages the Allowed CSG Lists is out of scope of 3GPP (e.g. Web interface).

- For each subscriber, the network maintains a single CSG list containing the CSG identities that the subscriber is allowed to use.
- The UE shall contain a list of allowed CSG identities (Allowed CSG List). It shall be possible to store the Allowed CSG List in the USIM. When available, the list on the USIM shall be used. It shall be possible for both, the operator and the UE, to modify the Allowed CSG List.
- The UE shall allow the user to introduce new CSGs to the Allowed CSG List by means of manual CSG selection only.
- The UE shall maintain an operator-controlled list of allowed CSG identities (Operator CSG list). It shall be possible to store the Operator CSG list in the USIM. When available, the list on the USIM shall be used. It shall be possible for the operator to modify the Operator CSG List.
- The two lists are maintained independently from each other. A change in the Operator CSG list shall not trigger the UE to modify the Allowed CSG list to reflect such change automatically.
- Except during manual CSG selection, all CSG cells belonging to a CSG identity not included in the Allowed CSG List or Operator CSG list shall be considered not suitable by the UE ("not suitable" as specified in TS 25.304 [6] and TS 36.304 [7]).
- Each CSG identity shall be associated to a subscriber group which identifies the subscribers allowed to access the CSG.
- When the subscriber group is updated, the affected UE shall be informed accordingly.
- For temporary members, it shall be possible to limit the period of time during which the subscriber is considered a member of a CSG (granted access rights). It shall be possible to configure a time period for each temporary member.
- The time period shall be configurable by the CSG manager and/or the operator operating the CSG and shall span from 1 decihour to several days. Unlimited membership to the CSG is allowed.
- When a CSG is no longer considered available to provide services, except for emergency calls (i.e. due to time period expiry or removal of the CSG membership), it shall be possible to continue the established communication in another cell not belonging to this CSG.
- In hybrid access mode when services cannot be provided to a CSG member due to a shortage of H(e)NB resources it shall be possible to continue the established communication of non-CSG members in another cell.
- In hybrid access mode, to minimise the impact on CSG members from established communication of non-CSG members, it shall be possible for the network to allow the data rate of established PS communication of non-CSG members to be reduced.