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*Technical Specification*

**LTE;  
Evolved Universal Terrestrial Radio  
Access Network (E-UTRAN);  
Architecture description  
(3GPP TS 36.401 version 8.5.0 Release 8)**

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# Contents

Intellectual Property Rights .....	2
Foreword.....	2
Foreword.....	5
1 Scope .....	6
2 References .....	6
3 Definitions and abbreviations.....	7
3.1 Definitions .....	7
3.2 Abbreviations .....	7
4 General principles .....	8
5 General architecture .....	8
5.1 General .....	8
5.2 User plane.....	8
5.3 Control plane.....	9
6 E-UTRAN architecture.....	10
6.1 Overview .....	10
6.2 E-UTRAN Identifiers .....	10
6.2.1 The principle of handling of Application Protocol Identities.....	10
6.2.2 PLMN Identity.....	11
6.2.3 Globally Unique MME Identifier (GUMMEI).....	11
6.2.4 Global eNB ID.....	11
6.2.5 E-UTRAN Cell Global Identifier (ECGI).....	11
6.2.6 Tracking Area Identity.....	12
6.2.7 E-RAB ID.....	12
6.2.8 UE Identifiers.....	12
6.2.8.1 RNTI.....	12
6.2.8.2 S-Temporary Mobile Subscriber Identity (S-TMSI).....	12
6.3 Transport Addresses .....	12
6.4 UE associations in eNB.....	12
7 E-UTRAN functions description.....	13
7.1 List of functions .....	13
7.2 Functions description .....	13
7.2.1 Transfer of user data .....	13
7.2.2 Radio channel ciphering and deciphering.....	14
7.2.3 Integrity protection .....	14
7.2.4 Header compression.....	14
7.2.5 Mobility control functions .....	14
7.2.5.1 Handover.....	14
7.2.5.2 void .....	14
7.2.5.3 Positioning .....	14
7.2.6 Inter-cell interference coordination.....	14
7.2.7 Connection setup and release.....	14
7.2.8 Load balancing.....	14
7.2.9 Distribution function for NAS messages .....	15
7.2.10 NAS node selection function .....	15
7.2.11 Synchronization .....	15
7.2.12 Radio access network sharing.....	15
7.2.13 MBMS function .....	15
7.2.14 Subscriber and equipment trace.....	15
7.2.15 RAN Information Management .....	15
7.2.16 Paging .....	15
8 Mobility management.....	16

8.1 Signalling connection .....16

8.2 Consequences for mobility handling .....16

9 Synchronization.....16

9.1 eNB Synchronisation.....16

10 void.....17

11 E-UTRAN interfaces .....17

11.1 General protocol model for E-UTRAN interfaces.....17

11.1.1 Radio Network Layer and Transport Network Layer .....17

11.1.2 Control plane .....18

11.1.3 User plane .....18

11.2 Iuant Interface - general principles.....18

**Annex A (informative): Change History .....19**

History .....20

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# 1 Scope

The present document describes the overall architecture of the E-UTRAN, including internal interfaces and assumptions on the radio, S1 and X2 interfaces.

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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 36.300: " Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN) Overall description Stage 2".
- [3] 3GPP TS 23.401: " GPRS enhancements for E-UTRAN access".
- [4] 3GPP TS 36.414: " Evolved Universal Terrestrial Access Network (E-UTRAN); S1 data transport".
- [5] 3GPP TS 36.424: " Evolved Universal Terrestrial Access Network (E-UTRAN); X2 data transport".
- [6] 3GPP TS 36.440: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); General aspects and principles for interfaces supporting Multimedia Broadcast Multicast Service (MBMS) within E-UTRAN".
- [7] ITU-T Recommendation G.823 (3/00): "The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy".
- [8] ITU-T Recommendation G.824 (3/00): "The control of jitter and wander within digital networks which are based on the 1544 kbit/s hierarchy".
- [9] ITU-T Recommendation G.825 (8/01): "The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)".
- [10] ITU-T Recommendation G.8261/Y.1361 (2/08): "Timing and Synchronization aspects in Packet networks".
- [11] 3GPP TS 23.003: "Numbering, addressing and identification".
- [12] 3GPP TR 44.901: "External Network Assisted Cell Change".
- [13] 3GPP TS 48.018: "General Packet Radio Service (GPRS); BSS GPRS Protocol (BSSGP)".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**E-RAB:** An E-RAB uniquely identifies the concatenation of an S1 Bearer and the corresponding Data Radio Bearer. When an E-RAB exists, there is a one-to-one mapping between this E-RAB and an EPS bearer of the Non Access Stratum as defined in [3].

**S1:** interface between an eNB and an EPC, providing an interconnection point between the E-UTRAN and the EPC. It is also considered as a reference point.

**X2:** logical interface between two eNBs. Whilst logically representing a point to point link between eNBs, the physical realization need not be a point to point link.

### 3.2 Abbreviations

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].

AP	Application Protocol
C-RNTI	Cell RNTI
ECGI	E-UTRAN Cell Global Identifier
EEC	Ethernet Equipment Clock
eNB	E-UTRAN Node B
E-RAB	E-UTRAN Radio Access Bearer
EPC	Evolved Packet Core
EPS	Evolved Packet System
E-UTRA	Evolved UTRA
E-UTRAN	Evolved UTRAN
FDD	Frequency Division Duplex
GUMMEI	Globally Unique MME Identifier
ID	Identity
IP	Internet Protocol
LTE	Long Term Evolution
MBMS	Multimedia Broadcast Multicast Service
MBSFN	Multimedia Broadcast multicast service Single Frequency Network
NDS	Network Domain Security
MME	Mobility Management Entity
NAS	Non Access Stratum
PLMN	Public Land Mobile Network
RA-RNTI	Random Access RNTI
RET	Remote Electrical Tilting
RIM	RAN Information Management
RNL	Radio Network Layer
RNTI	Radio Network Temporary Identifier
RRC	Radio Resource Control
RTP	Real-time Transport Protocol
QoS	Quality of Service
SFN	System Frame Number
S-GW	Serving Gateway
S-TMSI	S-Temporary Mobile Subscriber Identity
TCP	Transmission Control Protocol
TDD	Time Division Duplex
TDM	Time Division Multiplexing
TMA	Tower Mounted Amplifier
TNL	Transport Network Layer
UDP	User Datagram Protocol



UE	User Equipment
UMTS	Universal Mobile Telecommunication System

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## 4 General principles

The general principles guiding the definition of E-UTRAN Architecture as well as the E-UTRAN interfaces are the following:

- Logical separation of signalling and data transport networks.
- E-UTRAN and EPC functions are fully separated from transport functions. Addressing scheme used in E-UTRAN and EPC shall not be tied to the addressing schemes of transport functions. The fact that some E-UTRAN or EPC functions reside in the same equipment as some transport functions does not make the transport functions part of the E-UTRAN or the EPC.
- Mobility for RRC connection is fully controlled by the E-UTRAN.
- When defining the E-UTRAN interfaces the following principles were followed: the functional division across the interfaces shall have as few options as possible.
- Interfaces should be based on a logical model of the entity controlled through this interface.
- One physical network element can implement multiple logical nodes.

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## 5 General architecture

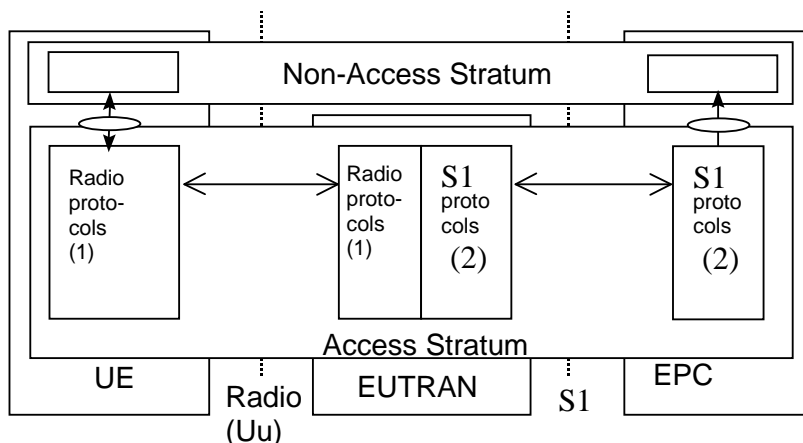
### 5.1 General

The protocols over Uu and S1 interfaces are divided into two structures:

- **User plane protocols**  
These are the protocols implementing the actual E-RAB service, i.e. carrying user data through the access stratum.
- **Control plane protocols**  
These are the protocols for controlling the E-RABs and the connection between the UE and the network from different aspects (including requesting the service, controlling different transmission resources, handover etc.). Also a mechanism for transparent transfer of NAS messages is included.

### 5.2 User plane

The E-RAB service is offered from SAP to SAP by the Access Stratum. Figure 5.2-1 shows the protocols on the Uu and S1 interfaces that linked together provide this E-RAB service.

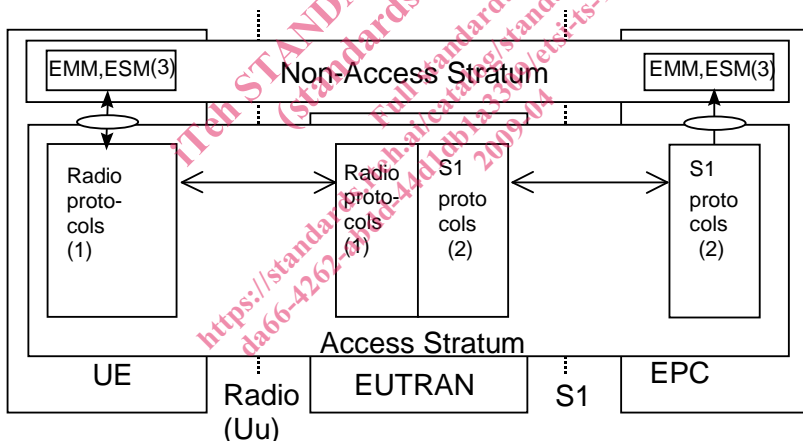


- (1) The radio interface protocols are defined in documents TS 36.2xx and TS 36.3xx.
- (2) The S1 interface protocols are defined in documents TS 36.41x.

Figure 5.2-1: S1 and Uu user plane

### 5.3 Control plane

Figure 5.3-1 shows the control plane (signalling) protocol stacks on S1 and Uu interfaces.



- (1) The radio interface protocols are defined in documents TS 36.2xx and TS 36.3xx.
- (2) The protocol is defined in documents TS 36.41x. (Description of S1 interface).
- (3) **EMM, ESM:** This exemplifies a set of NAS control protocols between UE and EPC. The evolution of the protocol architecture for these protocols is outside the scope of the present document.

Figure 5.3-1: S1 and Uu control plane

NOTE: Both the Radio protocols and the S1 protocols contain a mechanism to transparently transfer NAS messages.