3GPP TSG CN Plenary Meeting #14 **NP-010658**
Kyoto, Japan, 12th –14th December 2001

Source: **TSG CN WG 1**

Title: **CRs to Rel-5 on Work Item LCS enhancements towards 24.008 and 44.064**

Agenda item: **9.7**

Document for: **APPROVAL**

Introduction:

This document contains **2** CRs on **Rel-5 to** Work Item **"LCS enhancements"**, that have been agreed by **TSG CN WG1**, and are forwarded to TSG CN Plenary meeting #14 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level
24.008	489	2	Rel-5	LCS capability for GPRS	B	5.1.0	5.2.0	N1-011993
44.064	002	3	Rel-5	Introduction of a new TOM protocol discriminator for RRLP	B	4.1.0	5.0.0	N1-012038

3GPP TSG-CN1 Meeting #21

Tdoc N1-011993
revised N1-011844
revised N1-011486

Cancun, Mexico, 26.- 30. November 2001

CR-Form-v4

CHANGE REQUEST

⌘ **24.008** **CR** 489 ⌘ ev 2 ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network **X**

Title:	⌘	LCS capability for GPRS
Source:	⌘	Siemens AG
Work item code:	⌘	*LCS for GERAN in A/Gb mode*
Date:	⌘	2001-11-08
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘ In R5 it will be possible to use the LCS service also via the PS domain in Gb mode. As transport layer for the RRLP protocol the LCC TOM protocol was chosen (LLC SAPI TOM8). Because the TOM8 LLC SAPI is a "fix wired" SAPI without a corresponding PDP context, the corresponding radio priority as well as a code point for the PFI (Packet Flow Identifier) need to be introduced.

Similar to SMS the radio priority for TOM8 must be assigned in the Attach Accept message.

Furthermore, the MS positioning capabilities need to be added to the GPRS Attach and RAU Request message.

Summary of change: ⌘
- a new Radio priority 2 IE is introduced, which is included in the Attach Accept message.
- a new IE for the MS positioning capabilities is added to the messages GPRS Attach and RAU Request
- a new PFI code point for the for the TOM8 SAPI is introduced.
- in the CM3 IE the description of the " MS Positioning Method Capability " field is deleted, as the field is not defined at all in the CSN1 structure.

Consequences if not approved: ⌘ *LCS for GERAN in A/Gb mode* will be uncompleted.

Clauses affected: ⌘ 9.4.1, 9.4.2, 9.4.14, 9.4.14, 10.5.7.2 and 10.5.5.12, 10.5.5.22(new), 10.5.6.11, 10.5.7.5(new), 10.5.1.7

Other specs affected: ⌘
☐ Other core specifications
☐ Test specifications
☐ O&M Specifications
⌘

Other comments: ⌘	

9.4.1 Attach request

This message is sent by the MS to the network in order to perform a GPRS or combined GPRS attach. See table 9.4.1/3GPP TS 24.008.

Message type: ATTACH REQUEST

Significance: dual

Direction: MS to network

Table 9.4.1/3GPP TS 24.008: ATTACH REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	½
	Attach request message identity	Message type 10.4	M	V	1
	MS network capability	MS network capability 10.5.5.12	M	LV	3-9
	Attach type	Attach type 10.5.5.2	M	V	½
	GPRS ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	½
	DRX parameter	DRX parameter 10.5.5.6	M	V	2
	P-TMSI or IMSI	Mobile identity 10.5.1.4	M	LV	6 - 9
	Old routing area identification	Routing area identification 10.5.5.15	M	V	6
	MS Radio Access capability	MS Radio Access capability 10.5.5.12a	M	LV	6 - 52
19	Old P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
17	Requested READY timer value	GPRS Timer 10.5.7.3	O	TV	2
9-	TMSI status	TMSI status 10.5.5.4	O	TV	1
33	PS LCS Capability	PS LCS Capability 10.5.5.22	O	TLV	3

9.4.1.1 Old P-TMSI signature

This IE is included if a valid P-TMSI and P-TMSI signature are stored in the MS.

9.4.1.2 Requested READY timer value

This IE may be included if the MS wants to indicate a preferred value for the READY timer.

9.4.1.3 TMSI status

This IE shall be included if the MS performs a combined GPRS attach and no valid TMSI is available.

9.4.1.4 PS LCS Capability

This IE shall be included if the MS supports at least one positioning method for the provision of location services (LCS) via the PS domain in Gb-mode.

9.4.2 Attach accept

This message is sent by the network to the MS to indicate that the corresponding attach request has been accepted. See table 9.4.2/3GPP TS 24.008.

Message type: ATTACH ACCEPT

Significance: dual

Direction: network to MS

Table 9.4.2/3GPP TS 24.008: ATTACH ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Attach accept message identity	Message type 10.4	M	V	1
	Attach result	Attach result 10.5.5.1	M	V	1/2
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Periodic RA update timer	GPRS Timer 10.5.7.3	M	V	1
	Radio priority for SMS	Radio priority 10.5.7.2	M	V	1/2
	~~Spare half octet~~ Radio priority for TOM8	~~Spare half octet~~ Radio priority 2 10.5.7.5~~1.8~~	M	V	1/2
	Routing area identification	Routing area identification 10.5.5.15	M	V	6
19	P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
17	Negotiated READY timer value	GPRS Timer 10.5.7.3	O	TV	2
18	Allocated P-TMSI	Mobile identity 10.5.1.4	O	TLV	7
23	MS identity	Mobile identity 10.5.1.4	O	TLV	7-10
25	GMM cause	GMM cause 10.5.5.14	O	TV	2
2A	T3302 value	GPRS Timer 2 10.5.7.4	O	TLV	3
8C	Cell Notification	Cell Notification 10.5.5.21	O	T	1
4A	Equivalent PLMNs	PLMN List 10.5.1.13	O	TLV	5-17

9.4.2.1 P-TMSI signature

This IE may be included to assign an identity to the MS's GMM context.

9.4.2.2 Negotiated READY timer

This IE may be included to indicate a value for the READY timer.

9.4.2.3 Allocated P-TMSI

This IE may be included to assign a P-TMSI to an MS in case of a GPRS or combined GPRS attach.

9.4.2.4 MS identity

This IE may be included to assign or unassign a TMSI to an MS in case of a combined GPRS attach.

9.4.2.5 GMM cause

This IE shall be included when IMSI attach for non-GPRS services was not successful during a combined GPRS attach procedure.

9.4.2.6 T3302 value

This IE may be included to indicate a value for the T3302 timer.

9.4.2.7 Cell Notification (GSM only)

In GSM, this IE shall be included by the SGSN in order to indicate the ability to support the Cell Notification.

9.4.2.8 Equivalent PLMNs

The *Equivalent PLMNs* information element is included if the network wants to inform the mobile station of equivalent PLMNs.

9.4.14 Routing area update request

This message is sent by the MS to the network either to request an update of its location file or to request an IMSI attach for non-GPRS services. See table 9.4.14/3GPP TS 24.008.

Message type: ROUTING AREA UPDATE REQUEST

Significance: dual

Direction: MS to network

Table 9.4.14/3GPP TS 24.008: ROUTING AREA UPDATE REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Routing area update request message identity	Message type 10.4	M	V	1
	Update type	Update type 10.5.5.18	M	V	1/2
	GPRS ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	1/2
	Old routing area identification	Routing area identification 10.5.5.15	M	V	6
	MS Radio Access capability	MS Radio Access capability 10.5.5.12a	M	LV	6 - 52
19	Old P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
17	Requested READY timer value	GPRS Timer 10.5.7.3	O	TV	2
27	DRX parameter	DRX parameter 10.5.5.6	O	TV	3
9-	TMSI status	TMSI status 10.5.5.4	O	TV	1
18	P-TMSI	Mobile identity 10.5.1.4	O	TLV	7
31	MS network capability	MS network capability 10.5.5.12	O	TLV	4-10
32	PDP context status	PDP context status 10.5.7.1	O	TLV	4
33	PS LCS Capability	PS LCS Capability 10.5.5.22	O	TLV	3

9.4.14.1 Old P-TMSI signature

This IE is included by the MS if it was received from the network in an ATTACH ACCEPT or ROUTING AREA UPDATE ACCEPT message.

9.4.14.2 Requested READY timer value

This IE may be included if the MS wants to indicate a preferred value for the READY timer.

9.4.14.3 DRX parameter

This IE shall be included if the MS changes the access network from GSM to UMTS, or the MS wants to indicate new DRX parameters to the network.

9.4.14.4 TMSI status

This IE shall be included if the MS performs a combined routing area update and no valid TMSI is available.

9.4.14.5 P-TMSI (UMTS only)

This IE shall be included by the MS.

9.4.14.6 MS network capability

This IE shall be included by the MS to indicate it's capabilities to the network.

9.4.14.7 PDP context status

This IE shall be included by the MS.

9.4.14.8 PS LCS Capability

This IE shall be included if the MS supports at least one positioning method for the provision of location services (LCS) via the PS domain in Gb-mode.

10.5.1.7 Mobile Station Classmark 3

The purpose of the *Mobile Station Classmark 3* information element is to provide the network with information concerning aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station. The Mobile Station Classmark information indicates general mobile station characteristics and it shall therefore, except for fields explicitly indicated, be independent of the frequency band of the channel it is sent on.

The *MS Classmark 3* is a type 4 information element with a maximum of 14 octets length.

The value part of a *MS Classmark 3* information element is coded as shown in figure 10.5.7/3GPP TS 24.008 and table 10.5.7/3GPP TS 24.008.

NOTE: The 14 octet limit is so that the CLASSMARK CHANGE message will fit in one layer 2 frame.

SEMANTIC RULE : a multiband mobile station shall provide information about all frequency bands it can support. A single band mobile station shall not indicate the band it supports in the *Multiband Supported, GSM 400 Bands Supported, GSM 700 Associated Radio Capability, GSM 850 Associated Radio Capability* or PCS *1900 Associated Radio Capability* fields in the MS Classmark 3. Due to shared radio frequency channel numbers between DCS 1800 and PCS 1900, the mobile should indicate support for either DCS 1800 band OR PCS 1900 band.

SEMANTIC RULE : a mobile station shall include the MS Measurement Capability field if the *Multi Slot Class* field contains a value of 19 or greater (see 3GPP TS 05.02).

Typically, the number of spare bits at the end is the minimum to reach an octet boundary. The receiver may add any number of bits set to "0" at the end of the received string if needed for correct decoding.

```
<Classmark 3 Value part> ::=
    < spare bit >
    {    < Multiband supported : { 000 } >
             < A5 bits >
    |    < Multiband supported : { 101 | 110 } >
             < A5 bits >
             < Associated Radio Capability 2 : bit(4) >
             < Associated Radio Capability 1 : bit(4) >
    |    < Multiband supported : { 001 | 010 | 100 } >
             < A5 bits >
             < spare bit >(4)
             < Associated Radio Capability 1 : bit(4) > }
    { 0 | 1 < R Support > }
    { 0 | 1 < Multi Slot Capability > }
    < UCS2 treatment: bit >
    < Extended Measurement Capability : bit >
    { 0 | 1 < MS measurement capability > }
    { 0 | 1 < MS Positioning Method Capability > }
    { 0 | 1 < EDGE Multi Slot Capability > }
    { 0 | 1 < EDGE Struct > }
    { 0 | 1 < GSM 400 Bands Supported : { 01 | 10 | 11 } >
             < GSM 400 Associated Radio Capability: bit(4) > }

    { 0 | 1 <GSM 850 Associated Radio Capability : bit(4) > }
    { 0 | 1 <PCS 1900 Associated Radio Capability : bit(4) > }
    < UMTS FDD Radio Access Technology Capability : bit >
    < UMTS 3.84 Mcps TDD Radio Access Technology Capability : bit >
    < CDMA 2000 Radio Access Technology Capability : bit >

    { 0 | 1  < DTM GPRS Multi Slot Class : bit(2) >
             < MAC Mode Support : bit >
             {0 | 1< DTM EGPRS Multi Slot Class : bit(2) > } }
    { 0 | 1 < Single Band Support > } -- Release 4 starts here:
    { 0 | 1 <GSM 700 Associated Radio Capability : bit(4)>}

    < UMTS 1.28 Mcps TDD Radio Access Technology Capability : bit >
    < MS_EXT_UTBF : bit >

    { 0 | 1 < Extended DTM GPRS Multi Slot Class : bit(2) >
             < Extended DTM EGPRS Multi Slot Class : bit(2) > }

    < spare bit > ;

< A5 bits > ::=
    < A5/7 : bit > < A5/6 : bit > < A5/5 : bit > < A5/4 : bit >  ;

<R Support>::=
    < R-GSM band Associated Radio Capability : bit(3) > ;

< Multi Slot Capability > ::=
    < Multi Slot Class : bit(5) >  ;
```

```
< MS Measurement capability > ::=
    < SMS_VALUE : bit (4) >
    < SM_VALUE : bit (4) > ;

< MS Positioning Method Capability > ::=
    < MS Positioning Method : bit(5) > ;

< EDGE Multi Slot Capability > ::=
    < EDGE Multi Slot Class : bit(5) > ;

 <EDGE Struct> : :=
    < Modulation Capability : bit >
    { 0 | 1 < EDGE RF Power Capability 1: bit(2) > }
    { 0 | 1 < EDGE RF Power Capability 2: bit(2) > }

< Single Band Support > ::=
    < GSM Band : bit (4) > ;
```

Figure 10.5.7/3GPP TS 24.008 *Mobile Station Classmark 3* information element

Table 10.5.7/3GPP TS 24.008: *Mobile Station Classmark 3* information element

Multiband Supported (3 bit field)

Band 1 supported (third bit of the field)

Bit 3

0 P-GSM not supported

1 P-GSM supported

Band 2 supported (second bit of the field)

BIT 2

0 E-GSM or R-GSM not supported

1 E-GSM or R-GSM supported

Band 3 supported (first bit of the field)

Bit 1

0 DCS 1800 not supported

1 DCS 1800 supported

The indication of support of P-GSM band or E-GSM or R-GSM band is mutually exclusive.

When the 'Band 2 supported' bit indicates support of E-GSM or R-GSM, the presence of the <R Support> field, see below, indicates if the E-GSM or R-GSM band is supported.

In this version of the protocol, the sender indicates in this field either none, one or two of these 3 bands supported.

For single band mobile station or a mobile station supporting none of the GSM 900 bands(P-GSM, E-GSM and R-GSM) and DCS 1800 bands, all bits are set to 0.

A5/4

Bit 1

0 Encryption algorithm A5/4 not available

1 Encryption algorithm A5/4 available

A5/5

Bit 1

0 Encryption algorithm A5/5 not available

1 Encryption algorithm A5/5 available

A5/6

Bit 1

0 Encryption algorithm A5/6 not available

1 Encryption algorithm A5/6 available

A5/7

0 Encryption algorithm A5/7 not available

1 Encryption algorithm A5/7 available

Associated Radio capability 1 and 2 (4 bit fields)

If either of P-GSM or E-GSM or R-GSM is supported, the radio capability 1 field indicates the radio capability for P-GSM, E-GSM or R-GSM, and the radio capability 2 field indicates the radio capability for DCS1800 if supported, and is spare otherwise.

If none of P-GSM or E-GSM or R-GSM are supported, the radio capability 1 field indicates the radio capability for DCS1800, and the radio capability 2 field is spare.

The radio capability contains the binary coding of the power class associated with the band indicated in multiband support bits (see GSMß05.05).

(continued...)

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

R Support

In case where the R-GSM band is supported the R-GSM band associated radio capability field contains the binary coding of the power class associated (see GSM 45.005) (regardless of the number of GSM bands supported). A mobile station supporting the R-GSM band shall also when appropriate, (see 10.5.1.6) indicate its support in the 'FC' bit in the Mobile Station Classmark 2 information element.

Note: the coding of the power class for P-GSM, E-GSM, R-GSM and DCS 1800 in radio capability 1 and/or 2 is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

Multi Slot Class (5 bit field)

In case the MS supports the use of multiple timeslots then the Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02.

UCS2 treatment (1 bit field)

This information field indicates the likely treatment by the mobile station of UCS2 encoded character strings. If not included, the value 0 shall be assumed by the receiver.

Bit 1

0 the ME has a preference for the default alphabet (defined in 3GPP TS 03.38) over UCS2.

1 the ME has no preference between the use of the default alphabet and the use of UCS2.

Extended Measurement Capability (1 bit field)

This bit indicates whether the mobile station supports 'Extended Measurements' or not

Bit 1

0 the MS does not support Extended Measurements

1 the MS supports Extended Measurements

SMS_VALUE (Switch-Measure-Switch) (4 bit field)
The SMS field indicates the time needed for the mobile station to switch from one radio channel to another, perform a neighbour cell power measurement, and the switch from that radio channel to another radio channel.

Bits
4 3 2 1

0 0 0 0 1/4 timeslot (~144 microseconds)
0 0 0 1 2/4 timeslot (~288 microseconds)
0 0 1 0 3/4 timeslot (~433 microseconds)
. . .
1 1 1 1 16/4 timeslot (~2307 microseconds)

SM_VALUE (Switch-Measure) (4 bit field)
The SM field indicates the time needed for the mobile station to switch from one radio channel to another and perform a neighbour cell power measurement.

Bits
4 3 2 1

0 0 0 0 1/4 timeslot (~144 microseconds)
0 0 0 1 2/4 timeslot (~288 microseconds)
0 0 1 0 3/4 timeslot (~433 microseconds)
. . .
1 1 1 1 16/4 timeslot (~2307 microseconds)

~~**MS Positioning Method Capability (1 bit field)**~~
~~This bit indicates whether the MS supports Positioning Method or not for the provision of Location Services.~~

MS Positioning Method (5 bit field)
This field indicates the Positioning Method(s) supported by the mobile station for the provision of location services (LCS) via the CS domain in A-mode.

MS assisted E-OTD

Bit 5

0 MS assisted E-OTD not supported

1 MS assisted E-OTD supported

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

MS based E-OTD

Bit 4

0 MS based E-OTD not supported

1 MS based E-OTD supported

MS assisted GPS

Bit 3

0 MS assisted GPS not supported

1 MS assisted GPS supported

MS based GPS

Bit 2

0 MS based GPS not supported

1 MS based GPS supported

~~MS~~ conventional GPS

Bit 1

0 conventional GPS not supported

1 conventional GPS supported

EDGE Multi Slot class (5 bit field)

In case the EDGE MS supports the use of multiple timeslots and the number of supported time slots is different from number of time slots supported for GMSK then the EDGE Multi Slot class field is included and is coded as the binary representation of the multislot class defined in 3GPP TS 05.02.

Modulation Capability

Modulation Capability field indicates the supported modulation scheme by MS in addition to GMSK

Bit 1

0 8-PSK supported for downlink reception only

1 8-PSK supported for uplink transmission and downlink reception

EDGE RF Power Capability 1 (2 bit field)

If 8-PSK modulation is supported for both uplink and downlink, the **EDGE RF Power Capability 1** field indicates the radio capability for8-PSK modulation in GSM 400, GSM700, GSM850 or GSM900.

EDGE RF Power Capability 2 (2 bit field)

If 8-PSK modulation is supported for both uplink and downlink, the **EDGE RF Power Capability 2** field indicates the radio capability for 8-PSK modulation in DCS1800 or PCS1900 if supported, and is not included otherwise.

The respective **EDGE RF Power Capability 1** and **EDGE RF Power Capability 2** fields contain the following coding of the 8-PSK modulation power class (see 3GPP TS 05.05):

Bits 2 1

0 0 Reserved

0 1 Power class E1

1 0 Power class E2

1 1 Power class E3

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

GSM 400 Bands Supported (2 bit field)

See the semantic rule for the sending of this field.

Bits

2 1

0 1 GSM 480 supported, GSM 450 not supported

1 0 GSM 450 supported, GSM 480 not supported

1 1 GSM 450 supported, GSM 480 supported

GSM 400 Associated Radio Capability (4 bit field)

If either GSM 450 or GSM 480 or both is supported, the GSM 400 Associated Radio Capability field indicates the radio capability for GSM 450 and/or GSM 480.

The radio capability contains the binary coding of the power class associated with the band indicated in GSM 400 Bands Supported bits (see 3GPP TS 05.05).

Note: the coding of the power class for GSM 450 and GSM 480 in GSM 400 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

GSM 850 Associated Radio Capability (4 bit field)

See the semantic rule for the sending of this field.

This field indicates whether GSM 850 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the GSM 850 band (see 3GPP TS 05.05).

Note: the coding of the power class for GSM 850 in GSM 850 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

PCS 1900 Associated Radio Capability (4 bit field)

See the semantic rule for the sending of this field.

This field indicates whether PCS 1900 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the PCS 1900 band (see 3GPP TS 05.05).

Note: the coding of the power class for PCS 1900 in PCS 1900 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

UMTS FDD Radio Access Technology Capability (1 bit field)

Bit 1
0 UMTS FDD not supported
1 UMTS FDD supported

UMTS 3.84 Mcps TDD Radio Access Technology Capability (1 bit field)

Bit 1
0 UMTS 3.84 Mcps TDD not supported
1 UMTS 3.84 Mcps TDD supported

CDMA 2000 Radio Access Technology Capability (1 bit field)

Bit 1
0 CDMA2000 not supported
1 CDMA2000 supported

DTM GPRS Multi Slot Class (2 bit field)
This field indicates the GPRS DTM multislot capabilities of the MS. It is coded as follows:

Bit 2 1
0 0 Multislot class 1 supported
0 1 Multislot class 5 supported
1 0 Multislot class 9 supported
1 1 Reserved for future extension. If received, the network shall interpret this as '00'

MAC Mode Support (1 bit field)
This field indicates whether the MS supports Dynamic and Fixed Allocation or only supports Exclusive Allocation. It is coded as follows:

Bit 1
0 Dynamic and Fixed Allocation not supported
1 Dynamic and Fixed allocation supported

EGPRS DTM Multislot Class (2 bit field)
This field indicates the EGPRS DTM multislot capabilities of the MS. This field shall be included only if the mobile station supports EGPRS DTM. This field is coded as the DTM GPRS Multi Slot Class field.

Single Band Support

This field shall be sent if the mobile station supports UMTS and one and only one GSM band with the exception of R-GSM; this field shall not be sent otherwise

GSM Band (4 bit field)

Bits
4 3 2 1
0 0 0 0 E-GSM is supported
0 0 0 1 P-GSM is supported
0 0 1 0 DCS 1800 is supported
0 0 1 1 GSM 450 is supported
0 1 0 0 GSM 480 is supported
0 1 0 1 GSM 850 is supported
0 1 1 0 PCS 1900 is supported
0 1 1 1 GSM 700 is supported
All other values are reserved for future use.

NOTE: When this field is received, the associated RF power capability is found in Classmark 1 or 2.

GSM 700 Associated Radio Capability (4 bit field)

See the semantic rule for the sending of this field.

This field indicates whether GSM 700 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the GSM 700 band (see 3GPP TS 05.05).

Note: the coding of the power class for GSM 700 in GSM 700 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

UMTS 1.28 Mcps TDD Radio Access Technology Capability (1 bit field)

Bit 1
0 UMTS 1.28 Mcps TDD not supported
1 UMTS 1.28 Mcps TDD supported

MS_EXT_UTBF (1 bit field)

Bit

0 Extended uplink TBF not supported

1 Extended uplink TBF supported

Extended GPRS DTM Multi Slot Class (2 bit field)

This field indicates the extended GPRS DTM multislot capabilities of the MS and shall be interpreted in conjunction with the GPRS DTM Multi Slot Class field. It is coded as follows, where 'DGMSC' denotes the DTM GPRS Multi Slot Class field:

DGMSC Bit	2 1	**Bit 2 1**	
	0 0	**0 0**	Multislot class 2 supported
	0 0	**0 1**	Multislot class 3 supported
	0 0	**1 0**	Multislot class 4 supported
	0 0	**1 1**	Multislot class 8 supported
	0 1	**0 0**	Multislot class 5 supported
	0 1	**0 1**	Multislot class 6 supported
	0 1	**1 0**	Multislot class 7 supported
	0 1	**1 1**	Spare. If received, the network shall interpret it as '(01) **00**'.
	1 0	**0 0**	Multislot class 9 supported
	1 0	**0 1**	Multislot class 10 supported
	1 0	**1 0**	Multislot class 11 supported
	1 0	**1 1**	Multislot class 12 supported

The presence of this field indicates that the MS supports combined fullrate and halfrate GPRS channels in the downlink.When this field is not present, the MS supports the multislot class indicated by the *DTM GPRS Multi Slot Class* field.

Extended DTM EGPRS Multi Slot Class (2 bit field)

This field is not considered when the EGPRS DTM Multi Slot Class field is not included. This field indicates the extended EGPRS DTM multislot capabilities of the MS and shall be interpreted in conjunction with the EGPRS DTM Multi Slot Class field. This field is coded as the Extended DTM GPRS Multi Slot Class field. The presence of this field indicates that the MS supports combined fullrate and halfrate GPRS channels in the downlink. When this field is not present, the MS supports the multislot class indicated by the *DTM GPRS Multi Slot Class* field.

10.5.5.20 Service type

The purpose of the *service type* information element is to specify the purpose of the Service request procedure.

The *service type* is a type 1 information element.

The *service type* information element is coded as shown in figure 10.5.135/3GPP TS 24.008 and table 10.5.153a/3GPP TS 24.008.

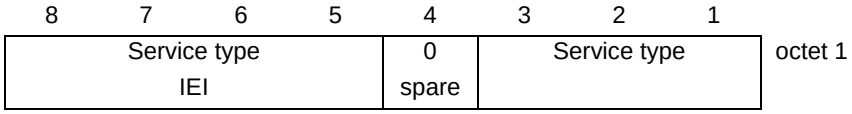

Figure 10.5.135/3GPP TS 24.008: *Service type* information element

Table 10.5.153a/3GPP TS 24.008: *Service type* information element

Service type value (octet 1) Bits **3 2 1** 0 0 0 Signalling 0 0 1 Data 0 1 0 Paging Response All other values are reserved.

10.5.5.21 Cell Notification

The purpose of the Cell Notification information element is to indicate that the Cell Notification is supported by the network and shall be then used by MS.

The Cell Notification information element is coded as shown in figure 10.5.135a/3GPP TS 24.008.

The Cell Notification is a type 2 information element.

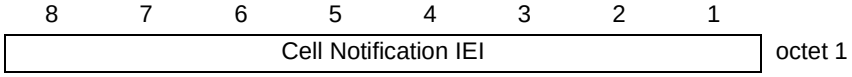

Figure 10.5.135a/3GPP TS 24.008: Cell Notification information element

10.5.5.22 PS LCS Capability

The purpose of the *PS LCS Capability* element is to indicate the positioning methods supported by the MS for the provision of location services (LCS) via the PS domain in Gb-mode.

The *PS LCS Capability* is a type 4 information element with a length of 3 octets.

The *PS LCS Capability* element is coded as shown in figure 10.5.135b/3GPP TS 24.008 and table 10.5.153b/3GPP TS 24.008.

8	7	6	5	4	3	2	1	
PS LCS Capability IEI								octet 1
Length of PS LCS Capability contents								octet 2
Spare			OTD-A	OTD-B	GPS-A	GPS-B	GPS-C	octet 3
0	0	0						

Figure 10.5.135b/3GPP TS 24.008: *PS LCS Capability* information element

Table 10.5.153b/3GPP TS 24.008 *PS LCS Capability* information element

PS LCS Capability value (octet 3, bit 1 to 5)

OTD-A (MS assisted E-OTD)
Bit 5
0 MS assisted E-OTD not supported
1 MS assisted E-OTD supported

OTD-B (MS based E-OTD)
Bit 4
0 MS based E-OTD not supported
1 MS based E-OTD supported

GPS-A (MS assisted GPS)
Bit 3
0 MS assisted GPS not supported
1 MS assisted GPS supported

GPS-B (MS based GPS)
Bit 2
0 MS based GPS not supported
1 MS based GPS supported

GPS-C (conventional GPS)
Bit 1
0 conventional GPS not supported
1 conventional GPS supported

Octet 3, bits 8, 7, 6 are spare and shall be coded all 0.

10.5.6.11 Packet Flow Identifier

The *Packet Flow Identifier (PFI)* information element indicates the Packet Flow Identifier for a Packet Flow Context.

The *Packet Flow Identifier* is a a type 4 information element with 3 octets length.

The *Packet Flow Identifier* information element is coded as shown in figure 10.5.143/3GPP TS 24.008 and table 10.5.161/3GPP TS 24.008.

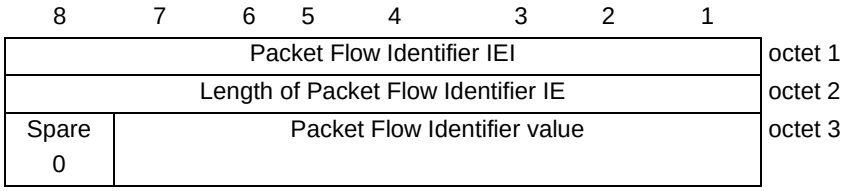

Figure 10.5.143/3GPP TS 24.008: *Packet Flow Identifier* information element

Table 10.5.161/3GPP TS 24.008: *Packet Flow Identifier* information element

Packet Flow Identifier value (octet 3)	
Bits	
7 6 5 4 3 2 1	
0 0 0 0 0 0 0	Best Effort
0 0 0 0 0 0 1	Signaling
0 0 0 0 0 1 0	SMS
0 0 0 0 0 1 1	TOM8
0 0 0 0 1~~0~~ 0~~1~~ 0~~1~~	}
to	} reserved
0 0 0 0 1 1 1	}
0 0 0 1 0 0 0	}
to	} dynamically assigned
1 1 1 1 1 1 1	}

****** next section for information only ******

10.5.7.2 Radio priority

The purpose of the *radio priority* information element is to specify the priority level that the MS shall use at the lower layers for transmission of data related to a PDP context or for mobile originated SMS transmission.

The *radio priority* information element is coded as shown in figure 10.5.145/3GPP TS 24.008 and table 10.5.161/3GPP TS 24.008.

The *radio priority* is a type 1 information element.

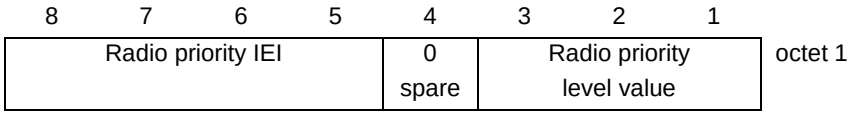

Figure 10.5.145/3GPP TS 24.008: *Radio priority* information element

Table 10.5.161/3GPP TS 24.008: *Radio priority* information element

Radio priority level value (octet 1) Bits **3 2 1** 0 0 1 priority level 1 (highest) 0 1 0 priority level 2 0 1 1 priority level 3 1 0 0 priority level 4 (lowest) All other values are interpreted as priority level 4 by this version of the protocol.

*** *next section for information only* ***

10.5.7.4 GPRS Timer 2

The purpose of the *GPRS timer 2* information element is to specify GPRS specific timer values, e.g. for the timer T3302.

The *GPRS timer 2* is a type 4 information element with 3 octets length.

The *GPRS timer 2* information element is coded as shown in figure 10.5.147/3GPP TS 24.008 and table 10.5.163/3GPP TS 24.008.

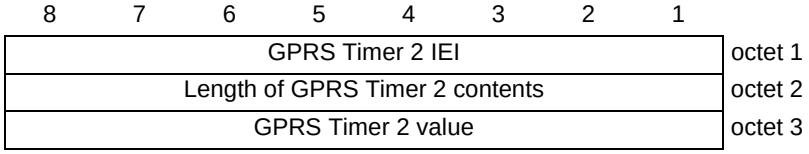

Figure 10.5.147/3GPP TS 24.008: GPRS *Timer 2* information element

Table 10.5.163/3GPP TS 24.008: GPRS *Timer 2* information element

GPRS Timer 2 value is coded as octet 2 of the *GPRS timer* information element.

10.5.7.5 Radio priority 2

The purpose of the *radio priority 2* information element is to specify the priority level that the MS shall use at the lower layers for transmission of mobile originated TOM8 transmission.

The *radio priority 2* information element is coded as shown in figure 10.5.148/3GPP TS 24.008 and table 10.5.164/3GPP TS 24.008.

The *radio priority* is a type 1 information element.

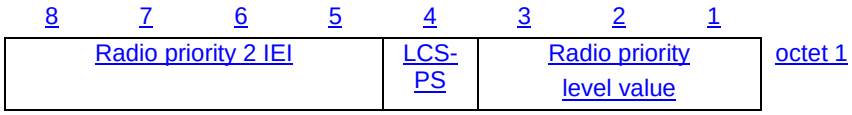

Figure 10.5.148/3GPP TS 24.008: *Radio priority 2* information element

Table 10.5.164/3GPP TS 24.008: *Radio priority 2* information element

Radio priority level value (octet 1, bits 1-3)

Bits 3 2 1	
0 0 1	priority level 1 (highest)
0 1 0	priority level 2
0 1 1	priority level 3
1 0 0	priority level 4 (lowest)

All other values are interpreted as priority level 4 by this version of the protocol.

LCS-PS (octet 1, bit 4)

Bit 4	
0	LCS via the PS domain in Gb-mode not supported
1	LCS via the PS domain in Gb-mode supported

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Cancun, Mexico, 26.- 30. November 2001

Tdoc N1-012038
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CR-Form-v4

CHANGE REQUEST

⌘ **44.064** **CR** 002 ⌘ ev 3 ⌘ Current version: 4.1.0 ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Introduction of a new TOM protocol discriminator for RRLP
Source:	⌘	Ericsson, Siemens AG, Motorola
Work item code:	⌘	LCS
Date:	⌘	28.11.01
Category:	⌘	**B**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	For introduction of the LCS procedure in Gb mode for Rel-5, the TOM protocol definition in 3GPP TS 44.064 need to be updated.
Summary of change:	⌘	It is proposed to define a new TOM protocol discriminator for RRLP and to increases the maximum size of the message capsule to 242 octets.
Consequences if not approved:	⌘	The LCS procedure in Gb mode will not be feasible.

Clauses affected:	⌘	2, 3.2, 4.10, Annex B
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] 3GPP TS 01.61: "Digital cellular telecommunications system (Phase 2+); GPRS ciphering algorithm requirements".

[3] 3GPP TS 02.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service description; Stage 1".

[4] 3GPP TS 03.40: "Digital cellular telecommunications system (Phase 2+); Technical realization of the Short Message Service (SMS); Point-to-Point (PP)".

[5] 3GPP TS 03.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service description; Stage 2".

[6] 3GPP TS 03.64: "Digital cellular telecommunications system (Phase 2+); Overall description of the General Packet Radio Service (GPRS) Radio interface; Stage 2".

[7] 3GPP TS 04.01: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface; General aspects and principles".

[8] 3GPP TS 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".

[9] 3GPP TS 04.11: "Digital cellular telecommunication system (Phase 2+); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[10] 3GPP TS 04.22: "Digital cellular telecommunications system (Phase 2+); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[11] 3GPP TS 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) – Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)".

[12] 3GPP TS 08.18: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".

[13] ITU-T Q.920 (1988): "ISDN user-network interface data link layer – general aspects".

[14] ITU-T Q.921 (1988): "ISDN user-network interface – data link layer specification".

[15] ITU-T Z.100 (1988): "CCITT specification and description language (SDL)".

[16] ISO 3309 (1984): "Information processing systems – Data communications – High-level logical link control procedures – Frame structure".

[17] ISO 4335 (1987): "Information processing systems – Data communication – High-level logical link control procedures – Consolidation of elements of procedures".

[18] ISO 7809 (1984): "Information processing systems – Data communication – High-level logical link control procedures – Consolidation of classes of procedures".

[19] ISO 7809 (1984): "Information processing systems – Data communication Add. 1: 1987 – High-level logical link control procedures – Consolidation of classes of procedures – Addendum 1".

[20] ISO 7809 (1984): "Information processing systems – Data communication Add. 2: 1987 – High-level logical link control procedures – Consolidation of classes of procedures – Addendum 2: Description of optional functions".

[21] TIA IS-130 (1995): "800 MHz Cellular System – TDMA Radio Interface – Radio Link Protocol 1" Arlington: Telecommunications Industry Association.

[22] TIA/EIA-136 (1999): "TDMA Cellular / PCS"; Arlington: Telecommunications Industry Association.

[23] 3GPP TS 44.060: “General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/ Medium Access Control (RLC/MAC) protocol”.

[24] 3GPP TS 44.031: “Mobile Station (MS) - Serving Mobile Location Centre (SMLC) Radio Resource LCS Protocol (RRLP)”.

[25] 3GPP TS 43.059: "Functional Stage 2 Description of Location Services (LCS) in GERAN".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. Additional applicable definitions can be found in 3GPP TS 02.60 [3].

frame rejection condition: a condition that results from the receipt of an undefined or incorrect frame.

inquiry process: a process performed in the peer receiver busy condition in which the LLE checks that the peer LLE is still in the own receiver busy condition.

invalid frame condition: a condition that results from the receipt of an invalid frame.

logical link connection: the logical connection between two LLE peers. A logical link connection is identified with a Data Link Connection Identifier (DLCI). A logical link connection is always in one of three states: TLLI Unassigned, TLLI Assigned / ADM, or ABM.

logical link control layer: the protocol layer between an MS and an SGSN consisting of one or more logical link management entities, one or more logical link entities, and a multiplex procedure.

logical link entity: the LLC layer protocol state machine controlling one logical link connection.

own receiver busy condition: a condition that results from the inability to accept additional I frames from the peer logical link entity.

peer receiver busy condition: a condition that results from the reception in of a RNR frame from the peer logical link entity.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply. Additional applicable abbreviations and symbols can be found in 3GPP TS 01.04 [1] and 3GPP TS 03.60.

ABM Asynchronous Balanced Mode
ACK ACKnowledgement
ADM Asynchronous Disconnected Mode

CNF	Confirm
DISC	DISConnect
DM	Disconnected Mode
FRMR	FRaMe Reject
GMM	GPRS Mobility Management
GRR	GPRS Radio Resources service access point
I	Information
IOV	Input Offset Value
IND	Indication
LAPD	Link Access Procedure on the D-channel
LCS	Location Services
LL	Logical Link
LLC	Logical Link Control
LLE	Logical Link Entity
LLGMM	LLC to GPRS Mobility Management service access point
LLM	Logical Link Management
LLME	Logical Link Management Entity
REQ	Request
RES	Response
RNR	Receive Not Ready
RR	Receive Ready
RRLP	Radio Resource LCS Protocol
S	Supervisory
SABM	Set Asynchronous Balanced Mode
SACK	Selective ACKnowledgement
TIA	Telecommunications Industry Association
TOM	Tunnelling Of Messages
UA	Unnumbered Acknowledgement
UI	Unconfirmed Information
XID	eXchange IDentification

********** *next section for information only* **********

4.7 LLC layer structure

The LLC layer structure is shown in Figure 1. This figure is a model shown for illustrative purposes only, and does not constrain implementations.

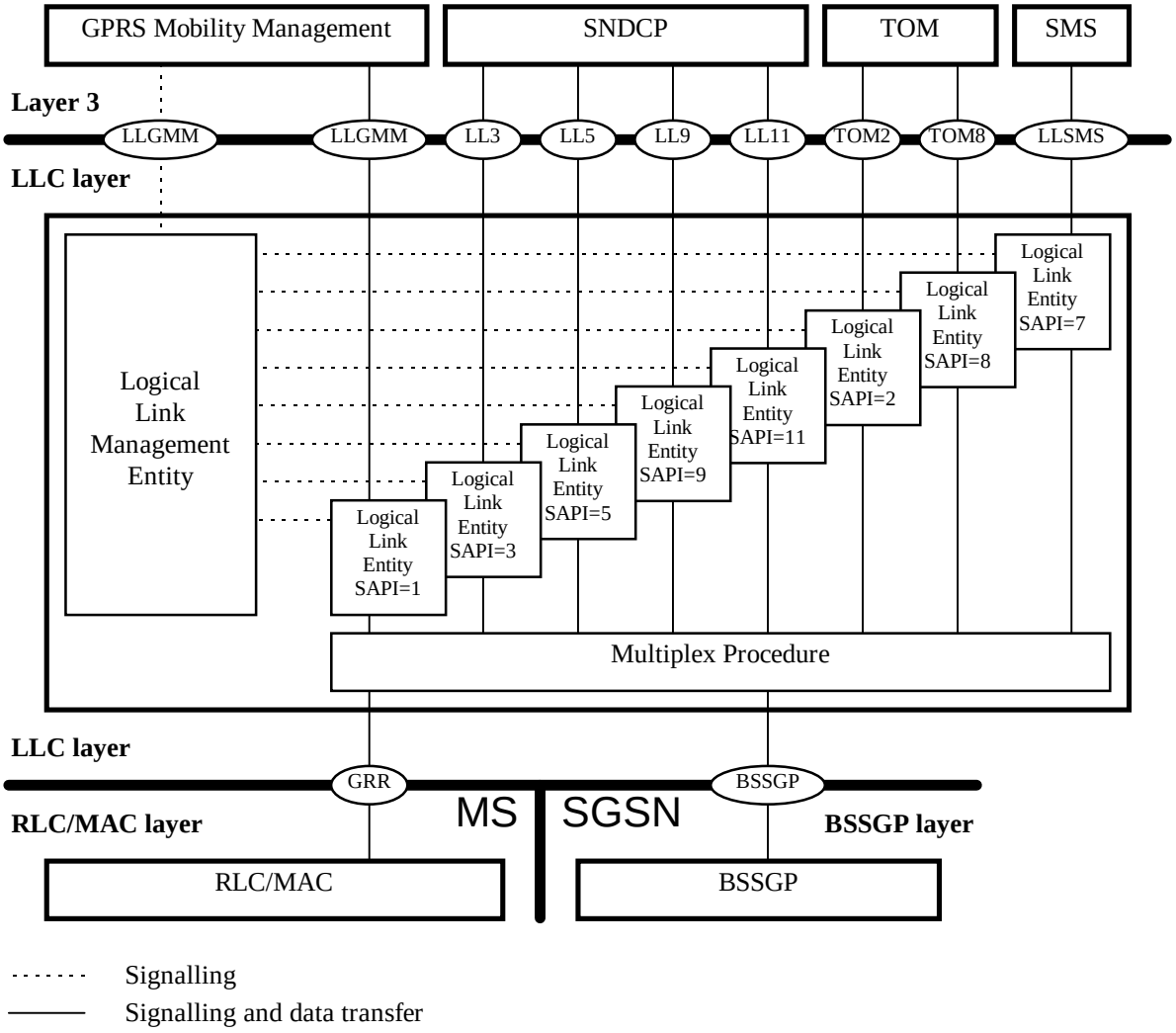

Figure 1: Functional model of the LLC layer

4.7.1 Logical Link Entity

The logical link procedures consist of multiple Logical Link Entities (LLEs) that control the information flow of individual connections. There may be multiple LLEs per TLLI. Functions provided by each LLE are:

- unacknowledged information transfer;
- acknowledged information transfer;
- flow control in ABM operation; and
- frame error detection.

The LLE analyses the control field of the received frame (see subclause 6.3) and provides appropriate responses and

layer-to-layer indications. In addition, LLE analyses the LLC layer service primitives and transmits the appropriate command and response frames. There is one logical link entity for each DLCI.

4.7.2 Multiplex procedure

On frame transmission, the multiplex procedure generates and inserts the FCS, performs the frame ciphering function, and provides SAPI-based logical link control layer contention resolution between the various LLEs.

On frame reception, the multiplex procedure performs the frame decipher function and checks the FCS. If the frame passes the FCS check, the multiplex procedure distributes the frame to the appropriate logical link entity based on the DLCI.

3GPP TS 01.61 [2] contains the requirements for the GPRS ciphering algorithm.

4.7.3 Logical Link Management

The Logical Link Management Entity (LLME) manages the resources that have an impact on individual connections. There is one LLME per TLLI. Functions provided by the LLME are:

- parameter initialisation;
- error processing; and
- connection flow control invocation.

The RLC/MAC layer functions are described in 3GPP TS 03.64 [6]. BSSGP is specified in 3GPP TS 08.18. SNDCP is specified in 3GPP TS 04.65.

4.8 GPRS Mobility Management

GPRS Mobility Management (GMM) uses the services of the LLC layer to transfer messages between the MS and the SGSN. GMM includes functions such as attach and authentication, and transport of session management messages for functions such as PDP context activation and deactivation. GMM procedures are defined in 3GPP TS 04.08 and are beyond the scope of the LLC layer. Interaction between GMM and LLC is defined in terms of service primitives, see clause 7.

4.9 Short Message Service

The Short Message Service (SMS) uses the services of the LLC layer to transfer short messages between the MS and the SGSN. SMS procedures are defined in 3GPP TS 03.40 [4] and 3GPP TS 04.11 [9] and are beyond of the scope of the LLC layer. Interaction between SMS and LLC is defined in terms of service primitives, see clause 7.

4.10 Tunnelling Of Messages

TOM is a generic protocol layer used for the exchange of TOM Protocol Envelopes between the MS and the SGSN. TOM procedures are defined in annex B.

********** *Next Modified Section* **********

Annex B (normative): Tunnelling of Messages (TOM)

Tunnelling of Messages (TOM) is a generic protocol layer used for the exchange of TOM Protocol Envelopes (see Figure B.1) between the MS and the SGSN. TOM uses two LLC SAPs, one for high-priority messages and another for low-priority messages. The TOM Protocol Envelope is composed of a TOM Protocol Header (containing one or more octets) and a Message Capsule. The TOM Protocol Header contains information about the specific application using the TOM protocol layer and any other TOM Protocol Discriminator-specific information. The Message Capsule is the actual payload of information in the TOM Protocol Envelope. One of the uses of the TOM protocol layer is to tunnel signalling messages between an MS and a non-GSM MSC/VLR when GPRS network elements are used in non-GSM networks. See 3GPP TS 03.60 and 3GPP TS 09.18. The TOM protocol layer is also used to tunnel Radio Resource LCS Protocol (RRLP) messages. See 3GPP TS 43.059[25] and 3GPP TS 44.031[24].

B.1 TOM Protocol Envelope structure

All TOM protocol peer-to-peer exchanges shall be in TOM Protocol Envelopes conforming to the format shown in Figure B.1. The TOM Protocol Header shall consist of the TOM Protocol Discriminator, Remaining Length of TOM Protocol Header, and Remaining Octets of TOM Protocol Header fields, and is a minimum of 1 octet and a maximum of 15 octets long.

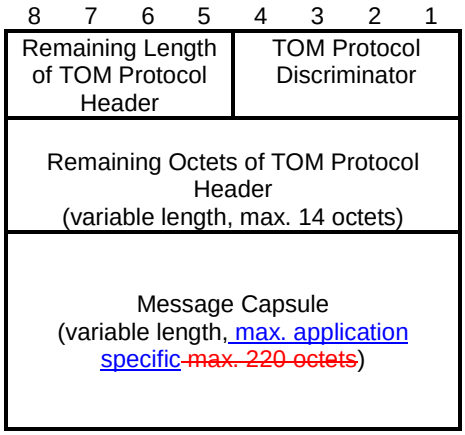

Figure B.1: TOM Protocol Envelope format

Note: When the TOM Protocol Discriminator indicates TIA/EIA-136, the maximum size of the message capsule is 220 octets (see [22]).
When the TOM Protocol Discriminator indicates RRLP, the maximum size of the message capsule is 242 octets (see 3GPP TS 44.031[24]).

B.1.1 TOM Protocol Discriminator

TOM Protocol Discriminator indicates the specific protocol technology using TOM, and is coded as follows:

bits 4 3 2 1
0 0 0 0 Not specified
0 0 0 1 TIA/EIA-136 [22]
0 0 1 0 RRLP [24]
1 1 1 1 Reserved for extension

All other values are reserved

If any other value than '0 0 0 1' or '0 0 1 0' is received, then the TOM Protocol Envelope shall be discarded with no further action.

B.1.2 Remaining Length of TOM Protocol Header

Remaining Length of TOM Protocol Header indicates the number of octets remaining in the TOM-protocol-header part of the TOM Protocol Envelope, and is coded as follows:

bits	**8 7 6 5**
0 0 0 0	0 octets remaining in TOM protocol header
0 0 0 1	1 octet remaining in TOM protocol header
1 1 1 0	14 octets remaining in TOM protocol header
1 1 1 1	Reserved for extension

If the value 1 1 1 1 is received, then the TOM Protocol Envelope shall be discarded with no further action.

B.1.3 Remaining Octets of TOM Protocol Header

This field contains the octets following the first octet in the TOM-protocol-header. If present, the interpretation of the information contained in this field is TO M Protocol Discriminator-specific.

B.1.4 Message Capsule

This field contains TOM Protocol Discriminator-specific payload in the TOM Protocol Envelope.