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**Changes shown with revision marks are based on the decisions of the last RAN3 meeting. These changes have yet to be formally approved by the WG.**



**3<sup>rd</sup> Generation Partnership Project (3GPP);  
Technical Specification Group (TSG) RAN;**

**UTRAN I<sub>u</sub> Interface: General Aspects and Principles**

**UMTS 25.410**

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# Intellectual Property Rights

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## Foreword

This Technical Specification (TS) has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of this TS are subject to continuing work within 3GPP and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released with an identifying change of release date and an increase in version number as follows:

Version m.t.e

where:

m indicates [major version number]

x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

y the third digit is incremented when editorial only changes have been incorporated into the specification.

---

## Introduction

*This clause is optional. If it exists, it is always the third unnumbered clause.*

*No text block identified.*

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# 1 Scope

The present document is an introduction to the UMTS 25.41x series of Technical Specifications that define the Iu interface for the interconnection of Radio Network Controller (RNC) component of the UMTS Terrestrial Radio Access Network (UTRAN) to the Core Network of the UMTS system.

---

## 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] UMTS 25.401, UTRAN Overall Description

[2] UMTS 23.30, Iu Principles

[3] UMTS 23.10

---

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.

*Editor's Note - Definitions of Source RNS(C) and Target RNC(C) are required.*

### ~~3.2~~ 3.2.2 Symbols

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

### 3.3 Abbreviations

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

---

## 4 General Aspects

*Editor's Note – Discussion is required about what information should be transferred from the UTRAN Architecture description to this document. Also, from other relevant documents (e.g. UMTS 23.30 Iu Principles).*

### 4.1 UTRAN Architecture

*Editor's Note – this chapter should describe enough of the system architecture for the role of the interface to be understood.*

See [1], chapter 8.1.

*Editor's Note - Any explanation of source and target RNC/S that is needed, over and above the definitions above, should be added here.*

## 4.2 I<sub>u</sub> Interface General Principles

From a UTRAN perspective, maximising the commonality of the various protocols that flow on the I<sub>u</sub> interface is desirable. This means at the minimum that :

- A common set of radio access bearer services will be offered by UTRAN to the Core Network nodes, regardless of their type (e.g. 3G-MSC or 3G-SGSN).

There will be a common functional split between UTRAN and the Core Network nodes, regardless of their type (e.g. 3G-MSC or 3G-SGSN).

Signalling in the radio network control plane shall not depend on the specific choice of transport layers.

## 4.3 I<sub>u</sub> Interface Specification Objectives

See [2], chapter 4.1.

The I<sub>u</sub> 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 I<sub>u</sub> user plane protocol(s) shall be independent of the core network domain, except where a specific feature is only required for one domain.

*Editor's Note—the two figures should be aligned with this assumption—probably by showing a single I<sub>u</sub> UP protocol (rather than PS and CS specific). A separate contribution will be provided, to maintain alignment with 25.415.*

## 4.4 I<sub>u</sub> Interface Capabilities

*[Editor's note: This chapter should shortly describe the I<sub>u</sub>–Interface Capabilities. In order to avoid inconsistency between documents, reference to [2], chapters 4 and 5, has been made]*

See [2], chapter 4.2.

## ~~4.5~~ 4.5 I<sub>u</sub> Interface Characteristics

### 4.5.1 Use of SCCP

#### 4.5.1.1 General

The SCCP is used to support signalling messages between the CNs and the RNS. One user function of the SCCP, called Radio Access Network Application Part (RANAP), is defined. The RANAP uses one signalling connection per active UE and CN for the transfer of layer 3 messages.

Both connectionless and connection-oriented procedures are used to support the RANAP. TS 25.413 explains whether connection oriented or connectionless services should be used for each layer 3 procedure.

The following sections describe the use of SCCP connections for RANAP transactions. Section 4.5.1.2 describes the connection establishment procedures. Section 4.5.1.3 describes the connection release procedures. Section 4.5.1.4 describes abnormal conditions.

#### 4.5.1.2 SCCP connection establishment

A new SCCP connection is established when information related to the communication between a UE and the network has to be exchanged between RNS and CN, and no SCCP connection exists between the CN and the RNS involved, for the concerned UE.



Various SCCP connection establishment cases have to be distinguished:

- i) RNS Initiated SCCP Signalling Connection
- ii) CN Initiated SCCP Signalling Connection

The above cases are the only cases currently identified for SCCP connection establishment. Others may emerge in the future.

#### 4.5.1.2.1 Establishment procedure in case i

The SCCP signalling connection establishment is initiated, by the RNS, at the reception of the first layer 3 non access stratum message from the UE.

##### Initiation

The RNS sends INITIAL UE message to the Core Network. The INITIAL UE message is included in the user data field of an SCCP connection request message.

##### Termination

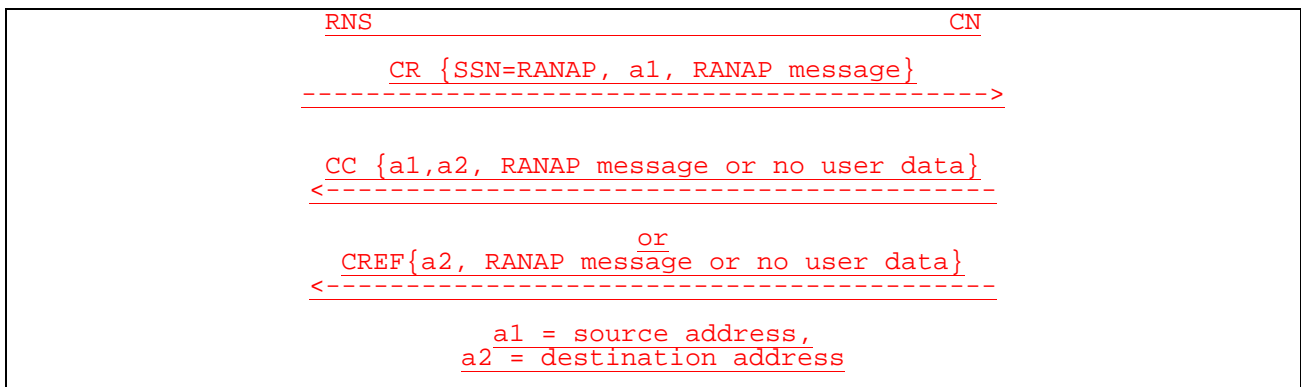
###### - successful outcome

- The SCCP connection confirm message, which may optionally contain a connection oriented RANAP message in the user data field, is returned to the RNS

###### - unsuccessful outcome

- If the SCCP signalling connection establishment fails, an SCCP connection refusal message will be sent back to the RNS. This message may contain a transparent message to be sent to the UE.

For more information on how the RANAP procedure Initial UE message is handled, please see the elementary procedure Initial UE message in TS 25.413.



**Figure 1: Setting-up of RNS Initiated SCCP Signalling Connection**

Note: Which addressing scheme for SCCP to be used over lu is TBD.

#### 4.5.1.2.2 Establishment procedure in case ii

The SCCP signalling connection establishment is initiated, by the Core Network, in connection with performing a Relocation.

##### Initiation

The Core Network initiates the connection establishment by sending a RELOCATION REQUEST message to the RNC. The RELOCATION REQUEST message is included in the user data field of an SCCP connection request message.

##### Termination

##### - successful outcome

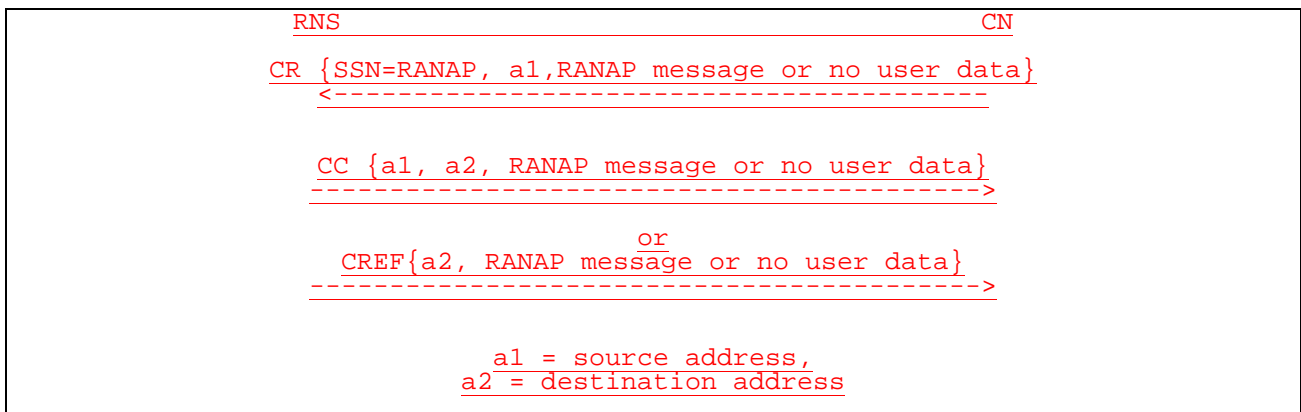
- The SCCP connection confirm message, which may optionally contain a connection oriented RANAP message in the user data field, is returned to the Core Network.

##### - unsuccessful outcome

- If the SCCP signalling connection establishment fails, an SCCP connection refusal message will be sent back to the Core Network. This message may contain a RANAP message in the user data field.

Note: In case of an unsuccessful termination of the UE signalling connection establishment (i.e. when RELOCATION FAILURE is sent to the CN), no radio resources are assigned for the UE in the RNS. If the SCCP signalling connection has been established, the CN is expected to initiate the SCCP connection release.

For more information on how the RANAP procedure for Relocation is handled, please see the elementary procedure Relocation Resource Allocation in TS 25.413.



**Figure 2: Setting-up of CN Initiated SCCP Signalling Connection**

Note: Which addressing scheme for SCCP to be used over lu is TBD.

#### 4.5.1.3 SCCP connection release

This procedure is always initiated at the Core Network side.

An SCCP connection is released when the CN realises that a given signalling connection is no longer required.

The CN sends a SCCP Released message.

#### 4.5.1.4 General SCCP Abnormal Conditions

If a user-out-of-service information or signalling-point-inaccessible information is received by the RANAP, no new attempt to establish SCCP connections towards the affected point code will be started until the corresponding user-in-service information or signalling-point-accessible information is received.

When a user-out-of-service information or signalling-point-inaccessible is received by the RNS, an optional timer may be started. When the timer expires, all the SCCP connections towards the affected point code will be released. When the user-in-service or signalling-point-accessible is received, the timer is stopped.

If for any reason an SCCP connection is released, the optional timer expires or a connection refusal is received while any of the RANAP procedures are being performed or while a dedicated resource is still allocated, the following actions are taken:

##### At RNS:

- Any RNS procedure relating to that connection is abandoned.
- The UTRAN resources allocated to the connection are released.

##### At Core Network:

- The resources associated with the SCCP connection are cleared as soon as possible.

---

## 5 Functions of the I<sub>u</sub> Interface Protocols

*Editor's Note – this section will either contain a functional division across the interface, and/or a reference to the appropriate bit of the UTRAN Architecture Specification*

Congestion control shall be performed over the I<sub>u</sub> user plane toward the IP domain using buffer management and no flow control.

---

## 6 I<sub>u</sub> Interface Protocol Structure

### 6.1 General

The Radio Network signalling over I<sub>u</sub> consists of the Radio Access Network Application Part (RANAP). The RANAP 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 I<sub>u</sub> 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 streamlining function.

The Radio Access Bearers are provided by the Access Stratum

## 6.2 Iu-CS

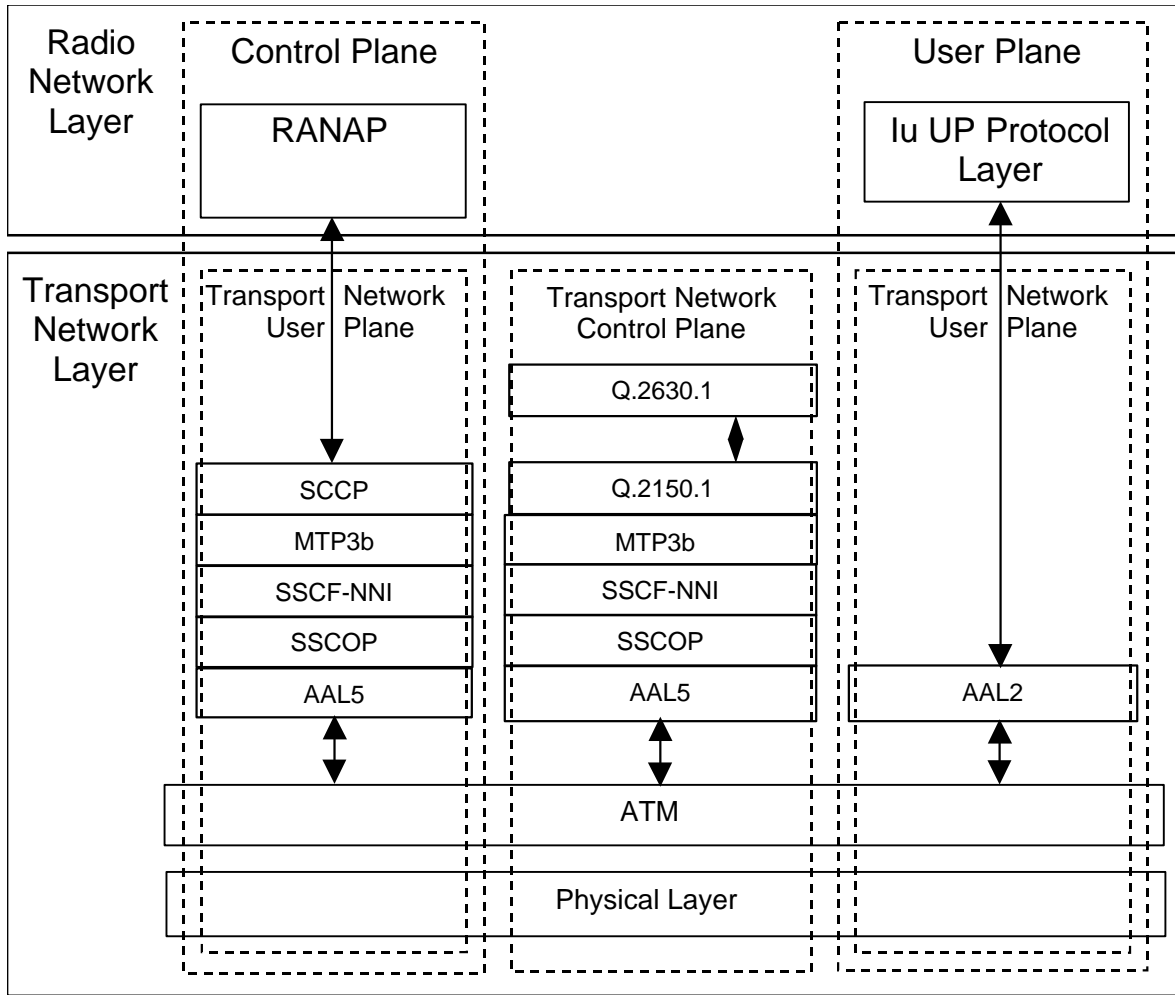


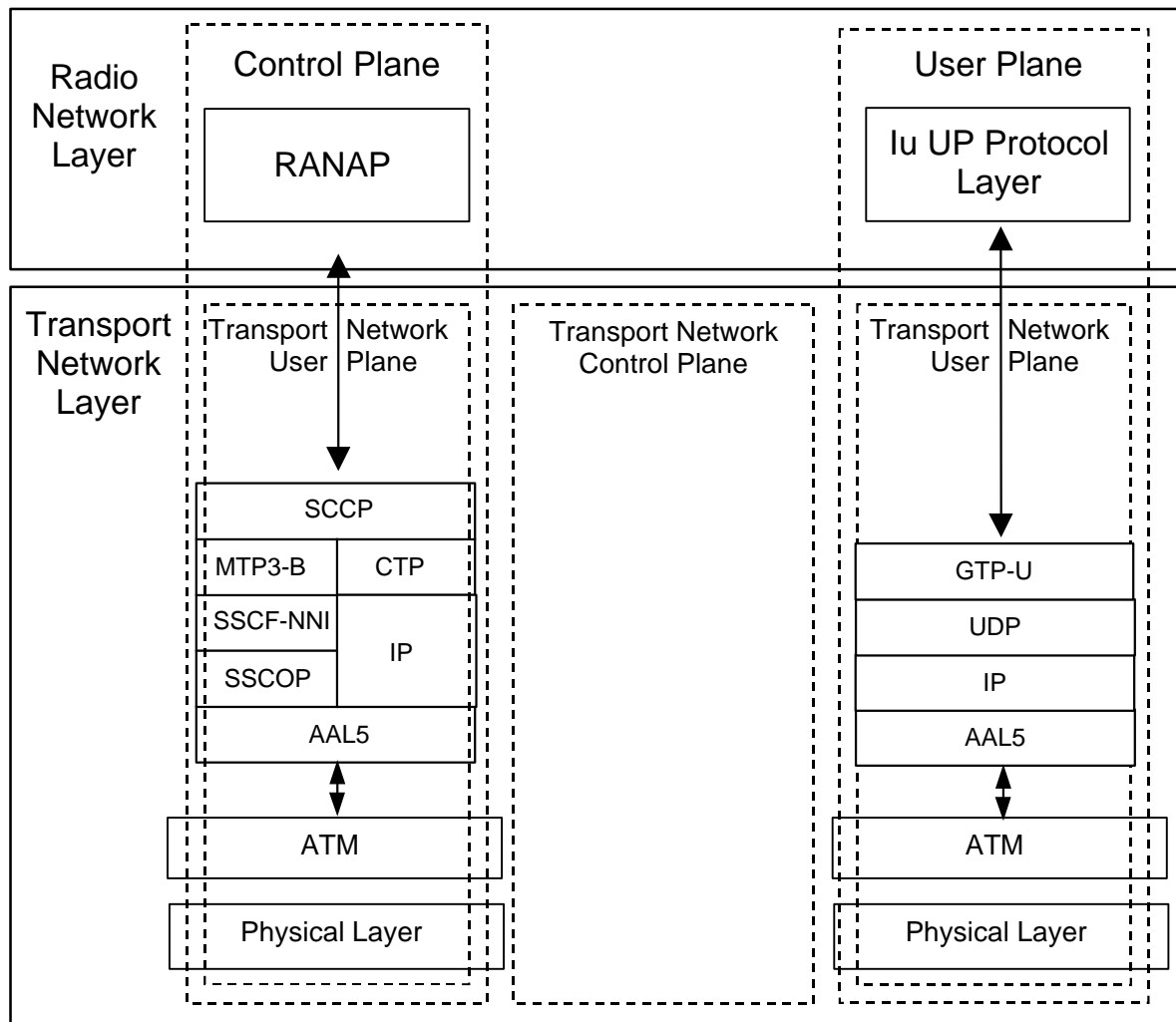
Figure 43: Iu-CS Interface Protocol Structure towards CS Domain

Figure 2. Iu-CS Interface Protocol Structure

*Editor's note: Should the next sentence be in here or in 25.414?*

Q.2630.1 is used as the ALCAP protocol for dynamically setup AAL-2 connections over Iu towards the PSTN Domain.

### 6.3 Iu-PS



**Figure 4: Iu Interface Protocol Structure towards PS Domain**

*Temporary Editor's Note—Relative to v.0.1.1 (TSGR3#3(99)416) GTP-U has been corrected to Transport Layer and the ATM/PHY layers have been removed from the transport layer control plane.*

RANAP Signalling is used to establish, modify and release the GTP-U tunnels.

## 7 Other Iu Interface Specifications

### 7.1 UTRAN Iu Interface: Layer 1 (UMTS 25.411)

*editor's note—text is required, but can be completed once S3.11 has been created. 25.411 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 specifies the signalling bearers for the RANAP and ALCAP protocols for both Iu-PS and Iu-CS.

## 7.3 RANAP Specification (UMTS 25.413)

UMTS 25.413 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 specifies the transport bearers for the user plane of the Iu interface. It also specifies the ALCAP protocol used to control these transport bearers.

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

UMTS 25.415 specifies the user plane frame handling protocols for the Iu interface.

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# 9 Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

## Annex A (Informative) – Stability Information

~~Editor’s Note—This section needs reformatting to align with the approved tabular format.~~

This annex details the stability of each section of the document, and notes areas where further text is required.

~~1—Stable~~

~~2—Will need references adding for other 25.41x documents~~

~~3—empty—should at least refer to 25.401, and the vocabulary document~~

~~4.1 Need to decide whether to include any information here to make it stand alone~~

~~4.2 Current contents are stable, but more needed?~~

~~4.3 only a reference to UMTS 23.10.~~

~~4.4 as 4.3~~

~~4.5 EMPTY—Contributions required.~~

~~5 NEARLY EMPTY—Contributions (or references to 25.401) required.~~

~~6.1 Stable, but more needed?~~

~~6.2 Stable—any descriptions needed?~~

~~6.3 Now stable—any descriptions needed?~~

~~7—Needs text for 7.1, otherwise stable.~~

<u>Section</u>	<u>Content missing</u>	<u>Incomplete</u>	<u>Restructuring needed</u>	<u>Checking needed</u>	<u>Editorial work required</u>	<u>Finalisation needed</u>	<u>Almost stable</u>	<u>Stable</u>
<u>1.2</u>						✓		
<u>3</u>	✓							
<u>4.1</u>		✓						
<u>4.2</u>							✓	
<u>4.3</u>		✓						
<u>4.4</u>							✓	
<u>4.5</u>	✓							
<u>5</u>		✓						
<u>6</u>								✓
<u>7</u>							✓	

In general, a thorough editorial review will be required to ensure internal consistency.

# 10History

Document history		
v 0.0.1	1999-02	Initial Specification Structure
V0.0.2	1999-02	Text from merged document included.
V0.0.3	1999-03	Updated with decision from WG3 #2 (inclusion of IP domain congestion control)
V0.1.0	1999-04	Approved by WG3
v.0.1.1	1999-05	Updated with decisions from WG3 #3 – mostly from Tdoc 344. References and Ch7 updated according to document renumbering.
v.0.1.2	1999-06	Further changes after SWG review, and text from Iu SWG @ WG3#4 added. – This version was never treated <u>in a WG3 meeting</u> .
v.0.2.1	1999-06	Approved at WG3#4, and showing changes agreed at that meeting – sentence on establishment of GTP-U tunnels, and commonality of U-plane protocols.
<u>v.0.3.1</u>	<u>1999-08</u>	<u>Approved at WG3#5, and showing changes agreed at that meeting – figures updated to show single UP protocol, and with SCCP usage text (modified from tdoc 725)</u>
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