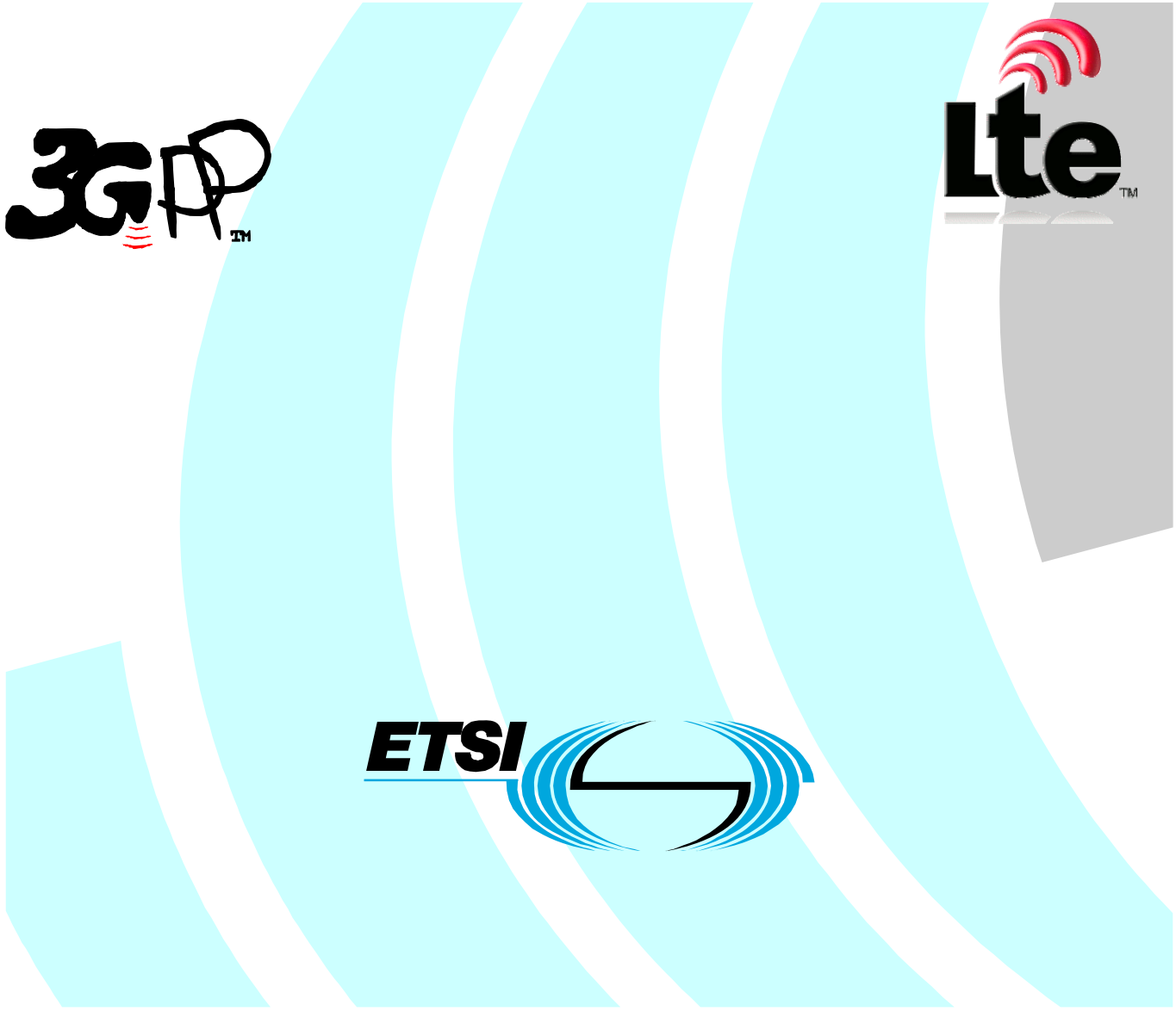
ETSI TS 132 511 V8.2.0 (2009-07)

Technical Specification

Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Automatic Neighbour Relation (ANR) management;
Concepts and requirements
(3GPP TS 32.511 version 8.2.0 Release 8)



Reference
RTS/TSGS-0532511v820

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

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

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:

32.511: "Automatic Neighbour Relation (ANR) management; Concepts and requirements".

1 Scope

The present document describes the requirements and architecture for the management of Neighbour cell Relations (NRs) across the Itf-N. The NR management is a key feature of Self Organization Network (SON) [4].

The NR concept and background information are described in clause 4.
The requirements for management of NR are defined in clause 5.

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 TR 32.501 "Telecommunication management; Self-Configuration of Network Elements; Concepts and Integration Reference Point (IRP) Requirements".

[6] 3GPP TS 36.300 'Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2'

[7] 3GPP TS 32.301 'Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (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 [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].

ANR function: The ANR function is described in 36.300 [6], section 22.3.2a.

Neighbour cell Relation: The Neighbour cell Relation (NR) is defined in 36.300 [6] section 22.3.2a

Searchlist: List of frequencies and supporting information to be used for neighbour cell measurements. The Searchlist contains entries for E-UTRAN and supported IRATs.

Editor"s note: This definition is provisional and subject to alignment with RAN2 and RAN3.

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].

NR	Neighbour cell Relation
eNB	eNodeB or evolved NodeB
UC	Use Case

4 Concepts and background

The ANR function in the eNB relates to the Use Cases **Establishment of new eNB in network** and **Optimisation of the neighbourhood list** in [4].

- For **Establishment of new eNB in network.** If the operator so chooses, the OAM system adds and configures NRs before the eNB goes into operation.
- For **Optimisation of the neighbourhood list**, the ANR function deals with automatic NR additions and removals. It minimizes the need for planning and configuring NRs. If the operator so chooses, the OAM system adds and configures NRs or removes NRs after the eNB goes into operation.

5 Requirements

5.1 Business level requirements

REQ-ANR-CON-001 NRs shall be set up and optimized with no or minimal human intervention.

REQ-ANR-CON-002 Initial status of the newly created NR by ANR function shall be such that HO is allowed, X2 connection setup is allowed, and the NR is allowed to be removed by ANR.

5.1.1 Automatic NR Management

5.1.1.1 Actor roles

5.1.1.2 Telecommunications resources

5.1.1.3 High-level use cases

5.2 Specification level requirements

5.2.1 General

5.2.2 Actor roles

5.2.3 Telecommunications resources

5.2.4 Use cases

5.2.4.1 Management of fully automatic ANR function

Use Case Stage	Evolution / Specification	<<Uses>> Related use
Goal (*)	The goal is that the IRPManager may add and remove NRs and that it may change attributes of the NRs	
Actors and Roles (*)	• IRPManager	
Telecom resources	• ANR function • eNB	
Assumptions		
Pre conditions	• The ANR function is active; • The cell may or may not have Neighbour Relations configured by O&M. • The eNB has finished Use Case *Self-configuration of a new eNodeB* [5].	
Begins when	This Use Case begins when all pre conditions have been met.	
Step 1 (*) (M)	• If the IRPManager finds out that an unsuitable Neighbour Relation has been added by ANR, the IRPManager may 'Blacklist' that particular Neighbour Relation. • If the IRPManager finds out that a desired Neighbour Relation has not been added by ANR, the IRPManager may 'Whitelist' that particular Neighbour Relation.	
Ends when (*)	This Use Case ends when the eNB is taken out of service or when the ANR function is stopped.	
Exceptions		
Post Conditions		
Traceability (*)	**REQ-ANR-CON-001** Editor"s note: Specification level requirements will be added when stable.	

5.2.4.2 Manual start of the ANR function by operator

Use Case Stage	Evolution / Specification	<<Uses>> Related use
Goal (*)	The goal is that the IRPManager may add and remove NRs and that it may change attributes of the NRs.	
Actors and Roles (*)	• IRPManager	
Telecom resources	• ANR function • eNB	
Assumptions		
Pre conditions	• The ANR function is not active; • The eNB may have Neighbour Relations. The NRs may be configured by O&M or be may have been added by ANR function if ANR function has been active previously.	
Begins when	The Use Case begins when the IRP Manager starts the ANR function.	
Step 1 (*) (M)		
Step 2 (*) (M)	The IRPManager may uncheck the noRemove attribute from any present Neighbour Relation.	
Step 3 (*) (M)	• If the IRPManager finds out that an unsuitable Neighbour Relation has been added by ANR, the IRPManager may 'Blacklist' that particular Neighbour Relation. • If the IRPManager finds out that a desired Neighbour Relation has not been added by ANR, the IRPManager may 'Whitelist' that particular Neighbour Relation.	
Ends when (*)	This Use Case ends when the eNB is taken out of service or when the ANR function is stopped.	
Exceptions		
Post Conditions		
Traceability (*)	**REQ-ANR-CON-001** Editor"s note: Specification level requirements will be added when stable.	

5.2.4.3 Handling of noX2 attribute

Use Case 1

IRPManager needs to be able to forbid and allow the establishment of X2 interfaces from the source macro eNBs to a target eNB. IRPManager is aware that the target eNB cannot support X2 connections. This UC on how noX2 is used relates to node level rather than cell level.

Use Case 2

IRPManager needs to be able to allow and forbid the establishment of X2 interfaces from the source HeNBs to a target macro eNB. This UC supports the case when a potentially large number of HeNBs in the vicinity of a macro eNB, X2 establishment requests from HeNB might saturate the physical ports of the macro eNB (not in terms of bandwidth saturation but rather the saturation in terms of the number of simultaneous establishment requests supported). This UC on how noX2 is used relates to node level rather than Cell level.

Editor"s note: The supporting cases need to be further refined

Use Case 3

IRPManager needs to be able to forbid the establishment of the X2 interface from (IRPManager's) operator's eNB to another operator's eNB or to an eNB that belongs to another unwanted PLMN. This UC supports the case when the IP address of the target eNB cannot be obtained or the X2 handovers to another unwanted PLMN are not allowed. This UC on how noX2 is used relates to node level rather than cell level.

Editor"s note: The first supporting case (pertaining to the IP address) needs further study

Use Case 4

IRPManager needs to be able to ask for the release of the X2 interface improperly established by eNB. This UC supports the case when the serving eNB has established an X2 interface (e.g., by ANR) before IRPManager had a chance to forbid the establishment of that X2 interface the IRPManager needs to be able to ask the serving eNB to release the X2 interface to the target eNB. This UC on how noX2 is used relates to node level rather than cell level.

5.2.5 Requirements

5.2.5.1 ANR function management

The business level requirements in section 5.1 are decomposed into the following specification level requirements:

REQ-ANR-FUN-01 An IRPManager shall be able to request that HO be allowed from source cell to target cell.

REQ-ANR-FUN-02 An IRPManager shall be able to request that HO be prohibited from source cell to target cell.

REQ-ANR-FUN-03 An IRPManager shall be able to request that HO be allowed from source cell to target cell and that no other entity than an IRPManager can remove that request. This is termed as HO white-listing.

REQ-ANR-FUN-04 An IRPManager shall be able to request that HO be prohibited from source cell to target cell and that no other entity than an IRPManager can remove that request. This is termed as HO black-listing.

REQ-ANR-FUN-05 An IRPAgent shall inform the IRPManager about success or failure of IRPManager operations to allow HO, prohibit HO, HO white-list and HO black-list.

REQ_ANR-FUN-06 An IRPManager shall be able to request establishment of an X2 connection from one eNB to another eNB.

REQ-ANR-FUN-07 An IRPManager shall be able to request the release of an X2 connection between two eNB"s.

REQ-ANR-FUN-08 An IRPManager shall be able to request that X2 interface from one eNB to another eNB be established if the X2 interface is not established and that the release of X2 interface be prohibited. No other entity than an IRPManager can remove that request. This is termed as X2 white-listing.

REQ-ANR-FUN-09 An IRPManager shall be able to request that X2 interface from one eNB to another eNB be released if the X2 interface is established and that the establishment of the X2 interface be prohibited. No other entity than an IRPManager can remove that request. This is termed as X2 black-listing.

REQ-ANR-FUN-10 Operator shall be able to disable/enable one eNB or multiple eNB"s ANR function when needed.

REQ-ANR-FUN-11 void

REQ-ANR-FUN-12 An IRPManager shall be able to add and configure new NRs in the eNB.

REQ-ANR-FUN-13 An IRPManager shall be able to remove NRs in the eNB

REQ-ANR-FUN-14 An IRPAgent shall inform the IRPManager about changes to the NR according to TS 32.301 [7].

REQ-ANR-FUN-15 A Searchlist is needed for each cell. The IRPManager should be able to configure the Searchlist.

REQ-ANR-FUN-16 An IRPAgent shall inform the IRPManager about the newly added and removed NRs according to TS 32.301 [7].

REQ-ANR-FUN-17 An IRPManager shall be able to retrieve ANR related attribute values on cell level, identifying:

- Source cell & target cell
- NR status (locked, unlocked)
- HO status (allowed, prohibited)

Editor"s note:
The "locked" NR status indicates that the NR shall not be removed by the ANR function.
The "unlocked" NR status indicates that the NR may be removed by the ANR function.
The "allowed" HO status indicates that handovers are allowed for this NR.

The "prohibited" HO status indicates that handovers are prohibited for this NR.

The combination of "locked" NR status and "allowed" HO status is a "whitelisted" relation.
The combination of "locked" NR status and "prohibited" HO status is a "blacklisted" relation

REQ-ANR-FUN-18 **The IRPAgent shall support a capability allowing the IRPManager to determine whether the X2 interface between two eNodeBs is established or not established.**

REQ-ANR-FUN-xx **The IRPAgent shall support a capability allowing the IRPManager to retrieve the X2 whitelisted and blacklisted eNBs.**

REQ-ANR-FUN-19 IRPManager shall be able to request that the source eNB be prohibited to use X2 interface for HOs to a target eNB even if the X2 interface exists between the eNBs. No other entity than an IRPManager can remove that request. This is termed as X2HO black-listing.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2008-12					Submitted to SA#42 for information and approval	1.0.0	8.0.0
2009-03	SP-43	SP-090213	001	1	Remove solution related terms and inconsistencies in Requirement specification and add clarifications	8.0.0	8.1.0
2009-06	SP-44	SP-090290	002	--	Clarify requirement **REQ-ANR-FUN-18**	8.1.0	8.2.0

History

Document history		
V8.0.0	February 2009	Publication
V8.1.0	April 2009	Publication
V8.2.0	July 2009	Publication