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**Universal Mobile Telecommunications System (UMTS);
Application of Q.1900 series to bearer independent
Circuit Switched (CS) core network architecture;
Stage 3
(3GPP TS 29.205 version 13.0.0 Release 13)**



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1 Scope

The present document describes the protocols to be used when ITU-T Q.1902 "Bearer Independent Call Control" is used as call control protocol in a 3GPP Bearer Independent CS core network 3GPP TS 23.205 [1]. The Q.1902 operates between (G)MSC servers. The BICC architecture as described in ITU-T Q.1902 [6]-[10] consists of a number of protocols. The following types of protocols are described: call control protocol, bearer control protocols and a resource control protocol for this architecture. The architecture complies with the requirements imposed by 3GPP TS 23.205 [1] and TS 23.153 [2].

The present document is valid for a 3rd generation PLMN (UMTS) complying with Release 4 and later.

Note: Q.1902 can be used in other network architectures than the one defined in 3GPP TS 23.205 [1].

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 23.205: "Bearer Independent CS Core Network – Stage 2".
- [2] 3GPP TS 23.153: "Out of Band Transcoder Control - Stage 2".
- [3] 3GPP TS 29.232: "Media Gateway Controller (MGC) – Media Gateway (MGW) Interface; Stage 3".
- [4] 3GPP TS 29.414: "Core Network Nb Data Transport and Signalling Transport".
- [5] ITU-T Recommendation Q.765.5 (06/2000): "Application Transport Mechanism".
- [6] ITU-T Recommendation Q.1902.1 (07/2001): "Bearer Independent Call Control CS2 Functional Description". Inclusive Amendment 3: "Support for the Customized Alerting Tone (CAT) service".
- [7] ITU-T Recommendation Q.1902.2 (07/2001): "Bearer Independent Call Control CS2 General functions of messages and parameters". Inclusive Amendment 5: "Support for the Customized Alerting Tone (CAT) service".
- [8] ITU-T Q.1902.3 (07/2001): "Bearer Independent Call Control CS2 Formats and Codes". Inclusive Amendment 5: "Support for the Customized Alerting Tone (CAT) service".
- [9] ITU-T Recommendation Q.1902.4 (07/2001): "Bearer Independent Call Control CS2 Basic Call Procedures".
- [10] ITU-T Recommendation Q.1902.5 (07/2001): "Exceptions to the Application Transport Mechanism in the Context of Bearer Independent Call Control".
- [11] ITU-T Recommendation Q.1902.6 (07/2001): "Generic Signalling Procedures for the support of the ISDN User Part Supplementary Services and for bearer redirection".
- [12] ITU-T Recommendation Q.1950 (07/2001): "Call Bearer Control Protocol".
- [13] ITU-T Recommendations Q.2630.1 (12/1999), Q.2630.2 (12/2000): "AAL type 2 signalling protocol".

- [14] ITU-T Recommendation Q.1990 (07/2001): "BICC Bearer Control tunnelling protocol".
- [15] ITU-T Recommendation Q.1970 (07/2001): "BICC IP Bearer Control protocol".
- [16] ITU-T Recommendation Q.1912.1 (07/2001): "Interworking between Signalling System No. 7 ISDN user part and the Bearer Independent Call Control protocol".
- [17] ITU-T Recommendation Q.1912.2 (07/2001): "Interworking between selected Signalling System (PSTN Access DSS1, C5, R1, R2, TUP) and the Bearer Independent Call Control Protocol".
- [18] ITU-T Recommendation Q.2150.0 (05/2001): "Generic Signalling Transport Service".
- [19] ITU-T Recommendation Q.2150.1 (05/2001): "Signalling Transport Converter on MTP3 and MTP3b".
- [20] ITU-T Recommendation Q.2150.3 (12/2002): "Signalling Transport Converter on SCTP".
- [21] ITU-T Recommendation H.248.4 (11/2000): "Gateway Control Protocol: Transport over SCTP".
- [22] 3GPP TS 29.202: "SS7 signalling transport in core network".
- [23] ITU-T Recommendation H.248.5 (11/2000): "Gateway control protocol: Transport over ATM".
- [24] ITU-T Q.765 (06/2000): "Signalling system No. 7 – Application transport mechanism".
- [25] 3GPP TS 23.003: "Numbering, addressing and identification".
- [26] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".
- [27] 3GPP TS 23.237: "IP Multimedia subsystem (IMS) Service Continuity; Stage 2".
- [28] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [29] 3GPP TS 23.284: "Local Call Local Switch; Stage 2".

3 Definitions, symbols and abbreviations

3.1 Definitions

3.2 Symbols

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

Nc	Interface between the (G)MSC servers.
Mc	Interface between the server and the media gateway.
Nb	Interface between media gateways (MGW).

3.3 Abbreviations

For the purposes of the present document, the abbreviations as defined in 3GPP TR 21.905 [28] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [28].

APM	Application Transport Mechanism
	Application Transport Message
APP	Application Transport Parameter
BAT	Bearer Association Transport
BICC	Bearer Independent Call Control
C5	CCITT signalling system number 5
GCR	Global Call Reference

LCLS	Local Call Local Switch
M3UA	MTP3 – User Adaptation Layer
MGC	Media Gateway Controller
MST	Mobile Service Transport
R1	Regional Signalling System 1
R2	Regional Signalling System 2
SCTP	Stream Control Transmission Protocol
SN	Serving Node
TUP	Telephony User Part

4 Protocols

Implementations providing any of the interfaces or protocols identified in the subclauses below shall implement the requirements of the specifications identified in those subclauses.

4.1 Call control protocol (Nc interface)

Q.1902.1	BICC PROTOCOL (CS2) FUNCTIONAL DESCRIPTION [6]
Q.1902.2	BICC PROTOCOL (CS2) AND SIGNALLING SYSTEM NO 7 ISUP GENERAL FUNCTIONS OF MESSAGES AND PARAMETERS [7]
Q.1902.3	BICC PROTOCOL (CS2) AND SIGNALLING SYSTEM NO 7 ISUP FORMATS AND CODES [8] (NOTE)
Q.1902.4	BICC (CS2) BASIC CALL PROCEDURES [9]
Q.1902.5	EXCEPTIONS TO THE APM IN THE CONTEXT OF BICC [10] AMENDMENT TO ITU-T RECOMMENDATION Q.765.5 FOR BICC CS2 [5]
Q.1902.6	GENERIC SIGNALLING PROCEDURES AND SUPPORT OF THE ISDN USER PART SUPPLEMENTARY SERVICES WITH THE BEARER INDEPENDENT CALL CONTROL PROTOCOL [11]
NOTE:	The "Backward CAT indicators" parameter shall be encoded as an optional 3-octet parameter in the ACM, CPG and SEG messages rather than as a 1-octet parameter as incorrectly defined in Amendment 5 of ITU-T Recommendation Q.1902.3 [8].

4.2 Interworking with other protocols

Q.1912.1	ISUP-BICC INTERWORKING [16]
Q.1912.2	INTERWORKING BETWEEN SELECTED SIGNALLING SYSTEMS (PSTN ACCESS DSS1 C5 R1 R2 TUP) AND THE BEARER INDEPENDENT CALL CONTROL PROTOCOL [17]

4.3 Resource control protocol (G)MSC and MGW (Mc Interface)

3GPP TS 29.232	"Media Gateway Controller (MGC) – Media Gateway (MGW) Interface; Stage 3" [3]
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4.4 Bearer control protocol between MGWs (Nb interface)

3GPP TS 29.414	"Core Network Nb Data Transport and Signalling Transport" [4] including ITU-T Recommendation Q.1970 "IP bearer control protocol" [15], ITU-T Recommendation Q.1990 "BICC tunneling control protocol" [14], ITU-T Recommendation Q.2630.1-2 "AAL type 2 signalling protocol" [13].
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4.5 Signalling Transport

4.5.1 Call Control protocols

Q.2150.0	"Generic Signalling Transport Service" [18]
Q.2150.1	"Signalling Transport Converter on MTP3 and MTP3b" [19]
Q.2150.3	"Signalling Transport Converter on SCTP" [20]
3GPP TS 29.202	"SS7 signalling transport in core network" [22] Annex A: The use of M3UA in 3GPP networks.

4.5.2 Resource control protocol (G)MSC and MGW (Mc Interface)

3GPP TS 29.232	"Media Gateway Controller (MGC) – Media Gateway (MGW) Interface; Stage 3" [3] including ITU-T Recommendation H.248.4 "Transport over SCTP" [21], ITU-T Recommendation H.248.5 "Transport over ATM" [23], and 3GPP TS 29.202 "SS7 signalling transport in core network" [22] Annex A: The use of M3UA in 3GPP networks.
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4.5.3 Bearer control protocol between MGWs (Nb interface)

3GPP TS 29.414	"Core Network Nb Data Transport and signalling transport" [4] including ITU-T Recommendation Q.2630.1-2: "AAL type 2 signalling protocol" [13] and the tunnel-up and tunnel-down procedure in 3GPP TS 29.232 [31]
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Annex A: Void

Annex B (normative): Transparent Support of Mobile Services

B.1 Introduction

This Annex specifies a new mobile APM usage "Transparent support of mobile services".

In ITU-T Recommendation Q.1902.3 [8], for the Application Transport Parameter (APP), the following codepoint is defined to refer to this application context identifier (ACI):

0 0 0 0 1 1 1 MST <as defined in ETSI TS 129.205>

The text in ITU-T Recommendation Q.1902.5 [10] shall be followed when implementing this application with the following clarification:

- where the text refers to BAT ASE this shall be interpreted to mean Mobile Service Transport (MST) service.

The MST service shall use implicit addressing; see ITU-T Recommendation Q.765 [24].

B.2 Mobile Service Transport (MST) – Format and Codes

B.2.1 Encapsulated Application Information

B.2.1.1 General Layout

The general layout of the Encapsulated Application Information field of the Application Transport parameter as defined in ITU-T Recommendation Q.1902.3 [8] is shown in Table B.2.1.1.1.

Table B.2.1.1.1: Encapsulated application information field

MSB						LSB		
8	7	6	5	4	3	2	1	Octet
Identifier 1								1
Length indicator 1								2
Compatibility information 1								3
Contents 1								4
Identifier n								m
Length indicator n								
Compatibility information n								
Contents n								p

Each information element within the Encapsulated Application Information field has the same structure. An information element consists of four fields which always appear in the following order: Identifier (one octet), Length indicator, Compatibility information, Contents.

The Identifier distinguishes one type from another one and governs the interpretation of the contents. There are two types of Identifiers: type "constructor" and type "simple", for which the contents are defined as follows:

- For a "constructor" type, the Contents field shall again consist of one or more information elements, each of which is structured as described above, i.e., Identifier, Length indicator, Compatibility information, Contents.
- For a "simple" type, the Contents field contains one value only.

When passing on an information element of type "constructor", the order of the information elements within this "constructor" shall be maintained.

The Length indicator specifies the length (i.e., integral number of octets in pure binary representation) of the Compatibility information and Contents. The length does not include the Identifier nor the Length indicator.

The format of the Length indicator is shown in Table B.2.1.1.2. Bit 8 is defined as Extension indicator and indicates whether or not the information on the length continues through the next octet. Value "0" of the Extension indicator means "information continues through the next octet", while value "1" means "last octet". The Length indicator itself has a maximum length of 2 octets, i.e., if octet 1a is needed, the Extension indicator of octet 1a is always set to value "1".

Table B.2.1.1.2: Length indicator

8	7	6	5	4	3	2	1	Octet
ext.							LSB	1
ext. 1	0	0	0	MSB				1a

The Compatibility information contains corresponding instructions for the case that the received information element is unrecognised. The format of this field is shown in Table B.2.1.1.3.

Table B.2.1.1.3: Compatibility information

8	7	6	5	4	3	2	1	Octet
ext.	pass-on not possible		instruction indicator	reserved	general action		instruction indicator	1
	send notification indicator				send notification indicator			

The following codes are used in the subfields of the Compatibility information field.

- | | | |
|------|-----|---|
| Bits | 2 1 | <i>Instruction indicator for general action</i> |
| | 0 0 | Pass on information element |
| | 0 1 | Discard information element |
| | 1 0 | Discard MST data |
| | 1 1 | Release call |
| Bit | 3 | <i>Send notification indicator for general action</i> |
| | 0 | Do not send notification |
| | 1 | Send notification |
| Bit | 4 | reserved |
| Bits | 6 5 | <i>Instruction indicator for pass-on not possible</i> |
| | 0 0 | Release call |

- 0 1 Discard information element
- 1 0 Discard MST data
- 1 1 reserved (interpreted as 00)
- Bit 7 *Send notification indicator for pass-on not possible*
- 0 Do not send notification
- 1 Send notification
- Bit 8 *Extension indicator*
- 0 Information continues through the next octet
- 1 Last octet

The Contents field is the substance of the element and contains the information the element is intended to convey.

B.2.1.2 List of Identifiers

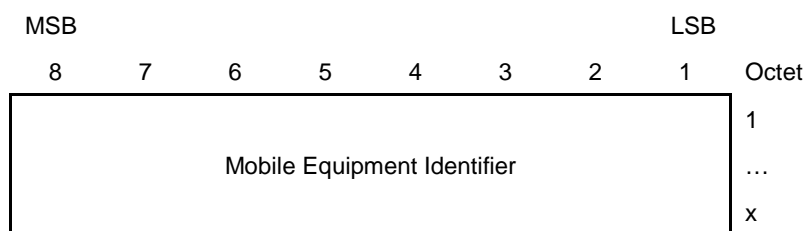
Table B.2.1.2.1 contains the list of Identifiers.

Table B.2.1.2.1: List of identifiers

Value	Information element name	Type	Reference
0000 0000	spare	-	
0000 0001	Mobile Equipment Identifier	simple	B.2.1.3
0000 0010	LCLS Negotiation Request	simple	B.2.1.4
0000 0011	LCLS Negotiation Response	simple	B.2.1.5
0000 0100	LCLS Status	simple	B.2.1.6
0000 0101	LCLS Status Change	simple	B.2.1.7
0000 0110	LCLS Status Result	simple	B.2.1.8
0000 0111	LCLS Global Call Reference	simple	B.2.1.9
0000 1000	LCLS Configuration Preference	simple	B.2.1.10
0000 1001	LCLS Configuration Change Request	simple	B.2.1.11
0000 1010	LCLS Configuration Change Result	simple	B.2.1.12
0000 1011 to 1101 1111	reserved for 3GPP use	-	
1110 0000 to 1111 1111	reserved for national use	-	

B.2.1.3 Mobile Equipment Identifier

The format of the Mobile Equipment Identifier is shown in Table B.2.1.3.1.

Table B.2.1.3.1: Mobile Equipment Identifier

The MEI contains either the International Mobile station Equipment Identity (IMEI) or the International Mobile station Equipment Identity and Software Version Number (IMEISV) as defined in subclause 6.2 of 3GPP TS 23.003 [25].

Both IMEI and IMEISV are TBCD encoded where IMEI is 15 digits and IMEISV is 16 digits. Bits 5 to 8 of octet n+1 (where n represents the octet of the IMEI(SV) being encoded) encodes digit 2n, bits 1 to 4 of octet n+1 encodes digit 2n-1 (i.e. the order of digits is swapped in each octet compared to the digit order defined in 3GPP TS 23.003 [25]). For IMEI, bits 5 to 8 of the last octet shall be filled with an end mark coded as '1111'.

For the use of the Mobile Equipment Identifier (MEI) see 3GPP TS 23.216 [26] and 3GPP TS 23.237 [27].

B.2.1.4 LCLS Negotiation Request

The format of the LCLS Negotiation Request is shown in Table B.2.1.4.1.

Table B.2.1.4.1: LCLS Negotiation Request

MSB	8	7	6	5	4	3	2	1	LSB	Octet
Extension Indicator	Spare						Permission Indicator		1	

The LCLS Negotiation Request is sent in the forward direction to indicate LCLS usage permission.

Bit 1 2	Permission Indicator
00	LCLS is allowed
01	LCLS is not allowed
10 – 11	Reserved for future use

Bit 3 - 7	Spare
-----------	-------

Bit 8	Extension Indicator
0	information continues in next octet
1	last octet

For the use of the LCLS Negotiation Request IE see Annex C.2.1 and 3GPP TS 23.284 [29].

B.2.1.5 LCLS Negotiation Response

The format of the LCLS Negotiation Response is shown in Table B.2.1.5.1.

Table B.2.1.5.1: LCLS Negotiation Response

MSB				LSB				Octet 1
8	7	6	5	4	3	2	1	
Spare						Permission Indicator		

The LCLS Negotiation Response contains information sent in the backwards direction to indicate result of the LCLS Negotiation Request. The LCLS Negotiation Response is coded as follows:

Bits 1 2	Permission Indicator
00	LCLS is allowed
01	LCLS is not allowed
10	LCLS is not supported by a subsequent node
11	spare
Bits 3 - 8	Spare

For the use of the LCLS Negotiation Response IE see Annex C.2.2 and 3GPP TS 23.284 [29].

B.2.1.6 LCLS Status

The format of the LCLS Status is shown in Table B.2.1.6.1.

Table B.2.1.6.1: LCLS Status

• MSB				• LSB				Octet 1
8	7	6	5	4	3	2	1	
LCLS Status								

The LCLS Status contains information sent in forward and backward directions to indicate LCLS connection status. The LCLS Status is coded as follows:

Value	Meaning
0000 0000	no indication
0000 0001	LCLS is feasible but not yet connected
0000 0010	LCLS not connected
0000 0011	LCLS connected

All other values are reserved.

For the use of the LCLS Status IE see Annex C.2.3, C.2.5 and 3GPP TS 23.284 [29].

B.2.1.7 LCLS Status Change

The format of the LCLS Status Change is shown in Table B.2.1.7.1.

Table B.2.1.7.1: LCLS Status Change

MSB				LSB				Octet 1
8	7	6	5	4	3	2	1	
LCLS Status Change								

The LCLS Status Change Identifier contains information sent in forward and backward directions to indicate requested change of LCLS connection status. The LCLS Status Change Identifier is coded as follows:

Value	Meaning
--------------	----------------

0000 0000	LCLS connection preparation
0000 0001	LCLS disconnection preparation
0000 0010	LCLS disconnection preparation for Handover

All other values are reserved.

For the use of the LCLS Status Change IE see Annex C.2.6 and 3GPP TS 23.284 [29].

B.2.1.8 LCLS Status Result

The format of the LCLS Status Result is shown in Table B.2.1.8.1.

Table B.2.1.8.1: LCLS Status Result

MSB						LSB		Octet 1
8	7	6	5	4	3	2	1	
Spare			Rejection Indicator				Acceptance Indicator	

The LCLS Status Result contains information sent in forward and backward directions to indicate result of the LCLS Status Change Request. The LCLS Status Result is coded as follows:

Bit 1	Acceptance Indicator
0	LCLS Status Change request accepted
1	LCLS Status Change request rejected

Bits 2 3 4 5	Rejection Indicator
0000	No indication
0001	Ongoing supplementary service
0010 – 1111	Reserved for future use

Bits 6 - 8 Spare

For the use of the LCLS Status Result IE see Annex C.2.6 and 3GPP TS 23.284 [29].

B.2.1.9 LCLS Global Call Reference

The format of the LCLS Global Call Reference (GCR) is shown in Table B.2.1.9.1.

Table B.2.1.9.1: LCLS Global Call Reference

MSB				LSB				
8	7	6	5	4	3	2	1	Octet
Network ID length indicator								1
Network ID (variable length 3 – 5 octets)								2 4+m (m=0,1,2)
Node ID length indicator								5+m
Node ID (fixed length: 2 octets)								6+m 7+m
Call Reference ID length indicator								8+m
Call Reference ID (fixed length: 5 octets)								9+m 13+m

The LCLS GCR is information sent in forward direction to uniquely identify a call and correlate activities associated with that call. The LCLS GCR is coded as follows:

- Network ID length indicator
Binary coded information indicating the number of octets in the Network ID field.
- Network ID
Information identifying a network. The Network ID field is specified in ITU-T Recommendation Q.1902.3 [8].
- Node ID length Indicator
Binary coded information indicating the number of octets in the Node ID field.
- Node ID
A binary number that uniquely identifies within the network the node which generates the call reference.
- Call Reference ID length indicator
Binary coded information indicating the number of octets in the Call Reference ID field.
- Call Reference ID
A binary number used for the call reference of the call. It is generated by the originating serving node for each call.

NOTE: If the originating serving radio access is GERAN the format of the Call Reference ID subfield is shown in Table B.2.1.9.2. The originating BSS ID is an integer that uniquely identifies the Base Station Subsystem (BSS) Node within an operator's network.

Table B.2.1.9.2: Call Reference ID

MSB				LSB				
8	7	6	5	4	3	2	1	Octet
Call Identifier (fixed length: 3 octets)								1 2 3
Originating BSS ID (fixed length: 2 octets)								4 5

For the use of the LCLS GCR IE see Annex C.2.1 and 3GPP TS 23.284 [29].

B.2.1.10 LCLS Configuration Preference

The format of the LCLS Configuration Preference is shown in Table B.2.1.10.1.

Table B.2.1.10.1: LCLS Configuration Preference

MSB				LSB				Octet
8	7	6	5	4	3	2	1	
Extension Indicator	Spare			Backward Data Reception Indicator	Forward Data Reception Indicator	Backward Data Sending Indicator	Forward Data Sending Indicator	1

The LCLS Configuration Preference contains information sent in forward and backward directions to indicate negotiated LCLS configuration preference.

Bit 1 Forward Data Sending Indicator

0 not required
1 required

Bit 2 Backward Data Sending Indicator

0 not required
1 required

Bit 3 Forward Data Reception Indicator

0 not required
1 required

Bit 4 Backward Data Reception Indicator

0 not required
1 required

Bits 5 - 7 Spare

Bit 8 Extension Indicator

0 information continues in next octet
1 last octet

For the use of the LCLS Configuration Preference IE see Annex C.2.1, C.2.2, C.2.4 and 3GPP TS 23.284 [29].

B.2.1.11 LCLS Configuration Change Request

The format of the LCLS Configuration Change Request is shown in Table B.2.1.11.1.

Table B.2.1.11.1: LCLS Configuration Change Request

MSB					LSB			Octet
8	7	6	5	4	3	2	1	
Extension Indicator	Spare				Type			1

The LCLS Configuration Change Request contains information sent in the forward and backward directions to indicate type of LCLS Configuration Change Request.

Bit 1 2 Type

00 LCLS Configuration Preference Modification Request
01 - 11 Spare

Bit 3 - 7 Spare

Bit 8 Extension Indicator
 0 information continues in next octet
 1 last octet

For the use of the LCLS Configuration Change Request IE see Annex C.2.4 and 3GPP TS 23.284 [29].

B.2.1.12 LCLS Configuration Change Result

The format of the LCLS Configuration Change Result is shown in Table B.2.1.12.1.

Table B.2.1.12.1: LCLS Configuration Change Result

MSB				LSB				Octet 1
8	7	6	5	4	3	2	1	
Spare			Rejection Indicator			Acceptance Indicator		

The LCLS Configuration Change Result contains information sent in the backward direction to indicate result of the LCLS Configuration Change Request. The LCLS Configuration Change Result is coded as follows:

Bit 1 Acceptance Indicator
 0 LCLS Configuration Change request accepted
 1 LCLS Configuration Change request rejected (if set then Rejection Indicator provides further details)

Bits 2 3 4 5 Rejection Indicator
 0000 No indication
 0001 Requested LCLS configuration not supported
 0010 Ongoing supplementary service
 0011 – 1111 Reserved for future use

Bits 6 - 8 Spare

For the use of the LCLS Configuration Change Result IE see Annex C.2.4 and 3GPP TS 23.284 [29].

B.2.2 Application Transport Instruction Indicators

For the MST service the Application Transport Instruction Indicators (ATII) shall be set as follows:

Bits 1 *Release call indicator (RCI)*
 0 do not release call

Bit 2 *Send notification indicator (SNI)*
 0 do not send notification

Annex C (normative): LCLS Service Application

LCLS Service is defined in 3GPP TS 23.284 [29] and is dependent on the following identifiers being included in BICC/ISUP messaging. The following sections describe the detailed protocol behaviour when these identifiers are included.

C.1 Use of MST ASE

LCLS service makes use of the services of the MST ASE described in Annex B. The services of the MST ASE are accessed by means of primitives (such as "MST_data") which are the same as BAT ASE primitives defined in ITU-T Recommendation Q.765.5 [5].

C.2 Procedures

C.2.1 Indication of LCLS Capability

C.2.1.1 LCLS Service Capability Indication

LCLS service shall be used for a call if MST_data primitive associated with an IAM includes LCLS Information Elements: a LCLS GCR, a LCLS Negotiation Request and a LCLS Configuration Preference. The absence of the LCLS Negotiation, the LCLS Configuration Preference and the LCLS GCR Information Elements in the IAM specifies that the LCLS service shall not be used.

The compatibility information of the LCLS Negotiation Request, the LCLS Configuration Preference and the LCLS GCR Information Elements shall be set so as to cause the Information Element to be discarded by nodes that do not support LCLS service.

The procedures for call establishment using the LCLS service are described in 3GPP TS 23.284 [29].

C.2.1.2 Actions at Originating Serving Node

An originating Serving Node (SN) that supports the LCLS service shall indicate this within the IAM message of the mobile originating call by including the LCLS Negotiation Request, the LCLS Configuration Preference and the LCLS GCR Information Elements within the MST Application Transport Parameter (APP) within the IAM.

When the LCLS service is allowed to be used the IAM is sent to the succeeding node with the Permission Indicator of the LCLS Negotiation Request Information Element set to "LCLS is allowed".

Depending on network requirements the originating SN may additionally indicate required configurations for user plane connectivity towards originating or terminating UE within the LCLS Configuration Preference Information Element. If the originating MSC server needs to:

- send data towards the terminating UE it shall set Forward Data Sending Indicator to "required";
- send data towards the originating UE it shall set Backward Data Sending Indicator to "required";
- receive data from the originating UE it shall set Forward Data Reception Indicator to "required";
- receive data from the terminating UE it shall set Backward Data Reception Indicator to "required".

The originating SN shall perform the setting of LCLS Configuration Preference Information Element according to rules specified in sub-clause 4.2 of 3GPP TS 23.284 [29] or it may determine that LCLS is not allowed and indicate this by setting the value of Permission Indicator of the LCLS Negotiation Request Information Element to "LCLS is not allowed".

C.2.1.3 Actions at Intermediate Serving Node

For the intermediate Serving Node (SN), LCLS service indication (i.e. LCLS GCR, LCLS Negotiation Request and LCLS Configuration Preference Information Elements) shall be included only if received from the preceding node and if the node itself supports the LCLS service.

The intermediate SN shall not change the LCLS GCR Information Element. If the intermediate SN receives Permission Indicator of the LCLS Negotiation Request Information Element set to "LCLS is not allowed" it shall not change it.

Depending on network requirements the intermediate SN may additionally indicate required configurations for user plane connectivity towards originating or terminating UE by changing the received LCLS Configuration Preference Information Element. If the intermediate SN needs to:

- send data towards the terminating UE it shall set Forward Data Sending Indicator to "required";
- send data towards the originating UE it shall set Backward Data Sending Indicator to "required";
- receive data from the originating UE it shall set Forward Data Reception Indicator to "required";
- receive data from the terminating UE it shall set Backward Data Reception Indicator to "required".

If the intermediate SN receives any of these indicators set to "required" it shall not change them.

C.2.1.4 Actions at Destination Serving Node

For the destination Serving Node (SN), LCLS service shall be supported only if the IAM with the LCLS Negotiation Request, LCLS Configuration Preference and LCLS GCR Information Elements within the MST Application Transport Parameter (APP) is received from the preceding node and if the node itself supports the LCLS service.

Depending on network requirements the destination SN may additionally modify received configurations for user plane connectivity towards originating or terminating UE, by changing the settings of the LCLS Configuration Preference Information Element. If the destination SN needs to:

- send data towards the terminating UE it shall set Forward Data Sending Indicator to "required";
- send data towards the originating UE it shall set Backward Data Sending Indicator to "required";
- receive data from the originating UE it shall set Forward Data Reception Indicator to "required";
- receive data from the terminating UE it shall set Backward Data Reception Indicator to "required".

If the destination SN receives any of these indicators set to "required" it shall not change them.

The destination SN shall perform modification of LCLS Configuration Preference Information Element according to rules specified in sub-clause 4.2 of 3GPP TS 23.284 [29] or it may determine that LCLS is not allowed and shall indicate this by setting the value of Permission Indicator of the LCLS Negotiation Response Information Element to "LCLS is not allowed".

C.2.2 Backward LCLS Negotiation during Call Setup

C.2.2.1 Introduction

LCLS service shall be used for a call if MST_data primitive associated with first backward (APM or ACM) message includes a LCLS Negotiation Response and a LCLS Configuration Preference Information Elements. The absence of the LCLS Negotiation Response and the LCLS Configuration Preference Information Elements in the first backward message specifies that the LCLS service shall not be used.

The compatibility information of the LCLS Negotiation Response and the LCLS Configuration Preference Information Elements shall be set so as to cause the Information Element to be discarded by nodes that do not support LCLS service.

C.2.2.2 Actions at Destination Serving Node

If LCLS service is supported according to conditions specified in sub-clause C.2.1.4 a destination SN shall include in the first backward message (APM or ACM) the LCLS Negotiation Response and the LCLS Configuration Preference Information Elements in the MST_Data request primitive.

C.2.2.3 Actions at Intermediate Serving Node

If LCLS service is supported according to conditions specified in sub-clause C.2.1.3 but a succeeding node does not return LCLS Negotiation Response Information Element in the first backward message, an Intermediate SN shall include the LCLS Negotiation Response Information Element. The Permission Indicator of the LCLS Negotiation Response Information Element shall be set to "LCLS is not supported by a subsequent node".

On receipt of a backward message (APM, ACM or CPG) with the LCLS Negotiation Response and the LCLS Configuration Preference Information Elements the Intermediate SN shall store the LCLS configuration settings from the LCLS Configuration Preference Information Element and shall forward the LCLS Negotiation Response and the LCLS Configuration Preference Information Elements unchanged.

C.2.2.4 Actions at Originating Serving Node

If the first backward message does not contain the LCLS Negotiation Response and the LCLS Configuration Preference Information Elements the originating SN shall assume that LCLS is not supported by succeeding node and LCLS shall not be performed for that call; no further LCLS signalling shall take place for that call.

If the first backward message contains the LCLS Negotiation Response Information Element but the Permission Indicator is set to "LCLS Not Allowed" or "LCLS is not supported by a subsequent node" then the originating SN shall not request establishment of the LCLS connection at this time.

NOTE: A subsequent LCLS Negotiation Response Information Element can be received from succeeding nodes, e.g. in the event of a call forwarding on no reply.

C.2.3 Answer message

C.2.3.1 Introduction

LCLS connection may be established for a call if MST_data primitive associated with an ANM includes a LCLS Status Identifier Information Element. The absence of the LCLS Status Identifier Information Element in the ANM specifies that the LCLS connection shall not be requested.

The compatibility information of the LCLS Status Identifier shall be set so as to cause the Information Element to be discarded by nodes that do not support LCLS service.

C.2.3.2 Actions at Destination Serving Node

If a destination SN determines that LCLS service is feasible according to the conditions specified in sub-clause 6.2.1.3.4 of 3GPP TS 23.284 [29] it shall include the LCLS Status Identifier Information Element set to "LCLS feasible but not yet connected" within the MST Application Transport Parameter (APP) within the ANM.

C.2.3.3 Actions at Intermediate Serving Node

An Intermediate SN shall pass the LCLS Status Identifier within the ANM unchanged.

C.2.3.4 Actions at Originating Serving Node

When an originating SN receives an ANM with the LCLS Status Identifier indicating the LCLS service is feasible it shall request LCLS connection.

C.2.4 LCLS Configuration Change Request

C.2.4.1 Introduction

Modification of a LCLS configuration can only occur after the LCLS negotiation has been performed during the call set-up phase according to the procedures described in sub-clauses C.2.1 and C.2.2. A SN involved in a LCLS Configuration Change procedure must not initiate a new LCLS Configuration Change Request until the existing LCLS Configuration Change procedure has been completed.

A LCLS Configuration Change Request message may be sent in either direction and at any time during the active phase of a call, after the LCLS negotiation has been performed during the call establishment. A LCLS Configuration Change Request and a LCLS Configuration Preference Information Elements indicating the requested change of the LCLS configuration shall be included in a MST_data primitive, corresponding to an APM message.

A MST_Data primitive, corresponding to the APM message shall be issued in response, including the LCLS Configuration Preference and the LCLS Configuration Change Result Information Elements indicating if the requested change of LCLS configuration has been accepted and if it has not been accepted the reason for rejection.

The compatibility information of the LCLS Configuration Preference, the LCLS Configuration Change Request and LCLS Configuration Change Result Information Elements shall be set so as to cause the Information Element to be discarded and send notification by nodes that do not support LCLS service.

NOTE: The term "initiating" SN in the following clauses refers to a SN which initiates the LCLS Configuration Change Request. The term "terminating" SN in the following clauses refers to a SN which terminates the LCLS Configuration Change Request.

C.2.4.2 Actions at Initiating Serving Node

If a SN determines that LCLS configuration needs to be changed it may send an APM message which includes a LCLS Configuration Change Request and the LCLS Configuration Preference Information Elements to its succeeding and/or preceding node. The initiating SN shall set the desired configurations as described in sub-clause C.2.1.2.

The LCLS Configuration Change Request may only be initiated if LCLS Negotiation was performed during call establishment.

NOTE: this does not require that LCLS was permitted during the call establishment.

On receipt of an APM message containing the LCLS Configuration Preference and the LCLS Configuration Change Result Information Elements, if the result indicates "accepted" the modification of the LCLS Configuration settings has been successful. If the LCLS Configuration Change Result Information Element indicates "rejected" the initiating SN shall resume the LCLS connection with the LCLS configuration unchanged.

C.2.4.3 Actions at Intermediate Serving Node

When an intermediate SN receives an APM message with the LCLS Configuration Change Request and the LCLS Configuration Preference Information Elements requesting a certain LCLS Configuration Change the intermediate SN shall check if it can support the requested LCLS configuration. If the intermediate SN can support the proposed LCLS configuration it shall forward the LCLS Configuration Preference and the LCLS Configuration Change Request Information Elements to its succeeding or preceding node. If the intermediate SN cannot support/permit the proposed LCLS configuration it shall respond with a LCLS Configuration Change Result Information Element set to "LCLS Configuration Change request rejected" along with the Rejection Indicator detailing the reason for rejection.

On receipt of an APM message with the LCLS Configuration Change Result and LCLS Configuration Preference Information Elements from its succeeding/preceding node if the LCLS Configuration Change Result Information Elements indicates "accepted" the intermediate SN shall store the LCLS configuration settings from the LCLS Configuration Preference Information Element and shall forward the APM message to its preceding/succeeding node.

If the LCLS Configuration Change Result Information Element indicates "rejected" the intermediate SN shall resume the LCLS connection with the LCLS configuration unchanged and the intermediate SN shall forward the APM message to its preceding/succeeding node.

C.2.4.4 Actions at Terminating Serving Node

When an SN which is a terminating SN with respect to a LCLS Configuration Change Request receives an APM message with the LCLS Configuration Change Request and LCLS Configuration Preference Information Elements requesting a certain LCLS Configuration Change the terminating SN shall check if it can support the requested LCLS configuration.

If the terminating SN can support the proposed LCLS configuration change it shall return the LCLS Configuration Preference Information Element and the LCLS Configuration Change Result Information Element indicating acceptance of the LCLS Configuration Change to its succeeding or preceding node. If the terminating SN cannot support/permit the proposed LCLS configuration it shall respond with a LCLS Configuration Change Result Information Element set to "LCLS Configuration Change request rejected" along with the Rejection Indicator detailing the reason for rejection.

C.2.5 LCLS Status Update

C.2.5.1 Introduction

A LCLS Status Update message may be sent in either direction to indicate that a LCLS connection status has been changed. A LCLS Status Identifier Information Element indicating the new LCLS connection status value shall be included in a MST_data primitive, corresponding to an APM message.

The compatibility information of the LCLS Status Identifier shall be set so as to cause the Information Element to be discarded and send notification by nodes that do not support LCLS service.

NOTE: The term "initiating" SN in the following clauses refers to an originating SN or a destination SN that may initiate the LCLS Status Update message. The term "terminating" SN in the following clauses refers to an originating SN or a destination SN that may receive the LCLS Status Update message.

C.2.5.2 Actions at Initiating Serving Node

If a SN determines that the LCLS connection status has been changed it shall send the new LCLS connection status value to an adjacent SN. An initiating SN shall send the LCLS Status Identifier Information Element within the MST Application Transport Parameter (APP) within the APM message.

C.2.5.3 Actions at Intermediate Serving Node

When an intermediate SN receives the APM message with the LCLS Status Identifier Information Element from the preceding/succeeding SN and if the same LCLS connection status value has not been already received from the succeeding/preceding SN, the intermediate SN shall store the new LCLS Connection status value and shall pass the LCLS Status Identifier Information Element within the APM message unchanged to its succeeding/preceding SN.

C.2.5.4 Actions at Terminating Serving Node

When a terminating SN receives the APM message with the LCLS Status Identifier Information Element from the adjacent SN, it shall update its LCLS connection status value.

C.2.6 LCLS Status Change Request

C.2.6.1 Introduction

A LCLS Status Change Request message may be sent in either direction and at any time during the active phase of a call, after the LCLS has been initially established. A LCLS Status Change Identifier Information Element indicating the requested change of the LCLS connection status shall be included in a MST_data primitive, corresponding to an APM message.

An MST_Data primitive, corresponding to the APM message shall be issued in response, including the LCLS Status Change Identifier Information Element and a LCLS Status Result Identifier Information Element indicating if the requested change of LCLS connection status has been accepted and if it has not been accepted the reason for rejection.

The compatibility information of the LCLS Status Change Identifier and the LCLS Status Result Identifier shall be set so as to cause the Information Element to be discarded and send notification by nodes that do not support LCLS service.

NOTE: The term "initiating" SN in the following clauses refers to a SN which initiates the LCLS Status Change. The term "terminating" SN in the following clauses refers to a SN which terminates the LCLS Status Change.

C.2.6.2 Actions at Initiating Serving Node

When a SN determines that the LCLS connection status needs to be changed, it shall request the change of the LCLS connection status from its preceding and/or succeeding SN. An initiating SN shall send the LCLS Status Change Identifier Information Element within the MST Application Transport Parameter (APP) within an APM message.

An APM message containing the LCLS Status Change Identifier Information Element and a LCLS Status Result Identifier Information Element will be received in response from the succeeding and/or preceding SN.

If initiating SN is an SN serving a Radio Network (originating SN or destination SN), upon reception of the LCLS Status Result Identifier Information Element indicating the acceptance of the requested LCLS connection status change, the initiating SN shall change the LCLS connection status.

NOTE: This change of LCLS connection status can be deferred until signalling interaction with the served Radio Network Controller, which is outside of the scope of this specification.

C.2.6.3 Actions at Intermediate Serving Node

When an intermediate SN receives from a preceding/succeeding SN an APM message that includes a LCLS Status Change Identifier Information Element within the MST Application Transport Parameter (APP) it shall check if it can support the required change of the LCLS connection status.

If the intermediate SN cannot support the requested change of the LCLS connection status it shall respond to the preceding/succeeding SN with the APM message containing the LCLS Status Change Identifier Information Element and a LCLS Status Result Identifier Information Element with an Acceptance indicator set to "LCLS Status Change request rejected" along with a Rejection Indicator detailing the reason for rejection.

If the intermediate SN can support the required change of the LCLS connection status it shall pass the LCLS Status Change Identifier Information Element within the APM message unchanged to its succeeding/preceding SN. An APM message will be received in response, including the LCLS Status Change Identifier Information Element and a LCLS Status Result Identifier Information Element from its succeeding/preceding SN. The intermediate SN shall pass the LCLS Status Change Identifier Information Element and the LCLS Status Result Identifier Information Element within the APM message unchanged to its succeeding/preceding SN.

C.2.6.4 Actions at Terminating Serving Node

Upon reception of an APM message that includes a LCLS Status Change Identifier Information Element, from the adjacent SN, a terminating SN shall check if it can support the required change of the LCLS connection status.

If the terminating SN can support the required change, it shall change the LCLS connection status. If the result of the LCLS connection status change is successful the terminating SN shall send to the adjacent SN the APM message with the LCLS Status Change Identifier Information Element and a LCLS Status Result Identifier Information Element indicating the acceptance of the requested LCLS connection status change.

NOTE: If the terminating SN is an SN serving a Radio Network (originating SN or destination SN), there can be additional signalling with the served Radio Network Controller, prior to responding to the LCLS Status Change Request; this is, however, outside of the scope of this specification.

If the result of the LCLS connection status change is unsuccessful or if the terminating SN cannot support the required change it shall respond to the adjacent SN with the APM message containing the LCLS Status Change Identifier

Information Element and a LCLS Status Result Identifier Information Element with an Acceptance indicator set to "LCLS Status Change request rejected" along with a Rejection Indicator detailing the reason for rejection.

Annex D (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
17/1/01	CN3/CN4 #66 Beijing			0.1.	New Document approved	-	0.1.0
15/2/01	Ad hoc CN 4#6 in Madrid			0.2	Revised Document approved	0.1.0	0.2.0
01/3/01	CN 4 #7 Sophia—Antopolis			0.3	Forwarded to TSG CN Plenary meeting #11 for approval	0.2.0	2.0.0
03/2001	CN#11	NP-010083			Modifications made during CN#11	2.0.0	2.1.0
03/2001	CN#11	NP-010214			Approved in CN#11	2.1.0	4.0.0
06/2001	CN#12	NP-010285	0001	1	Changes to provide interworking between signalling transport	4.0.0	4.1.0
09/2001	CN#13				Editorial clean up	4.1.0	4.2.0
09/2001	CN#13	NP-010452	0002		Mc signalling transport in IP environment	4.1.0	4.2.0
09/2001	CN#13	NP-010452	0003	1	BICC signalling transport in IP environment	4.1.0	4.2.0
09/2001	CN#13	NP-010452	0004		Status of ITU recommendation Q.2150.3	4.1.0	4.2.0
06/2002	CN#16				Rel-5 created after CN#16	4.2.0	5.0.0
06/2003	CN#20	NP-030220	0006	2	Alignment of references after renumbering of H248 by ITU-T	5.0.0	5.1.0
12/2004	CN#26				Rel-6 created after CN#26	5.1.0	6.0.0
06/2006	CT#32	CP-060298	0009	1		6.0.0	6.1.0
06/2007	CT#36				Upgraded unchanged from Rel-6	6.1.0	7.0.0
12/2008	CT#42				Upgraded unchanged from Rel-7	7.0.0	8.0.0
06/2009	CT#44	CP-090312	0011	2	Amendment for "multimedia Customized Alerting Tone (CAT) service in ITU ISUP/BICC	8.0.0	8.1.0
06/2009	CT#44	CP-090499	0013	1	Mobile Service Application Transport	8.1.0	9.0.0
12/2009	CT#46	CP-090801	0017	2	Introduction of IMEI IE to Mobile APM for SRVCC Emergency Call	9.0.0	9.1.0
06/2010	CT#48	CP-100267	0020	1	ITU amendments for Customized Alerting Tone (CAT)	9.1.0	9.2.0
06/2010	CT#48	CP-100278	0018		IPBCP version	9.1.0	9.2.0
03/2011	CT#51	CP-110041	0027	1	Correcting non-specific external references	9.2.0	9.3.0
03/2011	CT#51	CP-110081	0021	1	Introduction of LCLS Application to Mobile Service Application Transport	9.3.0	10.0.0
06/2011	CT#52	CP-110376	0028		Miscellaneous corrections	10.0.0	10.1.0
09/2011	CT#53	CP-110571	0034		Indication of LCLS Negotiation type	10.1.0	10.2.0
12/2011	CT#54	CP-110799	0036	1	Correction to Procedures for Indication of LCLS Capability	10.2.0	10.3.0
12/2011	CT#54	CP-110799	0037	2	Correction to Procedures for Backward LCLS Negotiation	10.2.0	10.3.0
12/2011	CT#54	CP-110799	0038	1	Correction to Procedures for LCLS in Answer message	10.2.0	10.3.0
12/2011	CT#54	CP-110799	0039	2	Correction to Procedures for LCLS Negotiation Change	10.2.0	10.3.0
12/2011	CT#54	CP-110799	0040	1	Correction to Procedures for LCLS Status Update	10.2.0	10.3.0
12/2011	CT#54	CP-110799	0041	1	Correction to Procedures for LCLS Status Change	10.2.0	10.3.0
12/2011	CT#54	CP-110799	0043	1	Re-specify Information Elements for LCLS Negotiation and LCLS Negotiation Change	10.2.0	10.3.0
12/2012	CT#57				Upgraded unchanged from Rel-7	10.3.0	11.0.0
2014-09	-	-	-	-	Update to Rel-12 version (MCC)	11.0.0	12.0.0
2015-12	-	-	-	-	Update to Rel-13 version (MCC)	12.0.0	13.0.0

History

Document history		
V13.0.0	January 2016	Publication