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Technical Report

3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Study on HNB Emergency Warning Area for UTRA (Release 12)



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Contents

Foreword	4
Introduction	4
1 Scope	5
2 References.....	5
3 Definitions, symbols and abbreviations	5
3.1 Definitions	5
3.2 Symbols.....	5
3.3 Abbreviations.....	5
4 Description of addressed issues.....	6
4.1 Current Setup and Operation	6
4.1.1 Provisioning and Start Up.....	6
4.1.2 Operation	7
5 Description of Proposed Solutions	7
6 Open Issues	7
7 Conclusions	10
Annex A: Change history.....	10

Foreword

This Technical Report 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

At present Cell Broadcast is used for ETWS/CMAS/PWS area warning systems. For the macro network this presents little problem, despite the fact that a warning area may contain a large number of cells in a macro network. Moreover the radio access parameters broadcast over the air in a 3G macro network have traditionally been planned before deployment and change only rarely.

The same as above is also applicable for deployments with HNBs, and also in this deployment it is possible to plan that the radio access parameters broadcasted over the air.

The use of the Emergency Area ID list concept has a number of benefits to operators that are not currently present in 3G, including:

1. The address list size may be controlled by the use of Emergency Area IDs
2. The Emergency Area ID allows the grouping of cells other than by TAI

Increased harmonisation between LTE and 3G would also allow an operator to re-use their Emergency Area ID list across RATs, which is particularly beneficial in the case of co-located cell sites or cell supporting multi-RAT operation.

1 Scope

The present document captures the result of the Study on HNB Emergency Warning Area RP-130859[2].

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] RP-130859 HNB Emergency Warning Area

3 Definitions, symbols and abbreviations

Delete from the above heading those words which are not applicable.

Clause numbering depends on applicability and should be renumbered accordingly.

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].

Definition format (Normal)

<defined term>: <definition>.

example: text used to clarify abstract rules by applying them literally.

3.2 Symbols

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

Symbol format (EW)

<symbol> <Explanation>

3.3 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].

Abbreviation format (EW)

<ACRONYM> <Explanation>

4 Description of addressed issues.

4.1 Current Setup and Operation

In this section, background is provided to the current setup and operation of Cell Broadcast for HNB

4.1.1 Provisioning and Start Up

Figure 1 shows the basic operation of the provisioning and set up of a system for Cell Broadcast towards a 3G HNB Subsystem as currently carried out.

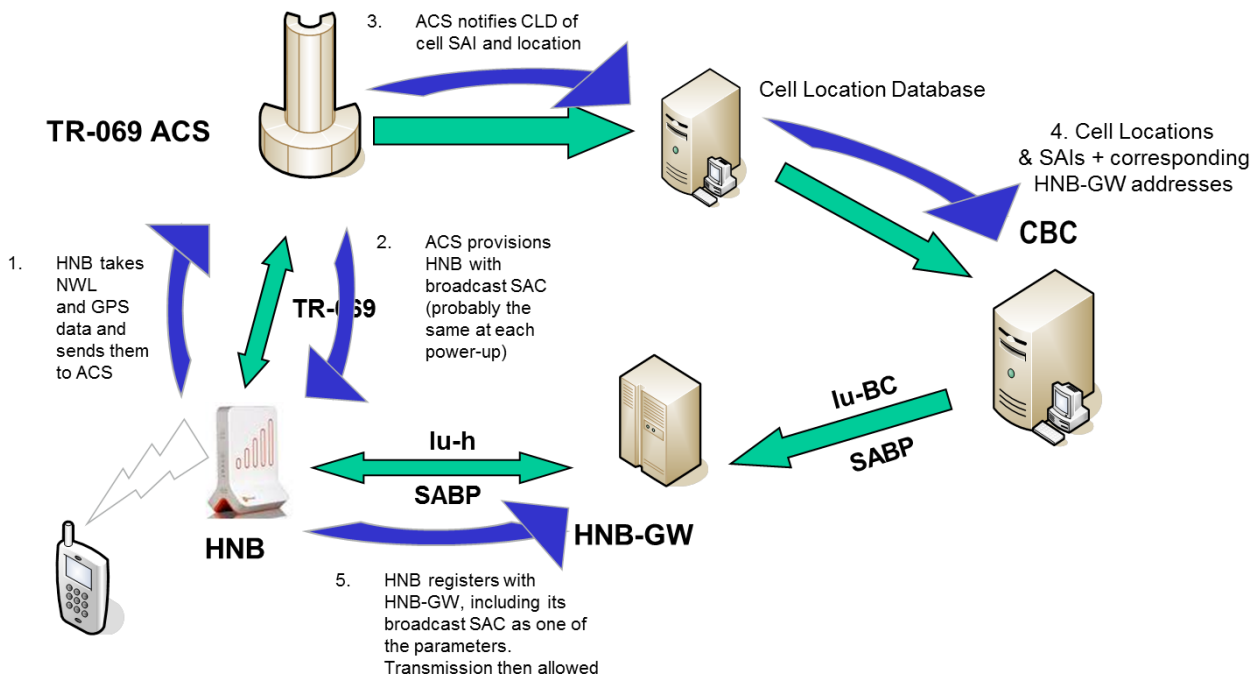


Figure 4.1.1.1 Standard provisioning mechanism for HNB Cell Broadcast

The process is summarised as follows:

1. Upon power up the HNB carries out standard Network Listen (NWL) and any other location reading procedures (e.g. GPS) and registers with the HNB Management System. The HNB Management System is a TR-069 ACS which is the master record of configuration data for the HNB.
2. The TR-069 ACS provisions the HNB with necessary operating information including the contact address for a HNB-GW, a range of LACs for over-the-air use that a HNB will select from, and a SAC for Broadcast purposes. In the case of a closed access HNB the LAC will be chosen to be different from all surrounding neighbour cells.
3. The TR-069 ACS will notify a cell location database (CLD) in the operator's network of the SAI for broadcast purposes of the HNB (SAI = PLMN + LAC + Broadcast SAC) plus the HNB's location and HNB-GW address for message routing. This is necessary if there is not a full geographic mapping algorithm understood between TR-069 ACS and CBC
4. The CBC is provisioned with the HNB Location, associated HNB-GW address, and SAI for broadcast.

The HNB registers with the HNB-GW providing its LAC and broadcast SAC to enable the HNB-GW to route incoming SABP messages from the CBC. The HNB-GW will compile a look-up table of broadcast SAI -> HNB address values for the purposes of routing. This step takes place after Step 2 and may take place in parallel with Steps 3 and 4.

4.1.2 Operation

Figure 2 summarises the basic operation when an alert is received.

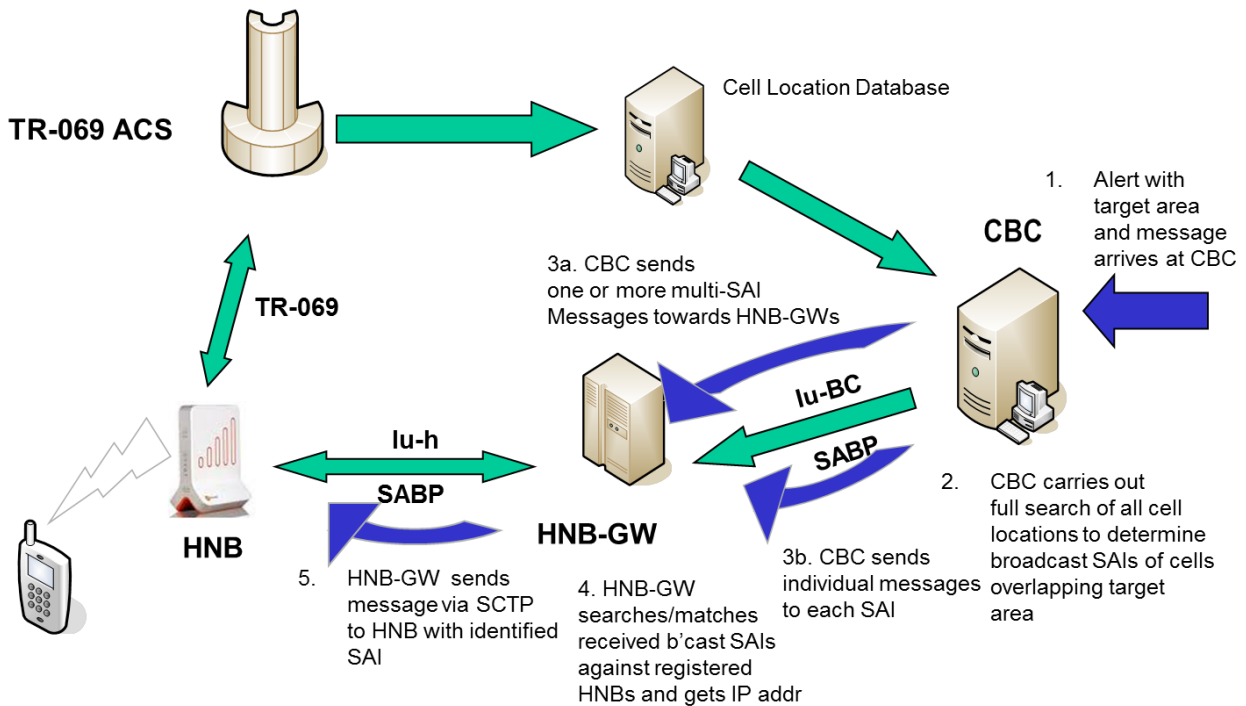


Figure 4.1.1.2 Summary of Cell Broadcast Operation for HNB

The process is summarised as follows:

1. The CBC receives an warning message and target area for distribution
2. The CBC carries out a search of all cell locations to determine the broadcast SAIs of those cells whose coverage overlaps the target area
3. The CBC generates and sends SABP messages to HNB-GWs that address impacted cells under those nodes. The address space for the message is currently a list of SAIs
4. The HNB-GW receiving a message matches the received broadcast SAIs in the message against those HNBs registered with it and gets the transport addresses of matching HNBs. Error messages should be generated for non-matching HNBs.
5. The HNB-GW forwards the SABP message over the SCTP link to the HNB

5 Description of Proposed Solutions

6 Open Issues

6.1 Open Issue List

This section contains a list of issues to be considered. They are classified into 3 groups:-

- Generic issues to be considered for any solution (including the existing specification), (cf the SID)
- Specific issues encountered in current standards-based deployments
- Issues to be addressed by any proposed solutions introducing new or changed functionalities

Group 1 – Generic Issues to be considered for any solution (including the existing specification)

These are the general areas including the impacts on nodes, transport links (message size and quantity) along both directions of the signalling chains.

Group 2 – Specific issues encountered in current standards-based deployment

Issue #	Description	Operational Phase (Configuration and Start-up / Message sending / Shut down)	Areas of impact	Current Standards based mechanism to address exists
1	LAC change on power-up for closed HNBS impacts HNB-GW, HMS, CBC and back-office (CLD)	Start-Up	HNB-GW HMS CBC Back-office (CLD)	
2	Introduction of new closed HNB to dense deployment leads to LAC replanning	Start-up / Operation	HNB-GW HMS Back-office (CLD) CBC	
3	CBC and back-office (CLD) real-time impact whenever new HNB is activated	Start-Up	HMS CBC Back-office (CLD)	
4	In case of a major re-start (e.g. regional power outage) any potential need for changing HNB parameters relevant to Cell Broadcast as the HNBS re-start and re-register creates peak load on back-office links and OA&M	Start-Up	HMS HMS – CLD link CLD – CBC link HNB-GW	
5	HNB power-off requires real-time back-office (CLD) and CBC update	Start-up / Shut-down	CBC Back-office (CLD)	

Issue #	Description	Operational Phase (Configuration and Start-up / Message sending / Shut down)	Areas of impact	Current Standards based mechanism to address exists
			HNB-GW	
6	HNB location change (e.g. home <-> office) causes LAC change	Start-up	HNB-GW HMS Back-office (CLD) CBC	
7	Major alert processing for large H(e)NB deployment	Operation	CBC	
8	Message size from CBC->HNB-GW for large scale alert demands bandwidth	Operation	CBC -> HNB-GW link	
9	Processing Load/Time on HNB-GW for large messages / impact on delivery time	Operation	HNB-GW	
10	Response size handling – message quantity on backhaul HNB-GW to CBC	Operation	HNB-GW CBC HNB-GW -> CBC link	

Group 3 – Issues to be addressed by any solution introducing new or changed functionality

1. Protocol changes and impact
2. OA&M
3. Backwards compatibility with nodes supporting current specifications

6.2 Confirmed Issues

This section contains the issues for which assessment has been carried out

7 Conclusions

Annex A: Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
130819	R3#81	R3-131301			Skeleton without number		0.0.1
130822	R3#81	R3-131560			Added open issues section	0.0.1	0.1.0
130822	R3#81	R3-131560			Added TPs on Current Setup and Operation from R3-131466	0.1.0	0.2.0
130822	R3#81	R3-131561			Added TR number, added TP on issues	0.2.0	0.3.0