TSG-RAN Meeting #7
TSGRP#7(00)0075
Madrid, Spain, 13 - 15 March 2000

Title: **Agreed CRs to TS 25.410**

Source: **TSG-RAN WG3**

Agenda item: **6.4.3**

Tdoc_Num	Specification	CR_Num	Revision_Num	CR_Subject	CR_Category	WG_Status	Cur_Ver_Num	New_Ver_Num
R3-000602	25.410	002		Changing local RAB ID to global	C	agreed	3.1.0	3.2.0
R3-000742	25.410	004	1	Protocol stack updates for Iu-PS	C	agreed	3.1.0	3.2.0
R3-000932	25.410	001	3	Extension with Service Area Broadcast Protocol	B	agreed	3.1.0	3.2.0
R3-000931	25.410	003	1	High-level Iu interface changes for SA Broadcast	B	agreed	3.1.0	3.2.0

3GPP TSG-RAN-WG3 meeting #11
Sophia Antipolis, France, 28 Feb – 3 Mar, 2000

***Document* R3-000602**
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25.410	CR	002	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [X]
(at least one should be marked with an X)

Source: TSG-RAN WG3 **Date:** 15 Feb 2000

Subject: Changing local RAB ID to global

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: The RAB identifier is changed to be global identifier for the connection covering both the radio bearer and the Iu bearer. This is according to the decision made in RAN-3 #10 meeting.

Clauses affected: 2, 5.2.1

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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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.

[1] UMTS 25.401, UTRAN Overall Description

[2] UMTS 23.930, Iu Principles

[3] UMTS 23.110, UMTS Access Stratum; Services and Functions

[4] UMTS 25.411, UTRAN Iu Interface: Layer 1

[5] UMTS 25.412, UTRAN Iu Interface: Signalling Transport

[6] UMTS 25.413, UTRAN Iu Interface: RANAP Signalling

[7] UMTS 25.414, UTRAN Iu Interface: Data Transport & Transport Signalling

[8] UMTS 25.415, UTRAN Iu Interface: CN-RAN User Plane Protocol

[9] Q.711 (7/96), Functional description of the signalling connection control part

[10] Q.712 (7/96), Definition and function of signalling connection control part messages

[11] Q.713 (7/96), Signalling connection control part formats and codes

[12] Q.714 (7/96), Signalling connection control part procedures

[13] UMTS 23.003, Numbering, Addressing and Identification

[14] UMTS 23.110, UMTS Access Stratum; Services and Functions

5.2.1 RAB establishment, modification and release function

The RAB, Radio Access Bearer, is defined to be set-up between UE and CN. Depending on subscription, service, requested QoS etc. different types of RABs will be used. It is the CN that controls towards the UTRAN the establishment , modification or release of a RAB.

The RAB identity is allocated by CN by mapping the value for the NAS Binding information (from the actual protocol IE for the respective CN domain) to the RAB ID as specified in [14]. The RAB identity ~~and~~ is ~~locally~~ globally significant on both the radio bearer and on the Iu bearer for a given UE in a particular CN domain~~over one Iu signalling instance~~.

RAB establishment, modification and release is a CN initiated function.

RAB establishment, modification and release is a UTRAN executed function.

RAB release request is a UTRAN initiated function, triggered when UTRAN fails to keep the RAB established with the UE.

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25.410	CR	004r1	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio	X	Core Network	X

Source:	TSG-RAN WG3	**Date:**	28 Feb 2000		
Subject:	Protocol stack updates for Iu-PS				
Work item:					

Category: *(only one category shall be marked with an X)*			**Release:**	
F	Correction		Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature	X	Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change:	RANAP control plane protocol stack for IP domain updated to use M3UA instead of ITUN. SCTP runs over IP – UDP removed.
Clauses affected:	6.3 Iu-PS

Other specs affected:			
Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:	


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6 I_u Interface Protocol Structure

6.1 General

The Radio Network signalling over Iu consists of the Radio Access Network Application Part (RANAP). The RANAP protocol consists of mechanisms to handle all procedures between the CN and UTRAN. It is also capable of conveying messages transparently between the CN and the UE without interpretation or processing by the UTRAN.

Over the Iu interface the RANAP protocol is, e.g. used for:

- Facilitate a set of general UTRAN procedures from the Core Network such as paging -notification as defined by the notification SAP in [3].
- Separate each User Equipment (UE) on the protocol level for mobile specific signalling management as defined by the dedicated SAP in [3].
- Transfer of transparent non-access signalling as defined in the dedicated SAP in [3].
- Request of various types of UTRAN Radio Access Bearers through the dedicated SAP in [3].
- Perform the SRNS Relocation function.

The Radio Access Bearers are provided by the Access Stratum.

6.2 Iu-CS

Figure 6.1 shows the protocol structure for Iu-CS, following the structure described in [1].

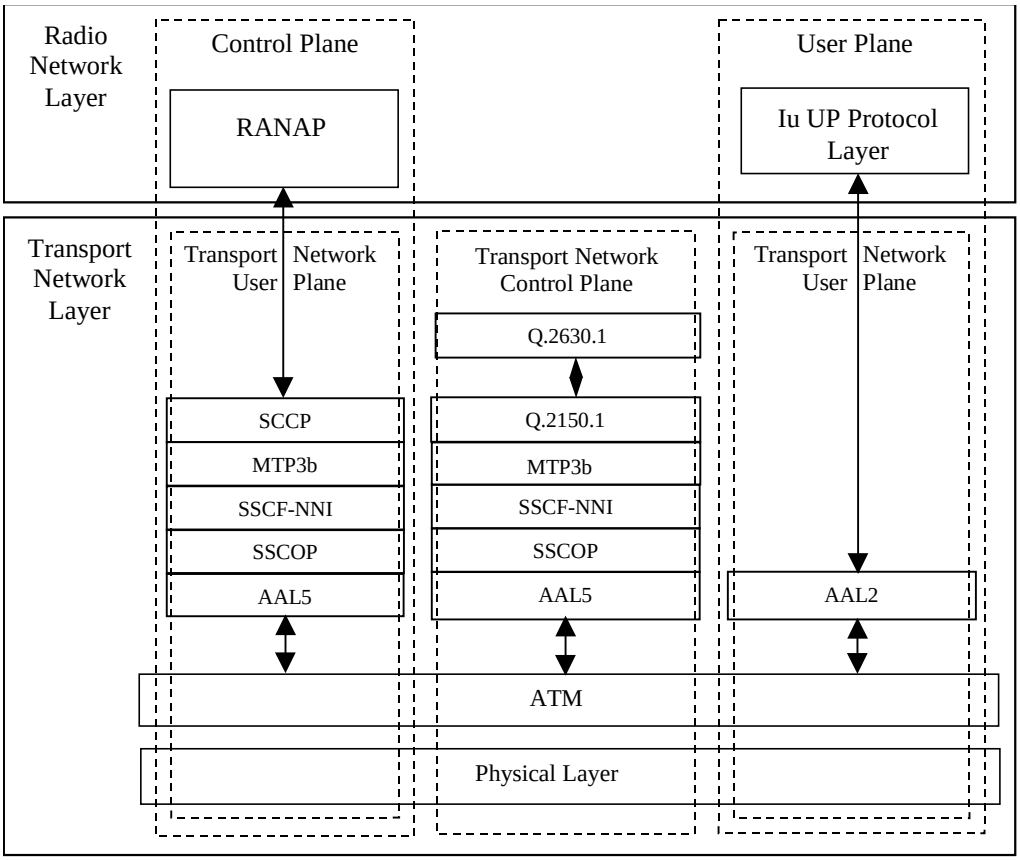
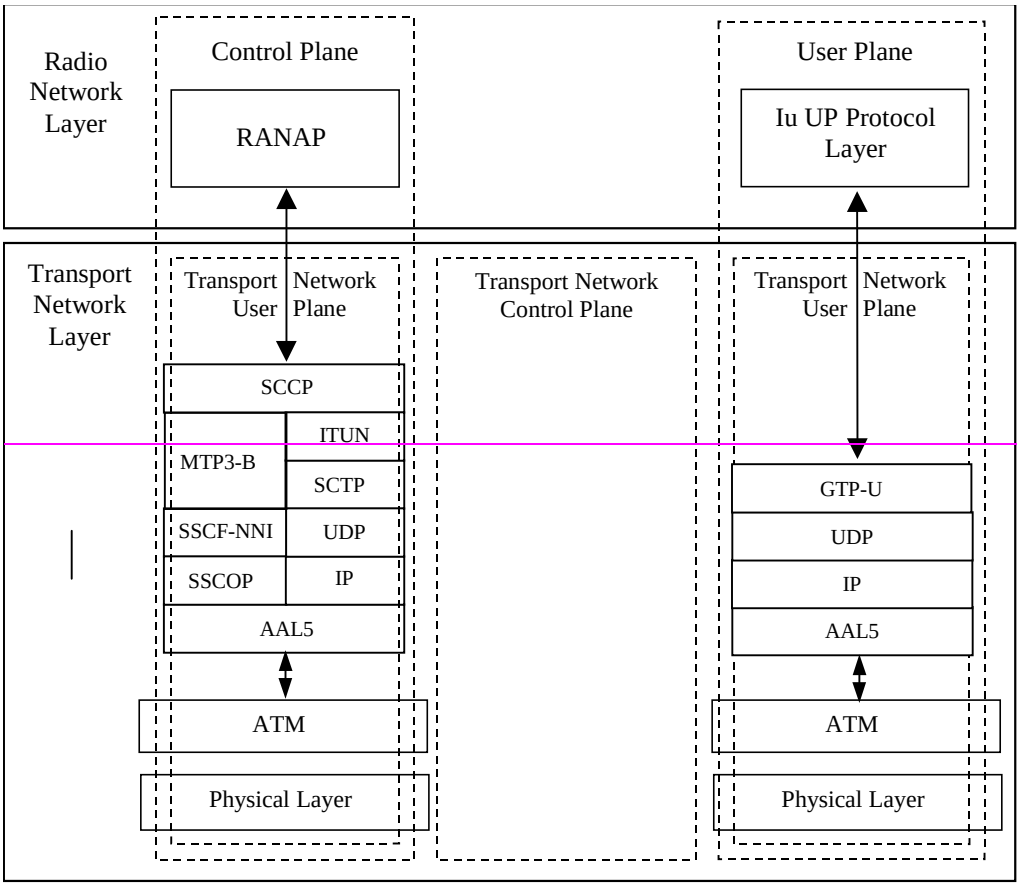


Figure 6.1: I_u –Interface Protocol Structure towards CS Domain

6.3 Iu-PS

Figure 6.2 shows the protocol structure for Iu-PS, following the structure described in [1].


Radio Network Layer
Control Plane
RANAP
User Plane
Iu UP Protocol Layer
Transport Network Layer
Transport User Plane
Network
Transport Network Control Plane
Transport User Plane
Network
SCCP
ITUN
MTP3-B
SCTP
SSCF-NNI
UDP
SSCOP
IP
AAL5
GTP-U
UDP
IP
AAL5
ATM
ATM
Physical Layer
Physical Layer

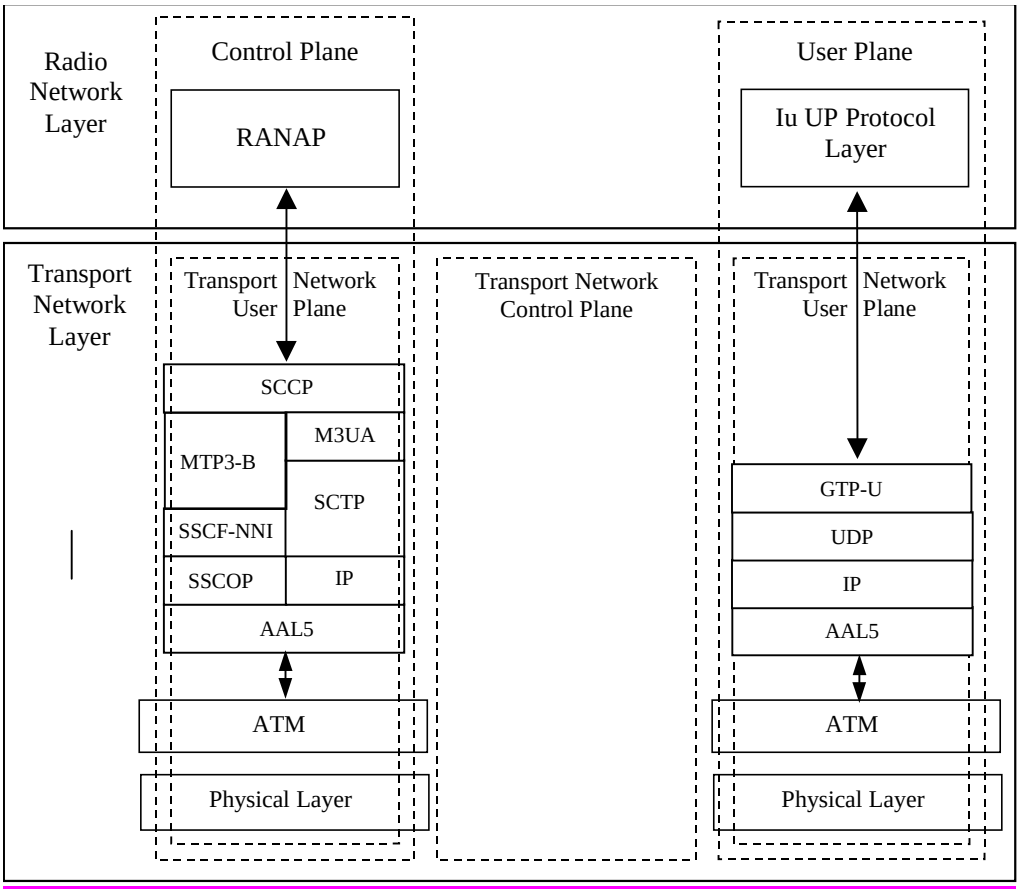


Figure 6.2: I_u Interface Protocol Structure towards PS Domain

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Sophia Antipolis, France, 28 Feb - 3 March 00

***Document* R3-000932**
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25.410	CR	001r3	Current Version:	3.1.0

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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [X]
(at least one should be marked with an X)

Source: TSG-RAN WG3 **Date:** 28-1-2000

Subject: Extension with Service Area Broadcast Protocol

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature	X		Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Addition of the Service Area Broadcast Protocol

Figure modified in r3.

Clauses affected: §2, §3.2, §4.3, §6.3, §7.6

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	25.414,25.419
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:


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2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

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[1] UMTS 25.401, UTRAN Overall Description

[2] UMTS 23.930, Iu Principles

[3] UMTS 23.110, UMTS Access Stratum; Services and Functions

[4] UMTS 25.411, UTRAN Iu Interface: Layer 1

[5] UMTS 25.412, UTRAN Iu Interface: Signalling Transport

[6] UMTS 25.413, UTRAN Iu Interface: RANAP Signalling

[7] UMTS 25.414, UTRAN Iu Interface: Data Transport & Transport Signalling

[8] UMTS 25.415, UTRAN Iu Interface: CN-RAN User Plane Protocol

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[10] Q.712 (7/96), Definition and function of signalling connection control part messages

[11] Q.713 (7/96), Signalling connection control part formats and codes

[12] Q.714 (7/96), Signalling connection control part procedures

[13] UMTS 23.003, Numbering, Addressing and Identification

[14] UMTS 25.419, UTRAN Iu Interface: Service Area Broadcast Protocol SABP

3.2 Abbreviations

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

3G-MSC	3rd Generation Mobile Switching Centre
3G-SGSN	3rd Generation Serving GPRS Support Node
AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
BC	Broadcast
BSSMAP	Base Station Subsystem Management Application Part
CBS	Cell Broadcast Service
CC	Connection Confirm
CN	Core Network
CR	Connection Release
CREF	Connection Refusal
CS	Circuit Switched
GT	Global Title
GTP-U	GPRS Tunnelling Protocol
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ISDN	Integrated Services Digital Network

LA	Location Area
NAS	Non Access Stratum
O&M	Operation and Maintenance
PS	Packet Switched
PSTN	Public Switched Telephone Network
PVC	Permanent Virtual Circuit
QoS	Quality of Service
RA	Routing Area
RAB	Radio Access Bearer
RANAP	Radio Access Network Application Part
RLP	Radio Link Protocol
RNC	Radio Network Controller
RNL	Radio Network Layer
RRC	Radio Resource Control
SA	Service Area
SABP	Service Area Broadcast Protocol
~~SACBS~~	~~Service Area Broadcast Service~~
SAP	Service Access Point
SCCP	Signalling Connection Control Part
SPC	Signalling Point Code
SRNS	Serving Radio Network Subsystem
SSN	Sub-System Number
SVC	Switched Virtual Circuit
TCP	Transmission Control Protocol
UE	User Equipment
UDP	User Datagram Protocol
UP	User Plane
URA	UTRAN Registration Area
UTRAN	UMTS Terrestrial Radio Access Network
VC	Virtual Circuit

4.3 I_u Interface Specification Objectives

The following objectives are partly derived from [2].

The Iu interface shall be specified such that it can support:

- the interconnection of RNCs with Core Network Access Points within a single PLMN
- the interconnection of RNCs with Core Network Access Points irrespective of the manufacturer of any of the elements.
- all UMTS services

The Iu interface shall facilitate the use of the same RNC, MSC or SGSN in all PLMNs.

The Iu interface shall facilitate the sharing of transport technology between Iu-PS and Iu-BC~~roadcast~~.

The Iu interface shall allow interworking to the GSM Core Network.

Independence between the protocol layers and between control and user planes shall be maintained on the Iu interface.

The Iu interface shall allow independent evolution of technologies within the Core, Radio Access and Transport Networks.

The Iu interface shall allow separate evolution of O&M facilities.

The Iu interface shall be standardised as an open and multi-vendor interface.

The Iu interface specifications shall facilitate the migration of some services from the CS-domain to the PS-domain. In particular, the RANAP protocol shall be common to both domains, and the Iu user plane protocol(s) shall be independent of the core network domain, except where a specific feature is only required for one domain.

6.3 Iu-BCcroadcast

Figure 6.3 shows the protocol structure for the Iu-BCroadcastc.

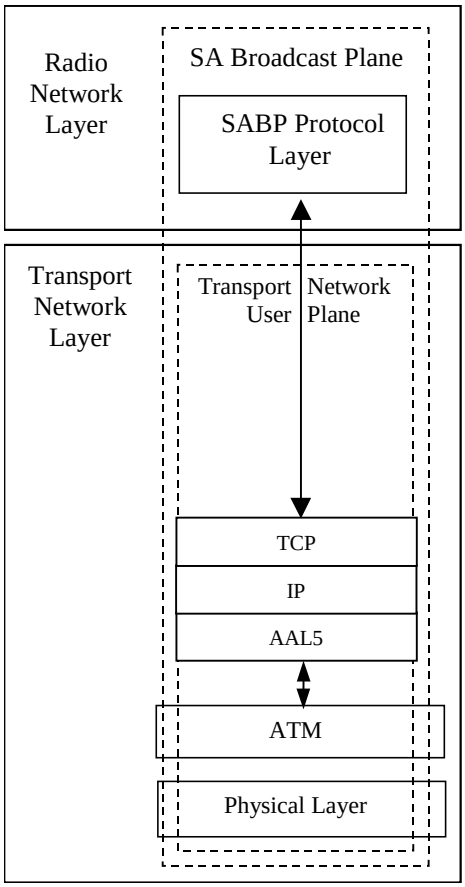

Figure 6.3: I_u Interface Protocol Structure towards Broadcast Domain

7 Other I_u Interface Specifications

7.1 UTRAN Iu Interface: Layer 1 (UMTS 25.411)

UMTS 25.411 [4] specifies the range of physical layer technologies that may be used to support the Iu interface.

7.2 UTRAN Iu Interface: Signalling Transport (UMTS 25.412)

UMTS 25.412 [5] specifies the signalling bearers for the RANAP and transport network control plane protocols for both Iu-PS and Iu-CS.

7.3 UTRAN Iu Interface: RANAP Specification (UMTS 25.413)

UMTS 25.413 [6] specifies the RANAP protocol for radio network control plane signalling over the Iu interface.

7.4 UTRAN Iu Interface: Data Transport and Transport Signalling (UMTS 25.414)

UMTS 25.414 [7] specifies the transport bearers for the user plane of the Iu interface. It also specifies the protocol used to control these transport bearers.

7.5 UTRAN Iu Interface: CN-UTRAN User Plane Protocol (UMTS 25.415)

UMTS 25.415 [8] specifies the user plane frame handling protocol for the Iu interface.

7.6 UTRAN Iu Interface: Service Area Broadcast Protocol SABP (UMTS 25.419)

UMTS 25.419 [14] specifies the communication requirements over the Iu interface towards the BC~~roadcast~~ domain.

7.7~~6~~ Summary

The present document, UMTS 25.410, specifies the general aspects and principles of the Iu interface as a whole.

The relationship between the other technical specifications that define the UTRAN Iu interface is shown in figure 7.1.

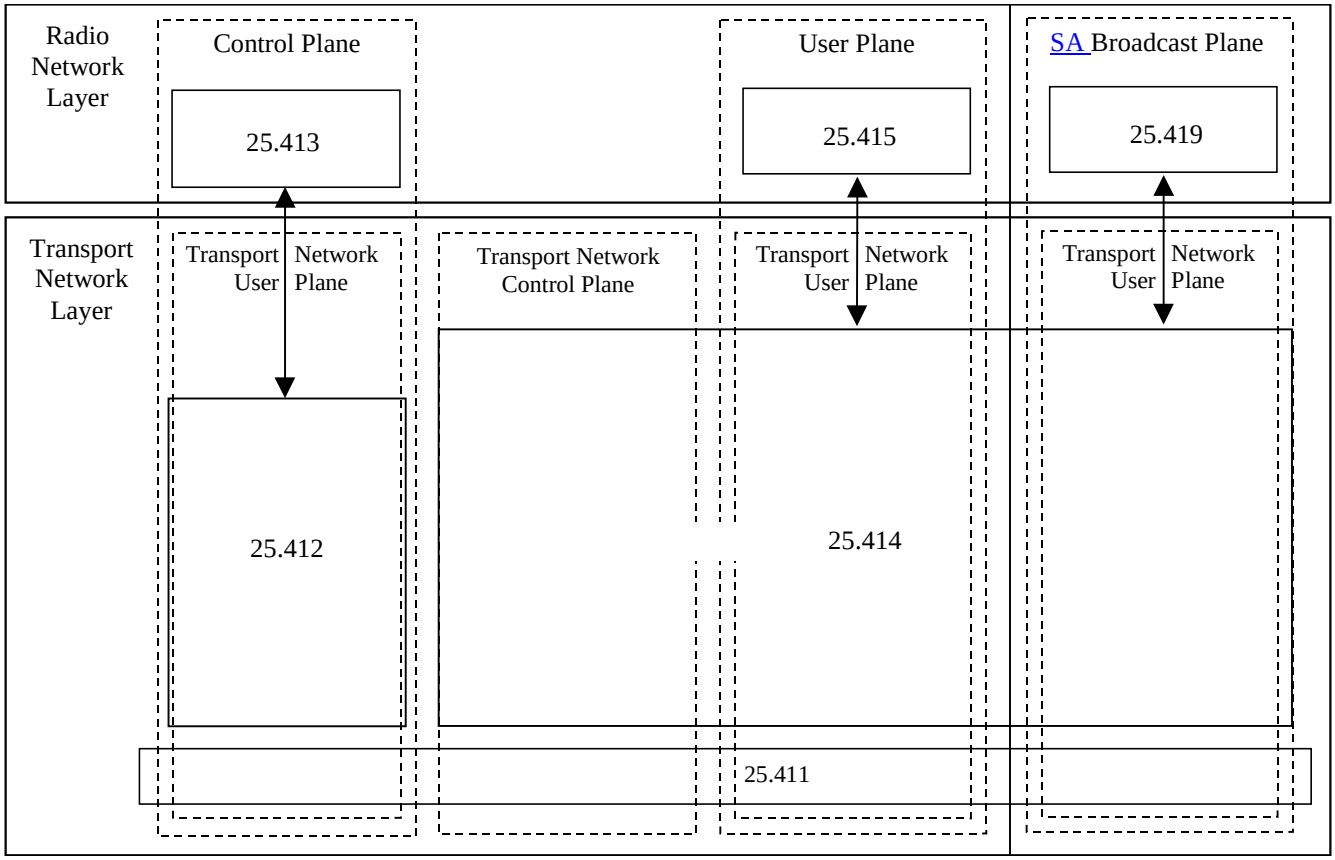

Figure 7.1: Summary of Iu Interface Specification Structure

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Sophia Antipolis, France 28 Feb – 3 March 00

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25.410	**CR**	**003r1**	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio	X	Core Network	X

Source: TSG-RAN WG3 **Date:** 22 Feb 00

Subject: High-level Iu interface changes for SA Broadcast

Work item:

Category: *(only one category shall be marked with an X)*			**Release:**	
F	Correction		Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature	X	Release 97	
C	Functional modification of feature		Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change: Introduction of Iu-BC leads to gaps in the architecture and principles governing the Iu Interface specifications. This change fills those gaps.

Clauses affected: 4.1.1, 4.1.2, 4.3, 4.4, 4.5.3 (new), 5.1, 5.4.6 (new) 5.3.2, 6.1

Other specs affected:			
Other 3G core specifications		→	List of CRs:
Other GSM core specifications		→	List of CRs:
MS test specifications		→	List of CRs:
BSS test specifications		→	List of CRs:
O&M specifications		→	List of CRs:

Other comments: CR001 makes changes SA Broadcast related changes to other sections of the same spec.

Existing 5.4.6 needs renumbering to 5.4.7


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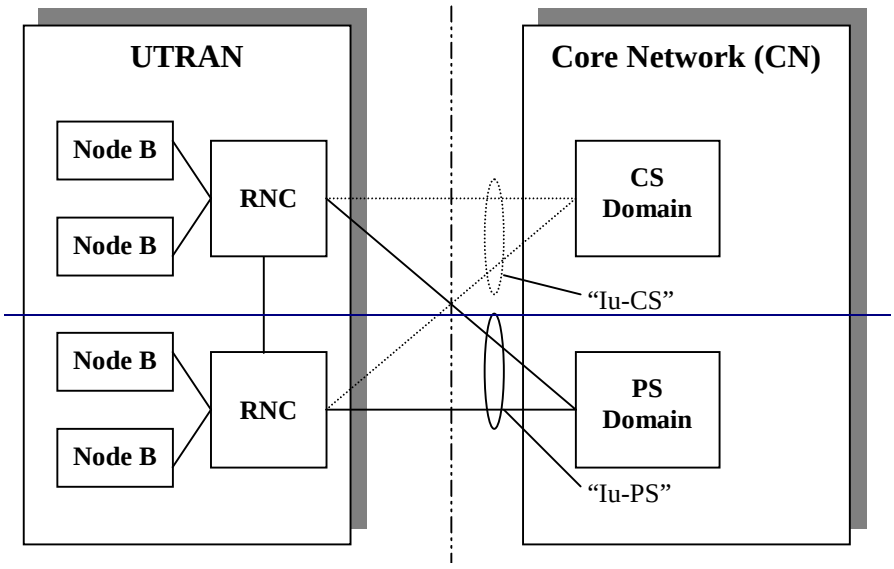
4 General Aspects

4.1 UTRAN Architecture

4.1.1 Iu Interface Architecture

The overall UMTS architecture and UTRAN architectures are described in [1]. This section specifies only the architecture of the Iu interface, and shall not constrain the network architecture of either Core or Radio Access Networks.

The I_u interface is specified at the boundary between the Core Network and UTRAN. Figure 4.1 depicts the logical division of the I_u interface. From the Iu perspective, the UTRAN access point is an RNC.



Iu Interface

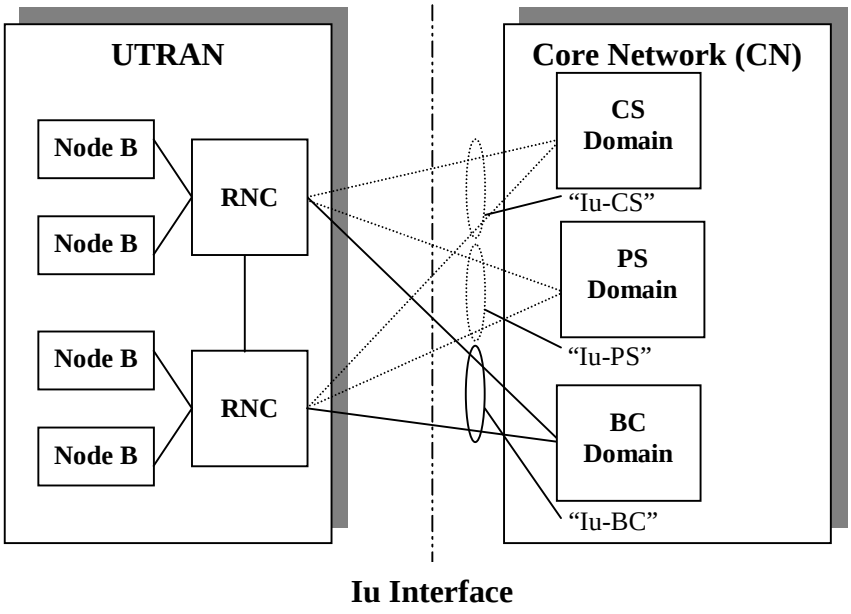


Figure 4.1: Iu Interface Architecture

The Iu interface towards the PS-domain of the core network is called Iu-PS, and the Iu interface towards the CS-domain is called Iu-CS. The differences between Iu-CS and Iu-PS are treated elsewhere in this specification. The Iu interface to the Broadcast domain is called Iu-BC.

There shall not be more than ~~two distinct Iu interfaces for any RNC~~ one Iu interface (Iu-CS) towards the CS domain and one Iu interface (Iu-PS) towards the PS-domain from any one RNC. There may be multiple Iu interfaces (Iu-BC) from an RNC towards the Broadcast domain.

In the separated core network architecture, this means that there shall be separate signalling and user data connections towards the ~~two~~ PS and CS domains – this applies in both transport and radio network layers.

In the combined architecture, there shall be separate connections in the user plane towards the PS and CS domains (in both transport and radio network layers). In the control plane, there shall be separate SCCP connections to the two logical domains.

In either architecture, there can be several RNCs within UTRAN and so UTRAN may have several I_u access points towards the Core Network. As a minimum, each Iu access point (in UTRAN or CN) shall independently fulfil the requirements of the relevant Iu specifications (25.41x series – see section 7).

4.1.2 Iu connection principles

The Iu interface has a hierarchical architecture where one higher layer entity controls several lower layer entities. The hierarchy for the CN - UTRAN signalling connection end points is described below.

- Each CN Access Point may be connected to one or more UTRAN Access Points;
- For the PS and C~~N~~S domains, e~~E~~ach UTRAN Access Point shall not be connected to more than one CN Access Point per CN domain.
- For the BC domain, each UTRAN Access Point may be connected to one or more CN Access Points.

4.3 I_u Interface Specification Objectives

The following objectives are partly derived from [2].

The Iu interface shall be specified such that it can support:

- the interconnection of RNCs with Core Network Access Points within a single PLMN
- the interconnection of RNCs with Core Network Access Points irrespective of the manufacturer of any of the elements.
- all UMTS services

The Iu interface shall facilitate the use of the same RNC, MSC or SGSN in all PLMNs.

The Iu interface shall allow interworking to the GSM Core Network.

Independence between the protocol layers and between control and user planes shall be maintained on the Iu interface.

The Iu interface shall allow independent evolution of technologies within the Core, Radio Access and Transport Networks.

The Iu interface shall allow separate evolution of O&M facilities.

The Iu interface shall be standardised as an open and multi-vendor interface.

The Iu interface specifications shall facilitate the migration of some services from the CS-domain to the PS-domain. In particular, the RANAP protocol shall be common to both PS and CS domains, and the Iu user plane protocol(s) shall be independent of the core network domain (PS or CS), except where a specific feature is only required for one domain.

4.4 I_u Interface Capabilities

The following capabilites are derived from the requirements described in [2].

The Iu interface supports:

- procedures to establish, maintain and release Radio Access Bearers;
- procedures to perform intra-system handover, inter-system handover and SRNS relocation;
- procedures to support the Cell ~~Service Area~~ Broadcast service;
- a set of general procedures, not related to a specific UE;
- the separation of each UE on the protocol level for user specific signalling management;
- the transfer of NAS signalling messages between UE and CN;
- location services by transferring requests from the CN to UTRAN, and location information from UTRAN to CN. The location information may comprise a geographical area identifier or global co-ordinates with uncertainty parameters;
- simultaneous access to multiple CN domains for a single UE;
- mechanisms for resource reservation for packet data streams.

4.5.3 Use of Transport Network User Plane on Iu-BC

TCP/IP is used as the bearer for the radio network layer protocol over Iu-BC.

The TCP connection is normally established by the CN using standard TCP procedures.

A new TCP connection is established by the RNC only when there is information (e.g. failure or restart indications) that needs to be sent from RNC to the CN, and there is no existing TCP connection. The RNC shall establish the connection using standard TCP procedures.

The node that established the connection shall release the TCP connection.

5.1 General

This section defines the functional split between the core network and the UMTS radio access network. In addition, the possible interaction between the functions is defined. The functional split is shown in table 5.1.

Table 5.1: Iu interface functional split

Function	UTRAN	CN
RAB management functions:		
RAB establishment, modification and release	X	X
RAB characteristics mapping Iu transmission bearers	X	
RAB characteristics mapping Uu bearers	X	
RAB queuing, pre-emption and priority	X	X
Radio Resource Management functions:		
Radio Resource admission control	X	
Broadcast Information	X	X
Iu link Management functions:		
Iu signalling link management	X	X
ATM VC management	X	X
AAL2 establish and release	X	X
AAL5 management	X	X
GTP-U Tunnels management	X	X
TCP Management	X	X
Buffer Management	X	
Iu U-plane (RNL) Management:		
Iu U-plane frame protocol management		X
Iu U-plane frame protocol initialization	X	
Mobility management functions:		
Location information reporting	X	X
Handover and Relocation		
Inter RNC hard HO, Iur not used or not available	X	X
Serving RNS Relocation (intra/inter MSC)	X	X
Inter system hard HO (UMTS-GSM)	X	X
Paging Triggering		X
Security Functions:		
Data confidentiality		
Radio interface ciphering	X	
Ciphering key management		X
User identity confidentiality	X	X
Data integrity		
Integrity checking	X	
Integrity key management		X
Service and Network Access functions:		
CN Signalling data	X	X
Data Volume Reporting	X	
UE Tracing	X	X
Location reporting	X	X
Iu Co-ordination functions:		
Paging co-ordination	X	X

5.4.6 TCP Management Function

This function is used to establish and release the TCP connections between CN and UTRAN over Iu-BC.

The TCP management function exists in both UTRAN and CN.

5.3.2 Broadcast information management

This function consists in the broadcast from network toward UE of some information in the coverage area of the whole network or different parts of the network.

There are ~~two~~ three kinds of Broadcast information management. UTRAN broadcast information, ~~and~~ CN broadcast information and Cell ~~Service Area b~~Broadcast information management. All UTRAN broadcast information management shall be be handled locally within UTRAN. All CN related broadcast information and Cell ~~Service Area broadcast~~ Broadcast information is controlled by CN. UTRAN executes the broadcast of CN information and Cell ~~Service Area~~ Broadcast information.

6 I_u Interface Protocol Structure

6.1 General

The Radio Network signalling over Iu consists of the Radio Access Network Application Part (RANAP). The RANAP protocol consists of mechanisms to handle all procedures between the CN and UTRAN. It is also capable of conveying messages transparently between the CN and the UE without interpretation or processing by the UTRAN.

Over the Iu interface the RANAP protocol is, e.g. used for:

- Facilitate a set of general UTRAN procedures from the Core Network such as paging -notification as defined by the notification SAP in [3].
- Separate each User Equipment (UE) on the protocol level for mobile specific signalling management as defined by the dedicated SAP in [3].
- Transfer of transparent non-access signalling as defined in the dedicated SAP in [3].
- Request of various types of UTRAN Radio Access Bearers through the dedicated SAP in [3].
- Perform the SRNS Relocation function.

The Radio Access Bearers are provided by the Access Stratum.

Over Iu-BC, a datagram mechanism is used, so there is no clear separation of control and user planes, and the SABP protocol is used for data transfer and signalling.