Agenda item: **8.2**

Source: Nokia

Title: **Iu functions**

Document for:

_____

1   Introduction

This contribution lists the Iu functions of the Iu interface and the functional split between the CN and UTRAN. The list of Iu functions is currently missing from section 5 of [1].

2   Iu functions and functional split

2.1   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 are defined. The functional split is shown in Table 1.

Table 1. The Iu interface functional split.

Function	UTRAN	CN
RAB functions:		
RAB overall management		X
RAB execution of setup, modification and release	X	
RAB mapping to transmission bearers	X	
RAB setup queueing	X	
RAB pre-emption	X	X
RAB release request	X	
Radio Resource Management functions	**X**	
Iu Signalling Connection Management:		
Iu signalling connection establishment	X	X
Iu signalling connection release		X
Iu U-plane Frame Protocol Management:		
Iu U-plane frame protocol mode selection		X
Iu U-plane frame protocol initialization		X
Mobility management functions:		
Mobility Management		X
Handovers & Relocation		
Active cell management, intra RNC	X	
Active cell management, inter RNC when Iur available (intra/inter MSC)	X	
Inter RNC hard HO, Iur not used or not available (intra/inter MSC)	X	X
Serving RNS Relocation (intra/inter MSC) (incl. MDC+RRC/MAC+Iu-link)	X	X
Inter system hard HO (UMTS-GSM)	X	X
Paging		
Paging triggering		X
Paging execution	X	
Location Management	X	X
Security Functions:		
Data confidentiality		
Radio interface ciphering	X	
Ciphering key management		X
User identity confidentiality	X	X
User Authentication		X
Data integrity		
Integrity checking	X	
Integrity key management		X
Service and Network Access functions:		
Transcoding		X
Call Control and Connection Management		X
Supplementary Services		X
Charging		X

2.2 RAB Functions

2.2.1 RAB overall management

RAB overall management is performed by the CN, which requests RABs. The CN is the owner of the RABs it has requested and thus has the overall control.

2.2.2 RAB execution of setup, modification and release

RAB execution is done by the RNC. This includes the setup, modification and release of RAB.

2.2.3 RAB mapping to transmission bearers

The bearer mapping function is used to map the radio bearers to the Iu interface transmission bearers. RNC shall perform the mapping between the bearers.

2.2.4 RAB setup queueing

The RNC can place some requested RABs into a queue.

2.2.5 RAB pre-emption

The CN can optionally set a pre-emption for a requested RAB. The RNC decides the usage of priority based on information rceived from the CN.

2.2.6 RAB release request

The RNC can request the CN to release some RABs, if the connection to the UE has been lost.

2.3 Radio Resource Management

Radio resource management shall be performed by the UTRAN.

2.4 Iu Signalling Connection Management

2.4.1 Iu signalling connection establishment

Iu signalling connection can be established either by the CN or the RNC.

2.4.2 Iu signalling connection release

Iu signalling connection is released by the CN.

2.5 Iu U-plane Frame Protocol Management

2.5.1 Iu U-plane frame protocol mode selection

Iu U-plane frame protocol mode is selected by the CN. The available modes are the transparent mode and the support mode.

2.5.2 Iu U-plane frame protocol initialization

Iu U-plane frame protocol is initialised by the CN.

2.6 Mobility Management Functions

2.6.1 Mobility Management

Mobility Management messages that are core network specific and are used between mobile terminal and core network shall be handled transparently by the Iu interface.

2.6.2 Handover & Relocation

2.6.2.1 Active Cell Management, intra RNC

This functionality includes procedures for adding and removing cells controlled by one RNC to and from the active set. The handovers may be hard or soft. This functionality is handled by UTRAN and it does not involve the CN.

2.6.2.2 Active Cell Management, inter RNC, when Iur is available

This functionality includes procedures for adding and removing cells controlled by an other RNC to and from the active set. This is possible only when Iur interface is available between the RNCs in question. As long as the Iur is available, the RNCs may be controlled by different MSCs, i.e. both intra and inter MSC cases are applicable. The handovers may be hard or soft. This functionality is handled by UTRAN and it does not involve the CN.

2.6.2.3 Inter RNC hard HO, Iur not used or not available

This functionality includes procedures for handover from one RNC to other RNC when Iur interface is not used or is not available, i.e. soft handover is not possible. The connection is switched in the CN, so both UTRAN and CN are involved. Both intra and inter CN entity cases are applicable.

2.6.2.4 Serving RNS Relocation

This functionality allows moving the Serving RNS functionality from one RNC to an other RNC, e.g. closer to where the UE has moved during the communication. The Serving RNS Relocation procedure may be applied when active cell management functionality has created a suitable situation for it. Both UTRAN and CN are involved.

2.6.2.5 Inter system Handover (e.g. GSM-UMTS)

Inter system handover is performed when a mobile hands over between a cell belonging different systems such as GSM and UMTS. This may imply also a change of radio access type. For intersystem handover between UMTS and GSM, the GSM procedures are used with the GSM network. Both UTRAN and CN are involved.

2.6.3 Paging

2.6.3.1 Paging triggering

The Core Network shall, when considered necessary, trigger the paging in the UTRAN system.

2.6.3.2 Paging execution

The paging function shall be executed by UTRAN.

2.6.4 Location Management

The location management is used to maintain the information about the location of the terminal.

The location management of an idle terminal is handled within the CN at the level of Location/Routing Area. The UTRAN controls the location management of active terminals, i.e. the UTRAN knows which cells/URA are used by the active terminal.

2.7 Security Functions

2.7.1 Data Confidentiality

2.7.1.1 Radio interface ciphering

The radio interface shall be ciphered upon request of the Core Network. Both Signalling and user data may be subject to ciphering. The ciphering shall be done within UTRAN.

2.7.1.2 Ciphering key management

The ciphering key and the used algorithm shall be supplied by the CN.

2.7.1.3 User identity confidentiality

Over a radio path a temporary identity shall be used instead of the permanent identity. The translation of the temporary identity to permanent identity shall mainly be handled by CN. Also the RNC has ability to use temporary identity for the user (RNTI).

2.7.2 User Authentication

The user authentication shall be provided by the CN. The authentication functions are transparent for the Iu Interface, and therefore outside the scope of Iu Interface documents.

2.7.3 Data integrity

2.7.3.1 Integrity checking

The purpose of the integrity check is to make sure that the signalling continues between the same elements as by authentication. The integrity check shall be done within the UTRAN.

2.7.3.2 Integrity key management

The integrity key and the used algorithm shall be supplied by the CN.

2.8 Service and Network Access Functions

2.8.1 Transcoding

The transcoding functionality is needed for changing the coding of a voice call from one coding scheme to another. This functionality is placed in the CN.

2.8.2 Call Control and Connection Management

CC/CM messages shall be handled transparently by the Iu interface. The Iu interface provides a transportation link between the core network and the UE.

2.8.3 Supplementary Services

Supplementary Services that are core network specific shall be handled transparently by the Iu interface.

2.8.4   Charging

Charging shall be handled by CN. The charging may be based on the used radio resources, received Quality of Service or on the amount of transmitted data.

3   Proposals

It is proposed to add the text and structure in section 2 of this contribution to section 5 of [1].

4   Reference

[1]   3GPP UMTS 25.410, *UTRAN Iu Interface, General Aspects and principles*, v.0.2.1, Source: Editor