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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
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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.

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: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (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 (2000-03): "The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy".
- [8] ITU-T Recommendation G.824 (2000-03): "The control of jitter and wander within digital networks which are based on the 1544 kbit/s hierarchy".
- [9] ITU-T Recommendation G.825 (2001-08): "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 (2008-04): "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 (NACC)".
- [13] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".
- [14] 3GPP TS 23.251: "Network Sharing; Architecture and functional description".
- [15] 3GPP TS 22.268: "Public Warning System (PWS) requirements".
- [16] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".
- [17] 3GPP TS 32.421: "Telecommunication management; Subscriber and equipment trace; Trace concepts and requirements".

- [18] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".
- [19] 3GPP TS 32.423: "Telecommunication management; Subscriber and equipment trace; Trace data definition and management".
- [20] 3GPP TS 32.441: "Telecommunication management; Trace Management Integration Reference Point (IRP); Requirements".
- [21] 3GPP TS 32.442: "Telecommunication management; Trace Management Integration Reference Point (IRP); Information Service (IS)".
- [22] 3GPP TS 32.446: "Telecommunication management; Trace Management Integration Reference Point (IRP); Solution Set (SS) definitions".
- [23] 3GPP TS 25.411: "UTRAN Iu interface layer 1".
- [24] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

3 Definitions 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].

Dual Connectivity: Defined in TS 36.300 [2].

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 (NAS) as defined in TS 23.401 [3].

S1: logical 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
AS	Access Stratum
CGI	Cell Global Identifier
CIoT	Cellular IoT
CMAS	Commercial Mobile Alert Service
C-RNTI	Cell RNTI
ECGI	E-UTRAN Cell Global Identifier
ECM	EPS Connection Management
EEC	Ethernet Equipment Clock
eNB	E-UTRAN Node B
EMM	EPS Mobility Management
E-RAB	E-UTRAN Radio Access Bearer
ESM	EPS Session Management
E-SMLC	Evolved Serving Mobile Location Centre
ETWS	Earthquake and Tsunami Warning System
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
MeNB	Master eNB
NDS	Network Domain Security
MME	Mobility Management Entity
NAS	Non-Access Stratum
OTDOA	Observed Time Difference Of Arrival (positioning method)
PLMN	Public Land Mobile Network
PWS	Public Warning System
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
SAP	Service Access Point
SCG	Secondary Cell Group
SeNB	Secondary eNB
SON	Self Organizing Networks
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
UTDOA	Uplink Time Difference of Arrival

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.

5 General architecture

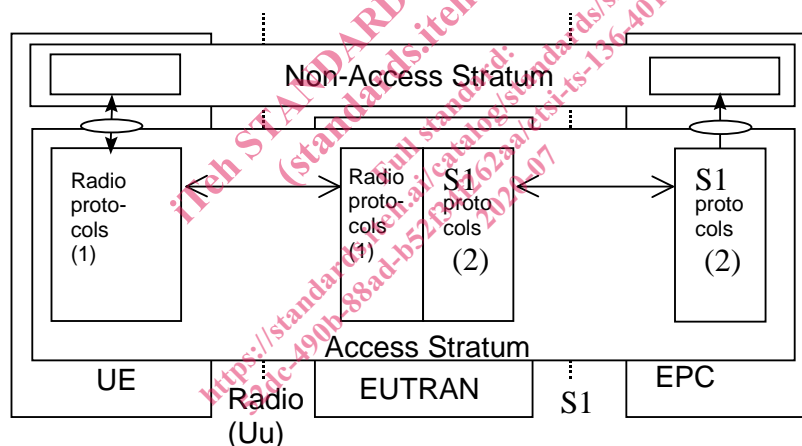
5.1 General

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.



Note 1: The radio interface protocols are defined in 3GPP TS 36.2xx and TS 36.3xx.

Note 2: The S1 interface protocols are defined in 3GPP 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.