ETSI TS 137 460 V15.1.0 (2019-05)

Universal Mobile Telecommunications System (UMTS);
LTE;
5G;
Iuant interface: General aspects and principles
(3GPP TS 37.460 version 15.1.0 Release 15)

Reference
RTS/TSGR-0337460vf10

Keywords
5G,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

Essential patents

IPRs essential or potentially essential to normative deliverables 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 (https://ipr.etsi.org/).

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.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

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.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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.

1 Scope

The present document is an introduction to the 3GPP TS 37.46x series of Technical Specifications that define the Iuant Interface for UMTS, E-UTRAN and NG-RAN. The logical Iuant interface is a Node B/eNB internal interface between the implementation specific O&M function and the RET antennas and TMAs control unit function of the Node B/ eNB.

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 TS 25.401: "UTRAN Overall Description".

[2] 3GPP TS 37.461: "Iuant Interface: Layer 1".

[3] 3GPP TS 37.462: "Iuant Interface: Signalling Transport".

[4] void

[5] ISO/IEC 13239 (2nd Edition, March 2000): "Information Technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures".

[6] 3GPP TS 25.442: "UTRAN implementation-specific O&M transport".

[7] 3GPP TS 37.466: "Iuant interface: Application Part".

3 Abbreviations

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

HDLC	High-Level Data Link Control
IP	Internet Protocol
O&M	Operations & Maintenance
OSI	Open Systems Interconnection
RET	Remote Electrical Tilting
RETAP	Remote Electrical Tilting Application Part
TMA	Tower Mounted Amplifier
TMAAP	Tower Mounted Amplifier application part
UMTS	Universal Mobile Telecommunications System
E-UTRAN	Evolved UTRAN

4 General aspects

4.1 Introduction

The Iuant interface for the control of RET antennas or TMAs is a logical part of the Node B/eNB as shown in figure 9 of TS 25.401 [1] for UMTS. Therefore, no new UTRAN/E-UTRAN element for the RET antennas or TMAs and no

new UTRAN/E-UTRAN element manager is needed. The existing Implementation Specific O&M transport (see TS 25.442 [6] for UMTS) is used for the connection between the RET antennas or TMAs control unit and the Node B element manager.

The Node B/eNB internal interface Iuant between the Implementation Specific O&M function and the RET antenna control unit function is specified in detail in the specifications for layer 1, signalling transport and RET application part (TS 37.461 [2], TS 37.462 [3], TS 37.466 [7]).

4.2 Iuant interface general principles

For the control of RET antennas a standard data interface between the Node B Implementation Specific O&M function and the Node B/eNB RET antenna control function according to TS 25.401 [1] for UMTS is defined by means of which functional parameters of the device can be remotely controlled. The Iuant interface for the RET antenna control is based on a three-layer protocol model. The three-layer model is a compact form of the OSI seven-layer reference model and includes only layers 1, 2 and 7:

- The Physical Layer (Layer 1) defines the signalling levels and basic data characteristics including the data rates;
- The Data Link Layer (Layer 2) for the Signalling Transport uses a specific class of the HDLC standard as defined in ISO/IEC 13239 [5];
- The Application Layer (Layer 7) defines the data payload format and the required command set. This layer is called the "Iuant: Application Part".

This compact model for the control interface provides an efficient protocol stack suitable for implementation on a single embedded micro-controller.

4.3 Iuant interface specification objectives

The Iuant interface specifications shall facilitate the following:

- Controlling the tilting of RET antennas remotely from the O&M Network and locally from the Node B;
- Indicating of TMA alarms and optionally controlling the gain of TMAs remotely from the O&M Network and locally from the Node B;
- Interfacing a mix of RET antennas, TMAs and Node Bs from different vendors;
- Providing RET or TMAs functionality in the UTRAN/E-UTRAN accompanied by an appropriate set of signalling commands and control parameters
- Support of error and alarm handling.

4.4 Iuant interface characteristics

The Iuant interface has a protocol structure as shown below in figure 4.4.1.

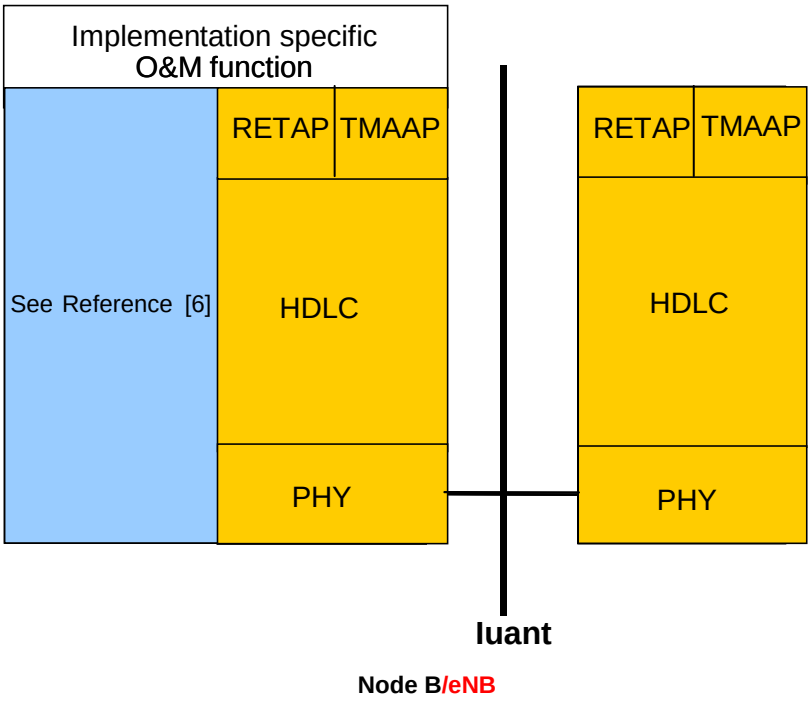

Figure 4.4.1: Protocol structure for Iuant interface

As the Iuant and the Implementation Specific O&M are different interfaces with e.g. different addressing schemes a mediation function is needed. This mediation function uses on one side a protocol that uses the implementation specific O&M bearer (e.g. IP) and on the other side the Iuant protocol.

5 Functions of the Iuant interface protocols

5.1 Physical layer functions

The physical layer provides a multi drop broadcast link between the primary device (Node B/eNB) and all secondary devices (RET antennas or TMAs). Any message transmitted will be received by all other devices. If two devices transmit at the same time, their messages will be garbled.

The connection requires a half duplex communication, which requires an appropriate scheme for the timing and access control of the connection.

5.2 Data link layer functions

The data link layer provides:

- A data packet communication format;
- An addressing scheme;
- A master/slave relationship whereby the primary device controls the half duplex timing;
- A message checksum scheme to protect from transmission errors;
- A message sequence numbering scheme which protects layer 7 from:

  - Duplicated messages;
  - Deleted messages;
  - Receiving messages in the wrong order.
- A flow control mechanism protecting each device from being overrun by messages.

These functions provide layer 7 with a safe full-duplex connection between the primary device and any secondary device. This full duplex connection allows both the primary and secondary device to transmit layer 7 messages to the opposite device of the connection, whenever they need to. Actual delivery time on layer 2 will depend on the layer 2 polling frequency, which is chosen by the primary device.

5.3 Application layer functions

The list of functions on the Iuant interface is the following:

- Control of RET antennas;
- Application software and configuration data download;
- Alarm Reporting;
- Operator specific data storage;
- Control of Tower Mounted Amplifiers (TMAs).

5.3.1 Control of RET antennas

A RET device provides means to adjust the electrical tilt of one or multiple antennas. The set of procedures to control RET antennas provides means to control the electrical tilt of one or more RET antennas remotely. The procedures are defined in TS 37.466 [7].

5.3.2 Application software and configuration data download

The interface provides means for downloading new application software and configuration data to a secondary device.

The support of application software download to a secondary device is optional. If a secondary device supports application software download, it shall reset itself and start running the new application software automatically after the completed download. Further details on the software download procedure (e.g. the different states of the secondary device and the supported elementary procedures in these states) are described in subclause 6.1 of TS 37.466 [7].

5.3.3 Alarm reporting

The secondary device reports every change in error status after subscription for alarm reporting by transmitting alarm messages to the primary device. Alarm information can also be interrogated in the application layer.

5.3.4 Operator specific data storage

The secondary device provides means for storage of operator specific data, e.g. inventory information.

5.3.5 Control of Tower Mounted Amplifiers (TMAs)

The TMA device provides means to indicate alarms and optionally to adjust the gain of TMAs. The set of procedures to control TMAs are defined in TS 37.466 [7].

6 Other Iuant interface specifications

6.1 Iuant interface: Layer 1 (TS 37.461)

TS 37.461 [2] specifies the standards allowed for implementation of Layer 1 (physical layer) on the Iuant interface.

6.2 Iuant interface: Signalling Transport (TS 37.462)

TS 37.462 [3] specifies the signalling transport related to RETAP and TMAAP signalling to be used across the Iuant interface.

6.3 Void

6.4 Summary of UTRAN Iuant interface Technical Specifications

The relationship between the technical specifications that define the Iuant interface is shown in figure 6.4.1.

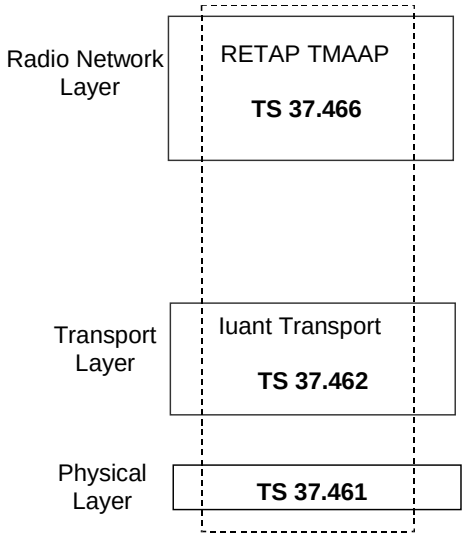

Figure 6.4.1: Iuant Interface Technical Specifications

6.5 Iuant interface: Application part specification (TS 37.466)

TS 37.466 [7] specifies protocols for application part to be used over the Iuant interface.

Annex A (informative): OSI model overview

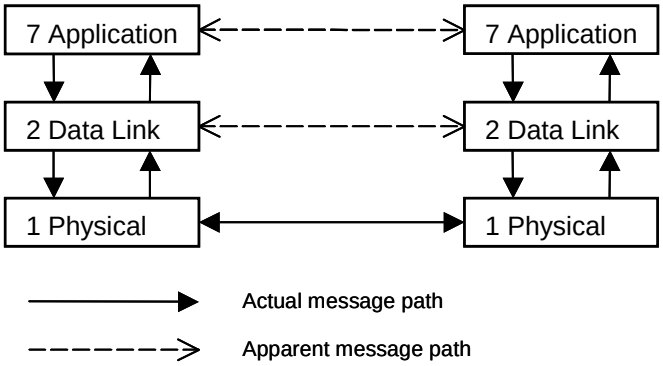

Figure A.1: Relevant OSI model layers

Figure A.1 shows the relevant OSI model layers and the communication paths between the primary and secondary device.

The two important aspects of the OSI model are:

- It defines a layered structure for the communication software;
- It provides each layer with an apparent direct link to the same layer at the other device.

However, in real life, the only actual message path between the two devices is through the physical connection between the two layer 1 entities.

The layer 2 entities appear to communicate directly. In actual fact, a message passed from the first device to the second device takes the following path:

- Layer 2 at the first device passes the message down to Layer 1;
- Layer 1 transmits the message across the physical connection (for instance a wire) to layer 1 at the second device;
- Layer 1 at the second device passes the message up to Layer 2 at the second device.

Likewise, layer 7 entities appear to communicate directly. In actual fact, a message passed from the first device to the second device takes the following path:

- Layer 7 at the first device passes the message down to Layer 2;
- Layer 2 at the first device passes the message down to Layer 1;
- Layer 1 transmits the message across the physical connection (for instance a wire) to layer 1 at the second device;
- Layer 1 at the second device passes the message up to Layer 2 at the second device;
- Layer 2 at the second device passes the message up to Layer 7 at the second device.

Annex B (informative): Change History

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2019-02	R3-103	R3-190079				Text transferred from 25.460 v15.0.0 (changes shown with rev marks)	1.15.0
2019-04	RAN#83	RP-190582				Specification approved by RAN plenary	15.1.0

History

Document history		
V15.1.0	May 2019	Publication