ETSI TS 125 414 V3.13.0 (2003-03)

Technical Specification

**Universal Mobile Telecommunications System (UMTS);
UTRAN Iu interface data transport & transport signalling
(3GPP TS 25.414 version 3.13.0 Release 1999)**

Reference

RTS/TSGR-0325414v3d0

Keywords

UMTS

ETSI

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Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Contents

Foreword

This Technical Specification (TS) 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:

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where:

x   the first digit:

1   presented to TSG for information;

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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 specifies the standards for user data transport protocols and related signalling protocols to establish user plane transport bearers over the UTRAN Iu interface.

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]   ITU-T Recommendation I.361 (11/95): "B-ISDN ATM layer specification".

[2]   ITU-T Recommendation I.363.2 (9/97): "B-ISDN ATM adaptation layer specification: Type 2 AAL".

[3]   ITU-T Recommendation I.363.5 (8/96): "B-ISDN ATM adaptation layer specification: Type 5 AAL".

[4]   ITU-T Recommendation I.366.1 (6/98): "Segmentation and Reassembly Service Specific Convergence Sublayer for the AAL Type 2".

[5]   ITU-T Recommendation E.164 (5/97): "The international public telecommunication numbering plan".

[6]   ITU-T Recommendation Q.2110 (7/94): "B-ISDN ATM adaptation layer - Service Specific Connection Oriented Protocol (SSCOP)".

[7]   ITU-T Recommendation Q.2140 (2/95): "B-ISDN ATM adaptation layer - Service Specific Coordination Function for Support of Signalling at the Network Node Interface (SSCF-NNI)".

[8]   ITU-T Recommendation Q.2150.1 (12/99): "AAL type 2 signalling transport converter on broadband MTP".

[9]   ITU-T Recommendation Q.2210 (7/96): "Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140".

[10]   ITU-T Recommendation Q.2630.1 (12/99): "AAL type 2 signalling protocol (Capability Set 1)".

[11]   ITU-T Recommendation X.213 (11/95): "Information technology - Open systems interconnection - Network Service Definition".

[12]   IETF RFC 768 (August 1980): "User Datagram Protocol".

[13]   IETF RFC 791 (September 1981): "Internet Protocol".

[14]   IETF RFC 2684 (September 1999): "Multiprotocol Encapsulation over ATM Adaptation Layer 5".

[15]   IETF RFC 2225 (April 1998): "Classical IP and ARP over ATM".

[16]   IETF RFC 2460 (December 1998): "Internet Protocol, Version 6 (IPv6) Specification".

[17]   3GPP TS 29.060: "General Packet Radio Service (GPRS) Service description; Stage 2".

[18]   IETF RFC 793 (September 1981): "Transmission Control Protocol".

[19]   IETF RFC 2474 (December 1998): "Definition of the Differentiated Services Field (DS Field) in the Ipv4 and Ipv6 Headers".

[20]   ITU-T Implementor's guide (12/99) for recommendation Q.2210 (07/96).

[21]   ITU-T Recommendation E.191 (03/00): "B-ISDN addressing".

3   Definitions and abbreviations

3.1   Definitions

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

Access Link Control Application Part (ALCAP): generic name for the transport signalling protocols used to set-up and teardown transport bearers

3.2   Abbreviations

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

AAL	ATM Adaptation Layer
AESA	ATM End System Address
ALCAP	Access Link Control Application Part
ARP	Address Resolution Protocol
ATM	Asynchronous Transfer Mode
CN	Core Network
GTP	GPRS Tunnelling Protocol
IP	Internet Protocol
LIS	Logical IP Subnet
MTP3b	Message Transfer Part level 3 for Q.2140
NSAP	Network Service Access Point
PDU	Protocol Data Unit
RFC	Request For Comment
RNC	Radio Network Controller
SA	Service Area
SABP	Service Area Broadcast Protocol
SABS	Service Area Broadcast Service
SAR	Segmentation and Reassembly
SCSF-NNI	Service Specific Coordination Function-Network Node Interface
SSCOP	Service Specific Connection Oriented Protocol
SSCS	Service Specific Convergence Sublayer
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VC	Virtual Circuit

4   ATM Layer

4.1   General

ATM shall be used in the transport network user plane and the transport network control plane according to ITU-T Recommendation I.361 [1]. The structure of the cell header used in the UTRAN Iu interface is the cell header format and encoding at NNI (see figure 3/I.361).

5 Circuit switched domain

5.1 Transport network user plane

5.1.1 General

Figure 1 shows the protocol stack for the transport network user plane on the Iu interface towards the circuit switched domain.

| AAL-2 SAR SSCS (I.366.1) |
| AAL2 (I.363.2) |
| ATM |

Figure 1

5.1.2 ATM Adaptation Layer 2

5.1.2.1 AAL2-Segmentation and Reassembly Service Specific Convergence Sublayer (I.366.1)

Service Specific Segmentation and Reassembly (SSSAR) sublayer of ITU-T Recommendation I.366.1 [4] is used for the segmentation and reassembly of AAL2 SDUs (i.e., only SSSAR is used from I.366.1).

5.1.2.2 AAL2-specification (I.363.2)

AAL2 shall be used according to ITU-T Recommendation I.363.2 [2].

5.2 Transport network control plane

5.2.1 General

Figure 2 shows the protocol stack for the transport network control plane on the Iu interface towards the circuit switched domain.

| AAL2 connection signalling (Q.2630.1) |
| AAL2 Signalling Transport Converter for MTP3b (Q.2150.1) |
| MTP3b |
| SSCF-NNI |
| SSCOP |
| AAL5 |
| ATM |

Figure 2

5.2.2 Signalling protocol (ALCAP)

5.2.2.1 AAL2 Signalling Protocol (Q.2630.1)

ITU-T Recommendation Q.2630.1 [10] shall be used for establishing AAL2 connections towards the circuit switched domain.

The AAL2 transport layer uses the embedded E.164 or other AESA variants of the NSAP addressing formats [11, 21]. Native E.164 [5] addressing shall not be used.

Binding ID provided by the radio network layer shall be copied in SUGR parameter of ESTABLISH request primitive of ITU-T Recommendation Q.2630.1 [10].

If there is an AAL2 switching function in the transport network layer of the interface, the AAL2 Link Characteristics parameter (ALC) shall be included in the Establish Request message of AAL2 signalling protocol.

5.2.3 Signalling transport converter

5.2.3.1 AAL2 MTP3B Signalling Transport Converter (Q.2150.1)

The AAL2 MTP3b Signalling Transport Converter shall be used according to ITU-T Recommendation Q.2150.1 [8].

5.2.4 MTP3b (Q.2210)

MTP3b shall be used according to ITU-T Recommendation Q.2210 [9 and 20].

5.2.5 SSCF-NNI (Q.2140)

SSCF-NNI shall be used according to ITU-T Recommendation Q.2140 [7].

5.2.6 SSCOP (Q.2110)

SSCOP shall be used according to ITU-T Recommendation Q.2110 [6].

5.2.7 ATM Adaptation Layer Type 5 (I.363.5)

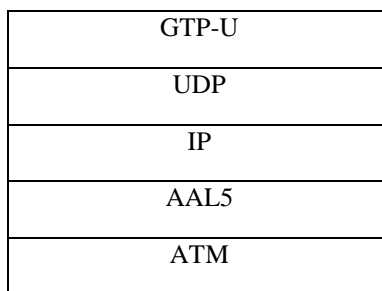AAL5 shall be used according to ITU-T Recommendation I.363.5 [3].

6 Packet switched domain

6.1 Transport network user plane

6.1.1 General

Figure 3 shows the protocol stack for the transport network user plane on the Iu interface towards the packet switched domain.

GTP-U
UDP
IP
AAL5
ATM

Figure 3

The protocol architecture for the User Plane of the Iu interface towards the packet switched domain shall be GTP-U [17] over UDP over IP over AAL5 over ATM. One or several AAL5/ATM permanent VC's may be used as the common layer 2 resources between the UTRAN and the packet switched domain of the CN.

One switched VC may be used per user flow. The standardisation of the procedures and protocols for use of Switched VC is outside the scope of 3GPP.

Congestion control shall be performed over the Iu user plane toward the packet switched domain using buffer management and no flow control.

6.1.2 GTP-U

The GTP-U [17] protocol shall be used over the Iu interface toward the packet switched domain.

6.1.3 UDP /IP

The path protocol used shall be UDP [12], which is specified in RFC 768.

The UDP port number for GTP-U shall be as defined in [17].

IPv4 [13] (RFC 791) shall be supported, IPv6 [16] (RFC 2460) support is optional.

There may be one or several IP addresses in the RNC and in the CN. The packet processing function in the CN shall send downstream packets of a given RAB to the RNC IP address (received in RANAP) associated to that particular RAB. The packet processing function in the RNC shall send upstream packets of a given RAB to the CN IP address (received in RANAP) associated to that particular RAB.

6.1.4 ATM Adaptation Layer Type 5 (I.363.5)

AAL5 shall be used according to ITU-T Recommendation I.363.5 [3].

AAL5 virtual circuits shall be used to transport the IP packets across the Iu interface toward the packet switched domain. Multiple VCs may be used over the interface. An association shall be made between a VC and the IP addresses that are related to this VC in the peer node side. This association shall be made using O&M or using "ATM Inverse ARP" when PVCs are used.

When PVCs are used, quality of service differentiation shall only be performed at the IP layer using differentiated services [19].

6.1.5 IP/ATM

When the association mentioned in 6.1.4 is made using 0&M, the "LLC encapsulation" option of "Multiprotocol Encapsulation over AAL5" shall be used to carry the IP packets over the ATM transport network when PVCs are used.

When the association mentioned in 6.1.4 is made using "ATM Inverse ARP", "Classical IP and ARP over ATM" protocols and the "LLC encapsulation" option of "Multiprotocol Encapsulation over AAL5" shall be used to carry the IP packets over the ATM transport network when PVCs are used. "Classical IP and ARP over ATM" is specified in RFC 2225 [15]. "Multiprotocol Encapsulation over AAL5" is specified in RFC 2684 [14].

"Classical IP and ARP over ATM" allows routers to be members of one or more LISs. The CN side of the Iu interface shall provide IP routing functionalities. The RNC side of the Iu interface may provide routing functionalities. If the RNC side of the Iu interface does not provide routing functionalities, the RNC routing tables shall include default route entries.

6.2   Transport network control plane

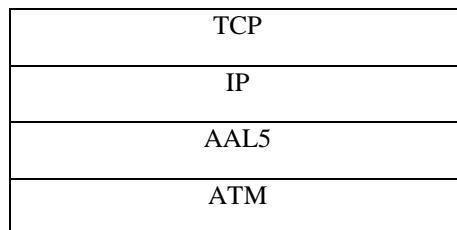ALCAP is not required over the Iu interface towards the packet switched domain.

7   Broadcast Domain

7.1   Transport network user plane

7.1.1   General

Figure 4 shows the protocol stack for the transport network user plane on the Iu interface towards the Broadcast domain.

TCP
IP
AAL5
ATM

Figure 4

The protocol architecture for the Service Area Broadcast Plane of the Iu interface shall be TCP over IP over AAL5 over ATM.

7.1.2   TCP/IP

The path protocol used shall be TCP, which is specified in RFC793 [18]. IPv4 [13] (RFC 791) shall be supported, IPv6 [16] (RFC 2460) support is optional.

The TCP Destination Port number for SABP messages is 3452. It is the registered port number for SABP.

The 3452 destination port number shall be used by both entities (RNC or CN) whenever it sets up a new TCP connection. When it sends SABP messages on an existing TCP connection, the sending entity (RNC or CN) shall use as TCP destination port number either 3452 if it was the initiator of this TCP connection, or the TCP source port number that was received from the peer entity that had initiated this existing TCP connection.

7.1.3   ATM Adaptation Layer Type 5 (I.363.5)

AAL5 shall be used according to ITU-T Recommendation I.363.5.

AAL5 virtual circuits shall be used to transport the IP packets across the Iu interface toward the broadcast domain. Multiple VCs may be used over the interface. An association shall be made between a VC and the IP addresses that are related to this VC in the peer node side. This association shall be made using O&M or using ATM Inverse ARP according to Classical IP over ATM when PVCs are used.

7.1.4   IP/ATM

When the association mentioned in 7.1.3 is made using O&M, the "LLC encapsulation" option of "Multiprotocol Encapsulation over AAL5" shall be used to carry the IP packets over the ATM transport network when PVCs are used.

When the association mentioned in 7.1.3 is made using "ATM Inverse ARP", "Classical IP and ARP over ATM" protocols and the "LLC encapsulation" option of "Multiprotocol Encapsulation over AAL5" shall be used to carry the IP packets over the ATM transport network when PVCs are used. "Classical IP and ARP over ATM" is specified in RFC 2225 [15]. "Multiprotocol Encapsulation over AAL5" is specified in RFC 2684 [14].

7.2 Transport network control plane

ALCAP is not required over the Iu interface towards the broadcast domain.

Annex A (informative):
Change history

Change history					
TSG RAN#	Version	CR	Tdoc RAN	New Version	Subject/Comment
RAN_04	-	-	-	3.0.0	Approved at TSG RAN #4 by correspondence and placed under Change Control
RAN_05	3.0.0	-	-	3.1.0	Approved at TSG RAN #5
RAN_06	3.1.0	001	RP-99747	3.2.0	Approved at TSG RAN #6
RAN_07	3.2.0	-	-	3.3.0	Approved at TSG RAN #7
RAN_08	3.3.0	-	RP-000237	3.4.0	Approved at TSG RAN #8
RAN_09	3.4.0	018 020	RP-000375	3.5.0	Approved at TSG RAN #9
RAN_10	3.5.0	022	RP-000614	3.6.0	Approved at TSG RAN #10
RAN_11	3.6.0	023 024	RP-010112	3.7.0	Approved at TSG RAN #11
RAN 13	3.7.0	021	RP-010580	3.8.0	Reference corrections
RAN 14	3.8.0	028	RP-010850	3.9.0	Reference corrections
RAN 15	3.9.0	031	RP-020165	3.10.0	AAL5 used to transport IP packet for Broadcast Domain
RAN 16	3.10.0	033	RP-020402	3.11.0	Correction of Aesa formats
RAN 16	3.10.0	036r1	RP-020402	3.11.0	Inclusion of TCP Port Number for SABP
RAN18	3.11.0	041	RP-020742	3.12.0	Correction to Iu-ps IP/ATM
RAN19	3.12.0	053	RP-030054	3.13.0	TCP Port number

History

Document history		
V3.2.0	January 2000	Publication
V3.3.0	March 2000	Publication
V3.4.0	June 2000	Publication
V3.5.0	September 2000	Publication
V3.6.0	December 2000	Publication
V3.7.0	March 2001	Publication
V3.8.0	September 2001	Publication
V3.9.0	December 2001	Publication
V3.10.0	March 2002	Publication
V3.11.0	June 2002	Publication
V3.12.0	December 2002	Publication
V3.13.0	March 2003	Publication