

Table 9.32/GSM 04.08: SYSTEM INFORMATION TYPE 3 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 3 Message Type	Message Type 10.4	M	V	1
	Cell Identity	Cell Identity 10.5.1.1	M	V	2
	Location Area Identification	Location Area Identification 10.5.1.3	M	V	5
	Control Channel Description	Control Channel description 10.5.2.11	M	V	3
	Cell Options	Cell Options (BCCH) 10.5.2.3	M	V	1
	Cell Selection Parameters	Cell Selection Parameters 10.5.2.4	M	V	2
	RACH Control Parameters	RACH Control Parameters 10.5.2.29	M	V	3
	SI 3 Rest Octets	SI 3 Rest Octets 10.5.2.34	M	V	4

9.1.36 System information type 4

This message is sent on the BCCH by the network giving information on control of the RACH, the location area identification, the cell identity and various other information about the cell. See table 9.33/GSM 04.08. Special requirements for the transmission of this message apply, see GSM 05.02. The L2 pseudo length of this message is the sum of lengths of all information elements present in the message except the *SI 4 Rest Octets* and *L2 Pseudo Length* information elements.

Message type: SYSTEM INFORMATION TYPE 4

Significance: dual

Direction: network to mobile station

Table 9.33/GSM 04.08: SYSTEM INFORMATION TYPE 4 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 4 Message Type	Message Type 10.4	M	V	1
	Location Area Identification	Location Area Identification 10.5.1.3	M	V	5
	Cell Selection Parameters	Cell Selection Parameters 10.5.2.4	M	V	2
	RACH Control Parameters	RACH Control Parameters 10.5.2.29	M	V	3
64	CBCH Channel Description	Channel description 10.5.2.5	O	TV	4
72	CBCH Mobile Allocation	Mobile Allocation 10.5.2.21	C	TLV	3-6
	SI 4 Rest Octets	SI 4 Rest Octets 10.5.2.35	M	V	0-10

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9.1.36.1 CBCH Channel description

This information element is present if SMSCB is active in the cell and indicates (together with the *CBCH Mobile Allocation IE*) where to find the CBCH.

9.1.36.2 CBCH Mobile Allocation

If the *CBCH Channel Description* Information Element indicates frequency hopping, the *CBCH Mobile Allocation IE* shall be present. If the *CBCH Channel Description* does not indicate frequency hopping, the *CBCH Mobile Allocation IE* shall be considered as an unnecessary IE in the message.

9.1.36.3 SI 4 Rest Octets

The sum of the length of this IE and the L2 pseudo length of the message equals 22.

9.1.37 System information type 5

This message is sent on the SACCH by the network to mobile stations within the cell giving information on the BCCH allocation in the neighbour cells. See table 9.34/GSM 04.08.

When received this information shall be used as the list of BCCH frequencies of the neighbouring cells to be reported on. Any change in the neighbour cells description must overwrite any old data held by the mobile station. The mobile station must analyse all correctly received system information type 5 messages.

Message type: SYSTEM INFORMATION TYPE 5

Significance: dual

Direction: network to mobile station

Table 9.34/GSM 04.08: SYSTEM INFORMATION TYPE 5 message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 5 Message Type	Message Type 10.4	M	V	1
	BCCH Frequency List	Neighbour Cell Description 10.5.2.22	M	V	16

9.1.38 System information type 5bis

This message is sent optionally on the SACCH by the network to mobile stations within the cell giving information on the extension of the BCCH allocation in the neighbour cells. See table 9.34a/GSM 04.08.

A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may ignore this message, see section 3.2.2.1.

When received (and not ignored) this information must be used as the list of neighbouring cells to be reported on. Any change in the neighbour cells description must overwrite any old data held by the mobile station. The mobile station must, with the exception stated above, analyse all correctly received system information type 5 messages.

Message type: SYSTEM INFORMATION TYPE 5bis

Significance: dual

Direction: network to mobile station

Table 9.34a/GSM 04.08: SYSTEM INFORMATION TYPE 5bis message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management	Protocol Discriminator	M	V	1/2

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	Protocol Discriminator	10.2			
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 5 bis Message Type	Message Type 10.4	M	V	1
	Extension of the BCCH Frequency List Description	Neighbour Cell Description 10.5.2.22	M	V	16

9.1.39 System information type 5ter

This message is sent optionally on the SACCH by the network to mobile stations within the cell giving information on the extension of the BCCH allocation in the neighbour cells. See table 9.34b/GSM 04.08.

A mobile station that supports either:

only the primary GSM band P-GSM 900 (cf. GSM 05.05), or

only the DCS 1800 band (cf. GSM 05.05)

may ignore this message, see section 3.2.2.1.

When received (and not ignored) this information must be used as part of the list of neighbouring cells to be reported on. Any change in the neighbour cells description must overwrite this part of any old data held by the mobile station. The mobile station shall, with the exception stated above, analyse all correctly received system information type 5ter messages.

Message type: SYSTEM INFORMATION TYPE 5ter

Significance: dual

Direction: network to mobile station

Table 9.34b/GSM 04.08: SYSTEM INFORMATION TYPE 5ter message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 5ter Message Type	Message Type 10.4	M	V	1
	Extended BCCH Frequency List	Neighbour Cell Description 2 10.5.2.22a	M	V	16

9.1.40 System information type 6

This message is sent on the SACCH by the network to mobile stations within the cell giving information of location area identification, of cell identity and various other information. See table 9.35/GSM 04.08. If received correctly by the mobile station this message is treated as in Sections 9.1.40.1 to 9.1.40.4.

The message shall not exceed a maximum length of 18 octets.

Message type: SYSTEM INFORMATION TYPE 6

Significance: dual

Direction: network to mobile station

Table 9.35/GSM 04.08: SYSTEM INFORMATION TYPE 6 message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2

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	System Information Type 6 Message Type	Message Type 10.4	M	V	1
	Cell Identity	Cell Identity 10.5.1.1	M	V	2
	Location Area Identification	Location Area Identification 10.5.1.3	M	V	5
	Cell Options	Cell Options (SACCH) 10.5.2.3	M	V	1
	NCC Permitted	NCC Permitted 10.5.2.27	M	V	1
	SI 6 Rest Octets	SI6 Rest Octets 10.5.2.35a	M	V	7

9.1.40.1 Cell Identity

Not used by mobile station.

9.1.40.2 Location Area Identification

Only applicable for mobile stations supporting VGCS listening and VBS listening:

If a new Location Area Identification is identified, an indication shall be given to the upper layer together with the new identification.

9.1.40.3 Cell Options

When correctly received, this information shall be used as the current Cell Options information. Any change in the Cell Options shall overwrite any old Cell Options data held by the mobile station.

9.1.40.4 NCC permitted

As for BCCH Frequency List in SYSTEM INFORMATION TYPE 5.

9.1.41 System information type 7

This message is sent on the BCCH by the network giving information about cell reselection parameters to be used in that cell. See table 9.36/GSM 04.08. Special requirements for the transmission of this message apply, see GSM 05.02. The L2 pseudo length of this message has the value 1.

Message type: SYSTEM INFORMATION TYPE 7

Significance: dual

Direction: network to mobile station

Table 9.36/GSM 04.08: SYSTEM INFORMATION TYPE 7 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 7 Message Type	Message Type 10.4	M	V	1
	SI 7 Rest Octets	SI 7 Rest Octets 10.5.2.36	M	V	20

9.1.42 System information type 8

This message is sent on the BCCH by the network giving information about cell reselection parameters to be used in that cell. See table 9.37/GSM 04.08. Special requirements for the transmission of this message apply, see GSM 05.02. The L2 Pseudo Length of this message has the value 1.

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Message type: SYSTEM INFORMATION TYPE 8

Significance: dual

Direction: network to mobile station

Table 9.37/GSM 04.08: SYSTEM INFORMATION TYPE 8 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 8 Message Type	Message Type 10.4	M	V	1
	SI 8 Rest Octets	SI 8 Rest Octets 10.5.2.37	M	V	20

9.1.43 System information Type 9

This message is sent on the BCCH by the network to all mobile stations within the cell giving some, but not necessarily all information on the scheduling of information on the BCCH. See table 9.37a/GSM 04.08. Special requirements for the transmission of this message apply, see subclause 3.2.2.1 and GSM 05.02. This message has a L2 Pseudo Length of 1.

Message type: SYSTEM INFORMATION TYPE 9

Significance: dual

Direction: network to mobile station

Table 9.37a/GSM 04.08: SYSTEM INFORMATION TYPE 9 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 pseudo length	L2 pseudo length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 9 Message Type	Message Type 10.4	M	V	1
	RACH Control Parameter	RACH Control Parameters 10.5.2.29	M	V	3
	SI 9 Rest Octets	SI 9 Rest Octets 10.5.2.37a	M	V	17

9.1.43a System information Type 13

This message is sent on the BCCH if indicated in one of the SYSTEM INFORMATION TYPE 3, 4, 7 or 8 messages. The message is sent by the network to provide information related to GPRS in the cell. See table 9.37b/GSM04.08. Special requirements for the transmission of this message apply, see GSM 05.02.

A mobile station not supporting GPRS shall treat this message as an unknown message type.

The L2 Pseudo Length of this message has the value 0.

Message type: SYSTEM INFORMATION TYPE 13

Significance: dual

Direction: network to mobile station

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Table 9.37b/GSM 04.08: SYSTEM INFORMATION TYPE 13 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 13 Message Type	Message Type 10.4	M	V	1
	SI 13 Rest Octets	SI 13 Rest Octets 10.5.2.37b	M	V	20

9.1.43b System Information Type 14

This message is sent on the BCCH by the network if indicated in SYSTEM INFORMATION TYPE 13 message. The message gives information of reference frequency lists and mobile allocations applicable for packet access in the cell. A consistent set of this type of messages is required to completely decode the information. See table 9.37c/GSM04.08. Special requirements for the transmission of this message apply, see GSM 05.02.

A mobile station not supporting GPRS shall treat this message as an unknown message type.

The L2 Pseudo Length of this message has the value 0.

Message type: SYSTEM INFORMATION TYPE 14

Significance: dual

Direction: network to mobile station

Table 9.37c/GSM 04.08: SYSTEM INFORMATION TYPE 14 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 14 Message Type	Message Type 10.4	M	V	1
	SI 14 Rest Octets	SI 14 Rest Octets 10.5.2.37c	M	V	20

9.1.43b.1 SI 14 Rest Octets

The information in the SI 14 type of message may be divided into a set of different segments which are sent in a set of N instances of the SI 14 message. Each message may provide a number of reference frequency lists and a number of mobile allocations.

A consistent set of SI 14 messages is identified by an identical value in the MA_CHANGE_MARK field, the value of N-1 in the SI 14 count field and SI 14 index values ranging from 0 to N-1.

A consistent set of the SI 14 messages is required to decode the information. To decode the contents of a consistent set of SI 14 messages, each kind of information structure, i.e. the reference frequency lists and the mobile allocations, shall be arranged in the order defined by the ascending order of the SI 14 index value and, among those received in the same SI 14 message, in the order they appear in each SI 14 message.

9.1.43b.2 Reference frequency list

A set of SI 14 messages may contain a number of reference frequency lists. The presence of reference frequency lists is conditional. The reference frequency lists shall be provided as required for the decoding of mobile allocations.

Each reference frequency list is assigned a RFL_NUMBER value, defined by the position of appearance within the ordered set of SI 14 messages, starting with the RFL_NUMBER value 0 for the first reference frequency list, and

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ending with the RFL_NUMBER value NC-1 for the last reference frequency list. NC is the total number of reference frequency lists contained in a consistent set of SI 14 messages.

A reference frequency list for the decoding of a mobile allocation is defined by the union of the radio frequencies contained in a set of referenced reference frequency lists, and optionally, the radio frequencies contained in the cell channel description defined by SI 1 message. Each radio frequency appearing in the reference frequency list shall be accounted once. The radio frequencies are arranged in the ascending order of ARFCN, except that ARFCN = 0, if included, is put last.

Each frequency in the reference frequency list defined by a set of reference frequency lists, and optionally, the cell channel description in SI 1 message, is assigned an ARFCN_NUMBER value, defined by the position within the reference frequency list, starting with 0 in the first position and ending with NF-1 in the last position. NF is the total number of frequencies contained in the reference frequency list.

9.1.43b.3 Mobile Allocation

A consistent set of SI 14 messages may contain a number of mobile allocations. If frequency hopping is not used for packet access in the cell, the SI 14 message is unnecessary.

Each mobile allocation is assigned a MA_NUMBER value, defined by the position of appearance within the ordered set of SI 14 messages, starting with the MA_NUMBER value 0 for the first mobile allocation, and ending with the MA_NUMBER value NM-1 for the last mobile allocation. NM is the total number of mobile allocations contained in a consistent set of SI 14 messages.

The mobile allocation defines the set of ARFCNs which may be allocated to a physical channel, see GSM 05.02. The coding of the mobile allocation refers to one or more reference frequency lists provided in the set of SI 14 messages, or to the cell channel description provided in the SI 1 message. Each mobile allocation is associated with a HSN value and a TSC value.

There are two alternative formats for the coding of the mobile allocation, the *MA bitmap* format and the ARFCN_NUMBER format. Using the *MA bitmap* format, the mobile allocation is defined as the set of radio frequencies indicated by the bitmap. Using the ARFCN_NUMBER format, the mobile allocation is defined by all frequencies included in the reference frequency list, reduced by those frequencies which may be present in the list of ARFCN_NUMBER values.

9.1.43c System information Type 15

This message is sent on the BCCH by the network if indicated in SYSTEM INFORMATION TYPE 13 message. The message gives information for packet power control interference measurements in the cell, see GSM 05.08. A consistent set of this type of messages is required to completely decode the information. See table 9.37d/GSM 04.08. Special requirements for the transmission of this message apply, see GSM 05.02.

A mobile station not supporting GPRS shall treat this message as an unknown message type.

The L2 Pseudo Length of this message has the value 0.

Message type: SYSTEM INFORMATION TYPE 15

Significance: dual

Direction: network to mobile station

Table 9.37d/GSM 04.08: SYSTEM INFORMATION TYPE 15 message content

IEI	Information element	Type / Reference	Presence	Format	length
	L2 Pseudo Length	L2 Pseudo Length 10.5.2.19	M	V	1
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	System Information Type 15 Message Type	Message Type 10.4	M	V	1

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	SI 15 Rest Octets	SI 15 Rest Octets 10.5.2.37c	M	V	20
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9.1.43c.1 SI 15 Rest Octets

The information in the SI 15 type of message may be divided into a set of different segments which are sent in a set of N instances of the SI 15 message. Each message provides a number of basic physical channel descriptions, i.e. RF channel descriptions and associated timeslot allocations, for interference measurements.

A consistent set of SI 15 messages is identified by an identical value in the IM_CHANGE_MARK field, the value of N -1 in the SI 15 count field and SI 15 index values ranging from 0 to N-1.

A consistent set of the SI 15 messages is required to decode the information. To decode the contents of a consistent set of SI 15 messages, the RF channel descriptions shall be arranged in the order defined by the ascending order of the SI 15 index value and, among those received in the same SI 15 message, in the order they appear in each SI 15 message.

9.1.44 Talker indication

This message is sent on the main DCCH by the mobile station to the network to give the talker information when a new layer 2 connection is established on a VGCS channel after an uplink access. See table 9.44/GSM 04.08.

Message type: TALKER INDICATION

Significance: dual

Direction: mobile station to network

Table 9.44/GSM 04.08 TALKER INDICATION message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Talker Indication Message Type	Message Type 10.4	M	V	1
	Mobile Station Classmark	Mobile Station Classmark 2 10.5.1.6	M	V	5
	Mobile Identity	Mobile Identity 10.5.1.4	M	LV	2-9

9.1.45 Uplink access

Only applicable for mobile stations supporting VGCS talking.

This message is sent in random mode on the voice group call channel uplink. It does not follow the basic format. The possible formats are presented directly below, without reference to information fields. The order of bit transmission is defined in GSM 04.04.

The message is only one octet long, coded as shown in figure 9.4/GSM 04.08 and table 9.45/GSM 04.08.

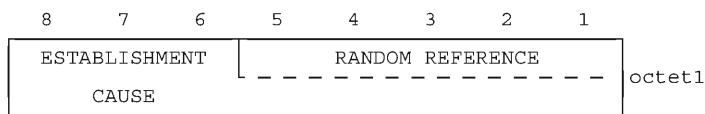


Figure 9.4/GSM 04.08 UPLINK ACCESS message content

ESTABLISHMENT CAUSE (octet 1)

This information field indicates the reason for requesting the establishment of a connection. This field has a variable length (from 3 bits up to 8 bits).

RANDOM REFERENCE (octet 1)

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This is an unformatted field with variable length (from 5 bits down to 0 bits).

The Channel Request message is coded as follows:

(Random Reference field is filled with "x").

Table 9.45/GSM 04.08 UPLINK ACCESS message content

Message 8 1	Meaning of Establishment Cause
110xxxxx	Subsequent talker uplink request
00100101	Reply on uplink access request
other values	reserved for future use

9.1.46 Uplink busy

The understanding of this message is only required for mobile stations supporting VGCS talking.

This message is broadcasted on the voice group call channel on the main DCCH, SAPI=0, by the network in unacknowledged mode to inform the mobile station of the uplink status of the voice group call channel. See table 9.46/GSM 04.08.

Message type: UPLINK BUSY

Significance: dual

Direction: network to mobile station

Table 9.46/GSM 04.08 UPLINK BUSY message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Uplink busy Message Type	Message Type 10.4	M	V	1

9.1.47 Uplink free

This message is sent on the main DCCH, in unacknowledged mode using the RR short protocol discriminator by the network to inform the mobile station of the uplink status of the voice group call channel. See table 9.47/GSM 04.08. The message indicates the uplink as free unless the Uplink Access Request field indicates the uplink as not free.

This message may also be used by the network to request the mobile station to perform an uplink reply procedure.

Message type: UPLINK FREE

Significance: dual

Direction: network to mobile station

Table 9.47/GSM 04.08 UPLINK FREE message content

<UPLINK FREE> ::=	<RR short PD : bit>	See GSM 04.07
	<message type : bit(5)>	See 10.4
	<short layer 2 header : bit(2)>	See GSM 04.06
	<Uplink Access Request bit>	
	{L H <Uplink Identity Code bit(6)>}	
	<implicit spare>;	

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Uplink Access Request :

- L Mobile station shall not perform the uplink reply procedure;
- H Mobile station shall perform the uplink reply procedure.

When set to H, this element also indicates the uplink as not free for the uplink access procedure

Uplink Identity Code :

This field is coded as the binary representation of the UIC.

If provided by the network, the Uplink Identity Code shall be used by the mobile for the coding of the UPLINK ACCESS message

9.1.48 Uplink release

Only applicable for mobile stations supporting VGCS talking.

This message is sent on the uplink of the voice group call channel to initiate a deactivation of the group transmit mode and to set the uplink free or on the downlink of the voice group call channel in order to reject an uplink access which was already granted by the network. See table 9.48/GSM 04.08

Message type: UPLINK RELEASE

Significance: local

Direction: both

Table 9.48/GSM 04.08 UPLINK RELEASE message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Uplink Release Message Type	Message Type 10.4	M	V	1
	RR Cause	RR Cause 10.5.2.31	M	V	1

9.1.49 VGCS uplink grant

The understanding of this message is only required for mobile stations supporting VGCS talking.

This message is sent in unacknowledged mode on the main signalling channel by the network to the mobile station to stop the sending of access bursts from the mobile station and to change the channel configuration to a dedicated configuration. See table 9.49/GSM 04.08.

Message type: VGCS UPLINK GRANT

Significance: dual

Direction: network to mobile station

Table 9.49/GSM 04.08 VGCS UPLINK GRANT message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	VGCS Uplink Grant Message Type	Message Type 10.4	M	V	1
	Request Reference	Request Reference 10.5.2.30	M	V	3

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	Timing Advance	Timing Advance 10.5.2.40	M	V	1
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9.1.50 System information type 10 \$(ASCII)\$

The understanding of messages of this message type is only required for mobile stations supporting VGCS listening and VBS listening. A mobile station not understanding the message shall treat it as unknown message.

Messages of this message type are optionally sent by the network in unacknowledged mode on the SACCH. SYSTEM INFORMATION TYPE 10 messages contain information about neighbour cells. When sent on the SACCH of a VGCS or VBS downlink, SYSTEM INFORMATION TYPE 10 messages address all mobile stations receiving that downlink within the cell. There may be different SYSTEM INFORMATION TYPE 10 messages sent on the same SACCH.

They are not standard layer 3 messages. They shall be transferred using the short header format for SACCH messages sent in unacknowledged mode specified in GSM 04.07.

Each SYSTEM INFORMATION TYPE 10 message defines a list of cells and may contain further information for cells of that list, a cell being identified by the pair of ARFCN and BSIC of the BCCH. Newer information about a cell received in SYSTEM INFORMATION TYPE 10 messages shall replace older information.

Message type: SYSTEM INFORMATION TYPE 10

Significance: dual

Direction: network to mobile station

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<SYSTEM INFORMATION TYPE 10> ::=
    <RR short PD : bit>      -- See GSM 04.07
    <message type : bit(5)>  -- See 10.4
    <short layer 2 header : bit(2)> -- See GSM 04.06
    <SI10 Rest Octets : bit(160)>; -- See 10.5.2.44

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9.1.51 EXTENDED MEASUREMENT ORDER \$(MAFA)\$

This message is sent on the SACCH by the network to the mobile station, to order the mobile station to send one extended measurement report. See table 9.1.51.1/GSM 04.08.

A mobile station which does not support Extended Measurements shall discard this message.

Message type: EXTENDED MEASUREMENT ORDER

Significance: dual

Direction: network to mobile station

Table 9.1.51.1/GSM 04.08: EXTENDED MEASUREMENT ORDER message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Extended Measurement Order	Message Type 10.4	M	V	1
	Extended Measurement Frequency List	Extended Measurement Frequency List 10.5.2.22d	M	V	16

9.1.52 Extended measurement report \$(MAFA)\$

This message is sent on the SACCH by the mobile station to the network to report extended measurement results about the signal strength on specified carriers. See table 9.1.52.1/GSM 04.08.

Message type: EXTENDED MEASUREMENT REPORT

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Significance: dual

Direction: mobile station to network

Table 9.1.52.1/GSM 04.08: EXTENDED MEASUREMENT REPORT message content

IEI	Information element	Type / Reference	Presence	Format	length
	RR management Protocol Discriminator	Protocol Discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Extended Measurement Report Message Type	Message Type 10.4	M	V	1
	Extended Measurement Results	Extended Measurement Results 10.5.2.20a	M	V	16

9.2 Messages for mobility management

Table 9.38/GSM 04.08 summarizes the messages for mobility management.

Table 9.38/GSM 04.08: Messages for mobility management

Registration messages:	Reference
IMSI DETACH INDICATION	9.2.12
LOCATION UPDATING ACCEPT	9.2.13
LOCATION UPDATING REJECT	9.2.14
LOCATION UPDATING REQUEST	9.2.15
Security messages:	Reference
AUTHENTICATION REJECT	9.2.1
AUTHENTICATION REQUEST	9.2.2
AUTHENTICATION RESPONSE	9.2.3
IDENTITY REQUEST	9.2.10
IDENTITY RESPONSE	9.2.11
TMSI REALLOCATION COMMAND	9.2.17
TMSI REALLOCATION COMPLETE	9.2.18
Connection management messages:	Reference
CM SERVICE ACCEPT	9.2.5
CM SERVICE REJECT	9.2.6
CM SERVICE ABORT	9.2.7
CM SERVICE REQUEST	9.2.9
CM RE-ESTABLISHMENT REQUEST	9.2.4
ABORT	9.2.8
NOTIFICATION RESPONSE	9.2.20
Miscellaneous message:	Reference
MM INFORMATION	9.2.15a
MM STATUS	9.2.16
MM NULL	9.2.19

9.2.1 Authentication reject

This message is sent by the network to the mobile station to indicate that authentication has failed (and that the receiving mobile station shall abort all activities). See table 9.39/GSM 04.08.

Message type: AUTHENTICATION REJECT

Significance: dual

Direction: network to mobile station

Table 9.39/GSM 04.08: AUTHENTICATION REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
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ETSI

	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Authentication Reject message type	Message type 10.4	M	V	1

9.2.2 Authentication request

This message is sent by the network to the mobile station to initiate authentication of the mobile station identity. See table 9.40/GSM 04.08.

Message type: AUTHENTICATION REQUEST

Significance: dual

Direction: network to mobile station

Table 9.40/GSM 04.08: AUTHENTICATION REQUEST message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Authentication Request message type	Message type 10.4	M	V	1
	Ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	Authentication parameter RAND	Auth. parameter RAND 10.5.3.1	M	V	16

9.2.3 Authentication response

This message is sent by the mobile station to the network to deliver a calculated response to the network. See table 9.41/GSM 04.08.

Message type: AUTHENTICATION RESPONSE

Significance: dual

Direction: mobile station to network

Table 9.41/GSM 04.08: AUTHENTICATION RESPONSE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Authentication Response message type	Message type 10.4	M	V	1
	Authentication parameter SRES	Auth. parameter SRES 10.5.3.2	M	V	4

9.2.4 CM Re-establishment request

This message is sent by the mobile station to the network to request re-establishment of a connection if the previous one has failed. See table 9.42/GSM 04.08.

Message type: CM RE-ESTABLISHMENT REQUEST

Significance: dual

ETSI

Direction: mobile station to network

Table 9.42/GSM 04.08: CM RE-ESTABLISHMENT REQUEST message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	CM Re-Establishment Request message type	Message type 10.4	M	V	1
	Ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	Mobile station classmark	Mobile station classmark 2 10.5.1.6	M	LV	4
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-9
13	Location area identification	Location area identification 10.5.1.3	C	TV	6

9.2.4.1 Location area identification

The *location area identification* information element shall appear when a TMSI is used as mobile identity, to render that mobile identity non-ambiguous. This is the LAI stored in the SIM.

9.2.4.2 Mobile Station Classmark

This IE shall include for multiband mobile station the Classmark 2 corresponding to the frequency band in use.

9.2.5 CM service accept

This message is sent by the network to the mobile station to indicate that the requested service has been accepted. See table 9.43/GSM 04.08.

Message type: CM SERVICE ACCEPT

Significance: dual

Direction: network to mobile station

Table 9.43/GSM 04.08: CM SERVICE ACCEPT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	CM Service Accept message type	Message type 10.4	M	V	1

9.2.5a CM service prompt \$(CCBS)\$

A mobile station that does not support the "Network initiated MO call" option shall treat this message as a message with message type not defined for the PD.

This message is sent by the network to the mobile station to request the mobile to establish a service for the specified CM protocol using the specified SAPI, e.g. circuit switched connection establishment on SAPI 0, supplementary services activation on SAPI 0, or short message transfer on SAPI 3. See Table 9.43a/GSM 04.08.

Message type: CM SERVICE PROMPT

ETSI

Significance: dual

Direction: network to mobile station

Table 9.43a/GSM 04.08: CM SERVICE PROMPT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	CM Service Prompt message type	Message type 10.4	M	V	1
	PD and SAPI of CM	PD and SAPI 10.5.1.10a	M	V	1

9.2.6 CM service reject

This message is sent by the network to the mobile station to indicate that the requested service cannot be provided. See table 9.44/GSM 04.08.

Message type: CM SERVICE REJECT

Significance: dual

Direction: network to mobile station

Table 9.44/GSM 04.08: CM SERVICE REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	CM Service Reject message type	Message type 10.4	M	V	1
	Reject cause	Reject cause 10.5.3.6	M	V	1

9.2.7 CM service abort

This message is sent by the mobile station to the network to request the abortion of the first MM connection establishment in progress and the release of the RR connection. See table 9.44a/GSM 04.08.

Message type: CM SERVICE ABORT

Significance: dual

Direction: mobile station to network

Table 9.44a/GSM 04.08: CM SERVICE ABORT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	CM Service Abort message type	Message type 10.4	M	V	1

9.2.8 Abort

This message is sent by the network to the mobile station to initiate the abortion of all MM connections and to indicate the reason for the abortion. See table 9.44b/GSM 04.08.

Message type: ABORT

ETSI

Significance: dual

Direction: network to mobile station

Table 9.44b/GSM 04.08: ABORT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Abort message type	Message type 10.4	M	V	1
	Reject cause	Reject cause 10.5.3.6	M	V	1

9.2.9 CM service request

This message is sent by the mobile station to the network to request a service for the connection management sublayer entities, e.g. circuit switched connection establishment, supplementary services activation, short message transfer. See table 9.45/GSM 04.08.

Message type: CM SERVICE REQUEST

Significance: dual

Direction: mobile station to network

Table 9.45/GSM 04.08: CM SERVICE REQUEST message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	CM Service Request message type	Message type 10.4	M	V	1
	CM service type	CM service type 10.5.3.3	M	V	1/2
	Ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	1/2
	Mobile station classmark	Mobile station classmark 2 10.5.1.6	M	LV	4
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-9
8-	Priority	Priority Level 10.5.1.11	O	TV	1

9.2.9.1 Mobile Station Classmark

This IE shall include for multiband mobile station the Classmark 2 corresponding to the frequency band in use.

9.2.9.2 Priority

May be included by mobile station supporting eMLPP to indicate the priority requested.

This information element is only meaningful when the CM service type is:

Mobile originating call establishment;

Emergency call establishment;

Voice group call establishment;

Voice broadcast call establishment.

ETSI

9.2.10 Identity request

This message is sent by the network to the mobile station to request a mobile station to submit the specified identity to the network. See table 9.46/GSM 04.08.

Message type: IDENTITY REQUEST

Significance: dual

Direction: network to mobile station

Table 9.46/GSM 04.08: IDENTITY REQUEST message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Identity Request message type	Message type 10.4	M	V	1
	Identity type	Identity type 10.5.3.4	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2

9.2.11 Identity response

This message is sent by the mobile station to the network in response to an IDENTITY REQUEST message providing the requested identity. See table 9.47/GSM 04.08.

Message type: IDENTITY RESPONSE

Significance: dual

Direction: mobile station to network

Table 9.47/GSM 04.08: IDENTITY RESPONSE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Identity Response message type	Message type 10.4	M	V	1
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-10

9.2.12 IMSI detach indication

This message is sent by the mobile station to the network to set a deactivation indication in the network. See table 9.48/GSM 04.08.

Message type: IMSI DETACH INDICATION

Significance: dual

Direction: mobile station to network

Table 9.48/GSM 04.08: IMSI DETACH INDICATION message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	IMSI Detach Indication message type	Message type 10.4	M	V	1
	Mobile station classmark	Mobile station classmark 1 10.5.1.5	M	V	1
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-9

9.2.12.1 Mobile Station Classmark

This IE shall include for multiband mobile station the Classmark 1 corresponding to the frequency band in use.

9.2.13 Location updating accept

This message is sent by the network to the mobile station to indicate that updating or IMSI attach in the network has been completed. See table 9.49/GSM 04.08.

Message type: LOCATION UPDATING ACCEPT

Significance: dual

Direction: network to mobile station

Table 9.49/GSM 04.08: LOCATION UPDATING ACCEPT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Location Updating Accept message type	Message type 10.4	M	V	1
	Location area identification	Location area identification 10.5.1.3	M	V	5
17	Mobile identity	Mobile identity 10.5.1.4	O	TLV	3-10
A1	Follow on proceed	Follow on proceed 10.5.3.7	O	T	1

9.2.13.1 Follow on proceed

The *follow on proceed* information element appears if the network wishes to indicate that the mobile station may attempt an MM connection establishment using the same RR connection.

ETSI

9.2.14 Location updating reject

This message is sent by the network to the mobile station to indicate that updating or IMSI attach has failed. See table 9.50/GSM 04.08.

Message type: LOCATION UPDATING REJECT

Significance: dual

Direction: network to mobile station

Table 9.50/GSM 04.08: LOCATION UPDATING REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Location Updating Reject message type	Message type 10.4	M	V	1
	Reject cause	Reject cause 10.5.3.6	M	V	1

9.2.15 Location updating request

This message is sent by the mobile station to the network either to request update of its location file (normal updating or periodic updating) or to request IMSI attach. See table 9.51/GSM 04.08.

Message type: LOCATION UPDATING REQUEST

Significance: dual

Direction: mobile station to network

Table 9.51/GSM 04.08: LOCATION UPDATING REQUEST message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Location Updating Request message type	Message type 10.4	M	V	1
	Location updating type	Location updating type 10.5.3.5	M	V	1/2
	Ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	1/2
	Location area identification	Location area identification 10.5.1.3	M	V	5
	Mobile station classmark	Mobile station classmark 1 10.5.1.5	M	V	1
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-9

9.2.15.1 Location area identification

The location area identification stored in the SIM is used.

9.2.15.2 Mobile Station Classmark

This IE shall include for multiband MS the Classmark 1 corresponding to the frequency band in use.

ETSI

9.2.15a MM information

This message is sent by the network to the mobile station to provide the mobile station with subscriber specific information. See table 9.5.1a/GSM 04.08.

Message type: MM INFORMATION

Significance: dual

Direction: network to mobile station

Table 9.5.1a/GSM 04.08 MM INFORMATION message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	MM Information message type	Message type 10.4	M	V	1
43	Full name for network	Network Name 10.5.3.5a	O	TLV	3-?
45	Short name for network	Network Name 10.5.3.5a	O	TLV	3-?
46	Network time zone	Time Zone 10.5.3.8	O	TV	2
47	Network time and time zone	Time Zone and Time 10.5.3.9	O	TV	8

9.2.15a.1 Full name for network

This IE may be sent by the network. If this IE is sent, the contents of this IE indicate the "full length name of the network" that the network wishes the mobile station to associate with the MCC and MNC contained in the Location Area Identification of the cell to which the mobile station sent its Channel Request message.

9.2.15a.2 Short name for network

This IE may be sent by the network. If this IE is sent, the contents of this IE indicate the "abbreviated name of the network" that the network wishes the mobile station to associate with the MCC and MNC contained in the Location Area Identification of the cell to which the mobile station sent its Channel Request message.

9.2.15a.3 Network time zone

This IE may be sent by the network. The mobile station should assume that this time zone applies to the Location Area of the cell to which the Channel Request message was sent.

9.2.15a.4 Network time zone and time

This IE may be sent by the network. The mobile station should assume that this time zone applies to the Location Area of the cell to which the Channel Request message was sent. The mobile station shall not assume that the time information is accurate.

9.2.16 MM Status

This message is sent by the mobile station or the network at any time to report certain error conditions listed in section 8. See table 9.5.1a/GSM 04.08.

Message type: MM STATUS

Significance: local

Direction: both

ETSI

Table 9.51a/GSM 04.08: MM STATUS message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	MM Status message type	Message type 10.4	M	V	1
	Reject cause	Reject cause 10.5.3.6	M	V	1

9.2.17 TMSI reallocation command

This message is sent by the network to the mobile station to reallocate or delete a TMSI. See table 9.52/GSM 04.08.

Message type: TMSI REALLOCATION COMMAND

Significance: dual

Direction: network to mobile station

Table 9.52/GSM 04.08: TMSI REALLOCATION COMMAND message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	TMSI Reallocation Command message type	Message type 10.4	M	V	1
	Location area identification	Location area identification 10.5.1.3	M	V	5
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-9

9.2.18 TMSI reallocation complete

This message is sent by the mobile station to the network to indicate that reallocation or deletion of a TMSI has taken place. See table 9.53/GSM 04.08.

Message type: TMSI REALLOCATION COMPLETE

Significance: dual

Direction: mobile station to network

Table 9.53/GSM 04.08: TMSI REALLOCATION COMPLETE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	TMSI Reallocation Complete message type	Message type 10.4	M	V	1

9.2.19 MM Null

This message is sent in mobile to network direction.

This message is not used on the radio interface. When received by the network it shall be ignored.

The introduction of this message solves interworking issues.

Message type: MM NULL

ETSI

Table 9.53a/GSM 04.08 MM NULL message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	MM Null message type	Message type 10.4	M	V	1

9.2.20 Notification response

This message is sent by the mobile station to the network to respond on a notification for a voice group call or voice broadcast call. See table 9.54/GSM 04.08.

Message type: NOTIFICATION RESPONSE

Significance: dual

Direction: mobile station to network

Table 9.54/GSM 04.08 NOTIFICATION RESPONSE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Mobility management protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Skip Indicator	Skip Indicator 10.3.1	M	V	1/2
	Notification response message type	Message type 10.4	M	V	1
	Mobile station classmark	Mobile station classmark 2 10.5.1.6	M	LV	4
	Mobile identity	Mobile identity 10.5.1.4	M	LV	2-9
	Group or broadcast call reference	Call reference 10.5.1.9	M	V	5

9.3 Messages for circuit-switched call control

Table 9.54/GSM 04.08 summarizes the messages for circuit-switched call control.

Table 9.54/GSM 04.08: Messages for circuit-mode connections call control.

Call establishment messages:	Reference
ALERTING	9.3.1
CALL CONFIRMED 1)	9.3.2
CALL PROCEEDING	9.3.3
CONNECT	9.3.5
CONNECT ACKNOWLEDGE	9.3.6
EMERGENCY SETUP 1)	9.3.8
PROGRESS	9.3.17
SETUP	9.3.23
Call information phase messages:	Reference
MODIFY 1)	9.3.13
MODIFY COMPLETE 1)	9.3.14
MODIFY REJECT 1)	9.3.15
USER INFORMATION	9.3.31
Call clearing messages:	Reference
DISCONNECT	9.3.7
RELEASE	9.3.18
RELEASE COMPLETE	9.3.19
Messages for supplementary service control	Reference
FACILITY	9.3.9
HOLD 1)	9.3.10
HOLD ACKNOWLEDGE 1)	9.3.11
HOLD REJECT 1)	9.3.12
RETRIEVE 1)	9.3.20
RETRIEVE ACKNOWLEDGE 1)	9.3.21
RETRIEVE REJECT 1)	9.3.22
Miscellaneous messages	Reference
CONGESTION CONTROL	9.3.4
NOTIFY	9.3.16
START DTMF 1)	9.3.24
START DTMF ACKNOWLEDGE 1)	9.3.25
START DTMF REJECT 1)	9.3.26
STATUS	9.3.27
STATUS ENQUIRY	9.3.28
STOP DTMF 1)	9.3.29
STOP DTMF ACKNOWLEDGE 1)	9.3.30

NOTE: Not supported by Blue Book CCITT Rec. Q.931.

9.3.1 Alerting

9.3.1.1 Alerting (network to mobile station direction)

This message is sent by the network to the calling mobile station to indicate that the called user alerting has been initiated.

See table 9.55/GSM 04.08.

Message type: ALERTING

Significance: global

Direction: network to mobile station

Table 9.55/GSM 04.08: ALERTING message content (network to mobile station direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier	M	V	1/2

ETSI

		10.3.2			
	Alerting message type	Message type 10.4	M	V	1
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
1E	Progress indicator	Progress indicator 10.5.4.21	O	TLV	4
7E	User-user	User-user 10.5.4.25	O	TLV	3-35

9.3.1.1.1 Facility

This information element may be used for functional operation of supplementary services.

9.3.1.1.2 Progress indicator

This information element may be included by the network:

- in order to pass information about the call in progress, e.g., in the event of interworking; and/or
- to make the mobile station attach the user connection for speech.

9.3.1.1.3 User-user

This information element may be included by the network if the called remote user included a *user-user* information element in the ALERTING message.

9.3.1.2 Alerting (mobile station to network direction)

This message is sent by the called mobile station to the network, to indicate that the called user alerting has been initiated.

See table 9.55a/GSM 04.08.

Message type: ALERTING

Significance: global

Direction: mobile station to network

Table 9.55a/GSM 04.08: ALERTING message content (mobile station to network direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Alerting message type	Message type 10.4	M	V	1
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
7F	SS version	SS version indicator 10.5.4.24	O	TLV	2-3

9.3.1.2.1 Facility

This information element may be used for functional operation of supplementary services.

9.3.1.2.2 User-user

This information element may be included when the called mobile station wants to return information to the calling remote user.

ETSI

9.3.1.2.3 SS version

This information element shall not be included if the *facility* information element is not present in this message.

This information element shall be included or excluded as defined in GSM 04.10. This information element should not be transmitted unless explicitly required by GSM 04.10.

9.3.2 Call confirmed

This message is sent by the called mobile station to confirm an incoming call request.

See table 9.56/GSM 04.08.

Message type: CALL CONFIRMED

Significance: local

Direction: mobile station to network

Table 9.56/GSM 04.08: CALL CONFIRMED message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Call confirmed message type	Message type 10.4	M	V	1
D-	Repeat Indicator	Repeat Indicator 10.5.4.22	C	TV	1
04	Bearer capability 1	Bearer capability 10.5.4.5	O	TLV	3-15
04	Bearer capability 2	Bearer capability 10.5.4.5	O	TLV	3-15
08	Cause	Cause 10.5.4.11	O	TLV	4-32
15	CC Capabilities	Call Control Capabilities 10.5.4.5a	O	TLV	3

9.3.2.1 Repeat indicator

The *repeat indicator* information element shall be included if *bearer capability 1* information element and *bearer capability 2* IE are both included in the message.

9.3.2.2 Bearer capability 1 and bearer capability 2

The *bearer capability 1* information element shall be included if and only if at least one of the following five cases holds:

- the mobile station wishes another bearer capability than that given by the *bearer capability 1* information element of the incoming SETUP message;
- the *bearer capability 1* information element is missing or not fully specified in the SETUP message;
- the *bearer capability 1* information element received in the SETUP message is accepted and the "radio channel requirement" of the mobile station is other than "full rate support only mobile station";
- the *bearer capability 1* information element received in the SETUP message indicates speech and is accepted and the mobile station supports other speech versions than GSM version 1;
- the *bearer capability 1* information element received in the SETUP message included the "fixed network user rate" parameter.

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When the *bearer capability 1* information element is followed by the *bearer capability 2* IE in the SETUP, the above rules apply to both *bearer capability 1* IE and *bearer capability 2* IE. Except those cases identified in GSM 07.01, if either *bearer capability* needs to be included, both shall be included.

Furthermore, both *bearer capability* information elements may be present if the mobile station wishes to reverse the order of occurrence of the *bearer capability* information elements (which is referred to in the *repeat indicator* information element, see section 10.5.4.22) in cases identified in GSM 07.01.

9.3.2.3 Cause

This information element is included if the mobile station is compatible but the user is busy.

9.3.2.4 CC Capabilities

This information element may be included by the mobile station to indicate its call control capabilities.

9.3.3 Call proceeding

This message is sent by the network to the calling mobile station to indicate that the requested call establishment information has been received, and no more call establishment information will be accepted.

See table 9.57/GSM 04.08.

Message type: CALL PROCEEDING

Significance: local

Direction: network to mobile station

Table 9.57/GSM 04.08: CALL PROCEEDING message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Call proceeding message type	Message type 10.4	M	V	1
D-	Repeat Indicator	Repeat Indicator 10.5.4.22	C	TV	1
04	Bearer capability 1	Bearer capability 10.5.4.5	O	TLV	3-15
04	Bearer capability 2	Bearer capability 10.5.4.5	O	TLV	3-15
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
1E	Progress indicator	Progress indicator 10.5.4.21	O	TLV	4
8-	Priority granted	Priority Level 10.5.1.11	O	TV	1

9.3.3.1 Repeat indicator

This information element is included if and only if *bearer capability 1* IE and *bearer capability 2* IE are both contained in the message.

9.3.3.2 Bearer capability 1 and bearer capability 2

The *bearer capability 1* information element is included if the network has to specify at least one of the negotiable parameters described in GSM 07.01, or if the *bearer capability 1* information element received in the SETUP message included the “fixed network user rate” parameter.

ETSI

When the *bearer capability 1* information element is followed by the *bearer capability 2* IE in the SETUP, the above rule applies to both *bearer capability 1* IE and *bearer capability 2* IE. Except those cases identified in GSM 07.01, if either *bearer capability* needs to be included, both shall be included.

9.3.3.3 Facility

This information element may be used for functional operation of supplementary services.

9.3.3.4 Progress Indicator

This information element may be included:

- in order to pass information about the call in progress e.g. in the event of interworking; and/or
- to make the MS attach the user connection for speech.

9.3.3.5 Priority granted

The priority field is provided by the network in the case that eMLPP is used and the priority assigned by the network is not the same as that requested by the mobile station.

9.3.4 Congestion control

This message is sent by the mobile station or the network to indicate the establishment or termination of flow control on the transmission of USER INFORMATION messages.

See table 9.58/GSM 04.08.

Message type: CONGESTION CONTROL

Significance: local (note)

Direction: both

Table 9.58/GSM 04.08: CONGESTION CONTROL message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Congestion control message type	Message type 10.4	M	V	1
	Congestion level	Congestion level 10.5.4.12	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
08	Cause	Cause 10.5.4.11	O	TLV	4-32

NOTE: This message has local significance, but may carry information of global significance.

9.3.4.1 Cause

This information element is included if the user to user information has been discarded as a result of the congestion situation.

ETSI

9.3.5 Connect

9.3.5.1 Connect (network to mobile station direction)

This message is sent by the network to the calling mobile station to indicate call acceptance by the called user.

See table 9.59/GSM 04.08.

Message type: CONNECT

Significance: global

Direction: network to mobile station

Table 9.59/GSM 04.08: CONNECT message content(network to mobile station direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Connect message type	Message type 10.4	M	V	1
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
1E	Progress indicator	Progress indicator 10.5.4.21	O	TLV	4
4C	Connected number	Connected number 10.5.4.13	O	TLV	3-14
4D	Connected subaddress	Connected subaddress 10.5.4.14	O	TLV	2-23
7E	User-user	User-user 10.5.4.25	O	TLV	3-35

9.3.5.1.1 Facility

This information element may be used for functional operation of supplementary services.

9.3.5.1.2 Progress indicator

This information element may be included by the network:

- in order to pass information about the call in progress e.g. in the event of interworking; and/or
- to make the MS attach the user connection for speech.

9.3.5.1.3 User-user

This information element may be included by the network if the remote user awarded the call included a user-user information element in the CONNECT message.

9.3.5.2 Connect (mobile station to network direction)

This message is sent by the called mobile station to the network to indicate call acceptance by the called user.

See table 9.59a/GSM 04.08.

Message type: CONNECT

Significance: global

Direction: mobile station to network

ETSI

Table 9.59a/GSM 04.08: CONNECT message content (mobile station to network direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Connect message type	Message type 10.4	M	V	1
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
4D	Connected subaddress	Connected subaddress 10.5.4.14	O	TLV	2-23
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
7F	SS version	SS version indicator 10.5.4.24	O	TLV	2-3

9.3.5.2.1 Facility

This information element may be used for functional operation of supplementary services.

9.3.5.2.2 User-user

This information element is included when the answering mobile station wants to return user information to the calling remote user.

9.3.5.2.3 SS version

This information element shall not be included if the *facility* information element is not present in this message.

This information element shall be included or excluded as defined in GSM 04.10. This information element should not be transmitted unless explicitly required by GSM 04.10.

9.3.6 Connect acknowledge

This message is sent by the network to the called mobile station to indicate that the mobile station has been awarded the call. It shall also be sent by the calling mobile station to the network to acknowledge the offered connection.

See table 9.60/GSM 04.08.

Message type: CONNECT ACKNOWLEDGE

Significance: local

Direction: both

Table 9.60/GSM 04.08: CONNECT ACKNOWLEDGE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Connect acknowledge message type	Message type 10.4	M	V	1

9.3.7 Disconnect

9.3.7.1 Disconnect (network to mobile station direction)

This message is sent by the network to indicate that the end-to-end connection is cleared.

See table 9.61/GSM 04.08.

ETSI

Message type: DISCONNECT

Significance: global

Direction: network to mobile station

Table 9.61/GSM 04.08: DISCONNECT message content (network to mobile station direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Disconnect message type	Message type 10.4	M	V	1
	Cause	Cause 10.5.4.11	M	LV	3-31
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
1E	Progress indicator	Progress indicator 10.5.4.21	O	TLV	4
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
7F	Allowed actions \$(CCBS)\$	Allowed actions 10.5.4.26	O	TLV	3

9.3.7.1.1 Facility

This information element may be used for functional operation of supplementary services, such as the user-user service.

9.3.7.1.2 Progress indicator

This information element is included by the network to make the MS attach the user connection for speech and react in a specific way during call clearing (see section 5.4.4).

9.3.7.1.3 User-user

This information element may be included by the network when the remote user initiates call clearing and included a user-user information element in the DISCONNECT message.

9.3.7.1.4 Allowed actions \$(CCBS)\$

This information element may be included by the network to inform the MS about further possible reactions.

9.3.7.2 Disconnect (mobile station to network direction)

This message is sent by the mobile station to request the network to clear an end-to-end connection.

See table 9.61a/GSM 04.08.

Message type: DISCONNECT

Significance: global

Direction: mobile station to network

Table 9.61a/GSM 04.08: DISCONNECT message content (mobile station to network direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Disconnect message type	Message type 10.4	M	V	1
	Cause	Cause	M	LV	3-31

ETSI

		10.5.4.11			
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
7F	SS version	SS version indicator 10.5.4.24	O	TLV	2-3

9.3.7.2.1 Facility

This information element may be used for functional operation of supplementary services, such as the user-user service.

9.3.7.2.2 User-user

This information element is included when the mobile station initiates call clearing and wants to pass user information to the remote user at call clearing time.

9.3.7.2.3 SS version

This information element shall not be included if the *facility* information element is not present in this message.

This information element shall be included or excluded as defined in GSM 04.10. This information element should not be transmitted unless explicitly required by GSM 04.10.

9.3.8 Emergency setup

This message is sent from the mobile station to initiate emergency call establishment.

See table 9.62/GSM 04.08.

Message type: EMERGENCY SETUP

Significance: global

Direction: mobile station to network

Table 9.62/GSM 04.08: EMERGENCY SETUP message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Emergency setup message type	Message type 10.4	M	V	1
04	Bearer capability	Bearer capability 10.5.4.5	O	TLV	3-9

9.3.8.1 Bearer capability

If the element is not included, the network shall by default assume speech and select full rate speech version 1. If this information element is included, it shall indicate speech, the appropriate speech version(s) and have the appropriate value of radio channel requirement field.

9.3.9 Facility

9.3.9.1 Facility (network to mobile station direction)

This message is sent by the network to the mobile station to request or acknowledge a supplementary service. The supplementary service to be invoked and its associated parameters are specified in the facility information element.

See table 9.62a/GSM 04.08.

Message type: FACILITY

ETSI

Significance: local (NOTE 1)

Direction: network to mobile station

Table 9.62a/GSM 04.08: FACILITY message content (network to mobile station direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Facility message type	Message type 10.4	M	V	1
	Facility (note 2)	Facility 10.5.4.15	M	LV	1-?

NOTE 1: This message has local significance; however, it may carry information of global significance.

NOTE 2: The *facility* information element has no upper length limit except that given by the maximum number of octets in a L3 message, see GSM 04.06.

9.3.9.2 Facility (mobile station to network direction)

This message is sent by the mobile station to the network to request or acknowledge a supplementary service. The supplementary service to be invoked and its associated parameters are specified in the facility information element.

See table 9.62b/GSM 04.08.

Message type: FACILITY

Significance: local (note 1)

Direction: mobile station to network

Table 9.62b/GSM 04.08: FACILITY message content (mobile station to network direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Facility message type	Message type 10.4	M	V	1
	Facility (note 2)	Facility 10.5.4.15	M	LV	1-?
7F	SS version	SS version indicator 10.5.4.24	O	TLV	2-3

NOTE 1: This message has local significance; however, it may carry information of global significance.

NOTE 2: The *facility* information element has no upper length limit except that given by the maximum number of octets in a L3 message, see GSM 04.06.

9.3.9.2.1 SS version

This information element shall be included or excluded as defined in GSM 04.10. This information element should not be transmitted unless explicitly required by GSM 04.10.

9.3.10 Hold

This message is sent by the mobile user to request the hold function for an existing call.

See table 9.62c/GSM 04.08 for the content of the HOLD message.

ETSI

For the use of this message, see GSM 04.10.

Message type: HOLD

Significance: local

Direction: mobile station to network

Table 9.62c/GSM 04.08: HOLD message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Hold message type	Message type 10.4	M	V	1

9.3.11 Hold Acknowledge

This message is sent by the network to indicate that the hold function has been successfully performed.

See table 9.62d/GSM 04.08 for the content of the HOLD ACKNOWLEDGE message.

For the use of this message, see GSM 04.10.

Message type: HOLD ACKNOWLEDGE

Significance: local

Direction: network to mobile station

Table 9.62d/GSM 04.08: HOLD ACKNOWLEDGE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Hold Acknowledge message type	Message type 10.4	M	V	1

9.3.12 Hold Reject

This message is sent by the network to indicate the denial of a request to hold a call.

See table 9.62e/GSM 04.08 for the content of the HOLD REJECT message.

For the use of this message, see GSM 04.10.

Message type: HOLD REJECT

Significance: local

Direction: network to mobile station

Table 9.62e/GSM 04.08: HOLD REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Hold Reject message type	Message type 10.4	M	V	1
	Cause	10.5.4.11	M	LV	3-31

ETSI

9.3.13 Modify

This message is sent by the mobile station to the network or by the network to the mobile station to request a change in bearer capability for a call.

See table 9.63/GSM 04.08.

Message type: MODIFY

Significance: global

Direction: both

Table 9.63/GSM 04.08: MODIFY message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify message type	Message type 10.4	M	V	1
	Bearer capability	Bearer capability 10.5.4.5	M	LV	2-14
7C	Low layer comp.	Low layer comp. 10.5.4.18	O	TLV	2-15
7D	High layer comp.	High layer comp. 10.5.4.16	O	TLV	2-5
A3	Reverse call setup direction	Reverse call setup direction 10.5.4.22a	O	T	1

9.3.13.1 Low layer compatibility

This information element shall be included if it was included in the initial SETUP message.

9.3.13.2 High layer compatibility

This information element shall be included if it was included in the initial SETUP message.

9.3.13.3 Reverse call setup direction

This information element is included or omitted in the mobile to network direction according to the rules defined in section 5.3.4.3.1.

9.3.14 Modify complete

This message is sent by the mobile station to the network or by the network to the mobile station to indicate completion of a request to change bearer capability for a call.

See table 9.64/GSM 04.08.

Message type: MODIFY COMPLETE

Significance: global

Direction: both

Table 9.64/GSM 04.08: MODIFY COMPLETE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2

ETSI

	Modify complete message type	Message type 10.4	M	V	1
	Bearer capability	Bearer capability 10.5.4.5	M	LV	2-14
7C	Low layer comp.	Low layer comp. 10.5.4.18	O	TLV	2-15
7D	High layer comp.	High layer comp. 10.5.4.16	O	TLV	2-5
A3	Reverse call setup direction	Reverse call setup direction 10.5.4.22a	O	T	1

9.3.14.1 Low layer compatibility

This information element shall be included if it was included in the initial SETUP message.

9.3.14.2 High layer compatibility

This information element shall be included if it was included in the initial SETUP message.

9.3.14.3 Reverse call setup direction

This information element is included or omitted according to the rules defined in section 5.3.4.3.2.

9.3.15 Modify reject

This message is sent by the mobile station to the network or by the network to the mobile station to indicate failure of a request to change the bearer capability for a call.

See table 9.65/GSM 04.08.

Message type: MODIFY REJECT

Significance: global

Direction: both

Table 9.65/GSM 04.08: MODIFY REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify reject message type	Message type 10.4	M	V	1
	Bearer capability	Bearer capability 10.5.4.5	M	LV	2-14
	Cause	Cause 10.5.4.11	M	LV	3-31
7C	Low layer comp.	Low layer comp. 10.5.4.18	O	TLV	2-15
7D	High layer comp.	High layer comp. 10.5.4.16	O	TLV	2-5

9.3.15.1 Low layer compatibility

This information element shall be included if it was included in the initial SETUP message.

9.3.15.2 High layer compatibility

This information element shall be included if it was included in the initial SETUP message.

ETSI

9.3.16 Notify

This message is sent either from the mobile station or from the network to indicate information pertaining to a call, such as user suspended.

See table 9.66/GSM 04.08.

Message type: NOTIFY

Significance: access

Direction: both

Table 9.66/GSM 04.08: NOTIFY message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Notify message type	Message type 10.4	M	V	1
	Notification indicator	Notification indicator 10.5.4.20	M	V	1

9.3.17 Progress

This message is sent from the network to the mobile station to indicate the progress of a call in the event of interworking or in connection with the provision of in-band information/patterns.

See table 9.67/GSM 04.08.

Message type: PROGRESS

Significance: global

Direction: network to mobile station

Table 9.67/GSM 04.08: PROGRESS message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Progress message type	Message type 10.4	M	V	1
	Progress indicator	Progress indicator 10.5.4.21	M	LV	3
7E	User-user	User-user 10.5.4.25	O	TLV	3-35

9.3.17.1 User-user

This information element is included when the PROGRESS message is sent by the network when the call has been cleared by the remote user before it reached the active state to indicate that the remote user wants to pass user information at call clearing time.

9.3.17a CC-Establishment \$(CCBS)\$

A mobile station that does not support the "Network initiated MO call" option shall treat this message as a message with message type not defined for the PD.

This message is sent from the network to the mobile station to provide information on the call that the mobile station should attempt to establish.

ETSI

See Table 9.67a/GSM 04.08.

Message type: CC-ESTABLISHMENT
Significance: local
Direction: network to mobile station

Table 9.67a/GSM 04.08: CC-Establishment message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	CC-Establishment message type	Message type 10.4	M	V	1
	Setup container	Container 10.5.4.22a	M	LV	3-n

* From the 4th IE onwards the message is coded in the same way as the SETUP message in MS to network direction from the 4th IE onwards.

9.3.17a.2 Setup container

This information element contains the contents of a SETUP message (Mobile Station to Network).

9.3.17b CC-Establishment confirmed \$(CCBS)\$

A Network that does not support the "Network initiated MO call" option shall treat this message as a message with message type not defined for the PD.

This message is sent by the mobile station to the network to indicate the requested channel characteristics for the call which may be initiated by the mobile station .

See Table 9.67b/GSM 04.08.

Message type: CC-ESTABLISHMENT CONFIRMED
Significance: local
Direction: mobile station to network

Table 9.67b/GSM 04.08: CC-ESTABLISHMENT CONFIRMED message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	CC-Establishment confirmed message type	Message type 10.4	M	V	1
D-	Repeat Indicator	Repeat Indicator 10.5.4.22	C	TV	1
04	Bearer capability 1	Bearer capability 10.5.4.5	M	TLV	3-10
04	Bearer capability 2	Bearer capability 10.5.4.5	O	TLV	3-10
08	Cause	Cause 10.5.4.11	O	TLV	4-32

9.3.17b.1 Repeat indicator

The *repeat indicator* information element shall be included if *bearer capability 1* information element and *bearer capability 2* IE are both included in the message.

ETSI

9.3.17b.2 Bearer capability 1 and bearer capability 2

If, in any subsequent SETUP message to be sent on this transaction the *bearer capability 1* information element is to be followed by the *bearer capability 2* IE, then the *bearer capability 2* IE shall be included in this message.

9.3.17b.9 Cause

This information element is included if the mobile station is compatible but the user is busy.

9.3.18 Release

9.3.18.1 Release (network to mobile station direction)

This message is sent, from the network to the mobile station to indicate that the network intends to release the transaction identifier, and that the receiving equipment shall release the transaction identifier after sending RELEASE COMPLETE.

See table 9.68/GSM 04.08.

Message type: RELEASE

Significance: local (note)

Direction: network to mobile station

Table 9.68/GSM 04.08: RELEASE message content (network to mobile station direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Release message type	Message type 10.4	M	V	1
08	Cause	Cause 10.5.4.11	O	TLV	4-32
08	Second cause	Cause 10.5.4.11	O	TLV	4-32
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
7E	User-user	User-user 10.5.4.25	O	TLV	3-35

NOTE: This message has local significance; however, it may carry information of global significance when used as the first call clearing message.

9.3.18.1.1 Cause

This information element shall be included if this message is used to initiate call clearing.

9.3.18.1.2 Second cause

This information element may be included under the conditions described in section 5.4.4.1.2.3 "Abnormal cases" (Clearing initiated by the network).

9.3.18.1.3 Facility

This information element may be included for functional operation of supplementary services.

ETSI

9.3.18.1.4 User-user

This information element may be included in the network to mobile station direction, when the RELEASE message is used to initiate call clearing, in order to transport user-user information from the remote user.

9.3.18.2 Release (mobile station to network direction)

This message is sent from the mobile station to the network to indicate that the mobile station intends to release the transaction identifier, and that the receiving equipment shall release the transaction identifier after sending RELEASE COMPLETE.

See table 9.68a/GSM 04.08.

Message type: RELEASE

Significance: local (note)

Direction: mobile station to network direction

Table 9.68a/GSM 04.08: RELEASE message content (mobile station to network direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Release message type	Message type 10.4	M	V	1
08	Cause	Cause 10.5.4.11	O	TLV	4-32
08	Second cause	Cause 10.5.4.11	O	TLV	4-32
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
7F	SS version	SS version indicator 10.5.4.24	O	TLV	2-3

NOTE: This message has local significance; however, it may carry information of global significance when used as the first call clearing message.

9.3.18.2.1 Cause

This information element shall be included if this message is used to initiate call clearing.

9.3.18.2.2 Second cause

This information element may be included under the conditions described in section 5.4.3.5 "Abnormal cases" (Clearing initiated by the mobile station).

9.3.18.2.3 Facility

This information element may be included for functional operation of supplementary services.

9.3.18.2.4 User-user

This information element is included when the RELEASE message is used to initiate call clearing and the mobile station wants to pass user information to the remote user at call clearing time.

9.3.18.2.5 SS version

This information element shall not be included if the *facility* information element is not present in this message.

ETSI

This information element shall be included or excluded as defined in GSM 04.10. This information element should not be transmitted unless explicitly required by GSM 04.10.

9.3.18a Recall \$(CCBS)\$

A mobile station that does not support the “Network initiated MO call” option shall treat this message as a message with message type not defined for the PD.

This message is sent from the network to the mobile station to initiate the sending of the SETUP message. In addition it provides information for user notification.

See Table 9.67a/GSM 04.08.

Message type: RECALL
Significance: local
Direction: network to mobile station

Table 9.67a/GSM 04.08: Recall message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Recall message type	Message type 10.4	M	V	1
	Recall Type	Recall Type 10.5.4.21a	M	V	1
	Facility	Facility 10.5.4.15	M	LV	2-n

9.3.18a.1 Recall Type

The purpose of the recall type information element is to describe the reason for the recall.

9.3.18a.2 Facility

The information element shall be included for functional operation of supplementary services.

9.3.19 Release complete

9.3.19.1 Release complete (network to mobile station direction)

This message is sent from the network to the mobile station to indicate that the network has released the transaction identifier and that the mobile station shall release the transaction identifier.

See table 9.69/GSM 04.08.

Message type: RELEASE COMPLETE
Significance: local (note)
Direction: network to mobile station direction

Table 9.69/GSM 04.08: RELEASE COMPLETE message content (network to mobile station direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Release complete message type	Message type 10.4	M	V	1
08	Cause	Cause	O	TLV	4-32

ETSI

		10.5.4.11			
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
7E	User-user	User-user 10.5.4.25	O	TLV	3-35

NOTE: This message has local significance; however, it may carry information of global significance when used as the first call clearing message.

9.3.19.1.1 Cause

This information element shall be included if the message is used to initiate call clearing.

9.3.19.1.2 Facility

This information element may be included for functional operation of supplementary services.

9.3.19.1.3 User-user

This information element is included in the network to mobile station direction, when the RELEASE COMPLETE message is used to initiate call clearing, in order to transport user-user information from the remote user.

9.3.19.2 Release complete (mobile station to network direction)

This message is sent from the mobile station to the network to indicate that the mobile station has released the transaction identifier and that the network shall release the transaction identifier.

See table 9.69a/GSM 04.08.

Message type: RELEASE COMPLETE

Significance: local (note)

Direction: mobile station to network direction

Table 9.69a/GSM 04.08: RELEASE COMPLETE message content (mobile station to network direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Release complete message type	Message type 10.4	M	V	1
08	Cause	Cause 10.5.4.11	O	TLV	4-32
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
7F	SS version	SS version indicator 10.5.4.24	O	TLV	2-3

NOTE: This message has local significance; however, it may carry information of global significance when used as the first call clearing message.

9.3.19.2.1 Cause

This information element shall be included if the message is used to initiate call clearing.

9.3.19.2.2 Facility

This information element may be included for functional operation of supplementary services.

ETSI

9.3.19.2.3 User-user

This information element is included in the mobile station to network direction when the RELEASE COMPLETE message is used to initiate call clearing and the mobile station wants to pass user information to the remote user at call clearing time.

9.3.19.2.4 SS version.

This information element shall not be included if the *facility* information element is not present in this message.

This information element shall be included or excluded as defined in GSM 04.10. This information element should not be transmitted unless explicitly required by GSM 04.10.

9.3.20 Retrieve

This message is sent by the mobile user to request the retrieval of a held call.

See table 9.69b/GSM 04.08 for the content of the RETRIEVE message.

For the use of this message, see GSM 04.10.

Message type: RETRIEVE

Significance: local

Direction: mobile station to network

Table 9.69b/GSM 04.08: RETRIEVE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Retrieve message type	Message type 10.4	M	V	1

9.3.21 Retrieve Acknowledge

This message is sent by the network to indicate that the retrieve function has been successfully performed.

See table 9.69c/GSM 04.08 for the content of the RETRIEVE ACKNOWLEDGE message.

For the use of this message, see GSM 04.10.

Message type: RETRIEVE ACKNOWLEDGE

Significance: local

Direction: network to mobile station

Table 9.69c/GSM 04.08: RETRIEVE ACKNOWLEDGE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Retrieve Acknowledge message type	Message type 10.4	M	V	1

9.3.22 Retrieve Reject

This message is sent by the network to indicate the inability to perform the requested retrieve function.

ETSI

See table 9.69d/GSM 04.08 for the content of the RETRIEVE REJECT message.

For the use of this message, see GSM 04.10.

Message type: RETRIEVE REJECT

Significance: local

Direction: network to mobile station

Table 9.69d/GSM 04.08: RETRIEVE REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Retrieve Reject message type	Message type 10.4	M	V	1
	Cause	10.5.4.11	M	LV	3-31

9.3.23 Setup

9.3.23.1 Setup (mobile terminated call establishment)

This message is sent by the network to the mobile station to initiate a mobile terminated call establishment.

See table 9.70/GSM 04.08.

Message type: SETUP

Significance: global

Direction: network to mobile station

Table 9.70/GSM 04.08: SETUP message content (network to mobile station direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Setup message type	Message type 10.4	M	V	1
D-	BC repeat indicator	Repeat indicator 10.5.4.22	C	TV	1
04	Bearer capability 1	Bearer capability 10.5.4.5	O	TLV	3-15
04	Bearer capability 2	Bearer capability 10.5.4.5	O	TLV	3-15
1C	Facility	Facility 10.5.4.15	O	TLV	2-?
1E	Progress indicator	Progress indicator 10.5.4.21	O	TLV	4
34	Signal	Signal 10.5.4.23	O	TV	2
5C	Calling party BCD number	Calling party BCD num. 10.5.4.9	O	TLV	3-14
5D	Calling party sub-address	Calling party subaddr. 10.5.4.10	O	TLV	2-23
5E	Called party BCD number	Called party BCD num. 10.5.4.7	O	TLV	3-13
6D	Called party sub-address	Called party subaddr. 10.5.4.8	O	TLV	2-23
D-	LLC repeat indicator	Repeat indicator 10.5.4.22	O	TV	1
7C	Low layer	Low layer comp.	O	TLV	2-15

ETSI

	compatibility I	10.5.4.18			
7C	Low layer compatibility II	Low layer comp. 10.5.4.18	C	TLV	2-15
D-	HLC repeat indicator	Repeat indicator 10.5.4.22	O	TV	1
7D	High layer compatibility i	High layer comp. 10.5.4.16	O	TLV	2-5
7D	High layer compatibility ii	High layer comp. 10.5.4.16	C	TLV	2-5
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
8-	Priority	Priority Level 10.5.1.11	O	TV	1
19	Alert	Alerting Pattern 10.5.4.26	O	TLV	3

9.3.23.1.1 BC repeat indicator

The *BC repeat indicator* information element is included if and only if *bearer capability 1* information element and *bearer capability 2* IE are both present in the message.

9.3.23.1.2 Bearer capability 1 and bearer capability 2

The *bearer capability 1* information element may be omitted in the case where the mobile subscriber is allocated only one directory number for all services (ref.: GSM 09.07). The *bearer capability 2* IE is missing at least if the *bearer capability 1* IE is missing.

9.3.23.1.3 Facility

This information element may be included for functional operation of supplementary services.

9.3.23.1.4 Progress indicator

This information element is included by the network

- in order to pass information about the call in progress e.g. in the event of interworking and/or
- to make the MS attach the user connection for speech.

9.3.23.1.5 Called party subaddress

Included in the Network-to-mobile station direction if the calling user includes a *called party subaddress* information element in the SETUP message.

9.3.23.1.6 LLC repeat indicator

The *LLC repeat indicator* information element is included if and only if both following conditions hold:

- The *BC repeat indicator* IE is contained in the message.
- The *low layer compatibility I* IE is contained in the message.

If included, the *LLC repeat indicator* shall specify the same repeat indication as the *BC repeat indicator* IE.

9.3.23.1.7 Low layer compatibility I

Included in the network-to-mobile station direction if the calling user specified a low layer compatibility.

9.3.23.1.8 Low layer compatibility II

Included if and only if the *LLC repeat indicator* information element is contained in the message.

ETSI

9.3.23.1.9 HLC repeat indicator

The *HLC repeat indicator* information element is included if and only both following conditions hold:

- The *BC repeat indicator* IE is contained in the message.
- The *high layer compatibility i* IE is contained in the message.

If included, the *HLC repeat indicator* shall specify the same repeat indication as the *BC repeat indicator* IE.

9.3.23.1.10 High layer compatibility i

Included in the network-to-mobile station direction if the calling user specified a high layer compatibility.

9.3.23.1.11 High layer compatibility ii

Included if and only if the *HLC repeat indicator* information element is contained in the message.

9.3.23.1.12 User-user

May be included in the network to called mobile station direction when the calling remote user included a user-user information element in the SETUP message.

9.3.23.1.13 Priority

May be included by the network to indicate the priority of the incoming call if eMLPP is used.

9.3.23.1.14 Alert \$(Network Indication of Alerting in the MS)\$

May be included by the network to give some indication about alerting (category or level). If supported in the MS, this optional indication is to be used by the MS as specified in GSM 02.07.

9.3.23.2 Setup (mobile originating call establishment)

This message is sent from the mobile station to the network to initiate a mobile originating call establishment.

See table 9.70a/GSM 04.08.

Message type: SETUP

Significance: global

Direction: mobile station to network

Table 9.70a/GSM 04.08: SETUP message content (mobile station to network direction)

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Setup message type	Message type 10.4	M	V	1
D-	BC repeat indicator	Repeat indicator 10.5.4.22	C	TV	1
04	Bearer capability 1	Bearer capability 10.5.4.5	M	TLV	3-15
04	Bearer capability 2	Bearer capability 10.5.4.5	O	TLV	3-15
1C	Facility(simple recall alignment)	Facility 10.5.4.15	O	TLV	2-
5D	Calling party sub-address	Calling party subaddr. 10.5.4.10	O	TLV	2-23
5E	Called party BCD	Called party BCD num.	M	TLV	3-43

ETSI

	number	10.5.4.7			
6D	Called party sub-address	Called party subaddr. 10.5.4.8	O	TLV	2-23
D-	LLC repeat indicator	Repeat indicator 10.5.4.22	O	TV	1
7C	Low layer compatibility I	Low layer comp. 10.5.4.18	O	TLV	2-15
7C	Low layer compatibility II	Low layer comp. 10.5.4.18	O	TLV	2-15
D-	HLC repeat indicator	Repeat indicator 10.5.4.22	O	TV	1
7D	High layer compatibility i	High layer comp. 10.5.4.16	O	TLV	2-5
7D	High layer compatibility ii	High layer comp. 10.5.4.16	O	TLV	2-5
7E	User-user	User-user 10.5.4.25	O	TLV	3-35
7F	SS version	SS version indicator 10.5.4.24	O	TLV	2-3
A1	CLIR suppression	CLIR suppression 10.5.4.11a	C	T	1
A2	CLIR invocation	CLIR invocation 10.5.4.11b	C	T	1
15	CC capabilities	Call Control Capabilities 10.5.4.5a	O	TLV	3
1D	Facility \$(CCBS)\$ (advanced recall alignment)	Facility 10.5.4.15	O	TLV	2-?
1B	Facility (recall alignment Not essential) \$(CCBS)\$	Facility 10.5.4.15	O	TLV	2-?

9.3.23.2.1 BC repeat indicator

The *BC repeat indicator* information element is included if and only if *bearer capability 1* IE and *bearer capability 2* IE are both present in the message.

9.3.23.2.2 Facility

The information element may be included for functional operation of supplementary services.

Three different codings of this IE exist, for further details see 04.10.

9.3.23.2.3 LLC repeat indicator

The *LLC repeat indicator* information element is included if and only if both following conditions hold:

- The *BC repeat indicator* IE is contained in the message.
- The *low layer compatibility I* IE is contained in the message.

If included, the *LLC repeat indicator* shall specify the same repeat indication as the *BC repeat indicator* IE.

9.3.23.2.4 Low layer compatibility I

The information element is included in the MS-to-network direction when the calling MS wants to pass low layer compatibility information to the called user.

9.3.23.2.5 Low layer compatibility II

Included if and only if the *LLC repeat indicator* information element is contained in the message.

9.3.23.2.6 HLC repeat indicator

The *HLC repeat indicator* information element is included if and only if both following conditions hold:

- The *BC repeat indicator* IE is contained in the message.

ETSI

- The *high layer compatibility i* IE is contained in the message.

If included, the *HLC repeat indicator* shall specify the same repeat indication as the *BC repeat indicator* IE.

9.3.23.2.7 High layer compatibility i

The information element is included when the calling MS wants to pass high layer compatibility information to the called user.

9.3.23.2.8 High layer compatibility ii

Included if and only if the *HLC repeat indicator* information element is contained in the message.

9.3.23.2.9 User-user

The information element is included in the calling mobile station to network direction when the calling mobile station wants to pass user information to the called remote user.

9.3.23.2.10 SS version

This information element shall not be included if the *facility* information element is not present in this message.

This information element shall be included or excluded as defined in GSM 04.10. This information element should not be transmitted unless explicitly required by GSM 04.10.

9.3.23.2.11 CLIR suppression

The information element may be included by the MS (see GSM 04.81). If this information element is included the *CLIR invocation* IE shall not be included.

9.3.23.2.12 CLIR invocation

The information element may be included by the MS (see GSM 04.81). If this information element is included the *CLIR suppression* IE shall not be included.

9.3.23.2.13 CC Capabilities

This information element may be included by the mobile station to indicate its call control capabilities.

9.3.23a Start CC \$(CCBS)\$

A Network that does not support the "Network initiated MO call" option shall treat this message as a message with message type not defined for the PD.

This message is sent by the mobile station to the network to open a Call Control transaction which the network has requested the mobile station to open.

See Table 9.70b/GSM 04.08.

Message type: START CC

Significance: local

Direction: mobile station to network

Table 9.70b/GSM 04.08: START CC message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Start CC	Message type	M	V	1

ETSI

	message type	10.4			
15	CC Capabilities	Call Control Capabilities 10.5.4.5a	O	TLV	3

9.3.23a.1 CC Capabilities

This information element may be included by the mobile station to indicate its call control capabilities

9.3.24 Start DTMF

This message is sent by the mobile station to the network and contains the digit the network should reconvert back into a DTMF tone which is then applied towards the remote user.

See table 9.71/GSM 04.08.

Message type: START DTMF

Significance: local

Direction: mobile station to network

Table 9.71/GSM 04.08: START DTMF message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Start DTMF message type	Message type 10.4	M	V	1
2C	Keypad facility	Keypad facility 10.5.4.17	M	TV	2

9.3.25 Start DTMF Acknowledge

This message is sent by the network to the mobile station to indicate the successful initiation of the action requested by the START DTMF message (conversion of the digit contained in this message into a DTMF tone).

See table 9.72/GSM 04.08.

Message type: START DTMF ACKNOWLEDGE

Significance: local

Direction: network to mobile station

Table 9.72/GSM 04.08: START DTMF ACKNOWLEDGE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Start DTMF acknowledge message type	Message type 10.4	M	V	1
2C	Keypad facility	Keypad facility 10.5.4.17	M	TV	2

9.3.25.1 Keypad facility

This information element contains the digit corresponding to the DTMF tone that the network applies towards the remote user.

ETSI

9.3.26 Start DTMF reject

This message is sent by the network to the mobile station, if the network can not accept the START DTMF message.

See table 9.73/GSM 04.08.

Message type: START DTMF REJECT

Significance: local

Direction: network to mobile station

Table 9.73/GSM 04.08: START DTMF REJECT message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Start DTMF reject message type	Message type 10.4	M	V	1
	Cause	Cause 10.5.4.11	M	LV	3-31

9.3.27 Status

This message is sent by the mobile station or the network at any time during a call to report certain error conditions listed in section 8. It shall also be sent in response to a STATUS ENQUIRY message.

See table 9.74/GSM 04.08.

Message type: STATUS

Significance: local

Direction: both

Table 9.74/GSM 04.08: STATUS message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Status message type	Message type 10.4	M	V	1
	Cause	Cause 10.5.4.11	M	LV	3-31
	Call state	Call state 10.5.4.6	M	V	1
24	Auxiliary states	Auxiliary states 10.5.4.4	O	TLV	3

9.3.27.1 Auxiliary states

The information element is included if and only if the call state is "active" or "mobile originating modify" and any auxiliary state is different from "idle". For the definition of the auxiliary states see GSM 04.83 and GSM 04.84

9.3.28 Status enquiry

This message is sent by the mobile station or the network at any time to solicit a STATUS message from the peer layer 3 entity. Sending of STATUS message in response to a STATUS ENQUIRY message is mandatory.

See table 9.75/GSM 04.08.

Message type: STATUS ENQUIRY

Significance: local

Direction: both

Table 9.75/GSM 04.08: STATUS ENQUIRY message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Status enquiry message type	Message type 10.4	M	V	1

9.3.29 Stop DTMF

This message is sent by a mobile station to the network and is used to stop the DTMF tone sent towards the remote user.

See table 9.76/GSM 04.08.

Message type: STOP DTMF

Significance: local

Direction: mobile station to network

Table 9.76/GSM 04.08: STOP DTMF message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Stop DTMF message type	Message type 10.4	M	V	1

9.3.30 Stop DTMF acknowledge

This message is sent by the network to the mobile station to indicate that the sending of the DTMF tone has been stopped.

See table 9.77/GSM 04.08.

Message type: STOP DTMF ACKNOWLEDGE

Significance: local

Direction: network to mobile station

Table 9.77/GSM 04.08: STOP DTMF ACKNOWLEDGE message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2

ETSI

	Stop DTMF acknowledge message type	Message type 10.4	M	V	1
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9.3.31 User information

This message is sent by the mobile station to the network to transfer information to the remote user. This message is also sent by the network to the mobile station to deliver information transferred from the remote user. This message is used if the user-to-user transfer is part of an allowed information transfer as defined in GSM 04.10.

See table 9.78/GSM 04.08.

Message type: USER INFORMATION

Significance: access

Direction: both

Table 9.78/GSM 04.08: USER INFORMATION message content

IEI	Information element	Type / Reference	Presence	Format	Length
	Call control protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	User Information message type	Message type 10.4	M	V	1
	User-user	User-user 10.5.4.25	M	LV	3-130
A0	More data	More data 10.5.4.19	O	T	1

9.3.31.1 User-user

Some networks may only support a maximum length of 35 octets. Procedures for interworking are not currently defined and are for further study.

9.3.31.2 More data

The information element is included by the sending user to indicate that another USER INFORMATION message pertaining to the same message block will follow.

9.4 GPRS Mobility Management Messages

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/GSM 04.08.

Message type: ATTACH REQUEST

Significance: dual

Direction: MS to network

Table 9.4.1/GSM 04.08: 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 classmark	MS classmark 4 10.5.5.12	M	LV	4 - 6
	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
	Force to standby	Force to standby 10.5.5.7	M	V	½
	Spare half octet	Spare half octet 10.5.1.8	M	V	½
	P-TMSI or IMSI	Mobile station identity 10.5.5.13	M	LV	6 - 10
XX	MS Radio Access capability	MS RA capability 10.5.5.12.a	O	TLV	5-12
	Old P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
	Old routing area identification	Routing area identification 10.5.5.15	O	TV	7
	Requested READY timer value	Timer 10.5.5.16	O	TV	2
	Requested STANDBY timer value	Timer 10.5.5.16	O	TV	2
	MS classmark	MS classmark 1 10.5.1.5	O	TV	2

9.4.1.0 MS Radio Access capability

This IE may be included by the MS in order to provide its radio access capabilities.

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 Old routing area identification

This IE is included if the MS has stored the old RAI and an associated valid P-TMSI.

9.4.1.3 Requested READY timer value

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

9.4.1.4 Requested STANDBY timer value

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

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/GSM 04.08.

Message type: ATTACH ACCEPT

ETSI

Significance: dual

Direction: network to MS

Table 9.4.2/GSM 04.08: 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
	Routing area identification	Routing area identification 10.5.5.15	O	TV	7
	Periodic RA update timer	Timer value 10.5.5.16	M	V	1
??	P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
	Negotiated DRX parameter	DRX parameter 10.5.5.6	O	TV	3
xx	Negotiated READY timer value	Timer 10.5.5.16	O	TV	2
xy	Negotiated STANDBY timer value	Timer 10.5.5.16	O	TV	2
??	Allocated P-TMSI	Mobile station identity 10.5.5.13	O	TLV	7
??	MS identity	Mobile identity 10.5.1.4	O	TLV	6 - 11
??	GMM cause	GMM cause 10.5.5.14	O	TV	2

9.4.2.1 Routing area identification

This IE is included if the old routing area identification sent in the corresponding Attach request message does not match the current routing area.

9.4.2.2 P-TMSI signature

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

9.4.2.3 Negotiated DRX parameter

This IE may be included to indicate the negotiated value for the DRX parameter.

9.4.2.4 Negotiated READY timer

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

9.4.2.5 Negotiated STANDBY timer

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

9.4.2.6 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.

ETSI

9.4.2.7 MS identity

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

9.4.2.8 GMM cause

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

9.4.3 Attach complete

This message is sent by the MS to the network if a P-TMSI IE was included within the *attach accept* message. See table 9.4.3/GSM 04.08.

Message type: ATTACH COMPLETE

Significance: dual

Direction: MS to network

Table 9.4.3/GSM 04.08: ATTACH COMPLETE 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 complete message identity	Message type 10.4	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2

9.4.4 Attach reject

This message is sent by the network to the MS to indicate that the corresponding attach request has been rejected. See table 9.4.4/GSM 04.08.

Message type: ATTACH REJECT

Significance: dual

Direction: network to MS

Table 9.4.4/GSM 04.08: ATTACH REJECT 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 reject message identity	Message type 10.4	M	V	1
	GMM cause	GMM cause 10.5.5.14	M	V	1

9.4.5 Detach request

This message is sent either by the MS or by the network to request release of a GMM context. See table 9.4.5/GSM 04.08.

ETSI

Message type: DETACH REQUEST

Significance: dual

Direction: both

Table 9.4.5/GSM 04.08:DETACH 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
	Detach request message identity	Message type 10.4	M	V	1
	Detach type	Detach type 10.5.5.5	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	GMM cause	GMM cause 10.5.5.14	O	TV	2

9.4.5.1 GMM cause

This IE shall be included in case the network initiates the detach procedure and the detach reason has to be indicated to the MS, e.g. due to a failed IMEI check.

9.4.6 Detach accept

This message is sent by the network or the MS to indicate that the detach procedure has been completed. See table 9.4.6/GSM 04.08.

Message type: DETACH ACCEPT

Significance: dual

Direction: both

Table 9.4.6/GSM 04.08:DETACH 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
	Detach accept message identity	Message type 10.4	M	V	1

9.4.7 P-TMSI reallocation command

This message is sent by the network to the MS to reallocate a P-TMSI. See table 9.4.7/GSM 04.08.

Message type: P-TMSI REALLOCATION COMMAND

Significance: dual

Direction: network to MS

ETSI

Table 9.4.7/GSM 04.08: P-TMSI REALLOCATION COMMAND 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
	P-TMSI reallocation command message identity	Message type 10.4	M	V	1
	P-TMSI	Mobile station identity 10.5.5.13	M	LV	6
	Routing area identification	Routing area identification 10.5.5.15	M	V	6
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4

9.4.7.1 P-TMSI signature

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

9.4.8 P-TMSI reallocation complete

This message is sent by the MS to the network to indicate that reallocation of a P-TMSI has taken place. See table 9.4.8/GSM 04.08.

Message type: P-TMSI REALLOCATION COMPLETE

Significance: dual

Direction: MS to network

Table 9.4.8/GSM 04.08: P-TMSI REALLOCATION COMPLETE 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
	P-TMSI reallocation complete message identity	Message type 10.4	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2

9.4.9 Authentication and ciphering request

This message is sent by the network to the MS to initiate authentication of the MS identity. Additionally, the ciphering mode is set, indicating whether ciphering will be performed or not. See table 9.4.9/GSM 04.08.

Message type: AUTHENTICATION AND CIPHERING REQUEST

Significance: dual

Direction: network to MS

ETSI

Table 9.4.9/GSM 04.08: AUTHENTICATION AND CIPHERING 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
	Authentication and ciphering request message identity	Message type 10.4	M	V	1
	Ciphering algorithm	Ciphering algorithm 10.5.5.3	M	V	1/2
	GPRS ciphering key sequence number	Ciphering key sequence number 10.5.1.2	M	V	1/2
	IMEISV request	IMEISV request 10.5.5.10	M	V	1/2
	Ciphering indicator	Ciphering indicator 10.5.5.4	M	V	1/2
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	Authentication parameter RAND	Authentication parameter RAND 10.5.3.1	O	TV	17

9.4.9.1 Authentication Parameter RAND

This IE shall only be included if authentication shall be performed.

9.4.10 Authentication and ciphering response

This message is sent by the MS to the network in response to an *Authentication and ciphering request* message. See table 9.4.10/GSM 04.08.

Message type: AUTHENTICATION AND CIPHERING RESPONSE

Significance: dual

Direction: MS to network

Table 9.4.10/GSM 04.08: AUTHENTICATION AND CIPHERING RESPONSE 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
	Authentication and ciphering response message identity	GPRS message type 10.4	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	Authentication parameter SRES	Authentication parameter SRES 10.5.3.2	O	TV	5
	IMEISV	Mobile identity 10.5.1.4	O	TLV	11

9.4.10.1 Authentication Parameter SRES

This IE is included if authentication was requested within the corresponding *authentication and ciphering request* message.

9.4.10.2 IMEISV

This IE is included if requested within the corresponding *authentication and ciphering request* message.

ETSI

9.4.11 Authentication and ciphering reject

This message is sent by the network to the MS to indicate that authentication has failed (and that the receiving MS shall abort all activities). See table 9.4.11/GSM 04.08.

Message type: AUTHENTICATION AND CIPHERING REJECT

Significance: dual

Direction: network to MS

Table 9.4.11/GSM 04.08: AUTHENTICATION AND CIPHERING REJECT 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
	Authentication and ciphering reject message identity	Message type 10.4	M	V	1

9.4.12 Identity request

This message is sent by the network to the MS to request submission of the MS identity according to the specified identity type. See table 9.4.12/GSM 04.08.

Message type: IDENTITY REQUEST

Significance: dual

Direction: network to MS

Table 9.4.12/GSM 04.08: IDENTITY 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
	Identity request message identity	Message type 10.4	M	V	1
	Identity type	Identity type 2 10.5.5.9	M	V	1/2
	Force to standby	Force to standby 10.5.5.7	M	V	1/2

9.4.13 Identity response

This message is sent by the MS to the network in response to an *identity request* message providing the requested identity. See table 9.4.13/GSM 04.08.

Message type: IDENTITY RESPONSE

Significance: dual

Direction: MS to network

Table 9.4.13/GSM 04.08: IDENTITY RESPONSE 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
	Identity response message identity	Message type 10.4	M	V	1
	Mobile identity	Mobile identity 10.5.1.4	M	LV	6 - 11
	Force to standby	Force to standby 10.5.5.7	M	V	½
	Spare half octet	Spare half octet 10.5.1.8	M	V	½

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/GSM 04.08.

Message type: ROUTING AREA UPDATE REQUEST

Significance: dual

Direction: MS to network

Table 9.4.14/GSM 04.08: 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
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	CS connected	CS connected 10.5.5.19	M	V	1/2
	Old routing area identification	Routing area identification 10.5.5.15	M	V	6
XX	MS Radio Access capability	MS RA capability 10.5.5.12.a	O	TLV	5-12
	Old P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
	Requested READY timer value	Timer 10.5.5.16	O	TV	2
	Requested STANDBY timer value	Timer 10.5.5.16	O	TV	2
	MS classmark	MS classmark 1 10.5.1.5	O	TV	2

9.4.14.0 MS Radio Access capability

This IE may be included by the MS in order to provide its radio access capabilities.

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.

ETSI

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 Requested STANDBY timer value

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

9.4.15 Routing area update accept

This message is sent by the network to the MS to provide the MS with GPRS mobility management related data in response to a *routing area update request* message. See table 9.4.15/GSM 04.08.

Message type: ROUTING AREA UPDATE ACCEPT

Significance: dual

Direction: network to MS

Table 9.4.15/GSM 04.08: ROUTING AREA UPDATE 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
	Routing area update accept message identity	Message type 10.4	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Update result	Update result 10.5.5.17	M	V	1/2
	Periodic RA update timer	Timer value 10.5.5.16	M	V	1
??	P-TMSI signature	P-TMSI signature 10.5.5.8	O	TV	4
??	P-TMSI	Mobile station identity 10.5.5.13	O	TLV	7
??	TMSI	Mobile identity 10.5.1.4	O	TLV	7
??	Routing area identification	Routing area identification 10.5.5.15	O	TV	7
??	List of LLC V(R)s	LLC V(R) list 10.5.5.11	O	TLV	4 - 9
aa	Negotiated READY timer value	Timer 10.5.5.16	O	TV	2
ab	Negotiated STANDBY timer value	Timer 10.5.5.16	O	TV	2
??	Reject cause	GMM cause 10.5.5.14	O	TV	2

9.4.15.1 P-TMSI signature

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

9.4.15.2 P-TMSI

This IE may be included in case of a GPRS or combined routing area updating procedure.

9.4.15.3 TMSI

This IE may be included in case of a combined routing area updating procedure.

ETSI

9.4.15.4 Routing area identification

This IE shall be included in case of P-TMSI and/or TMSI allocation or in case of a combined GPRS routing area updating procedure.

9.4.15.5 List of LLC V(R)s

This IE shall be included in case of an inter SGSN routing area updating, if there are LLC connections that have been established in acknowledged transfer mode.

9.4.15.6 Negotiated READY timer value

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

9.4.15.7 Negotiated STANDBY timer value

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

9.4.15.8 GMM cause

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

9.4.16 Routing area update complete

This message shall be sent by the MS to the network in response to a *routing area update accept message* if a P-TMSI and/or a TMSI has been assigned and/or if there are established LLC connections. See table 9.4.16/GSM 04.08.

Message type: ROUTING AREA UPDATE COMPLETE

Significance: dual

Direction: MS to network

Table 9.4.16/GSM 04.08: ROUTING AREA UPDATE COMPLETE 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 complete message identity	Message type 10.4	M	V	1
	Force to standby	Force to standby 10.5.5.7	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	List of LLC V(R)s	LLC V(R) list 10.5.5.11	O	TLV	4 - 9

9.4.16.1 List of LLC V(R)s

This IE shall be included if the *routing area update accept message* contained this IE.

9.4.17 Routing area update reject

This message is sent by the network to the MS in order to reject the routing area update procedure. See table 9.4.17/GSM 04.08.

Message type: ROUTING AREA UPDATE REJECT

Significance: dual

ETSI

Direction: MS to network

Table 9.4.17/GSM 04.08: ROUTING AREA UPDATE REJECT 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 reject message identity	Message type 10.4	M	V	1
	GMM cause	GMM cause 10.5.5.14	M	V	1

9.4.18 GMM Status

This message is sent by the MS or by the network at any time to report certain error conditions listed in section 8. See table 9.4.18/GSM 04.08.

Message type: GMM STATUS

Significance: local

Direction: both

Table 9.4.18/GSM 04.08: GMM STATUS 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
	GMM STATUS message identity	Message type 10.4	M	V	1
	GMM cause	GMM cause 10.5.5.1	M	V	1

9.4.19 GMM Information

This message is sent by the network at any time to sent certain information to the MS. See table 9.4.19/GSM 04.08.

Message type: GMM INFORMATION

Significance: local

Direction: network to mobile station

Table 9.4.19/GSM 04.08: GMM INFORMATION message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	GMM INFORMATION message type	GPRS message type 10.4	M	V	1
	Skip indicator	Skip indicator 10.3.1	M	V	1/2
	Full name for network	Network name 10.5.3.5a	O	TLV	3 - ?
	Short name for network	Network name 10.5.3.5a	O	TLV	3 - ?
	Network time zone	Time zone 10.5.3.8	O	TV	2
	Network time and time zone	Time zone and time 10.5.3.9	O	TV	8

9.4.19.1 Full name for network

This IE may be sent by the network. If this IE is sent, the contents of this IE indicate the "full length name of the network" that the network wishes the mobile station to associate with the MCC and MNC contained in the routing area identification of the current cell.

9.4.19.2 Short name for network

This IE may be sent by the network. If this IE is sent, the contents of this IE indicate the "abbreviated name of the network" that the network wishes the mobile station to associate with the MCC and MNC contained in the routing area identification of the cell the MS is currently in.

9.4.19.3 Network time zone

This IE may be sent by the network. The mobile station should assume that this time zone applies to the routing area of the cell the MS is currently in.

9.4.19.4 Network time zone and time

This IE may be sent by the network. The mobile station should assume that this time zone applies to the routing area the MS is currently in. The mobile station shall not assume that the time information is accurate.

9.5 GPRS Session Management Messages

9.5.1 Activate PDP context request

This message is sent by the MS to the network to request activation of a PDP context. See table 9.5.1/GSM 04.08.

Message type: ACTIVATE PDP CONTEXT REQUEST

Significance: global

Direction: MS to network

Table 9.5.1/GSM 04.08: ACTIVATE PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate PDP context request message identity	Message type 10.4	M	V	1
	NSAPI	Network service access point identifier 10.5.6.2	M	V	1
	Requested LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Requested QoS	Quality of service 10.5.6.5	M	V	4
	Requested PDP address	Packet data protocol address 10.5.6.4	M	LV	3 - 18
	Access point name	Access point name 10.5.6.1	O	TLV	3 - 255
	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 255

9.5.1.1 Access point name

This IE is included in the message when the MS selects a specific external network to be connected to.

9.5.1.2 Protocol configuration options

This IE is included in the message when the MS provides protocol configuration options for the external PDN.

9.5.2 Activate PDP context accept

This message is sent by the network to the MS to acknowledge activation of a PDP context.
See table 9.5.2/GSM 04.08.

Message type: ACTIVATE PDP CONTEXT ACCEPT

Significance: global

Direction: network to MS

Table 9.5.2/GSM 04.08: ACTIVATE PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate PDP context accept message identity	Message type 10.4	M	V	1
	Negotiated LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	Negotiated QoS	Quality of service 10.5.6.5	M	V	4
	Radio priority level	Radio priority level 10.5.6.10	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	PDP address	Packet data protocol address 10.5.6.4	M	LV	3 - 18
	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 255

9.5.2.1 Protocol configuration options

This IE is included in the message when the network wishes to transmit protocol configuration options for the external PDN.

9.5.3 Activate PDP context reject

This message is sent by the network to the MS to reject activation of a PDP context.
See table 9.5.3/GSM 04.08.

Message type: ACTIVATE PDP CONTEXT REJECT

Significance: global

Direction: network to MS

Table 9.5.3/GSM 04.08: ACTIVATE PDP CONTEXT REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate PDP context reject message identity	Message type 10.4	M	V	1
	SM cause	SM Cause 10.5.6.6	M	V	1

9.5.4 Request PDP context activation

This message is sent by the network to the MS to initiate activation of a PDP context.
See table 9.5.4/GSM 04.08.

Message type: REQUEST PDP CONTEXT ACTIVATION

Significance: global

Direction: network to MS

ETSI

Table 9.5.4/GSM 04.08: REQUEST PDP CONTEXT ACTIVATION message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Request PDP context activation message identity	GPRS message type 10.4	M	V	1
	Offered PDP address	Packet data protocol address 10.5.6.4	M	LV	3 - 18

9.5.5 Request PDP context activation reject

This message is sent by the MS to the network to reject initiation of a PDP context activation.

See table 9.5.5/GSM 04.08.

Message type: REQUEST PDP CONTEXT ACTIVATION REJECT

Significance: global

Direction: MS to network

Table 9.5.5/GSM 04.08: REQUEST PDP CONTEXT ACTIVATION REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Request PDP context act. reject message identity	Message type 10.4	M	V	1
	PDP address	Packet data protocol address 10.5.6.4	M	LV	3 - 18
	SM cause	SM cause 10.5.6.6	M	V	1

9.5.6 Modify PDP context request

This message is sent by the network to the MS to request modification of an active PDP context identified by NSAPI.

See table 9.5.6/GSM 04.08.

Message type: MODIFY PDP CONTEXT REQUEST

Significance: global

Direction: network to MS

Table 9.5.6/GSM 04.08: MODIFY PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify PDP context request message identity	Message type 10.4	M	V	1
	Radio priority level	Radio priority level 10.5.6.10	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	Requested LLC SAPI	LLC service access point identifier 10.5.6.9	M	V	1
	New QoS	Quality of service 10.5.6.5	M	V	4

9.5.7 Modify PDP context accept

This message is sent by the MS to the network to acknowledge the modification of an active PDP context. See table 9.5.7/GSM 04.08.

Message type: MODIFY PDP CONTEXT ACCEPT

Significance: global

Direction: MS to network

Table 9.5.7/GSM 04.08: MODIFY PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Modify PDP context accept message identity	Message type 10.4	M	V	1

9.5.8 Deactivate PDP context request

This message is sent to request deactivation of an active PDP context. See table 9.5.8/GSM 04.08.

Message type: DEACTIVATE PDP CONTEXT REQUEST

Significance: global

Direction: both

Table 9.5.8/GSM 04.08: DEACTIVATE PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate PDP context request message identity	Message type 10.4	M	V	1
	SM cause	SM cause 10.5.6.6	M	V	1

9.5.9 Deactivate PDP context accept

This message is sent to acknowledge deactivation of the PDP context requested in the corresponding *Deactivate PDP context request* message. See table 9.5.9/GSM 04.08.

ETSI

Message type: DEACTIVATE PDP CONTEXT ACCEPT

Significance: global

Direction: both

Table 9.5.9/GSM 04.08: DEACTIVATE PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate PDP context accept message identity	Message type 10.4	M	V	1
	SM cause	SM cause 10.5.6.6	M	V	1

9.5.10 Activate AA PDP context request

This message is sent by the MS to the network to initiate activation of an AA PDP context.
See table 9.5.10/GSM 04.08.

Message type: ACTIVATE AA PDP CONTEXT REQUEST

Significance: global

Direction: MS to network

Table 9.5.10/GSM 04.08: ACTIVATE AA PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate AA PDP context request message identity	Message type 10.4	M	V	1
	NSAPI	Network service access point identifier 10.5.6.2	M	V	1
	Requested QoS	Quality of service 10.5.6.5	M	V	4
	Requested packet data protocol address	Packet data protocol address 10.5.6.4	M	LV	3 - 18
	Access point name	Access point name 10.5.6.1	M	LV	3 - 255
	Protocol configuration options	Protocol configuration options 10.5.6.3	M	LV	3 - 255
	Requested AA-READY timer value	Timer 10.5.5.16	O	TV	2

9.5.10.1 Access point name

This IE is included in the message when the MS selects a specific external network to be connected to.

9.5.10.2 Protocol configuration options

This IE is included in the message when the MS provides protocol configuration options for the external PDN.

9.5.10.3 Requested AA-READY timer value

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

ETSI

9.5.11 Activate AA PDP context accept

This message is sent by the network to the MS to acknowledge the activation of an AA PDP context. See table 9.5.11/GSM 04.08.

Message type: ACTIVATE AA PDP CONTEXT ACCEPT

Significance: global

Direction: network to MS

Table 9.5.11/GSM 04.08: ACTIVATE AA PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate AA PDP context accept message identity	Message type 10.4	M	V	1
	Negotiated QoS	Quality of service 10.5.6.5	M	V	4
	P-TMSI	Mobile station identity 10.5.5.14	M	LV	6
	Packet data protocol address	Packet data protocol address 10.5.6.4	M	LV	3 - 18
	Radio priority level	Radio priority level 10.5.6.10	M	V	1/2
	Spare half octet	Spare half octet 10.5.1.8	M	V	1/2
	SM cause	SM cause 10.5.6.6	M	V	1
	Protocol configuration options	Protocol configuration options 10.5.6.3	O	TLV	3 - 255
	Negotiated AA-Ready timer value	Timer 10.5.5.16	O	TV	2

9.5.11.1 Protocol configuration options

This IE may be included if the network wishes to transmit protocol configuration options from the external PDN.

9.5.11.2 Negotiated AA-Ready timer value

This IE may be included if the network wants to indicate a value for the AA-READY timer.

9.5.12 Activate AA PDP context reject

This message is sent by the network to the MS to reject the activation of an AA PDP context. See table 9.5.12/GSM 04.08.

Message type: ACTIVATE AA PDP CONTEXT REJECT

Significance: global

Direction: network to MS

Table 9.5.12/GSM 04.08: ACTIVATE AA PDP CONTEXT REJECT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Activate AA PDP context reject message identity	Message type 10.4	M	V	1
	Cause	SM Cause 10.5.6.6	M	V	1

9.5.13 Deactivate AA PDP context request

This message is sent to request deactivation of an active AA PDP context. See table 9.5.13/GSM 04.08.

Message type: DEACTIVATE AA PDP CONTEXT REQUEST

Significance: global

Direction: network to MS

Table 9.5.13/GSM 04.08: DEACTIVATE PDP CONTEXT REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate AA PDP context request message identity	Message type 10.4	M	V	1
	AA deactivation cause	AA deactivation cause 10.5.6.8	M	V	1

9.5.14 Deactivate AA PDP context accept

This message is sent to acknowledge deactivation of an AA PDP context requested by the corresponding *Deactivate AA PDP context request* message. See table 9.5.14/GSM 04.08.

Message type: DEACTIVATE AA PDP CONTEXT ACCEPT

Significance: global

Direction: MS to network

Table 9.5.14/GSM 04.08: DEACTIVATE AA PDP CONTEXT ACCEPT message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	Deactivate AA PDP context accept message identity	Message type 10.4	M	V	1

9.5.15 SM Status

This message is sent by the network or the MS to pass information on the status of the indicated context. See table 9.5.15/GSM 04.08.

Message type: SM Status

Significance: local

Direction: both

ETSI

Table 9.5.15/GSM 04.08: SM STATUS message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 10.2	M	V	1/2
	Transaction identifier	Transaction identifier 10.3.2	M	V	1/2
	SM Status message identity	Message type 10.4	M	V	1
	Cause	SM Cause 10.5.6.6	M	V	1

10 General message format and information elements coding

The figures and text in this section describe the Information Elements contents.

10.1 Overview

Within the Layer 3 protocols defined in GSM 04.08, every message with the exception of the messages sent on the BCCH, downlink CCCH, SCH, RACH, and the HANDOVER ACCESS message, is a standard L3 message as defined in GSM 04.07 [20]. This means that the message consists of the following parts:

- a) protocol discriminator;
- b) transaction identifier;
- c) message type;
- d) other information elements, as required.

This organization is illustrated in the example shown in figure 10.1/GSM 04.08.

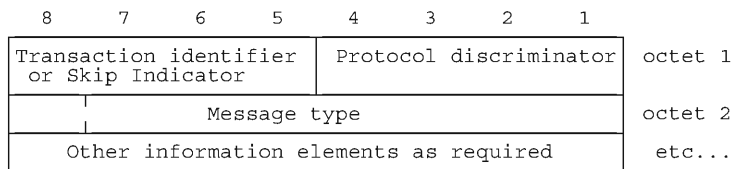


Figure 10.1/GSM 04.08 General message organization example

Unless specified otherwise in the message descriptions of section 9, a particular information element shall not be present more than once in a given message.

The term "default" implies that the value defined shall be used in the absence of any assignment, or that this value allows negotiation of alternative values in between the two peer entities.

When a field extends over more than one octet, the order of bit values progressively decreases as the octet number increases. The least significant bit of the field is represented by the lowest numbered bit of the highest numbered octet of the field.

10.2 Protocol Discriminator

The Protocol Discriminator (PD) and its use are defined in GSM 04.07 [20]. GSM 04.08 defines the protocols relating to the PD values:

bits	4	3	2	1
	0	0	1	1
	0	1	0	1
	0	1	1	0
	1	0	0	0
	1	0	1	0

Call Control; call related SS messages
Mobility Management messages for non-GPRS services
Radio Resource management messages
Mobility Management messages for GPRS services
Session Management messages

except the call related SS procedures, which are defined in GSM 04.10.

10.3 Skip indicator and transaction identifier

10.3.1 Skip indicator

Bits 5 to 8 of the first octet of every Radio Resource management message and Mobility Management message and GPRS Mobility Management message contains the skip indicator. A message received with skip indicator different from 0000 shall be ignored. A message received with skip indicator encoded as 0000 shall not be ignored (unless it is ignored for other reasons). A protocol entity sending a Radio Resource management message or a Mobility Management message or a GPRS Mobility Management message shall encode the skip indicator as 0000.

10.3.2 Transaction identifier

Bits 5 to 8 of the first octet of every message belonging to the protocols "Call Control; call related SS messages" and "Session Management" contain the transaction identifier (TI). The transaction identifier and its use are defined in GSM 04.07 [20].

10.4 Message Type

The message type IE and its use are defined in GSM 04.07 [20]. Tables 10.3/GSM 04.08, 10.4/GSM 04.08, and 10.4a/GSM 04.08 define the value part of the message type IE used in the Radio Resource management protocol, the Mobility Management protocol, the Call Control protocol, and Session management protocol.

Table 10.1/GSM 04.08 (page 1 of 2): Message types for Radio Resource management

8	7	6	5	4	3	2	1	
0	0	1	1	1	-	-	-	Channel establishment messages:
1	0	0	-	-	-	-	-	- RR INITIALISATION REQUEST
0	1	1	-	-	-	-	-	- ADDITIONAL ASSIGNMENT
1	1	1	-	-	-	-	-	- IMMEDIATE ASSIGNMENT
0	0	1	-	-	-	-	-	- IMMEDIATE ASSIGNMENT EXTENDED
0	1	0	-	-	-	-	-	- IMMEDIATE ASSIGNMENT REJECT
0	0	1	1	0	-	-	-	Ciphering messages:
1	0	1	-	-	-	-	-	- CIPHERING MODE COMMAND
0	1	0	-	-	-	-	-	- CIPHERING MODE COMPLETE
0	0	1	1	0	-	-	-	Configuration change messages:
0	0	0	-	-	-	-	-	- CONFIGURATION CHANGE COMMAND
0	0	1	-	-	-	-	-	- CONFIGURATION CHANGE ACK.
0	1	1	-	-	-	-	-	- CONFIGURATION CHANGE REJECT
0	0	1	0	1	-	-	-	Handover messages:
1	1	0	-	-	-	-	-	- ASSIGNMENT COMMAND
0	0	1	-	-	-	-	-	- ASSIGNMENT COMPLETE
1	1	1	-	-	-	-	-	- ASSIGNMENT FAILURE
0	1	0	-	-	-	-	-	- PDCH ASSIGNMENT COMMAND
0	1	1	-	-	-	-	-	- HANDOVER COMMAND
1	0	0	-	-	-	-	-	- HANDOVER COMPLETE
0	0	0	-	-	-	-	-	- HANDOVER FAILURE
1	0	1	-	-	-	-	-	- PHYSICAL INFORMATION
0	0	0	0	1	-	-	-	Handover messages continued:
0	0	0	0	0	-	-	-	- RR-CELL CHANGE ORDER
0	0	0	0	1	-	-	-	Channel release messages:
1	0	1	-	-	-	-	-	- CHANNEL RELEASE
0	1	0	-	-	-	-	-	- PARTIAL RELEASE
1	1	1	-	-	-	-	-	- PARTIAL RELEASE COMPLETE
0	0	1	0	0	-	-	-	Paging and Notification messages:
0	0	1	-	-	-	-	-	- PAGING REQUEST TYPE 1
0	1	0	-	-	-	-	-	- PAGING REQUEST TYPE 2
1	0	0	-	-	-	-	-	- PAGING REQUEST TYPE 3
1	1	1	-	-	-	-	-	- PAGING RESPONSE
0	0	0	-	-	-	-	-	- NOTIFICATION/NCH
1	0	1	-	-	-	-	-	- NOTIFICATION/FACCH
1	1	0	-	-	-	-	-	- Reserved (see NOTE)
0	0	0	0	1	0	1	1	- - Reserved (see NOTE)

(continued...)

NOTE: This value was allocated but never used in earlier phases of the protocol.

Table 10.1/GSM 04.08 (page 2 of 2): Message types for Radio Resource management

8	7	6	5	4	3	2	1	
0	0	0	1	1	-	-	-	System information messages:
0	0	0	0	-	-	-	-	SYSTEM INFORMATION TYPE 8
0	0	0	1	-	-	-	-	SYSTEM INFORMATION TYPE 1
0	1	0	-	-	-	-	-	SYSTEM INFORMATION TYPE 2
0	1	1	-	-	-	-	-	SYSTEM INFORMATION TYPE 3
1	0	0	-	-	-	-	-	SYSTEM INFORMATION TYPE 4
1	0	1	-	-	-	-	-	SYSTEM INFORMATION TYPE 5
1	1	0	-	-	-	-	-	SYSTEM INFORMATION TYPE 6
1	1	1	-	-	-	-	-	SYSTEM INFORMATION TYPE 7
0	0	0	0	0	-	-	-	System information messages:
0	1	0	-	-	-	-	-	SYSTEM INFORMATION TYPE 2bis
0	1	1	-	-	-	-	-	SYSTEM INFORMATION TYPE 2ter
1	0	1	-	-	-	-	-	SYSTEM INFORMATION TYPE 5bis
1	1	0	-	-	-	-	-	SYSTEM INFORMATION TYPE 5ter
1	0	0	-	-	-	-	-	SYSTEM INFORMATION TYPE 9
0	0	0	-	-	-	-	-	SYSTEM INFORMATION TYPE 13
0	0	1	-	-	-	-	-	SYSTEM INFORMATION TYPE 14
1	1	1	-	-	-	-	-	SYSTEM INFORMATION TYPE 15
0	0	0	1	0	-	-	-	Miscellaneous messages:
0	0	0	-	-	-	-	-	CHANNEL MODE MODIFY
0	1	0	-	-	-	-	-	RR STATUS
1	1	1	-	-	-	-	-	CHANNEL MODE MODIFY ACKNOWLEDGE
1	0	0	-	-	-	-	-	FREQUENCY REDEFINITION
1	0	1	-	-	-	-	-	MEASUREMENT REPORT
1	1	0	-	-	-	-	-	CLASSMARK CHANGE
0	1	1	-	-	-	-	-	CLASSMARK ENQUIRY
0	0	1	1	0	1	1	0	EXTENDED MEASUREMENT REPORT
0	0	1	1	0	1	1	1	EXTENDED MEASUREMENT ORDER
0	0	1	1	0	1	0	0	GPRS SUSPENSION REQUEST
								VGCS uplink control messages:
0	0	0	0	1	0	0	1	VGCS UPLINK GRANT
0	0	0	0	1	1	1	0	UPLINK RELEASE
0	0	0	0	1	1	0	0	UPLINK FREE
0	0	1	0	1	0	1	0	UPLINK BUSY
0	0	0	1	0	0	0	1	TALKER INDICATION

Bit 8 is reserved for possible future use as an extension bit, see GSM 04.07.

Table 10.1a/GSM 04.08: Message types for Radio Resource management messages using the RR short protocol discriminator

5	4	3	2	1	
0	0	0	0	0	SYSTEM INFORMATION TYPE 10
0	0	0	0	1	NOTIFICATION/FACCH
0	0	0	1	0	UPLINK FREE

Table 10.2/GSM 04.08: Message types for Mobility Management

8	7	6	5	4	3	2	1	
0	x	0	0	-	-	-	-	Registration messages:
				0	0	0	1	- IMSI DETACH INDICATION
				0	0	1	0	- LOCATION UPDATING ACCEPT
				0	1	0	0	- LOCATION UPDATING REJECT
				1	0	0	0	- LOCATION UPDATING REQUEST
0	x	0	1	-	-	-	-	Security messages:
				0	0	0	1	- AUTHENTICATION REJECT
				0	0	1	0	- AUTHENTICATION REQUEST
				0	1	0	0	- AUTHENTICATION RESPONSE
				1	0	0	0	- IDENTITY REQUEST
				1	0	0	1	- IDENTITY RESPONSE
				1	0	1	0	- TMSI REALLOCATION COMMAND
				1	0	1	1	- TMSI REALLOCATION COMPLETE
0	x	1	0	-	-	-	-	Connection management messages:
				0	0	0	1	- CM SERVICE ACCEPT
				0	0	1	0	- CM SERVICE REJECT
				0	0	1	1	- CM SERVICE ABORT
				0	1	0	0	- CM SERVICE REQUEST
				0	1	0	1	- CM SERVICE PROMPT
				0	1	1	0	- NOTIFICATION RESPONSE
				1	0	0	0	- CM RE-ESTABLISHMENT REQUEST
				1	0	0	1	- ABORT
0	x	1	1	-	-	-	-	Miscellaneous messages:
				0	0	0	0	- MM NULL
				0	0	0	1	- MM STATUS
				0	0	1	0	- MM INFORMATION

Bit 8 is reserved for possible future use as an extension bit, see GSM 04.07.

Bit 7 is reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bit 7 is coded with a "0". See GSM 04.07.

Table 10.3/GSM 04.08: Message types for Call Control and call related SS messages

8	7	6	5	4	3	2	1	
0	x	0	0	0	0	0	0	escape to nationally specific message types ; see 1) below
0	x	0	0	-	-	-	-	Call establishment messages:
				0	0	0	1	- ALERTING
				1	0	0	0	- CALL CONFIRMED
				0	0	1	0	- CALL PROCEEDING
				0	1	1	1	- CONNECT
				1	1	1	1	- CONNECT ACKNOWLEDGE
				1	1	1	0	- EMERGENCY SETUP
				0	0	1	1	- PROGRESS
				0	1	0	0	- CC-ESTABLISHMENT
				0	1	1	0	- CC-ESTABLISHMENT CONFIRMED
				1	0	1	1	- RECALL
				1	0	0	1	- START CC
				0	1	0	1	- SETUP
0	x	0	1	-	-	-	-	Call information phase messages:
				0	1	1	1	- MODIFY
				1	1	1	1	- MODIFY COMPLETE
				0	0	1	1	- MODIFY REJECT
				0	0	0	0	- USER INFORMATION
				1	0	0	0	- HOLD
				1	0	0	1	- HOLD ACKNOWLEDGE
				1	0	1	0	- HOLD REJECT
				1	1	0	0	- RETRIEVE
				1	1	0	1	- RETRIEVE ACKNOWLEDGE
				1	1	1	0	- RETRIEVE REJECT
0	x	1	0	-	-	-	-	Call clearing messages:
				0	1	0	1	- DISCONNECT
				1	1	0	1	- RELEASE
				1	0	1	0	- RELEASE COMPLETE
0	x	1	1	-	-	-	-	Miscellaneous messages:
				1	0	0	1	- CONGESTION CONTROL
				1	1	1	0	- NOTIFY
				1	1	0	1	- STATUS
				0	1	0	0	- STATUS ENQUIRY
				0	1	0	1	- START DTMF
				0	0	0	1	- STOP DTMF
				0	0	1	0	- STOP DTMF ACKNOWLEDGE
				0	1	1	0	- START DTMF ACKNOWLEDGE
				0	1	1	1	- START DTMF REJECT
				1	0	1	0	- FACILITY

1): When used, the message type is defined in the following octet(s), according to the national specification.

Bit 8 is reserved for possible future use as an extension bit, see GSM 04.07.

Bit 7 is reserved for the send sequence number in messages sent from the mobile station. In messages sent from the network, bit 7 is coded with a "0". See GSM 04.07.

Table 10.4/GSM 04.08: Message types for GPRS mobility management

Bits								
8	7	6	5	4	3	2	1	
0	0	-	-	-	-	-	-	Mobility management messages
0	0	0	0	0	0	0	1	Attach request
0	0	0	0	0	0	1	0	Attach accept
0	0	0	0	0	0	1	1	Attach complete
0	0	0	0	0	1	0	0	Attach reject
0	0	0	0	0	1	0	1	Detach request
0	0	0	0	0	1	1	0	Detach accept
0	0	0	0	1	0	0	0	Routing area update request
0	0	0	0	1	0	0	1	Routing area update accept
0	0	0	0	1	0	1	0	Routing area update complete
0	0	0	0	1	0	1	1	Routing area update reject
0	0	0	1	0	0	0	0	P-TMSI reallocation command
0	0	0	1	0	0	0	1	P-TMSI reallocation complete
0	0	0	1	0	0	1	0	Authentication and ciphering req
0	0	0	1	0	0	1	1	Authentication and ciphering resp
0	0	0	1	0	1	0	0	Authentication and ciphering rej
0	0	0	1	0	1	0	1	Identity request
0	0	0	1	0	1	1	0	Identity response
0	0	1	0	0	0	0	0	GMM status
0	0	1	0	0	0	0	1	GMM information

Table 10.4a/GSM 04.08: Message types for GPRS session management

Bits								
8	7	6	5	4	3	2	1	
0	1	-	-	-	-	-	-	Session management messages
0	1	0	0	0	0	0	1	Activate PDP context request
0	1	0	0	0	0	1	0	Activate PDP context accept
0	1	0	0	0	0	1	1	Activate PDP context reject
0	1	0	0	0	1	0	0	Request PDP context activation
0	1	0	0	0	1	0	1	Request PDP context activation rej.
0	1	0	0	0	1	1	0	Deactivate PDP context request
0	1	0	0	0	1	1	1	Deactivate PDP context accept
0	1	0	0	1	0	0	0	Modify PDP context request
0	1	0	0	1	0	0	1	Modify PDP context accept
0	1	0	1	0	0	0	0	Activate AA PDP context request
0	1	0	1	0	0	0	1	Activate AA PDP context accept
0	1	0	1	0	0	1	0	Deactivate AA PDP context request
0	1	0	1	0	0	1	1	Deactivate AA PDP context accept
0	1	0	1	0	1	0	0	SM Status

10.5 Other information elements

The different formats (V, LV, T, TV, TLV) and the four categories of information elements (type 1, 2, 3, and 4) are defined in GSM 04.07.

The first octet of an information element in the non-imperative part contains the IEI of the information element. If this octet does not correspond to an IEI known in the message (see GSM 04.07), the receiver shall assume that the information element is:

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- if bit 8 of the first octet of the IE has the value 1, the IE is of type 1 or 2, i.e. that it is an information element of one octet length; or
- if bit 8 of the first octet of the IE has the value 0, the IE is of type 4, i.e. that the next octet is the length indicator indicating the length of the remaining of the information element. If in this case bits 5, 6, and 7 of the first octet of the IE also have the value 0, the IE is encoded as "comprehension required".

NOTE: The handling of messages containing unknown IEs encoded as "comprehension required" is specified in section 8.

This rule allows the receiver to jump over unknown information elements and to analyse any following information elements.

The information elements which are common for at least two of the three protocols Radio Resources management, Mobility Management and Call Control, are listed in section 10.5.1.

The information elements for the protocols Radio Resources management, Mobility Management and Call Control are listed in sections 10.5.2, 10.5.3 and 10.5.4 respectively. Default information element identifiers are listed in annex K.

NOTE: Different information elements may have the same default information element identifier if they belong to different protocols.

The descriptions of the information element types in sections 10.5.1, 10.5.2, 10.5.3, and 10.5.4 are organized in alphabetical order of the IE types. Each IE type is described in one subsection.

The subsection may have an introduction:

- possibly explaining the purpose of the IE;
- possibly describing whether the IE belongs to type 1, 2, 3, 4 or 5;
- possibly indicating the length that the information element has if it is either type 5 or if it is used in format TV (type 1 and 3) or TLV (type 4).

A figure of the subsection defines the structure of the IE indicating:

- possibly the position and length of the IEI. (However it depends on the message in which the IE occurs whether the IE contains an IEI.);
- the fields the IE value part is composed of;
- possibly the position and length of the length indicator. (However it depends on the IE type whether the IE contains a length indicator or not.);
- possibly octet numbers of the octets that compose the IE (see clause a) below).

Finally, the subsection contains tables defining the structure and value range of the fields that compose the IE value part. The order of appearance for information elements in a message is defined in section 9.

The order of the information elements within the imperative part of messages has been chosen so that information elements with 1/2 octet of content (type 1) go together in succession. The first type 1 information element occupies bits 1 to 4 of octet N, the second bits 5 to 8 of octet N, the third bits 1 to 4 of octet N + 1 etc. If the number of type 1 information elements is odd then bits 5 to 8 of the last octet occupied by these information elements contains a spare half octet IE in format V.

Where the description of information elements in this Technical Specification contains bits defined to be "spare bits", these bits shall set to the indicated value (0 or 1) by the sending side, and their value shall be ignored by the receiving side. With few exceptions, spare bits are indicated as being set to "0" in GSM 04.08.

The following rules apply for the coding of type 4 information elements:

- a) The octet number of an octet (which is defined in the figure of a subsection) consists of a positive integer, possibly of an additional letter, and possibly of an additional asterisk, see clause f). The positive integer identifies one octet or a group of octets.

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- b) Each octet group is a self contained entity. The internal structure of an octet group may be defined in alternative ways.
- c) An octet group is formed by using some extension mechanism. The preferred extension mechanism is to extend an octet (N) through the next octet(s) (Na, Nb, etc.) by using bit 8 in each octet as an extension bit.

The bit value "0" indicates that the octet group continues through to the next octet. The bit value "1" indicates that this octet is the last octet of the group. If one octet (Nb) is present, the preceding octets (N and Na) shall also be present.

In the format descriptions appearing in section 10.5.1 to 10.5.4, bit 8 is marked "0/1 ext" if another octet follows. Bit 8 is marked "1 ext" if this is the last octet in the extension domain.

Additional octets may be defined in later versions of the protocols ("1 ext" changed to "0/1 ext") and equipments shall be prepared to receive such additional octets; the contents of these octets shall be ignored. However the length indicated in sections 9 and 10 only takes into account this version of the protocols.

- d) In addition to the extension mechanism defined above, an octet (N) may be extended through the next octet(s) (N+1, N+2 etc.) by indications in bits 7-1 (of octet N).
- e) The mechanisms in c) and d) may be combined.
- f) Optional octets are marked with asterisks (*).

10.5.1 Common information elements.

10.5.1.1 Cell identity

The purpose of the *Cell Identity* information element is to identify a cell within a location area.

The *Cell Identity* information element is coded as shown in figure 10.2/GSM 04.08 and table 10.5/GSM 04.08.

The *Cell Identity* is a type 3 information element with 3 octets length.

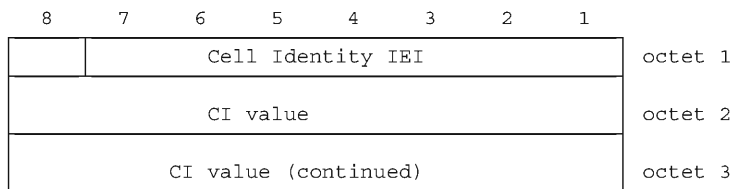


Figure 10.2/GSM 04.08 *Cell Identity* information element

Table 10.5/GSM 04.08: Cell Identity information element

<p>CI value, Cell identity value (octet 2 and 3)</p> <p>In the CI value field bit 8 of octet 2 is the most significant bit and bit 1 of octet 3 the least significant bit.</p> <p>The coding of the cell identity is the responsibility of each administration. Coding using full hexadecimal representation may be used. The cell identity consists of 2 octets.</p>

10.5.1.2 Ciphering Key Sequence Number

The purpose of the *Ciphering Key Sequence Number* information element is to make it possible for the network to identify the ciphering key Kc which is stored in the mobile station without invoking the authentication procedure. The ciphering key sequence number is allocated by the network and sent with the AUTHENTICATION REQUEST message to the mobile station where it is stored together with the calculated ciphering key Kc.

The *Ciphering Key Sequence Number* information element is coded as shown in figure 10.3/GSM 04.08 and table 10.6/GSM 04.08.

The ciphering key sequence number is a type 1 information element.

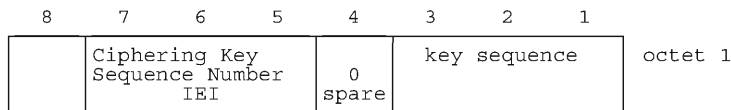


Figure 10.3/GSM 04.08 Ciphering Key Sequence Number information element

Table 10.6/GSM 04.08: Ciphering Key Sequence Number information element

<p>Key sequence (octet 1)</p> <p>Bits 3 2 1</p> <p>0 0 0 through Possible values for the ciphering key 1 1 0 sequence number</p> <p>1 1 1 No key is available (MS to network); Reserved (network to MS)</p>

10.5.1.3 Location Area Identification

The purpose of the *Location Area Identification* information element is to provide an unambiguous identification of location areas within the area covered by the GSM system.

The *Location Area Identification* information element is coded as shown in figure 10.4/GSM 04.08 and table 10.7/GSM 04.08.

The *Location Area Identification* is a type 3 information element with 6 octets length.

8	7	6	5	4	3	2	1	
Location Area Identification IEI								octet 1
MCC digit 2				MCC digit 1				octet 2
1	1	1	1	MCC digit 3				octet 3
MNC digit 2				MNC digit 1				octet 4
LAC								octet 5
LAC (continued)								octet 6

Figure 10.4/GSM 04.08 Location Area Identification information element

Table 10.7/GSM 04.08: Location Area Identification information element

MCC, Mobile country code (octet 2 and 3)
The MCC field is coded as in CCITT Rec. E212, Annex A.

If the LAI is deleted the MCC and MNC shall take the value from the deleted LAI.

In abnormal cases, the MCC stored in the mobile station can contain elements not in the set {0, 1 ... 9}. In such cases the mobile station should transmit the stored values using full hexadecimal encoding. When receiving such an MCC, the network shall treat the LAI as deleted.

MNC, Mobile network code (octet 4)
The coding of this field is the responsibility of each administration but BCD coding shall be used. If an administration decides to include only one digit in the MNC then bits 5 to 8 of octet 4 are coded as "1111".

Note: GSM 03.03 defines that a 2 digit MNC shall be used, however the possibility to use a one digit MNC in LAI is provided on the radio interface

In abnormal cases, the MNC stored in the mobile station can have digit 1 not in the set {0, 1 ... 9} and/or digit 2 not in the set {0, 1 ... 9, F} hex. In such cases the mobile station should transmit the stored values using full hexadecimal encoding. When receiving such an MNC, the network shall treat the LAI as deleted.

LAC, Location area code (octet 5 and 6)
In the LAC field bit 8 of octet 5 is the most significant bit and bit 1 of octet 6 the least significant bit.
The coding of the location area code is the responsibility of each administration except that two values are used to mark the LAC, and hence the LAI, as deleted. Coding using full hexadecimal representation may be used. The location area code consists of 2 octets.
If a LAI has to be deleted then all bits of the location area code shall be set to one with the exception of the least significant bit which shall be set to zero. If a SIM is inserted in a Mobile Equipment with the location area code containing all zeros, then the Mobile Equipment shall recognise this LAC as part of a deleted LAI

10.5.1.4 Mobile Identity

The purpose of the *Mobile Identity* information element is to provide either the international mobile subscriber identity, IMSI, the temporary mobile subscriber identity, TMSI, the international mobile equipment identity, IMEI or the international mobile equipment identity together with the software version number, IMEISV.

The IMSI shall not exceed 15 digits, the TMSI is 4 octets long, and the IMEI is composed of 15 digits, the IMEISV is 16 digits (see GSM 03.03).

For all transactions except emergency call establishment, emergency call re-establishment, mobile terminated call establishment, the identification procedure, and the ciphering mode setting procedure, the mobile station and the network shall select the mobile identity type with the following priority:

- 1- TMSI: The TMSI shall be used if it is available.
- 2- IMSI: The IMSI shall be used in cases where no TMSI is available.

For mobile terminated call establishment the mobile station shall select the same mobile identity type as received from the network in the PAGING REQUEST message.

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For emergency call establishment and re-establishment the mobile station shall select the mobile identity type with the following priority:

- 1- TMSI: The TMSI shall be used if it is available.
- 2- IMSI: The IMSI shall be used in cases where no TMSI is available.
- 3- IMEI: The IMEI shall be used in cases where no SIM is available or the SIM is considered as not valid by the mobile station or no IMSI or TMSI is available.

In the identification procedure the mobile station shall select the mobile identity type which was requested by the network.

In the ciphering mode setting procedure the mobile shall select the IMEISV.

The *Mobile Identity* information element is coded as shown in figure 10.5/GSM 04.08 and table 10.8/GSM 04.08.

The *Mobile Identity* is a type 4 information element with a minimum length of 3 octet and 11 octets length maximal. Further restriction on the length may be applied, e.g. number plans.

8	7	6	5	4	3	2	1	
Mobile Identity IEI								octet 1
Length of mobile identity contents								octet 2
Identity digit 1				odd/ even indic	Type of identity			octet 3
Identity digit p+1				Identity digit p				octet 4*

Figure 10.5/GSM 04.08 *Mobile Identity* information element

Table 10.8/GSM 04.08: *Mobile Identity* information element

Type of identity (octet 3)	
Bits	
3	2 1
0	0 1 IMSI
0	1 0 IMEI
0	1 1 IMEISV
1	0 0 TMSI
0	0 0 No Identity note 1)
All other values are reserved.	
Odd/even indication (octet 3)	
Bit	
4	
0	even number of identity digits and also when the TMSI is used
1	odd number of identity digits
Identity digits (octet 3 etc)	
For the IMSI, IMEI and IMEISV this field is coded using BCD coding. If the number of identity digits is even then bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111".	
If the mobile identity is the TMSI then bits 5 to 8 of octet 3 are coded as "1111" and bit 8 of octet 4 is the most significant bit and bit 1 of the last octet the least significant bit. The coding of the TMSI is left open for each administration.	

NOTE 1: This can be used in the case when a fill paging message without any valid identity has to be sent on the paging subchannel.

10.5.1.5 Mobile Station Classmark 1

The purpose of the *Mobile Station Classmark 1* information element is to provide the network with information concerning aspects of high priority of the mobile station equipment. This affects 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 *Mobile Station Classmark 1* information element is coded as shown in figure 10.6/GSM 04.08 and table 10.9/GSM 04.08.

The *Mobile Station Classmark 1* is a type 3 information element with 2 octets length.

	8	7	6	5	4	3	2	1	
	Mobile Station Classmark 1 IEI								octet 1
0	Revision level	ES IND	A5/1	RF power capability					octet 2

Figure 10.6/GSM 04.08 *Mobile Station Classmark 1* information element

Table 10.9/GSM 04.08: *Mobile Station Classmark 1* information element

Revision level (octet 2)
Bits 7 6
0 0 Reserved for phase 1
0 1 Used by phase 2 mobile stations
All other values are reserved for future use.
ES IND (octet 2, bit 5) "Controlled Early Classmark Sending" option implementation
0 "Controlled Early Classmark Sending" option is not implemented in the MS
1 "Controlled Early Classmark Sending" option is implemented in the MS
NOTE: The value of the ES IND gives the implementation in the MS. It's value is not dependent on the broadcast SI 3 Rest Octet <Early Classmark Sending Control> value.
1 encryption algorithm A5/1 not available
RF power capability (octet 2)
When the GSM P, E [or R] 900 MHz band is used (for exceptions see 3.4.18):
Bits 3 2 1
0 0 0 class 1
0 0 1 class 2
0 1 0 class 3
0 1 1 class 4
1 0 0 class 5
All other values are reserved.
When the DCS 1800 band is used (for exceptions see 3.4.18):
Bits 3 2 1
0 0 0 class 1
0 0 1 class 2
0 1 0 class 3
All other values are reserved.

10.5.1.6 Mobile Station Classmark 2

The purpose of the *Mobile Station Classmark 2* information element is to provide the network with information concerning aspects of both high and low priority of the mobile station equipment. This affects 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 *Mobile Station Classmark 2* information element is coded as shown in figure 10.7/GSM 04.08, table 10.10a/GSM 04.08 and table 10.10b/GSM 04.08.

The *Mobile Station Classmark 2* is a type 4 information element with 5 octets length.

8	7	6	5	4	3	2	1	
Mobile station classmark 2 IEI								octet 1
Length of mobile station classmark 2 contents								octet 2
0 spare	Revision level	ES IND	A5/1	RF power capability				octet 3
0 spare	PS capa.	SS Screen. Indicator	SM ca pabi.	VBS	VGCS	FC		octet 4
CM3	0	0	0	0	CMSP	A5/3	A5/2	octet 5
		spare						

Figure 10.7/GSM 04.08 Mobile Station Classmark 2 information element

NOTE: Owing to backward compatibility problems, bit 8 of octet 4 should not be used unless it is also checked that the bits 8, 7 and 6 of octet 3 are not "0 0 0".

Table 10.10a/GSM 04.08: *Mobile Station Classmark 2* information element

Revision level (octet 3)
Bits
7 6
0 0 Reserved for phase 1
0 1 Used by phase 2 mobile stations
All other values are reserved for future use
ES IND (octet 3, bit 5) "Controlled Early Classmark Sending" option implementation
0 "Controlled Early Classmark Sending" option is not implemented in the MS
1 "Controlled Early Classmark Sending" option is implemented in the MS
NOTE: The value of the ES IND gives the implementation in the MS. It's value is not dependent on the broadcast SI 3 Rest Octet <Early Classmark Sending Control> value.
A5/1 algorithm supported (octet 3, bit 4)
0 encryption algorithm A5/1 available
1 encryption algorithm A5/1 not available
When GSM 900 P, E [or R] band is used (for exceptions see 3.4.18):
Bits
3 2 1
0 0 0 class 1
0 0 1 class 2
0 1 0 class 3
0 1 1 class 4
1 0 0 class 5
All other values are reserved.
When the DCS 1800 band is used (for exceptions see 3.4.18):
Bits
3 2 1
0 0 0 class 1
0 0 1 class 2
0 1 0 class 3
All other values are reserved.
PS capability (pseudo-synchronization capability) (octet 4)
Bit 7
0 PS capability not present
1 PS capability present
SS Screening Indicator (octet 4)
Bits
6 5
0 0 defined in GSM 04.80
0 1 defined in GSM 04.80
1 0 defined in GSM 04.80
1 1 defined in GSM 04.80
SM capability (MT SMS pt to pt capability) (octet 4)
Bit 4
0 Mobile station does not support mobile terminated point to point SMS
1 Mobile station supports mobile terminated point to point SMS

Table 10.10b/GSM 04.08: *Mobile Station Classmark 2* information element

VBS notification reception (octet 4)
Bit 3
0 no VBS capability or no notifications wanted
1 VBS capability and notifications wanted
VGCS notification reception (octet 4)
Bit 2
0 no VGCS capability or no notifications wanted
1 VGCS capability and notifications wanted
FC Frequency Capability (octet 4)
When a GSM 900 band is used (for exceptions see 3.4.18):
Bit 1
0 The MS does not support the E-GSM or R-GSM band (For definition of frequency bands see GSM 05.05)
1 The MS does support the E-GSM or R-GSM (For definition of frequency bands see GSM 05.05)
Note : For mobile station supporting the R-GSM band further information can be found in MS Classmark 3.
When the DCS 1800 band is used (for exceptions see 3.4.18):
Bit 1
0 Reserved for future use (for definition of frequency bands see GSM 05.05)
Note: This bit conveys no information about support or non support of the E-GSM or R-GSM band when transmitted on a DCS 1800 channel.
CM3 (octet 5, bit 8)
0 The MS does not support any options that are indicated in CM3
1 The MS supports options that are indicated in classmark 3 IE
CMSP: CM Service Prompt (octet 5, bit 3) \$(CCBS)\$
0 "Network initiated MO CM connection request" not supported.
1 "Network initiated MO CM connection request" supported for at least one CM protocol.
A5/3 algorithm supported (octet 5, bit 2)
0 encryption algorithm A5/3 not available
1 encryption algorithm A5/3 available
A5/2 algorithm supported (octet 5, bit 1)
0 encryption algorithm A5/2 not available
1 encryption algorithm A5/2 available

NOTE: Additional mobile station capability information might be obtained by invoking the classmark interrogation procedure.

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 10.8/GSM 04.08 and table 10.11/GSM 04.08.

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

```

<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)> }
  <R Support>
  <Multi Slot Capability>
  <UCS2 support : bit>
  <Extended Measurement Capability : bit> $(MAFA)$
  <spare bit>;

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

<R Support> ::=
  0 | -- R-GSM band not supported
  1 < R-GSM band Associated Radio Capability : bit(3)>; -- R-GSM band supported

<Multi Slot Capability> ::=
  0 | -- single slot capability
  1 <Multi Slot Class : bit(5)> ;
< MS Measurement capability > ::=
  < SMS_VALUE : bit string (4) >
  < SM_VALUE : bit string (4) >

```

Figure 10.8/GSM 04.08 Mobile Station Classmark 3 information element

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 *Multibands Supported* field in the MS Classmark 3.

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.

A mobile station shall include the MS Measurement Capability field if the MS Multislot Class field contains a value of 19 or greater (see GSM 05.02).

Table 10.11/GSM 04.08: Mobile Station Classmark 3 information element

Multibands Supported (3 bit field)	
Band 1 supported (third bit of the field)	
0	P-GSM not supported
1	P-GSM supported
Band 2 supported (second bit of the field)	
0	E-GSM or R-GSM not supported
1	E-GSM or R-GSM supported
Band 3 supported (first bit of the field)	
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.	
Of the 'Band 2 supported' bit indicates support of E-GSM or R-GSM, the first bit 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 or two of these 3 bands supported. However, if only one band is indicated, the receiver shall ignore the Associated Radio Capability 2.	
For single band mobile station all bits are set to 0.	
A5/4	
0	encryption algorithm A5/4 not available
1	encryption algorithm A5/4 available
A5/5	
0	encryption algorithm A5/5 not available
1	encryption algorithm A5/5 available
A5/6	
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	
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 GSM 05.05).	
R Support	
0	R-GSM band is not supported
1	R-GSM band is supported
In case where the R-GSM band is supported the R-GSM band associated radio capability (3 bit field) contains the binary coding of the power class associated (see GSM 05.05). 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.	
MSCI, Multi Slot Capability Indication	
0	Multislot class information not included, no multislot capability
1	Multislot class defined by the Multislot Class field

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(continued...)

Table 10.11/GSM 04.08 (continued): *MS Classmark 3* information element

Multi Slot Class (5 bit field)
If MSC1 is "1" then the Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02.
Range 1 to 18
All other values are reserved.
UCS2
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.
0 the ME has a preference for the default alphabet (defined in GSM 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 \$(MAFA)\$
This bit indicates whether the mobile station supports 'Extended Measurements' or not
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 1/8 timeslot (~72 microseconds)
0 0 0 1 2/8 timeslot (~144 microseconds)
0 0 1 0 3/8 timeslot (~216 microseconds)
...
1 1 1 1 16/8 timeslot (~1154 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 1/8 timeslot (~72 microseconds)
0 0 0 1 2/8 timeslot (~144 microseconds)
0 0 1 0 3/8 timeslot (~216 microseconds)
...
1 1 1 1 16/8 timeslot (~1154 microseconds)

10.5.1.8 Spare Half Octet

This element is used in the description of messages in section 9 when an odd number of half octet type 1 information elements are used. This element is filled with spare bits set to zero and is placed in bits 5 to 8 of the octet unless otherwise specified.

10.5.1.9 Descriptive group or broadcast call reference

The purpose of the *Descriptive Group or Broadcast Call Reference* is to provide information describing a voice group or broadcast call. The IE of the *Descriptive Group or Broadcast Call Reference* is composed of the group or broadcast call reference together with a service flag, an acknowledgement flag, the call priority and the group cipher key number.

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The *Descriptive Group or Broadcast Call Reference* information element is coded as shown in figure 10.8bis/GSM 04.08 and Table 10.12/GSM 04.08

The *Descriptive Group or Broadcast Call Reference* is a type 3 information element with 6 octets length.

8	7	6	5	4	3	2	1		
Group or broadcast call reference IEI								octet 1	
Binary coding of the group or broadcast call reference								octet 2	
								octet 3	
								octet 4	
				SF	AF	call priority		octet 5	
Ciphering information				0	Spare		0	0	octet 6

Figure 10.8bis/GSM 04.08 Descriptive Group or Broadcast Call Reference

Table 10.12/GSM 04.08 Descriptive Group or Broadcast Call Reference

```

Binary code of the group or broadcast call reference
The length of the binary code has 27 bits which is
encoded in the octet 2, 3, 4
and Bits 8,7,6 (octet 5).
The highest bit of the BC is the bit 8 in the octet 2
and the lowest bit is allocated in the bit 6
in the octet 5. (see also GSMá03.03)

SF Service flag (octet 5)
Bit
5
0          VBS (broadcast call reference)
1          VGCS (group call reference)

AF Acknowledgement flag (octet 5)
Bit
4
0          acknowledgement is not required
1          acknowledgement is required

Call priority (octet 5)
Bit
3 2 1
0 0 0    no priority applied
0 0 1    call priority level 4
0 1 0    call priority level 3
0 1 1    call priority level 2
1 0 0    call priority level 1
1 0 1    call priority level 0
1 1 0    call priority level B
1 1 1    call priority level A

Ciphering information (octet 6)
Bit
8 7 6 5
0 0 0 0    no ciphering
0 0 0 1    ciphering with cipher key number 1
0 0 1 0    ciphering with cipher key number 2
0 0 1 1    ciphering with cipher key number 3
0 1 0 0    ciphering with cipher key number 4
0 1 0 1    ciphering with cipher key number 5
0 1 1 0    ciphering with cipher key number 6
0 1 1 1    ciphering with cipher key number 7
1 0 0 0    ciphering with cipher key number 8
1 0 0 1    ciphering with cipher key number 9
1 0 1 0    ciphering with cipher key number A
1 0 1 1    ciphering with cipher key number B
1 1 0 0    ciphering with cipher key number C
1 1 0 1    ciphering with cipher key number D
1 1 1 0    ciphering with cipher key number E
1 1 1 1    ciphering with cipher key number F
    
```

10.5.1.10 Group Cipher Key Number

The purpose of the *Group Cipher Key Number* is to provide information on the group cipher key to be used for ciphering and deciphering by the mobile station.

The *Group Cipher Key Number* information element is coded as shown in figure 10.8ter/GSM 04.08 and Table10.12bis/GSM 04.08

The *Group Cipher Key Number* is a type 3 information element with 1 1/2 octets length.

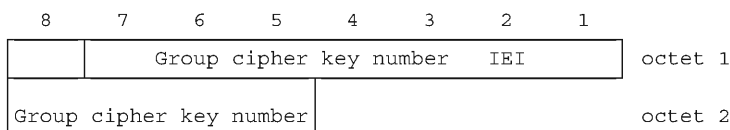


Figure 10.8ter/GSM 04.08 Descriptive group or broadcast call reference

ETSI

Table 10.12bis/GSM 04.08 Group Cipher Key Number

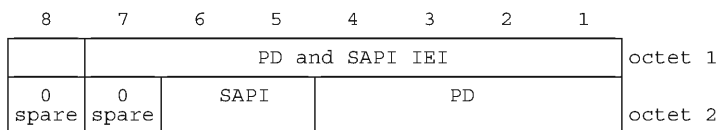
Group cipher key number (octet 2)	
Bit	
8 7 6 5	
0 0 0 0	spare
0 0 0 1	cipher key number 1
0 0 1 0	cipher key number 2
0 0 1 1	cipher key number 3
0 1 0 0	cipher key number 4
0 1 0 1	cipher key number 5
0 1 1 0	cipher key number 6
0 1 1 1	cipher key number 7
1 0 0 0	cipher key number 8
1 0 0 1	cipher key number 9
1 0 1 0	cipher key number A
1 0 1 1	cipher key number B
1 1 0 0	cipher key number C
1 1 0 1	cipher key number D
1 1 1 0	cipher key number E
1 1 1 1	cipher key number F

10.5.1.10a PD and SAPI \$(CCBS)\$

The purpose of the *PD and SAPI* information element is to provide information concerning Protocol Discriminators and Service Access Point Identifiers.

The *PD and SAPI* information element is coded as shown in figure 10.8qua/GSM 04.08 and table 10.12ter/GSM 04.08.

The *PD and SAPI* is a type 3 information element with 2 octets length.



**Figure 10.8qua/GSM 04.08
PD and SAPI information element**

Table 10.12ter/GSM 04.08: PD and SAPI information element

SAPI: Service Access Point Identifier (octet 2)
Bits
6 5
0 0 SAPI 0
0 1 reserved
1 0 reserved
1 1 SAPI 3
PD: Protocol Discriminator (octet 2)
bits 4-1
Encoded as specified in section 11.2.1 of 04.07.

10.5.1.11 Priority Level

The purpose of the *Priority Level* is to provide information defining the priority level requested or applied. The *Priority Level* IE may be included in CM_SERVICE_REQUEST, CALL_PROCEEDING and SETUP messages.

ETSI

The *Priority Level* information element is coded as shown in figure 10.8quad/GSM 04.08 and table 10.12ter/GSM 04.08.

The *Priority Level* is a type 1 information element with 1 octet length.

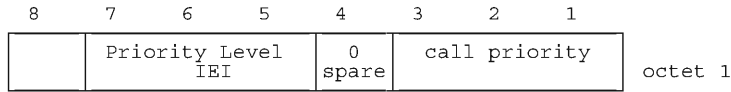


Figure 10.8quad/GSM 04.08 Priority Level

Table 10.12ter/GSM 04.08 Priority Level

Call priority (octet 1)	
Bit	
3 2 1	
0 0 0	no priority applied
0 0 1	call priority level 4
0 1 0	call priority level 3
0 1 1	call priority level 2
1 0 0	call priority level 1
1 0 1	call priority level 0
1 1 0	call priority level B
1 1 1	call priority level A

10.5.2 Radio Resource management information elements.

10.5.2.1a BA Range

The purpose of the BA Range information element is to provide the mobile station with ARFCN range information which can be used in the cell selection procedure.

The BA Range information element is coded as shown in figure 10.8a/GSM 04.08 and table 10.12a/GSM 04.08.

The BA Range is a type 4 information element with a minimum length of 6 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

8	7	6	5	4	3	2	1		
BA RANGE IEI								octet 1	
Length of BA Range contents								octet 2	
Number of Ranges								octet 3	
RANGE1_LOWER (high part)								octet 4	
RANGE1_LOWER (low part)				RANGE1_HIGHER (high part)				octet 5	
RANGE1_HIGHER (low part)				RANGE2_LOWER (high part)				octet 6	
RANGE2_LOWER (low part)						RANGE2_HIGHER (high part)		octet 7	
RANGE2_HIGHER (low part)								octet 8	
RANGE3_LOWER (high part)								octet 9	
RANGE3_LOWER (low part)				RANGE3_HIGHER (high part)				octet 10	
RANGE3_HIGHER (low part)				RANGE4_LOWER (high part)				octet 11	
RANGE4_LOWER (low part)						RANGE4_HIGHER (high part)		octet 12	
RANGE4_HIGHER (low part)								octet 13	
:								octet n	

Figure 10.8a/GSM 04.08 BA RANGE information element

Table 10.12a/GSM 04.08: BA Range information element

<p>Number of Ranges parameter The number of Ranges parameter indicates in binary the number of ranges to be transmitted in the IE. It shall have a minimum value of 1.</p> <p>RANGEi LOWER</p> <p>If \$(impr-BA-range-handling)\$ is not supported: \$begin The RANGEi LOWER is coded as the binary representation of the ARFCN used as the lower limit of a range of frequencies to be used by the mobile station in cell selection (see GSM 05.08 and GSM 03.22) \$end</p> <p>If \$(impr-BA-range-handling)\$ is supported: \$begin The RANGEi LOWER is coded as the binary representation of the ARFCN used as the lower limit of a range of frequencies which could be used by the mobile station in cell selection (see GSM 05.08 and GSM 03.22) \$end</p> <p>RANGEi HIGHER</p> <p>If \$(impr-BA-range-handling)\$ is not supported: \$begin The RANGEi HIGHER is coded as the binary representation of the ARFCN used as the higher limit of a range of frequencies to be used by the mobile station in cell selection (see GSM 05.08 and GSM 03.22) \$end</p> <p>If \$(impr-BA-range-handling)\$ is supported: \$begin The RANGEi HIGHER is coded as the binary representation of the ARFCN used as the higher limit of a range of frequencies which could be used by the mobile station in cell selection (see GSM 05.08 and GSM 03.22) \$end</p> <p>If the length of the BA range information element is greater than the number of octets required to carry the Number of Ranges given in octet 3, then any unused octets or parts of octets at the end of the IE shall be considered as spare.</p> <p>If \$(impr-BA-range-handling)\$ is supported: If a mobile station receives range information which has ranges or part of the ranges which are not supported by the mobile station, the mobile station shall take into account those parts of the ranges which it does support.</p>

10.5.2.1b Cell Channel Description

The purpose of the *Cell Channel Description* information element is to provide the reference frequency list to be used to decode the mobile allocation information element.

The *Cell Channel Description* is a type 3 information element with 17 octets length.

There are several formats for the *Cell Channel Description* information element, distinguished by the "format indicator" subfield. Some formats are frequency bit maps, the others use a special encoding scheme.

NOTE: No more than 64 RF channels should be encoded in the Cell Allocation since this is the maximum number of RF channels which can be referenced in the Mobile Allocation IE.

ETSI

10.5.2.1b.1 General description

Figure 10.9/04.08 shows only a special bit numbering. The different general format is described in table 10.13/04.08.

	8	7	6	5	4	3	2	1	
	Cell Channel Description IEI								octet 1
Bit 128	Bit 127	0 spare	0 spare	Bit 124	Bit 123	Bit 122	Bit 121		octet 2
Bit 120	Bit 119	Bit 118	Bit 117	Bit 116	Bit 115	Bit 114	Bit 113		octet 3
Bit 008	Bit 007	Bit 006	Bit 005	Bit 004	Bit 003	Bit 002	Bit 001		octet 17

Figure 10.9/GSM 04.08 Cell Channel Description information element (general format)

Table 10.13/GSM 04.08: Cell Channel Description information element, general format

FORMAT-ID, Format Identifier (Bit 128 and next)

The different formats are distinguished by the bits of higher number. The possible values are the following:

Bit 128	Bit 127	Bit 124	Bit 123	Bit 122	format notation
0	0	X	X	X	bit map 0
1	0	0	X	X	1024 range
1	0	1	0	0	512 range
1	0	1	0	1	256 range
1	0	1	1	0	128 range
1	0	1	1	1	variable bit map

All other combinations are reserved for future use. A GSMá900 mobile station which only supports the primary GSMáband P-GSMá900 (cf. GSMá05.05) may consider all values except the value for bit map 0 as reserved.

The significance of the remaining bits depends on the FORMAT-ID. The different cases are specified in the next sections.

Mobile stations shall treat all ARFCNs in the set {0, 1, 2 ... 1023} as valid ARFCN values even if the mobile station is unable to transmit or receive on that ARFCN.

10.5.2.1b.2 Bit map 0 format

8	7	6	5	4	3	2	1	
Cell Channel Description IEI								octet 1
0	0	0	0	CA ARFCN 124	CA ARFCN 123	CA ARFCN 122	CA ARFCN 121	octet 2
FORMAT-ID		spare						
CA ARFCN 120	CA ARFCN 119	CA ARFCN 118	CA ARFCN 117	CA ARFCN 116	CA ARFCN 115	CA ARFCN 114	CA ARFCN 113	octet 3
CA ARFCN 008	CA ARFCN 007	CA ARFCN 006	CA ARFCN 005	CA ARFCN 004	CA ARFCN 003	CA ARFCN 002	CA ARFCN 001	octet 17

Figure 10.10/GSM 04.08 Cell Channel Description information element, bit map 0 format

Table 10.14/GSM 04.08: Cell channel Description information element, bit map 0 format

CA ARFCN N, Cell Allocation Absolute RF Channel Number N (octet 2 etc.)

For a RF channel with ARFCN = N belonging to the cell allocation the CA ARFCN N bit is coded with a "1"; N = 1, 2, .. , 124.

For a RF channel with ARFCN = N not belonging to the cell allocation the CA ARFCN N bit is coded with a "0"; N = 1, 2 .. , 124.

10.5.2.1b.3 Range 1024 format

8	7	6	5	4	3	2	1	
Cell Channel Description IEI								octet 1
1	0	0	0	0	0	W(1) (high part)		octet 2
FORMAT-ID		spare	spare	FORMA T-ID	F0			
W(1) (low part)								octet 3
W(2) (high part)								octet 4
W(2) (low)	W(3) (high part)							octet 5
W(3) (low part)	W(4) (high part)							octet 6
W(4) (low part)	W(5) (high part)							octet 7
W(5) (low part)	W(6) (high part)							octet 8
W(6) (low part)	W(7) (high part)							octet 9
W(7) (low part)	W(8) (high part)							octet 10
W(8) (low)	W(9)							octet 11
W(10)							W(11) high	octet 12
W(11) (low part)						W(12) (high part)		octet 13
W(12) (low part)					W(13) (high part)			octet 14
W(13) (low part)				W(14) (high part)				octet 15
W(14) (low part)			W(15) (high part)					octet 16
W(15) (low part)	W(16)							octet 17

Figure 10.11/GSM 04.08 Cell Channel Description information element (1024 range format)

Table 10.15/GSM 04.08: Cell Channel Description information element, range 1024 format

F0, frequency 0 indicator (octet 2, bit 3):
 0 ARFCN 0 is not a member of the set
 1 ARFCN 0 is a member of the set
 W(i), i from 1 to 16 (octet 2 to 17):
 Each W(i) encodes a non negative integer in binary format.
 If W(k) is null, W(k+1) to W(16) must be null also.
 Each non null W(k) allows to compute, together with some previous W(i) the ARFCN F(k) of a frequency in the set. The computation formulas are given in section 10.5.2.13.3.

10.5.2.1b.4 Range 512 format

8	7	6	5	4	3	2	1	
Cell Channel Description IEI								octet 1
1	0	0	0	1	0	0		ORIG-ARFCN high
FORMAT-ID spare spare FORMAT-ID								octet 2
ORIG-ARFCN (middle part)								octet 3
ORIG-ARFCN low	W(1) (high part)							octet 4
W(1) (low part)		W(2) (high part)						octet 5
W(2) (low part)		W(3) (high part)						octet 6
W(3) (low part)		W(4) (high part)						octet 7
W(4) low	W(5)							octet 8
W(6)							W(7) high	octet 9
W(7) (low part)					W(8) (high part)			octet 10
W(8) (low part)				W(9) (high part)				octet 11
W(9) (low part)		W(10)						octet 12
W(11)					W(12) (high part)			octet 13
W(12) (low part)				W(13) (high part)				octet 14
W(13) (low part)		W(14)						octet 15
W(15)					W(16) (high part)			octet 16
W(16) (low part)				W(17)				octet 17

Figure 10.12/GSM 04.08 Cell Channel Description information element (512 range format)

ETSI

Table 10.19/GSM 04.08: Cell Channel Description information element, variable bit map format

ORIG-ARFCN, origin ARFCN (octet 2, 3 and 4)
 This field encodes the ARFCN of one frequency belonging to the set. This value is also used as origin of the bit map to generate all other frequencies.
 RRFCN N, relative radio frequency channel number N (octet 4 etc.)
 For a RF channel with ARFCN = (ORIG-ARFCN + N) mod 1024 belonging to the set, RRFCN N bit is coded with a "1"; N = 1, 2, .., 111
 For a RF channel with ARFCN = (ORIG-ARFCN + N) mod 1024 not belonging to the set, RRFCN N bit is coded with a "0"; N = 1, 2, .., 111

10.5.2.2 Cell Description

The purpose of the *Cell Description* information element is to provide a minimum description of a cell, e.g. to allow the mobile station to use its pre-knowledge about synchronization.

The *Cell Description* information element is coded as shown in figure 10.16/GSM 04.08 and table 10.20/GSM 04.08.

The *Cell Description* is a type 3 information element with 3 octets length.

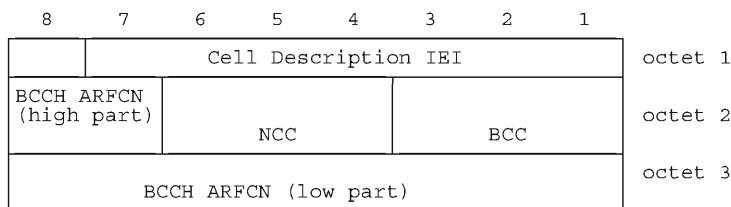


Figure 10.16/GSM 04.08 Cell Description information element

Table 10.20/GSM 04.08: Cell Description information element

NCC, PLMN colour code (octet 2)
 The NCC field is coded as the binary representation of the PLMN colour code (see TS. GSMá03.03)
 BCC, BS colour code (octet 2)
 The BCC field is coded as the binary representation of the BS colour code (see TS. GSMá03.03).
 BCCH ARFCN (octet 2, bits 7 and 8, and octet 3)
 The BCCH ARFCN number field is coded as the binary representation of the BCCH carriers absolute RF channel number.
 Range: 0 to 1023

10.5.2.3 Cell Options (BCCH)

The purpose of the *Cell Options (BCCH)* information element is to provide a variety of information about a cell.

ETSI

The *Cell Options* (BCCH) information element is coded as shown in figure 10.17/GSM 04.08 and table 10.21/GSM 04.08.

The *Cell Options* (BCCH) is a type 3 information element with 2 octets length.

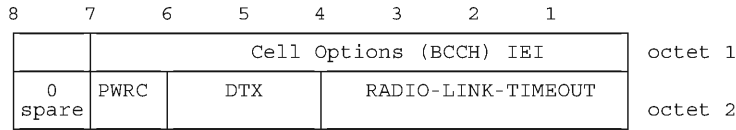


Figure 10.17/GSM 04.08 *Cell Options* (BCCH) information element

10.5.2.3a Cell Options (SACCH)

The purpose of the *Cell Options* (SACCH) information element is to provide a variety of information about a cell.

The *Cell Options* (SACCH) information element is coded as shown in figure 10.17a/GSM 04.08 and table 10.21a/GSM 04.08.

The *Cell Options* (SACCH) is a type 3 information element with 2 octets length.

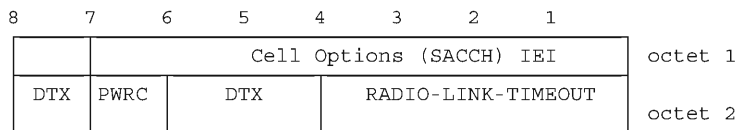


Figure 10.17a/GSM 04.08 *Cell Options* (SACCH) information element

Table 10.21/GSM 04.08: *Cell Options* (BCCH) information element

PWRC Power control indicator (octet 2) Note 1	
bit	7
0	PWRC is not set
1	PWRC is set
DTX, DTX indicator (octet 2) Note 3	
Bit	5
6	5
0 0	The MSs may use uplink discontinuous transmission
0 1	The MSs shall use uplink discontinuous transmission
1 0	The MS shall not use uplink discontinuous transmission
RADIO-LINK_TIMEOUT (octet 2) Note 2	
Bits	
4 3 2 1	
0 0 0 0	4
0 0 0 1	8
0 0 1 0	12
.	
.	
1 1 1 0	60
1 1 1 1	64

NOTE 1: The precise meaning of the PWRC parameter can be found in GSM 05.08.

NOTE 2: The precise meaning of RADIO-LINK-TIMEOUT parameter can be found in GSM 05.08.

NOTE 3: The DTX indicator field is not related to the use of downlink discontinuous transmission.

Table 10.21a/GSM 04.08: *Cell Options (SACCH)* information element

PWRC Power control indicator (octet 2) Note 1	
bit 7	
0	PWRC is not set
1	PWRC is set
DTX, DTX indicator (octet 2) Note 3	
Bit	
8 6 5	
0 0 0	The MS may use uplink discontinuous transmission on a TCH-F. The MS shall not use uplink discontinuous transmission on TCH-H.
0 0 1	The MS shall use uplink discontinuous transmission on a TCH-F. The MS shall not use uplink discontinuous transmission on TCH-H.
0 1 0	The MS shall not use uplink discontinuous transmission on a TCH-F. The MS shall not use uplink discontinuous transmission on TCH-H.
0 1 1	Note 4: The MS shall use uplink discontinuous transmission on a TCH-F. The MS may use uplink discontinuous transmission on TCH-H.
1 0 0	The MS may use uplink discontinuous transmission on a TCH-F. The MS may use uplink discontinuous transmission on TCH-H.
1 0 1	The MS shall use uplink discontinuous transmission on a TCH-F. The MS shall use uplink discontinuous transmission on TCH-H.
1 1 0	The MS shall not use uplink discontinuous transmission on a TCH-F. The MS shall use uplink discontinuous transmission on TCH-H.
1 1 1	Note 4: The MS may use uplink discontinuous transmission on a TCH-F. The MS shall use uplink discontinuous transmission on TCH-H.
RADIO-LINK_TIMEOUT (octet 2) Note 2	
Bits	
4 3 2 1	
0 0 0 0	4
0 0 0 1	8
0 0 1 0	12
.	
.	
.	
1 1 1 0	60
1 1 1 1	64

NOTE 1: The precise meaning of the PWRC parameter can be found in GSM 05.08 .

NOTE 2: The precise meaning of RADIO-LINK-TIMEOUT parameter can be found in GSM 05.08.

NOTE 3: The DTX indicator field is not related to the use of downlink discontinuous transmission.

NOTE 4: These codes shall not be sent to mobile stations that implement an earlier version of this protocol in which these codes were not defined.

10.5.2.4 Cell Selection Parameters

The purpose of the *Cell Selection Parameters* information element is to provide a variety of information about a cell.

The *Cell Selection Parameters* information element is coded as shown in figure 10.18/GSM 04.08 and table 10.22/GSM 04.08.

The *Cell Selection Parameters* information element is a type 3 information element with 3 octets length.

ETSI

8	7	6	5	4	3	2	1	
Cell Selection Parameters IEI								octet 1
CELL-RESELECT HYSTERESIS				MS-TXPWR-MAX-CCH				octet 2
ACS	NECI	RXLEV-ACCESS-MIN						octet 3

Figure 10.18/GSM 04.08 Cell Selection Parameters information element

Table 10.22/GSM 04.08: Cell Selection Parameters information element

<p>CELL-RESELECT-HYSTERESIS (octet 2) The usage of this information is defined in GSM 5.08</p> <p>Bits</p> <table border="0"> <tr> <td style="text-align: right;">8 7 6</td> <td></td> </tr> <tr> <td style="text-align: right;">0 0 0</td> <td>0 dB RXLEV hysteresis for LA re-selection</td> </tr> <tr> <td style="text-align: right;">0 0 1</td> <td>2 dB RXLEV hysteresis for LA re-selection</td> </tr> <tr> <td style="text-align: right;">0 1 0</td> <td>4 dB RXLEV hysteresis for LA re-selection</td> </tr> <tr> <td style="text-align: right;">0 1 1</td> <td>6 dB RXLEV hysteresis for LA re-selection</td> </tr> <tr> <td style="text-align: right;">1 0 0</td> <td>8 dB RXLEV hysteresis for LA re-selection</td> </tr> <tr> <td style="text-align: right;">1 0 1</td> <td>10 dB RXLEV hysteresis for LA re-selection</td> </tr> <tr> <td style="text-align: right;">1 1 0</td> <td>12 dB RXLEV hysteresis for LA re-selection</td> </tr> <tr> <td style="text-align: right;">1 1 1</td> <td>14 dB RXLEV hysteresis for LA re-selection</td> </tr> </table> <p>MS-TXPWR-MAX-CCH (octet 2) The MS-TXPWR-MAX-CCH field is coded as the binary representation of the "power control level" in TS GSM 5.05 corresponding to the maximum TX power level an MS may use when accessing on a Control Channel CCH. This value shall be used by the Mobile Station according to GSM 5.08.</p> <p>Range: 0 to 31.</p> <p>RXLEV-ACCESS-MIN (octet 3) The RXLEV-ACCESS-MIN field is coded as the binary representation of the minimum received signal level at the MS for which it is permitted to access the system.</p> <p>Range: 0 to 63. (See TS GSM 5.08).</p> <p>ACS, ADDITIONAL RESELECT PARAM IND (octet 3) Bit 8: In System Information type 3 message: Spare, set to "0"</p> <p>In System Information type 4 message: 0 The SI 4 rest octets, if present, shall be used to derive the value of PI and possibly C2 parameters and/or other parameters 1 The value of PI and possibly C2 parameters and/or other parameters in a System information type 7 or type 8 message shall be used</p> <p>NECI: HALF RATE SUPPORT (octet 3) Bit 7: 0 New establishment causes are not supported 1 New establishment causes are supported</p>	8 7 6		0 0 0	0 dB RXLEV hysteresis for LA re-selection	0 0 1	2 dB RXLEV hysteresis for LA re-selection	0 1 0	4 dB RXLEV hysteresis for LA re-selection	0 1 1	6 dB RXLEV hysteresis for LA re-selection	1 0 0	8 dB RXLEV hysteresis for LA re-selection	1 0 1	10 dB RXLEV hysteresis for LA re-selection	1 1 0	12 dB RXLEV hysteresis for LA re-selection	1 1 1	14 dB RXLEV hysteresis for LA re-selection
8 7 6																		
0 0 0	0 dB RXLEV hysteresis for LA re-selection																	
0 0 1	2 dB RXLEV hysteresis for LA re-selection																	
0 1 0	4 dB RXLEV hysteresis for LA re-selection																	
0 1 1	6 dB RXLEV hysteresis for LA re-selection																	
1 0 0	8 dB RXLEV hysteresis for LA re-selection																	
1 0 1	10 dB RXLEV hysteresis for LA re-selection																	
1 1 0	12 dB RXLEV hysteresis for LA re-selection																	
1 1 1	14 dB RXLEV hysteresis for LA re-selection																	

10.5.2.4a MAC Mode and Channel Coding Requested

The purpose of the *MAC Mode and Channel Coding Requested* information element is for the mobile station to indicate to the network which channel coding rate the mobile station desires the network to use on the downlink.

ETSI

The *MAC Mode and Channel Coding Requested* information element is coded as shown in figure 10.18a/GSM 04.08 and table 10.22a/GSM 04.08.

The *MAC Mode and Channel Coding Requested* is a type 1 information element.

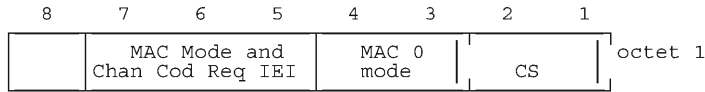


Figure 10.18a/GSM 04.08 *MAC Mode and Channel Coding Requested* information element

Table 10.22a/GSM 04.08: *MAC Mode and Channel Coding Requested* information element

<p>CS : Coding Scheme This field indicates to network the channel coding scheme (see GSM 05.03) that the network should use on the downlink. The field is encoded according to the following table:</p> <p>bits</p> <table style="margin-left: 20px;"> <tr><td>2</td><td>1</td><td></td></tr> <tr><td>0</td><td>0</td><td>CS 1</td></tr> <tr><td>0</td><td>1</td><td>CS 2</td></tr> <tr><td>1</td><td>0</td><td>CS 3</td></tr> <tr><td>1</td><td>1</td><td>CS 4</td></tr> </table> <p>MAC Mode (bits 3-4, octet 1) This field is encoded the same as the MAC_MODE field in the PACKET RESOURCE REQUEST message described in GSM 04.60.</p>	2	1		0	0	CS 1	0	1	CS 2	1	0	CS 3	1	1	CS 4
2	1														
0	0	CS 1													
0	1	CS 2													
1	0	CS 3													
1	1	CS 4													

10.5.2.5 Channel Description

The purpose of the *Channel Description* information element is to provide a description of an allocable channel together with its SACCH.

The *Channel Description* information element is coded as shown in figure 10.19/GSM 04.08 and table 10.23/GSM 04.08.

The *Channel Description* is a type 3 information element with 4 octets length.

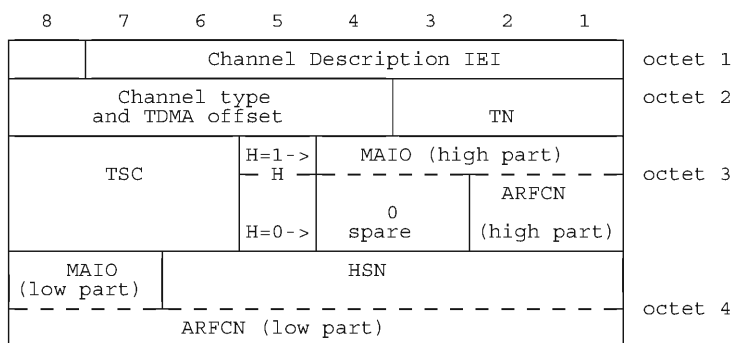


Figure 10.19/GSM 04.08 *Channel Description* information element

Table 10.23/GSM 04.08: Channel Description information element

Channel type and TDMA offset (octet 2)	
Bits	
8 7 6 5 4	
0 0 0 0 1	TCH/F + ACCHs
0 0 0 1 T	TCH/H + ACCHs
0 0 1 T T	SDCCH/4 + SACCH/C4 or CBCH (SDCCH/4)
0 1 T T T	SDCCH/8 + SACCH/C8 or CBCH (SDCCH/8)
The T bits indicate the subchannel number coded in binary.	
All other values are reserved.	
The Channel Type and TDMA offset field shall be ignored and all bits treated as spare when received in an IMMEDIATE ASSIGNMENT message used for packet uplink or downlink assignment. The sender sets the spare bits to the coding for TCH/F+ACCHs.	
The Channel Type and TDMA offset field shall be ignored and all bits treated as spare when received in a PDCH ASSIGNMENT COMMAND message. The sender set the spare bits to the coding for TCH/F+ACCHs	
TN, Timeslot number (octet 2)	
The TN field is coded as the binary representation of the timeslot number as defined in GSMá05.10.	
Range: 0 to 7.	
TSC, Training Sequence Code (octet 3)	
The TSC field is coded as the binary representation of the Training Sequence code as defined in GSMá 05.03	
Range: 0 to 7.	
H, Hopping channel (octet 3)	
Bit	
5	
0	Single RF channel
1	RF hopping channel
Note: The value of H affects the semantics of the channel selector field	
Channel selector (octet 3 and 4)	
H = "0": The channel selector field consists of the absolute RF channel number	
Octet 3	
Bits	
4 3	
0 0	Spare

Continued

Table 10.23/GSM 04.08 (concluded): Channel Description information element

<p>ARFCN, (octet 3, bits 2 and 1, and octet 4, bits 8 to 1) The ARFCN is coded as the binary representation of the absolute RF channel number</p> <p>Range: 0 to 1023</p> <p>H = "1": The channel selector field consists of the mobile allocation index offset, MAIO, and the hopping sequence number, HSN.</p> <p>MAIO, (octet 3 bit 4 to 1 high part and octet 4 bit 8 to 7 low part) The MAIO field is coded as the binary representation of the mobile allocation index offset as defined in GSM 05.02.</p> <p>Range: 0 to 63.</p> <p>HSN, (octet 4 bit 6 to 1) The HSN field is coded as the binary representation of the hopping sequence number as defined in GSM 05.02 Range 0 to 63.</p>
--

10.5.2.5a Channel Description 2

The purpose of the *Channel Description 2* information element is to provide a description of an allocable channel configuration together with its SACCH.

The *Channel Description 2* information element is coded as shown in figure 10.19a/GSM 04.08 and table 10.23a/GSM 04.08.

The *Channel Description 2* is a type 3 information element with 4 octets length.

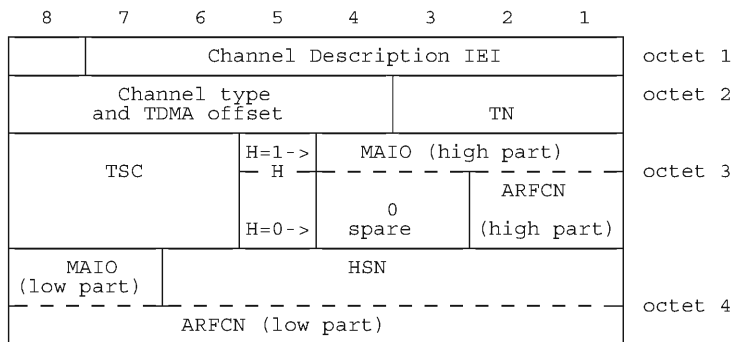


Figure 10.19a/GSM 04.08 Channel Description 2 information element

Table 10.23a/GSM 04.08: Channel Description 2 information element

Channel type and TDMA offset (octet 2)					
Bits					
8	7	6	5	4	
0	0	0	0	0	TCH/F + FACCH/F and SACCH/M at the timeslot indicated by TN, and additional bidirectional or unidirectional TCH/Fs and SACCH/Ms according to the <i>multislot allocation</i> information element
0	0	0	0	1	TCH/F + FACCH/F and SACCH/F
0	0	0	1	T	TCH/H + ACCHs
0	0	1	T	T	SDCCH/4 + SACCH/C4 or CBCH (SDCCH/4)
0	1	T	T	T	SDCCH/8 + SACCH/C8 or CBCH (SDCCH/8)
The T bits indicate the subchannel number coded in binary.					
In the description below "n" is the timeslot number indicated by TN. The description is valid only if all the indicated timeslot numbers are in the range 0 to 7.					
1	0	X	X	X	TCH/F + FACCH/F and SACCH/M at the time slot indicated by TN, and additional bidirectional TCH/Fs and SACCH/Ms at other timeslots according to the following:
X X X:					
0	0	0			no additional timeslots
0	0	1			at timeslot n-1
0	1	0			at timeslot n+1, n-1
0	1	1			at timeslot n+1, n-1 and n-2
1	0	0			at timeslot n+1, n-1, n-2, and n-3
1	0	1			at timeslot n+1, n-1, n-2, n-3 and n-4
1	1	0			at timeslot n+1, n-1, n-2, n-3, n-4 and n-5
1	1	1			at timeslot n+1, n-1, n-2, n-3, n-4, n-5 and n-6
1	1	0	0	1	to
1	1	0	1	1	TCH/F + FACCH/F and SACCH/M at the time slot indicated by TN and additional unidirectional TCH/FDs and SACCH/MDs at other timeslots according to the following:
1	1	0	0	1	at timeslot n-1
1	1	0	1	0	at timeslot n+1, n-1
1	1	0	1	1	at timeslot n+1, n-1 and n-2
1	1	1	1	0	TCH/F + FACCH/F and SACCH/M at the time slot indicated by TN and additional bidirectional TCH/F and SACCH/M at timeslot n+1 and unidirectional TCH/FD and SACCH/MD at timeslot n-1
All other values are reserved.					

(continued...)

Table 10.23a/GSM 04.08 (concluded) :Channel Description information element

<p>TN, Timeslot number (octet 2) The TN field is coded as the binary representation of the timeslot number as defined in TS GSMá05.10.</p> <p>Range: 0 to 7.</p> <p>TSC, Training Sequence Code (octet 3) The TSC field is coded as the binary representation of the Training Sequence code as defined in TS GSMá 05.03 Range: 0 to 7.</p> <p>H, Hopping channel (octet 3) Bit 5 0 Single RF channel 1 RF hopping channel</p> <p>Note: The value of H affects the semantics of the channel selector field</p> <p>Channel selector (octet 3 and 4) H = "0": The channel selector field consists of the absolute RF channel number</p> <p>Octet 3 Bits 4 3 0 0 Spare</p> <p>ARFCN, (octet 3, bits 2 and 1, and octet 4, bits 8 to 1) The ARFCN is coded as the binary representation of the absolute RF channel number</p> <p>Range: 0 to 1023</p> <p>H = "1": The channel selector field consists of the mobile allocation index offset, MAIO, and the hopping sequence number, HSN.</p> <p>MAIO, (octet 3 bit 4 to 1 high part and octet 4 bit 8 to 7 low part) The MAIO field is coded as the binary representation of the mobile allocation index offset as defined in TS GSMá05.02.</p> <p>Range: 0 to 63.</p> <p>HSN, (octet 4 bit 6 to 1) The HSN field is coded as the binary representation of the hopping sequence number as defined in TS GSMá05.02 Range 0 to 63.</p>

10.5.2.6 Channel Mode

The *Channel Mode* information element gives information of the mode on coding/decoding and transcoding. The exact mode is determined by the contents of this IE and the channel type.

The *Channel Mode* information element is coded as shown in figure 10.20/GSM 04.08 and table 10.24/GSM 04.08.

The *Channel Mode* is a type 3 information element with 2 octets length.

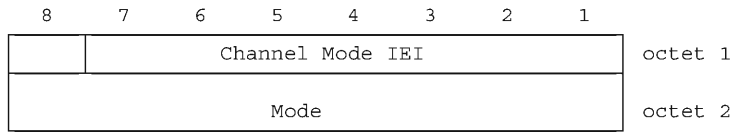


Figure 10.20/GSM 04.08 Channel Mode information element

Table 10.24/GSM 04.08: Channel Mode information element

The mode field is encoded as follows:	
(octet 2)	
Bits	
8 7 6 5 4 3 2 1	
0 0 0 0 0 0 0 0	signalling only
0 0 0 0 0 0 0 1	speech full rate or half rate version 1
0 0 1 0 0 0 0 1	speech full rate or half rate version 2
0 1 0 0 0 0 0 1	speech full rate or half rate version 3
0 0 0 0 1 1 1 1	data, 14.5 kbit/s radio interface rate
0 0 0 0 0 0 1 1	data, 12.0 kbit/s radio interface rate
0 0 0 0 1 0 1 1	data, 6.0 kbit/s radio interface rate
0 0 0 1 0 0 1 1	data, 3.6 kbit/s radio interface rate
Other values are reserved for future use.	

10.5.2.7 Channel Mode 2

The Channel Mode 2 information element gives information of the mode of coding/decoding and transcoding.

The Channel Mode 2 information element is coded as shown in figure 10.21/GSM 04.08 and table 10.25/GSM 04.08.

The Channel Mode 2 is a type 3 information element with 2 octets length.

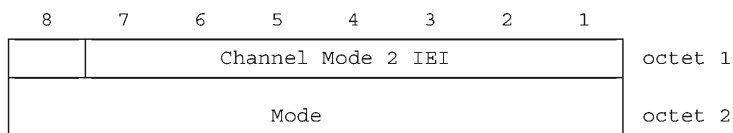


Figure 10.21/GSM 04.08 Channel Mode 2 information element

Table 10.25/GSM 04.08: Channel Mode 2 information element

The mode field is encoded as follows:	
(octet 2)	
Bits	
8 7 6 5 4 3 2 1	
0 0 0 0 0 0 0 0	signalling only
0 0 0 0 0 1 0 1	speech half rate version 1
0 0 1 0 0 1 0 1	speech half rate version 2
0 1 0 0 0 1 0 1	speech half rate version 3
0 0 0 0 1 1 1 1	data, 6.0 kbit/s radio interface rate
0 0 0 1 0 1 1 1	data, 3.6 kbit/s radio interface rate
Other values are reserved for future use.	

10.5.2.8 Channel Needed

The purpose of the *Channel Needed* information element is to indicate to up to two mobile stations which type of channel is needed (for each mobile station) for the transaction linked to the paging procedure.

The *Channel Needed* information element is coded as shown in figure 10.22/GSM 04.08 and table 10.26/GSM 04.08.

The *Channel Needed* is a type 1 information element.

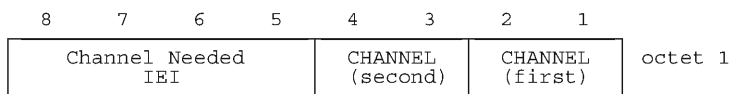


Figure 10.22/GSM 0408 Channel Needed information element

Table 10.26/GSM 04.08: Channel Needed information element

CHANNEL (octet 1)		
Bits		
2/4	1/3	
0	0	Any channel.
0	1	SDCCH.
1	0	TCH/F (Full rate).
1	1	TCH/H or TCH/F (Dual rate).
If this information element is used for only one mobile station, then the first CHANNEL field is used and the second CHANNEL field is spare.		

10.5.2.8a Channel Request Description

The purpose of the *Channel Request Description* information element is to indicate to the network the type of requested uplink resources or to indicate the type of paging that is being responded to.

The *Channel Request Description* information element is coded as shown in figure 10.22a/GSM 04.08 and table 10.26a/GSM 04.08.

The *Channel Request Description* is a type 3 information element with a length of 5 octets.

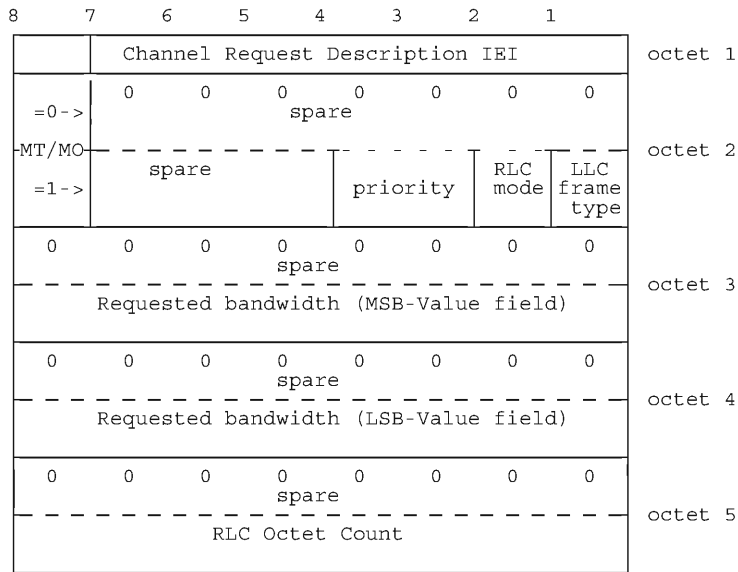


Figure 10.22a/GSM 04.08 Channel Request Description information element

Table 10.26a/GSM 04.08: Channel Request Description information element details

<p>MT/MO (bit 8, octet 2)</p> <p>1 Mobile originated (MO) 0 Mobile terminated (MT)</p> <p>PRIORITY (bits 3-4, octet 2) When MT/MO indicates MO, this field indicates the priority of the requested TBF</p> <p>bit 4 3 0 0 Priority Level 1 (Highest priority) 0 1 Priority Level 2 1 0 Priority Level 3 1 1 Priority Level 4 (Lower priority)</p> <p>RLC_MODE (bit 2, octet 2) When MT/MO indicates MO, this field indicates the RLC mode of the requested TBF.</p> <p>0 RLC acknowledged mode 1 RLC unacknowledged mode</p> <p>LLC_FRAME_TYPE (bit 1, octet 2) When MT/MO indicates MO, this field indicates the type of the first LLC frame to be transmitted over the requested uplink TBF.</p> <p>0 LLC frame is SACK or NACK 1 LLC frame is not SACK or NACK</p> <p>REQUESTED_BANDWIDTH (16 bits field) When MT/MO indicates MO, this field indicates the useful uplink bandwidth requested in bit rate. The bit rate field is the binary encoding of the rate information expressed in 100 bits/s, starting from 0 x 100 bits/s until 65535 x 100 bits/s. The throughput granted by BSS may be higher to cope with protocol overhead and retransmissions.</p> <p>RLC_OCTET_COUNT (bits 1-8, octet 3) When MT/MO indicates MO, this field indicates the number of octets of RLC data the mobile station wishes to transfer: see GSM 04.60.</p>

10.5.2.9 Cipher Mode Setting

The purpose of the *Cipher Mode Setting* information element is to indicate whether stream ciphering shall be started or not and if it is to be started, which algorithm to use.

The *Cipher Mode Setting* information element is coded as shown in figure 10.23/GSM 04.08 and table 10.27/GSM 04.08.

The *Cipher Mode Setting* is a type 1 information element.

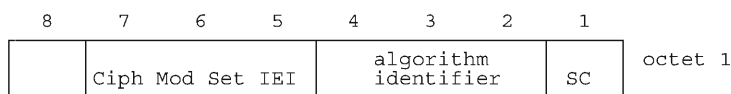


Figure 10.23/GSM 04.08 Cipher Mode Setting information element

ETSI

Table 10.27/GSM 04.08: Cipher Mode Setting information element

algorithm identifier
If SC=1 then:
bits
4 3 2
0 0 0 cipher with algorithm A5/1
0 0 1 cipher with algorithm A5/2
0 1 0 cipher with algorithm A5/3
0 1 1 cipher with algorithm A5/4
1 0 0 cipher with algorithm A5/5
1 0 1 cipher with algorithm A5/6
1 1 0 cipher with algorithm A5/7
1 1 1 reserved
If SC=0 then bits 4, 3 and 2 are spare and set to "0"
SC (octet 1)
Bit
1
0 No ciphering
1 Start ciphering

10.5.2.10 Cipher Response

The *Cipher Response* information element is used by the network to indicate to the mobile station which information the mobile station has to include in the CIPHERING MODE COMPLETE message.

The *Cipher Response* information element is coded as shown in figure 10.24/GSM 04.08 and table 10.28/GSM 04.08.

The *Cipher Response* is a type 1 information element.

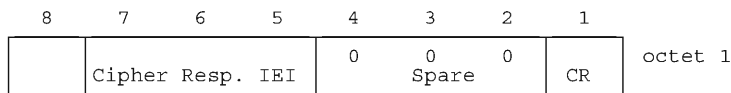


Figure 10.24/GSM 04.08 Cipher Response information element

Table 10.28/GSM 04.08: Cipher Response information element

CR Cipher Response (octet 1)
Bit
1
0 IMEISV shall not be included
1 IMEISV shall be included

10.5.2.11 Control Channel Description

The purpose of the *Control Channel Description* information element is to provide a variety of information about a cell.

The *Control Channel Description* information element is coded as shown in figure 10.25/GSM 04.08 and table 10.29/GSM 04.08.

The *Control Channel Description* is a type 3 information element with 4 octets length.

8	7	6	5	4	3	2	1	
Control Channel Description IEI								octet 1
0 spare	ATT	BS-AG-BLKS-RES			CCCH-CONF			octet 2
0 spare	0 spare	0 spare	0 spare	0 spare	BS-PA-MFRMS			octet 3
T 3212 time-out value								octet 4

Figure 10.25/GSM 04.08 Control Channel Description information element

Table 10.29/GSM 04.08: Control Channel Description information element

ATT, Attach-detach allowed (octet 2)	
Bit	
7	
0	MSs in the cell are not allowed to apply IMSI attach and detach procedure.
1	MSs in the cell shall apply IMSI attach and detach procedure.
BS-AG-BLKS-RES (octet 2)	
The BS-AG-BLKS-RES field is coded as the binary representation of the number of blocks reserved for access grant.	
Range 0 to 2 if CCCH-CONF = "001"	
0 to 7 for other values of CCCH-CONF	
All other values are reserved in the first case	
CCCH-CONF (octet 2)	
bits	
3 2 1	
0 0 0	1 basic physical channel used for CCCH, not combined with SDCCHs
0 0 1	1 basic physical channel used for CCCH, combined with SDCCHs
0 1 0	2 basic physical channel used for CCCH, not combined with SDCCHs
1 0 0	3 basic physical channel used for CCCH, not combined with SDCCHs
1 1 0	4 basic physical channels used for CCCH, not combined with SDCCHs
all other values are reserved	

(continued....)

Table 10.29/GSM 04.08 (concluded): Control Channel Description information element

BS-PA-MFRMS (octet 3)	
Bits	
3 2 1	
0 0 0	2 multiframe period for transmission of PAGING REQUEST messages to the same paging subgroup
0 0 1	3 multiframe period for transmission of PAGING REQUEST messages to the same paging subgroup
0 1 0	4 multiframe period for transmission of PAGING REQUEST messages to the same paging subgroup
.	.
.	.
1 1 1	9 multiframe period for transmission of PAGING REQUEST messages to the same paging subgroup
Note: The number of different paging subchannels on the CCCH is:	
$\text{MAX}(1, (3 - \text{BS-AG-BLKS-RES})) * \text{BS-PA-MFRMS}$ if CCCH-CONF = "001" $(9 - \text{BS-AG-BLKS-RES}) * \text{BS-PA-MFRMS}$ for other values of CCCH-CONF	
T3212 timeout value (octet 4)	
The T3212 timeout value field is coded as the binary representation of the timeout value for periodic updating in decihours.	
Range: 1 to 255	
The value 0 is used for infinite timeout value i.e. periodic updating shall not be used within the cell.	

10.5.2.12 Frequency Channel Sequence

The purpose of the *Frequency Channel Sequence* information element is to provide the absolute radio frequency channel numbers used in the mobile hopping sequence. This information element shall only be used for radio frequency channels in the primary GSM band (see GSM 05.05).

The *Frequency Channel Sequence* information element is coded as shown in figure 10.26/GSM 04.08 and table 10.30/GSM 04.08.

The *Frequency Channel Sequence* is a type 3 information element with 10 octets length.

8	7	6	5	4	3	2	1	
Frequency Channel Sequence IEI								octet 1
0 spare		Lowest ARFCN						octet 2
inc skip of ARFCN 01				inc skip of ARFCN 02				octet 3
:								
:								
:								
inc skip of ARFCN 15				inc skip of ARFCN 16				octet 10

Figure 10.26/GSM 04.08 Frequency Channel Sequence information element

Table 10.30/GSM 04.08: *Frequency Channel Sequence* information element

<p>Lowest ARFCN (octet 2) The lowest ARFCN field is coded as the binary representation of the lowest absolute RF channel number appearing in the sequence of channels used in the frequency hopping.</p> <p>Range: 1 to 124</p> <p>All other values are reserved.</p> <p>Increment skip ARFCN n (octet 3 to 10) The increment skip ARFCN n is coded as the binary representation of the increment of the preceding absolute RF channel number appearing in the sequence of channels used in the frequency hopping: n = 1, ..., 16.</p> <p>Range: 0 to 15</p> <p>The value 0 indicates that the increment value is 15 but the concerned channel is not used and the next field, i.e. Increment skip ARFCN n+1 (if present) must be added to the increment to determine the next absolute RF channel number in the sequence of channels used in the frequency hopping.</p>

10.5.2.13 Frequency List

The purpose of the *Frequency List* information element is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence.

The *Frequency List* information element is a type 4 information element.

There are several formats for the *Frequency List* information element, distinguished by the "format indicator" subfield. Some formats are frequency bit maps, the others use a special encoding scheme.

10.5.2.13.1 General description

Table 10.31/GSM 04.08: *Frequency List* information element, general format

FORMAT-ID, Format Identifier (part of octet 3)					
The different formats are distinguished by the FORMAT-ID field. The possible values are the following:					
Bit	Bit	Bit	Bit	Bit	format notation
8	7	4	3	2	
0	0	X	X	X	bit map 0
1	0	0	X	X	1024 range
1	0	1	0	0	512 range
1	0	1	0	1	256 range
1	0	1	1	0	128 range
1	0	1	1	1	variable bit map
All other combinations are reserved for future use. A GSMá900 mobile station which only supports the primary GSMáband P-GSMá900 (cf. GSMá05.05) may consider all values except the value for bit map 0 as reserved.					
The significance of the remaining bits depends on the FORMAT-ID. The different cases are specified in the next sections.					

10.5.2.13.2 Bit map 0 format

8	7	6	5	4	3	2	1	
Frequency List IEI								octet 1
0	0	0	1	0	0	0	0	octet 2
Length of frequency list contents								
0	0	0 spare		ARFCN 124	ARFCN 123	ARFCN 122	ARFCN 121	octet 3
FORMAT-ID								
ARFCN 120	ARFCN 119	ARFCN 118	ARFCN 117	ARFCN 116	ARFCN 115	ARFCN 114	ARFCN 113	octet 4
ARFCN 008	ARFCN 007	ARFCN 006	ARFCN 005	ARFCN 004	ARFCN 003	ARFCN 002	ARFCN 001	octet 18

Figure 10.27/GSM 04.08 *Frequency List* information element, bit map 0 format

Table 10.32/GSM 04.08: Frequency List information element, bit map 0 format

ARFCN N, Absolute RF Channel Number N (octet 3 etc.)

For a RF channel with ARFCN = N belonging to the frequency list the ARFCN N bit is coded with a "1"; N = 1, 2, .. , 124.

For a RF channel with ARFCN = N not belonging to the frequency list the ARFCN N bit is coded with a "0"; N = 1, 2 .. , 124.

10.5.2.13.3 Range 1024 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

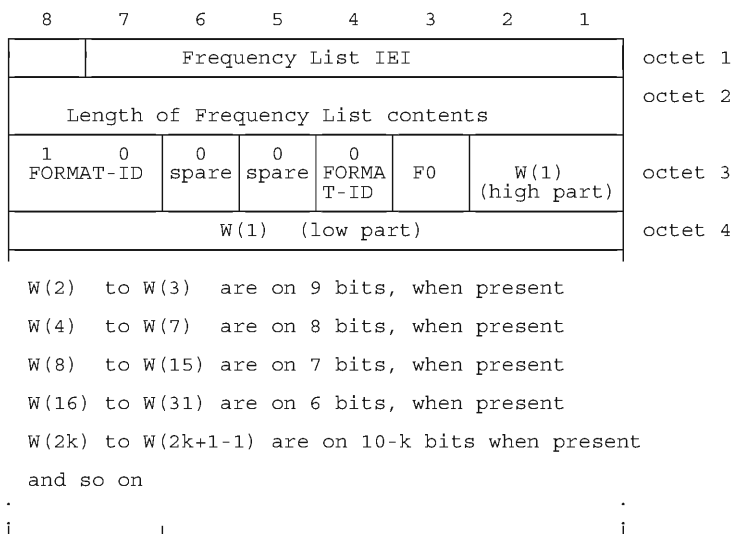


Figure 10.28/GSM 04.08 Frequency List information element (Range 1024 format)

Table 10.33/GSM 04.08: *Frequency List* information element, range 1024 format

<p>F0, frequency 0 indicator (octet 3, bit 3):</p> <p>0 ARFCN 0 is not a member of the set 1 ARFCN 0 is a member of the set</p> <p>W(i), i from 1 to M (octet 3 and next):</p> <p>Each W(i) encodes a non negative integer in binary format.</p> <p>If W(k) is null, W(i) for i>k must be null also.</p> <p>Each non null W(k) allows to compute, together with some previous W(i) the ARFCN F(k) of a frequency in the set. The first computation formulas are given hereafter, with the following conventions:</p> <p>W_i denotes W(i); F_i denotes F(i); + indicates the natural integer addition; * indicates the natural integer multiplication; n mod m indicates the remainder of the euclidian division of n by m, ie $0 \leq (n \text{ mod } m) \leq m-1$ and there exists k such that $n = (k*m) + (n \text{ mod } m)$;</p> <p>n smod m indicates the offset remainder of the euclidian division of n by m, ie $1 \leq (n \text{ smod } m) \leq m$ and there exists k such that $n = (k*m) + (n \text{ smod } m)$;</p> <p>F1 = W1 F2 = (W1 - 512 + W2) smod 1023 F3 = (W1 + W3) smod 1023 F4 = (W1 - 512 + (W2 - 256 + W4) smod 511) smod 1023 F5 = (W1 + (W3 - 256 + W5) smod 511) smod 1023 F6 = (W1 - 512 + (W2 + W6) smod 511) smod 1023 F7 = (W1 + (W3 + W7) smod 511) smod 1023 F8 = (W1 - 512 + (W2 - 256 + (W4 - 128 + W8) smod 255) smod 511) smod 1023</p>
--

(continued...)

Table 10.33/GSM 04.08 (concluded): *Frequency List* information element, range 1024 format

```

F9  = (W1      + (W3 - 256 + (W5 - 128 + W9 )
      smod 255) smod 511) smod 1023
F10 = (W1 - 512 + (W2      + (W6 - 128 + W10)
      smod 255) smod 511) smod 1023
F11 = (W1      + (W3      + (W7 - 128 + W11)
      smod 255) smod 511) smod 1023
F12 = (W1 - 512 + (W2 - 256 + (W4      + W12)
      smod 255) smod 511) smod 1023
F13 = (W1      + (W3 - 256 + (W5      + W13)
      smod 255) smod 511) smod 1023
F14 = (W1 - 512 + (W2      + (W6      + W14)
      smod 255) smod 511) smod 1023
F15 = (W1      + (W3      + (W7      + W15)
      smod 255) smod 511) smod 1023
F16 = (W1 - 512 + (W2 - 256 + (W4 - 128 +
      (W8 - 64 + W16) smod 127)
      smod 255) smod 511) smod 1023

```

More generally, the computation of F(K) can be done with the following program, using ADA language (declarative parts are skipped and should be obvious):

```

INDEX := K;
J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
N := W(INDEX);
while INDEX>1 loop
  if 2*INDEX < 3*J then
    INDEX := INDEX - J/2;           -- left child
    N := (N + W(PARENT) - 1024/J - 1) mod
         (2048/J - 1) + 1;
  else
    INDEX := INDEX - J;           -- right child
    N := (N + W(PARENT) - 1) mod (2048/J - 1) + 1;
  end if;
  J := J/2;
end loop;
F(K) := N;

```

10.5.2.13.4 Range 512 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

Table 10.34/GSM 04.08: *Frequency List* information element, range 512 format

<p>ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)</p> <p>This field encodes the ARFCN of one frequency belonging to the set. This value is also used to decode the rest of the element.</p> <p>$W(i)$, i from 1 to M (octet 5 and next):</p> <p>Each $W(i)$ encodes a non negative integer in binary format.</p> <p>If $W(k)$ is null, $W(i)$ for $i > k$ must be null also.</p> <p>Each non null $W(k)$ allows to compute, together with some previous $W(i)$ the ARFCN $F(k)$ of a frequency in the set. The first computation formulas are given hereafter, with the following conventions:</p> <p>W_i denotes $W(i)$; W_0 denotes the value of ORIG-ARFCN F_i denotes $F(i)$; $+$ indicates the natural integer addition; $*$ indicates the natural integer multiplication; $n \bmod m$ indicates the remainder of the euclidian division of n by m, ie $0 \leq (n \bmod m) \leq m-1$ and there exists k such that $n = (k*m) + (n \bmod m)$; $n \text{ smod } m$ indicates the offset remainder of the euclidian division of n by m, ie $1 \leq (n \text{ smod } m) \leq m$ and there exists k such that $n = (k*m) + (n \text{ smod } m)$;</p> <p>$F_1 = (W_0 + W_1) \bmod 1024$ $F_2 = (W_0 + (W_1 - 256 + W_2) \text{ smod } 511) \bmod 1024$ $F_3 = (W_0 + (W_1 + W_3) \text{ smod } 511) \bmod 1024$ $F_4 = (W_0 + (W_1 - 256 + (W_2 - 128 + W_4) \text{ smod } 255) \text{ smod } 511) \bmod 1024$ $F_5 = (W_0 + (W_1 + (W_3 - 128 + W_5) \text{ smod } 255) \text{ smod } 511) \bmod 1024$ $F_6 = (W_0 + (W_1 - 256 + (W_2 + W_6) \text{ smod } 255) \text{ smod } 511) \bmod 1024$ $F_7 = (W_0 + (W_1 + (W_3 + W_7) \text{ smod } 255) \text{ smod } 511) \bmod 1024$ $F_8 = (W_0 + (W_1 - 256 + (W_2 - 128 + (W_4 - 64 + W_8) \text{ smod } 127) \text{ smod } 255) \text{ smod } 511) \bmod 1024$ $F_9 = (W_0 + (W_1 + (W_3 - 128 + (W_5 - 64 + W_9) \text{ smod } 127) \text{ smod } 255) \text{ smod } 511) \bmod 1024$</p>

(continued...)

Table 10.34/GSM 04.08 (concluded): *Frequency List* information element, range 512 format

```

F10 = (W0 + (W1 - 256 + (W2          + (W6 - 64 + W10)
      smod 127) smod 255) smod 511) mod 1024
F11 = (W0 + (W1          + (W3          + (W7 - 64 + W11)
      smod 127) smod 255) smod 511) mod 1024
F12 = (W0 + (W1 - 256 + (W2 - 128 + (W4          + W12)
      smod 127) smod 255) smod 511) mod 1024

F13 = (W0 + (W1          + (W3 - 128 + (W5          + W13)
      smod 127) smod 255) smod 511) mod 1024
F14 = (W0 + (W1 - 256 + (W2          + (W6          + W14)
      smod 127) smod 255) smod 511) mod 1024
F15 = (W0 + (W1          + (W3          + (W7          + W15)
      smod 127) smod 255) smod 511) mod 1024
F16 = (W0 + (W1 - 256 + (W2 - 128 + (W4 - 64 +
      (W8 - 32 + W16)
      smod 63) smod 127) smod 255) smod 511) mod 1024
F17 = (W0 + (W1          + (W3 - 128 + (W5 - 64 +
      (W9 - 32 + W17)
      smod 63) smod 127) smod 255) smod 511) mod 1024

```

More generally, the computation of F(K) can be done with the following program, using ADA language (declarative parts are skipped and should be obvious):

```

INDEX := K;
J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
N := W(INDEX);
while INDEX > 1 loop
  if 2*INDEX < 3*J then -- left child
    INDEX := INDEX - J/2;
    N := (N + W(PARENT) - 512/J - 1) mod
         (1024/J - 1) + 1;
  else -- right child
    INDEX := INDEX - J;
    N := (N + W(_INDEX) - 1) mod (1024/J - 1) + 1;
  end if;
  J := J/2;
end loop;
F(K) := (W(0) + N) mod 1024;

```

10.5.2.13.5 Range 256 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

Table 10.35/GSM 04.08: *Frequency List* information element, range 256 format

<p>ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)</p> <p>This field encodes the ARFCN of one frequency belonging to the set. This value is also used to decode the rest of the element.</p> <p>$W(i)$, i from 1 to M (octet 5 and next):</p> <p>Each $W(i)$ encodes a non negative integer in binary format.</p> <p>If $W(k)$ is null, $W(i)$ for $i > k$ must be null also.</p> <p>Each non null $W(k)$ allows to compute, together with some previous $W(i)$ the ARFCN $F(k)$ of a frequency in the set. The first computation formulas are given hereafter, with the following conventions:</p> <p>W_i denotes $W(i)$; W_0 denotes the value of ORIG-ARFCN F_i denotes $F(i)$; $+$ indicates the natural integer addition; $*$ indicates the natural integer multiplication; $n \bmod m$ indicates the remainder of the euclidian division of n by m, ie $0 \leq (n \bmod m) \leq m-1$ and there exists k such that $n = (k*m) + (n \bmod m)$; $n \text{ smod } m$ indicates the offset remainder of the euclidian division of n by m, ie $1 \leq (n \text{ smod } m) \leq m$ and there exists k such that $n = (k*m) + (n \text{ smod } m)$;</p> <p>$F_1 = (W_0 + W_1) \bmod 1024$ $F_2 = (W_0 + (W_1 - 128 + W_2) \text{ smod } 255) \bmod 1024$ $F_3 = (W_0 + (W_1 + W_3) \text{ smod } 255) \bmod 1024$ $F_4 = (W_0 + (W_1 - 128 + (W_2 - 64 + W_4) \text{ smod } 127) \text{ smod } 255) \bmod 1024$ $F_5 = (W_0 + (W_1 + (W_3 - 64 + W_5) \text{ smod } 127) \text{ smod } 255) \bmod 1024$ $F_6 = (W_0 + (W_1 - 128 + (W_2 + W_6) \text{ smod } 127) \text{ smod } 255) \bmod 1024$ $F_7 = (W_0 + (W_1 + (W_3 + W_7) \text{ smod } 127) \text{ smod } 255) \bmod 1024$</p>

(continued...)

Table 10.35/GSM 04.08 (concluded): *Frequency List* information element, range 256 format

F8	= (W0 + (W1 - 128 + (W2 - 64 + (W4 - 32 + W8) smod 63) smod 127) smod 255) mod 1024
F9	= (W0 + (W1 + (W3 - 64 + (W5 - 32 + W9) smod 63) smod 127) smod 255) mod 1024
F10	= (W0 + (W1 - 128 + (W2 + (W6 - 32 + W10) smod 63) smod 127) smod 255) mod 1024
F11	= (W0 + (W1 + (W3 + (W7 - 32 + W11) smod 63) smod 127) smod 255) mod 1024
F12	= (W0 + (W1 - 128 + (W2 - 64 + (W4 + W12) smod 63) smod 127) smod 255) mod 1024
F13	= (W0 + (W1 + (W3 - 64 + (W5 + W13) smod 63) smod 127) smod 255) mod 1024
F14	= (W0 + (W1 - 128 + (W2 + W6 + W14) smod 63) smod 127) smod 255) mod 1024
F15	= (W0 + (W1 + (W3 + W7 + W15) smod 63) smod 127) smod 255) mod 1024
F16	= (W0 + (W1 - 128 + (W2 - 64 + (W4 - 32 + (W8 - 16 + W16) smod 31) smod 63) smod 127) smod 255) mod 1024
F17	= (W0 + (W1 + (W3 - 64 + (W5 - 32 + (W9 - 16 + W17) smod 31) smod 63) smod 127) smod 255) mod 1024
F18	= (W0 + (W1 - 128 + (W2 + (W6 - 32 + (W10 - 16 + W18) smod 31) smod 63) smod 127) smod 255) mod 1024
F19	= (W0 + (W1 + (W3 + (W7 - 32 + (W11 - 16 + W19) smod 31) smod 63) smod 127) smod 255) mod 1024
F20	= (W0 + (W1 - 128 + (W2 - 64 + (W4 + (W12 - 16 + W20) smod 31) smod 63) smod 127) smod 255) mod 1024
F21	= (W0 + (W1 + (W3 - 64 + (W5 + (W13 - 16 + W21) smod 31) smod 63) smod 127) smod 255) mod 1024

More generally, the computation of F(K) can be done with the following program, using ADA language (declarative parts are skipped and should be obvious):

```

INDEX := K;
J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
N := W(INDEX);
while INDEX > 1 loop
  if 2*INDEX < 3*J then -- left child
    INDEX := INDEX - J/2;
    N := (N + W(INDEX) - 256/J - 1) mod
         (512/J - 1) + 1;
  else -- right child
    INDEX := INDEX - J;
    N := (N + W(INDEX) - 1) mod (512/J - 1) + 1;
  end if;
  J := J/2;
end loop;
F(K) := (W(0) + N) mod 1024;

```

10.5.2.13.6 Range 128 format

The information element contains a header, and W(1) to W(M) for some M. If, due to octet boundaries, some bits are not used at the end of the last octet, these bits must be set to 0.

Table 10.36/GSM 04.08: *Frequency List* information element, range 128 format

<p>ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)</p> <p>This field encodes the ARFCN of one frequency belonging to the set. This value is also used to decode the rest of the element.</p> <p>$W(i)$, i from 1 to M (octet 5 and next):</p> <p>Each $W(i)$ encodes a non negative integer in binary format.</p> <p>If $W(k)$ is null, $W(i)$ for $i > k$ must be null also.</p> <p>Each non null $W(k)$ allows to compute, together with some previous $W(i)$ the ARFCN $F(k)$ of a frequency in the set. The first computation formulas are given hereafter, with the following conventions:</p> <p>W_i denotes $W(i)$; W_0 denotes the value of ORIG-ARFCN F_i denotes $F(i)$; $+$ indicates the natural integer addition; $*$ indicates the natural integer multiplication; $n \bmod m$ indicates the remainder of the euclidian division of n by m, ie $0 \leq (n \bmod m) \leq m-1$ and there exists k such that $n = (k*m) + (n \bmod m)$; $n \text{ smod } m$ indicates the offset remainder of the euclidian division of n by m, ie $1 \leq (n \text{ smod } m) \leq m$ and there exists k such that $n = (k*m) + (n \text{ smod } m)$;</p> <p>$F_1 = (W_0 + W_1) \bmod 1024$ $F_2 = (W_0 + (W_1 - 64 + W_2) \text{ smod } 127) \bmod 1024$ $F_3 = (W_0 + (W_1 + W_2 + W_3) \text{ smod } 127) \bmod 1024$ $F_4 = (W_0 + (W_1 - 64 + (W_2 - 32 + W_4) \text{ smod } 63) \text{ smod } 127) \bmod 1024$ $F_5 = (W_0 + (W_1 + (W_3 - 32 + W_5) \text{ smod } 63) \text{ smod } 127) \bmod 1024$ $F_6 = (W_0 + (W_1 - 64 + (W_2 + W_6) \text{ smod } 63) \text{ smod } 127) \bmod 1024$ $F_7 = (W_0 + (W_1 + (W_3 + W_7) \text{ smod } 63) \text{ smod } 127) \bmod 1024$</p>
--

(continued...)

Table 10.36/GSM 04.08 (concluded): *Frequency List* information element, range 128 format

F8	=	(W0 + (W1 - 64 + (W2 - 32 + (W4 - 16 + W8) smod 31)
		smod 63) smod 127) mod 1024
F9	=	(W0 + (W1 + (W3 - 32 + (W5 - 16 + W9) smod 31)
		smod 63) smod 127) mod 1024
F10	=	(W0 + (W1 - 64 + (W2 + (W6 - 16 + W10) smod 31)
		smod 63) smod 127) mod 1024
F11	=	(W0 + (W1 + (W3 + (W7 - 16 + W11) smod 31)
		smod 63) smod 127) mod 1024
F12	=	(W0 + (W1 - 64 + (W2 - 32 + (W4 + W12) smod 31)
		smod 63) smod 127) mod 1024
F13	=	(W0 + (W1 + (W3 - 32 + (W5 + W13) smod 31)
		smod 63) smod 127) mod 1024
F14	=	(W0 + (W1 - 64 + (W2 + (W6 + W14) smod 31)
		smod 63) smod 127) mod 1024
F15	=	(W0 + (W1 + (W3 + (W7 + W15) smod 31)
		smod 63) smod 127) mod 1024
F16	=	(W0 + (W1 - 64 + (W2 - 32 + (W4 - 16 + (W8 - 8 + W16)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F17	=	(W0 + (W1 + (W3 - 32 + (W5 - 16 + (W9 - 8 + W17)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F18	=	(W0 + (W1 - 64 + (W2 + (W6 - 16 + (W10 - 8 + W18)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F19	=	(W0 + (W1 + (W3 + (W7 - 16 + (W11 - 8 + W19)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F20	=	(W0 + (W1 - 64 + (W2 - 32 + (W4 + (W12 - 8 + W20)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F21	=	(W0 + (W1 + (W3 - 32 + (W5 + (W13 - 8 + W21)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F22	=	(W0 + (W1 - 64 + (W2 + (W6 + W14 - 8 + W22)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F23	=	(W0 + (W1 + (W3 + (W7 + (W15 - 8 + W23)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F24	=	(W0 + (W1 - 64 + (W2 - 32 + (W4 - 16 + (W8 + W24)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F25	=	(W0 + (W1 + (W3 - 32 + (W5 - 16 + (W9 + W25)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F26	=	(W0 + (W1 - 64 + (W2 + (W6 - 16 + (W10 + W26)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F27	=	(W0 + (W1 + (W3 + (W7 - 16 + (W11 + W27)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F28	=	(W0 + (W1 - 64 + (W2 - 32 + (W4 + (W12 + W28)
		smod 15) smod 31) smod 63) smod 127) mod 1024
F29	=	(W0 + (W1 + (W3 - 32 + (W5 + (W13 + W29)
		smod 15) smod 31) smod 63) smod 127) mod 1024

More generally, the computation of F(K) can be done with the following program, using ADA language (declarative parts are skipped and should be obvious):

```

INDEX := K;
J := GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
N := W(INDEX);
while INDEX > 1 loop
  if 2*INDEX < 3*J then -- left child
    INDEX := INDEX - J/2;
    N := (N + W(INDEX) - 128/J - 1) mod
         (256/J - 1) + 1;
  else -- right child
    INDEX := INDEX - J;
    N := (N + W(INDEX) - 1) mod (256/J - 1) + 1;
  end if;
  J := J/2;
end loop;
F(K) := (W(0) + N) mod 1024;

```

10.5.2.13.7 Variable bit map format

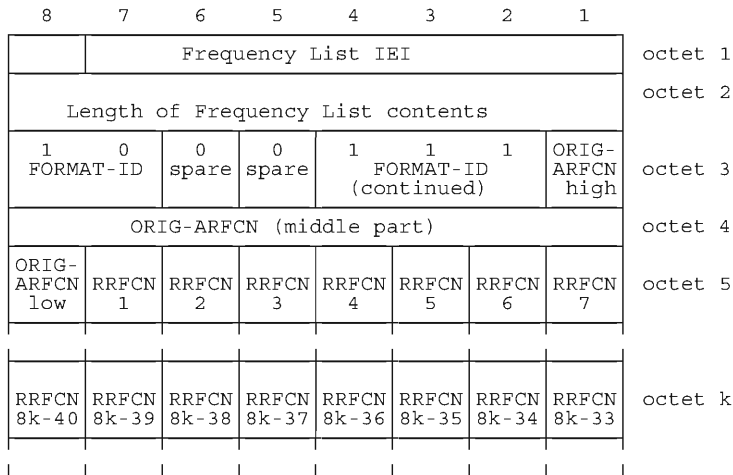


Figure 10.32/GSM 04.08 *Frequency List* information element, variable bit map format

Table 10.37/GSM 04.08: *Frequency List* information element, variable bit map format

<p>ORIG-ARFCN, origin ARFCN (octet 3, 4 and 5)</p> <p>This field encodes the ARFCN of one frequency belonging to the set. This value is also used as origin of the bit map to generate all the other frequencies.</p> <p>RRFCN N, relative radio frequency channel number N (octet 5 etc.)</p> <p>For a RF channel with $ARFCN = (ORIG-ARFCN + N) \bmod 1024$ belonging to the set, RRFCN N bit is coded with a "1"; $N = 1, 2, \dots, 8M+7$ with $1 \leq M \leq 127$</p> <p>For a RF channel with $ARFCN = (ORIG-ARFCN + N) \bmod 1024$ not belonging to the set, RRFCN N bit is coded with a "0"; $N = 1, 2, \dots, 8M+7$ with $1 \leq M \leq 127$</p>
--

10.5.2.14 Frequency Short List

The purpose of the *Frequency Short List* information element is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence, in a small fixed length information element to obtain when possible the HANOVER COMMAND message in a single block.

The *Frequency Short List* information element is a type 3 information element of 10 octet length.

This element is encoded exactly as the *Frequency List* information element, except that it has a fixed length instead of a variable length and does not contain a length indicator and that it shall not be encoded in bitmap 0 format.

10.5.2.14a Frequency Short List 2

The purpose of the *Frequency Short List 2* information element is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence, in a small fixed length information element to obtain the SYSTEM INFORMATION TYPE 11 and NOTIFICATION FACCH messages in a single block.

The *Frequency Short List* information element is a type 3 information element of 8 octet length.

ETSI

This element is encoded exactly as the *Frequency List* information element, except that it has a fixed length instead of a variable length and does not contain a length indicator and that it shall not be encoded in bitmap 0 format.

10.5.2.14b Group Channel Description

The purpose of the *Group Channel Description* information element is to provide a description of an allocable voice group call or voice broadcast call channel together with its SACCH and that part of the RF channels belonging to the cell allocation which is used in the mobile hopping sequence if applicable.

The *Group Channel Description* information element is coded as shown in figure 10.32a/GSM 04.08 and table 10.37a/GSM 04.08.

The *Group Channel Description* is a type 4 information element with 4 to 13 octets length.

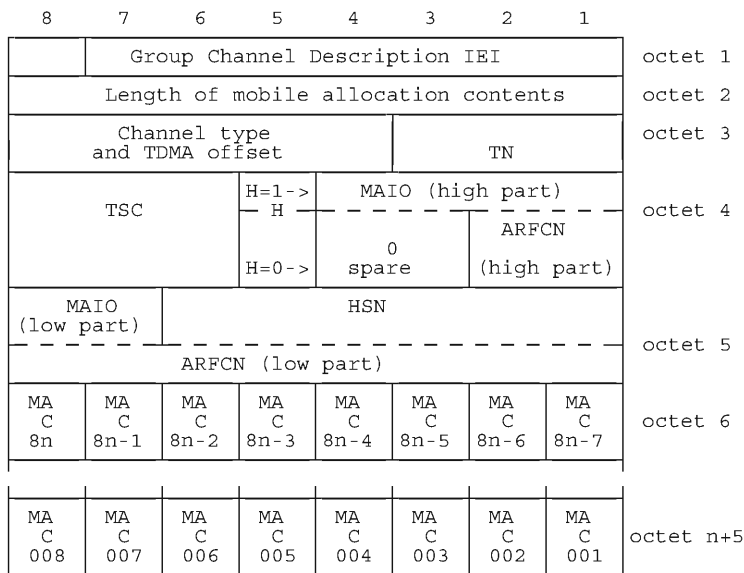


Figure 10.32a/GSM 04.08 Group Channel Description information element

Table 10.37a/GSM 04.08 Group Channel Description information element

Channel type and TDMA offset (octet 3)	
Bits	
8 7 6 5 4	
0 0 0 0 1	TCH/FS + ACCHs (speech codec version 1)
0 0 0 1 T	TCH/HS + ACCHs (speech codec version 1)
0 0 1 T T	SDCCH/4 + SACCH/C4
0 1 T T T	SDCCH/8 + SACCH/C8
The T bits indicate the subchannel number coded in binary.	
All other values are reserved for future use.	
TN, Timeslot number (octet 3)	
The TN field is coded as the binary representation of the timeslot number as defined in GSM 05.10.	
Range: 0 to 7.	
TSC, Training Sequence Code (octet 4)	
The TSC field is coded as the binary representation of the Training Sequence code as defined in GSM 05.03	
Range: 0 to 7.	
H, Hopping channel (octet 4)	
Bit	
5	
0	Single RF channel
1	RF hopping channel
Note 1: The value of H affects the semantics of the channel selector field	
Note 2: If H=0, the information element terminates with octet 5	
Channel selector (octet 4 and 5)	
H = "0": The channel selector field consists of the absolute RF channel number	
Octet 4	
Bits	
4 3	
0 0	Spare
ARFCN, (octet 4, bits 2 and 1, and octet 5, bits 8 to 1)	
The ARFCN is coded as the binary representation of the absolute RF channel number	
Range: 0 to 1023	
H = "1": The channel selector field consists of the mobile allocation index offset, MAIO, and the hopping sequence number, HSN.	
MAIO, (octet 4 bit 4 to 1 high part and octet 5 bit 8 to 7 low part)	
The MAIO field is coded as the binary representation of the mobile allocation index offset as defined in GSM 05.02.	
Range: 0 to 63.	
HSN, (octet 5 bit 6 to 1)	
The HSN field is coded as the binary representation of the hopping sequence number as defined in GSM 05.02	
Range 0 to 63.	

(Continued)

Table 10.37a/GSM 04.08 (concluded) Group Channel Description information element

MA C i, Mobile allocation RF channel i (octet 4 etc.), i = 1, 2, ..., NF
 The MA C i bit indicates whether or not the Mobile allocation frequency list includes the i'th frequency in the cell allocation frequency list. In the cell allocation frequency list the absolute RF channel numbers are placed in increasing order of ARFCN, except that ARFCN 0, if included in the set, is put in the last position in the list,

For a RF channel belonging to the mobile allocation the MA C i bit is coded with a "1"; i = 1, 2, ..., NF.

For a RF channel not belonging to the mobile allocation the MA C i bit is coded with a "0"; i = 1, 2, ..., NF.

If $NF \bmod 8 \neq 0$ then bits NF to 8n in octet 4 must be coded with a "0" in each.

10.5.2.15 Handover Reference

The purpose of the *Handover Reference* information element is to provide a handover reference value used for access identification.

The *Handover Reference* information element is coded as shown in figure 10.33/GSM 04.08 and table 10.38/GSM 04.08.

The *Handover Reference* is a type 3 information element with 2 octets length.

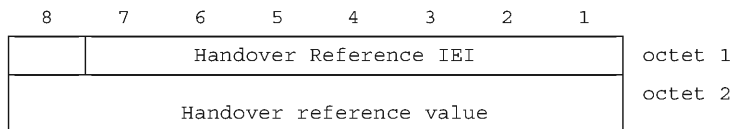


Figure 10.33/GSM 04.08 Handover Reference information element

Table 10.38/GSM 04.08: Handover Reference information element

Handover reference value (octet 2)
 The handover reference value field is coded using binary representation.
 Range: 0 to 255.

10.5.2.16 IA Rest Octets

The *IA Rest Octets* information element contains spare bits and possibly either a *packet uplink assignment* construction, a *packet downlink assignment* construction or a *frequency parameters, before time* construction.

The *frequency parameters, before time* construction combines a mobile allocation (see 10.5.2.21) and a MAIO (see the *channel description* information element).

The *IA Rest Octets* information element is coded according to the syntax specified below and described in table 10.38a/GSM 04.08.

The *IA Rest Octets* information element is a type 5 information element with 1-12 octets length.

ETSI

```

<IA Rest Octets> ::=
{ 1 1
  { 0 < Packet Uplink Assignment >
    | 1 < Packet Downlink Assignment > }
| 1 0
  < Length of frequency parameters : bit string (6) >
  < Frequency Parameters, before time >
| 0 1
| 0 0 }
< spare padding >;

< packet uplink assignment > ::=
< RESPONSE_INDICATOR : bit >
{ 0 | 1
  < TFI_ASSIGNMENT : bit (7) >
  < USF : bit (3) >
  < USF_GRANULARITY : bit >
  < CHANNEL_CODING_COMMAND : bit (2) >
  < TLLI_BLOCK_CHANNEL_CODING : bit >
}
< ALPHA : bit (4) >
< GAMMA : bit (5) >
{ 0 | 1 < TIMING_ADVANCE_INDEX : bit (4) > }
{ 0 | 1 < TBF_STARTING_TIME : bit (16) > };

< packet downlink assignment > ::=
< TLLI : bit (32) >
< TFI_ASSIGNMENT : bit (7) >
< RLC_MODE : bit >
< ALPHA : bit (4) >
< GAMMA : bit (5) >
{ 0 | 1 < TIMING_ADVANCE_INDEX : bit (4) > }
{ 0 | 1 < TBF_STARTING_TIME : bit (16) > };

< Frequency Parameters, before time > ::=
{ null
| 0 0
  < MAIO : bit string (6) >
  < Mobile Allocation : < octet > * >
};

```


Table 10.38a/GSM 04.08: *IA Rest Octet* information element (page 1 of 2)**Packet Uplink Assignment**

The **RESPONSE_INDICATOR** field (1 bit) is coded:

- 0 one phase packet access;
- 1 two phase access or single block packet access.

The **TFI_ASSIGNMENT** field (7 bit) is the binary representation of the Temporary Flow Identity, see GSM 04.60. Range: 0 to 127.

The **USF** field (3 bit) is the binary representation of the uplink state flag, see GSM 04.60. Range: 0 to 7.

The **USF_GRANULARITY** field (1 bit) indicates the USF granularity to be applied by the mobile station when it is assigned a TBF using Dynamic Allocation, see GSM 04.60:

- 0 the mobile station shall transmit one RLC/MAC block;
- 1 the mobile station shall transmit four consecutive RLC/MAC blocks.

The **CHANNEL_CODING_COMMAND** field (2 bit) indicates the coding scheme to be used for transmission, see GSM 05.03:

- 0 0 coding scheme 1, CS-1;
- 0 1 coding scheme 2, CS-2;
- 1 0 coding scheme 3, CS-3;
- 1 1 coding scheme 4, CS-4.

The **TLLI_BLOCK_CHANNEL_CODING** field (1 bit) indicates the channel coding to be used for RLC data block comprising TLLI for contention resolution:

- 0 mobile station shall use CS-1;
- 1 mobile station shall use coding scheme as specified by the CHANNEL CODING COMMAND field.

The **ALPHA** field (4 bit) is the binary representation of the parameter α for MS output power control, see GSM 05.08:

- 0 0 0 0 $\alpha = 0.0$
 - 0 0 0 1 $\alpha = 0.1$
 - : :
 - 1 0 1 0 $\alpha = 1.0$
- All other values are reserved.

The **GAMMA** field (5 bit) is the binary representation of the parameter Γ_{CH} for MS output power control, see GSM 05.08:

- | | <u>GSM 900</u> | <u>GSM 1800</u> |
|----|--------------------------|--------------------------|
| 0 | $\Gamma_{CH} = +39$ dBm; | $\Gamma_{CH} = +36$ dBm; |
| 1 | $\Gamma_{CH} = +37$ dBm; | $\Gamma_{CH} = +34$ dBm; |
| : | : | (steps of 2 dB size) |
| 31 | $\Gamma_{CH} = -23$ dBm. | $\Gamma_{CH} = -26$ dBm. |

The **TA_INDEX** field (4 bit) is the binary representation of the timing advance index (TAI), see GSM 05.10 and GSM 04.04. Range: 0 to 15.

The **TBF_STARTING_TIME** field (16 bit) defines a starting time for the packet uplink assignment. The TBF starting time is coded using the same coding as the V format of the type 3 information element *Starting Time* (10.5.2.38).

Table 10.38a/GSM 04.08: *IA Rest Octet* information element (continued, page 2 of 2)**Packet Downlink Assignment**

The **TLLI** field (32 bit) is the binary representation of a TLLI. The coding of TLLI is left open for each administration using the structure specified in GSM 03.03.

The **TFI_ASSIGNMENT** field (7 bit) is the binary representation of the Temporary Flow Identity, see GSM 04.60. Range: 0 to 127.

The **RLC_MODE** field (1 bit) indicates the RLC mode, see GSM 04.60:

- 0 RLC acknowledged mode;
- 1 RLC unacknowledged mode.

The **ALPHA** field (4 bit) and the **GAMMA** field (5 bit) are the binary representations of the respective parameters α and Γ_{CH} for MS output power control, see *Packet Uplink Assignment* construction.

The **TA_INDEX** field (4 bit) is the binary representation of the timing advance index (TAI), see GSM 05.10 and GSM 04.04. Range: 0 to 15.

The **TBF_STARTING_TIME** field (16 bit) defines a starting time for the packet downlink assignment. The TBF starting time is coded using the same coding as the V format of the type 3 information element *Starting Time* (10.5.2.38).

Frequency parameters, before time

Length of frequency parameters (octet 2, bits 1 to 6)

This field is coded as the binary representation of the number of octets occupied by the frequency parameters, before time field. If this length is 0, the frequency parameters, before time is not present.

The **MAIO** field (octet 3, bits 6 to 1) is coded as the binary representation of the mobile allocation index offset. Range: 0 to 63.

The **Mobile Allocation** field (octet 3 to k+2) contains a bitmap referring to the *Cell Channel Description* IE in SI 1 message. The length of the bitmap is $8k$, where $k = ((NF-1) \div 8 + 1)$ and where NF denotes the number of ARFCNs contained in the cell channel description. The different bit positions in the mobile allocation bitmap are assigned indices $i = 1$ to $8k$, starting with $i = 8k$ in the most significant bit position and ending with $i = 1$ in the least significant bit position. The bit position with index i corresponds to the i 'th frequency in the cell channel description arranged in ascending order of ARFCN (except that ARFCN = 0, if included, is put last) and numbered from 1 to NF . Each bit position in the mobile allocation bitmap is coded:

- 0 RF channel not belonging to mobile allocation;
- 1 RF channel belonging to mobile allocation.

If $NF \bmod 8 \neq 0$, then bit positions $i = NF+1$ to $8k$ in octet 3 shall each be coded with a "0".

10.5.2.17 IAR Rest Octets

The *IAR Rest Octets* information element contains only spare bits. Its purpose is to allow the upward compatible introduction of new information on the AGCH in later phases.

The *IAR Rest Octets* information element is a type 5 information element with 4 octets length.

	8	7	6	5	4	3	2	1	
	IAR Rest Octets IEI								octet 1
	0	0	1	0	1	0	1	1	octet 2
	spare	spare	spare	spare	spare	spare	spare	spare	
	0	0	1	0	1	0	1	1	octet 3
	spare	spare	spare	spare	spare	spare	spare	spare	
	0	0	1	0	1	0	1	1	octet 4
	spare	spare	spare	spare	spare	spare	spare	spare	

Figure 10.35/GSM 04.08 IAR Rest Octets information element

10.5.2.18 IAX Rest Octets

The *IAX Rest Octets* information element contains only spare bits only. Its purpose is to allow the upward compatible introduction of new information on the AGCH in later phases.

The *IAX Rest Octets* information element is a type 5 information element with 1-5 octets length.

	8	7	6	5	4	3	2	1	
	IAX Rest Octets IEI								octet 1
	0	0	1	0	1	0	1	1	octet 2*
	spare	spare	spare	spare	spare	spare	spare	spare	
	0	0	1	0	1	0	1	1	octet 3*
	spare	spare	spare	spare	spare	spare	spare	spare	
	...								
	0	0	1	0	1	0	1	1	octet n*
	spare	spare	spare	spare	spare	spare	spare	spare	

Figure 10.36/GSM 04.08 IAX Rest Octets information element

10.5.2.19 L2 Pseudo Length

The *L2 Pseudo Length* information element indicates the number of octets following it in the message which are to be interpreted in the scope of the phase 1 protocol, i.e. the total number of octets (excluding the Rest Octets) for which T, V, TV, LV, or TLV formatting is used (reference Table 11.1/GSM 04.07).

The *L2 Pseudo Length* information element is the first part of e.g. SYSTEM INFORMATION messages which are mentioned as exceptions in section 10.1. It occupies the first octet of such messages.

For any of the SYSTEM INFORMATION messages sent on the BCCH, a mobile station should ignore the contents of the *L2 Pseudo Length* value contained in the *L2 Pseudo Length* information element. For some specific messages, further requirements are specified in section 9.

The *L2 Pseudo Length* Information element is an element with 2 octets length:

	8	7	6	5	4	3	2	1	
	L2 Pseudo Length IEI								octet 1
	L2 Pseudo Length value						0	1	octet 2

Figure 10.37/GSM 04.08 L2 Pseudo Length information element

Table 10.39/GSM 04.08: L2 Pseudo Length information element

L2 pseudo length value (octet 2)
The coding of the L2 pseudo length value field is the binary representation of the L2 pseudo length of the message in which the L2 pseudo length information element occurs.

NOTE: bits 1 and 2 are not spare.

10.5.2.20 Measurement Results

The purpose of the *Measurement Results* information element is to provide the results of the measurements made by the mobile station on the serving cell and the neighbour cells.

The *Measurement Results* information element is coded as shown in figure 10.38/GSM 04.08 and table 10.40/GSM 04.08.

The *Measurement Results* is a type 3 information element with 17 octets length.

8	7	6	5	4	3	2	1	
Measurement Results IEI								octet 1
BA-USED		DTX-USED		RXLEV-FULL-SERVING-CELL				octet 2
0 spare		MEAS-VALID		RXLEV-SUB-SERVING-CELL				octet 3
0 spare		RXQUAL-FULL-SERVING-CELL		RXQUAL-SUB-SERVING-CELL		NO-NCELL-M (high part)		octet 4
NO-NCELL-M (low part)		RXLEV-NCELL 1						octet 5
BCCH-FREQ-NCELL 1				BSIC-NCELL 1 (high part)				octet 6
BSIC-NCELL 1 (low part)		RXLEV-NCELL 2 (high part)						octet 7
RXLEV-NCELL 2 (low part)		BCCH-FREQ-NCELL 2				BSIC-NCELL 2 (high part)		octet 8

(continued..)

Figure 10.38/GSM 04.08 Measurement Results information element

BSIC-NCELL 2 (low part)		RXLEV-NCELL 3 (high part)		octet 9
RXLEV-NCELL 3 (low part)	BCCH-FREQ-NCELL 3		BSIC-NCELL 3 (high part)	octet 10
BSIC-NCELL 3 (low part)		RXLEV-NCELL 4 (high part)		octet 11
RXLEV-NCELL 4 (low part)	BCCH-FREQ-NCELL 4			octet 12
BSIC-NCELL 4			RXLEV-NCELL 5 (high part)	octet 13
RXLEV-NCELL 5 (low part)		BCCH-FREQ-NCELL 5 (high part)		octet 14
BCCH-FREQ-NCELL 5 (low part)	BSIC-NCELL 5		RXLEV-NCELL 6 (high part)	octet 15
RXLEV-NCELL 6 (low part)		BCCH-FREQ-NCELL 6 (high part)		octet 16
BCCH-FREQ-NCELL 6 (low part)	BSIC-NCELL 6			octet 17

Figure 10.38/GSM 04.08 *Measurement Results* information element (continued)

Table 10.40/GSM 04.08: *Measurement Results* information element

BA-USED (octet 2), the value of the BA-IND field of the neighbour cells description information element or elements defining the BCCH allocation used for the coding of BCCH-FREQ-NCELL fields. Range 0 to 1.

DTX-USED (octet 2) This bit indicates whether or not the mobile station used DTX during the previous measurement period.

Bit 7
0 DTX was not used
1 DTX was used

RXLEV-FULL-SERVING-CELL and RXLEV-SUB-SERVING-CELL, (octets 2 and 3)
Received signal strength on serving cell, measured respectively on all slots and on a subset of slots (see GSM 05.08)

The RXLEV-FULL-SERVING-CELL and RXLEV-SUB-SERVING-CELL fields are coded as the binary representation of a value N. N corresponds according to the mapping defined in GSM 05.08 to the received signal strength on the serving cell.

Range: 0 to 63

MEAS-VALID (octet 3)
This bit indicates if the measurement results for the dedicated channel are valid or not

Bit 7
0 The measurement results are valid
1 the measurement results are not valid

RXQUAL-FULL-SERVING-CELL and RXQUAL-SUB-SERVING-CELL (octet 4)
Received signal quality on serving cell, measured respectively on all slots and on a subset of the slots (see TS. GSM 05.08)

(continued...)

Table 10.40/GSM 04.08: *Measurement Results* information element (continued)

CELL fields are coded as the binary representation of the received signal quality on the serving cell.				
Range: 0 to 7 (See GSM 05.08)				
NO-NCELL-M, Number of neighbouring cell measurements (octets 4 and 5)				
Bits				
1 8 7				
0 0 0	No neighbour cell measurement result			
0 0 1	1	"	"	"
0 1 0	2	"	"	"
0 1 1	3	"	"	"
1 0 0	4	"	"	"
1 0 1	5	"	"	"
1 1 0	6	"	"	"
1 1 1	Neighbour cell information not available for serving cell			
RXLEV-NCELL <i>i</i> , Received signal strength on the <i>i</i> 'th neighbouring cell (octet 5, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16)				
The RXLEV-NCELL field is coded as the binary representation of a value N. N corresponds according to the mapping defined in TS. GSM 05.08 to the received signal strength on the <i>i</i> 'th neighbouring cell. See note 1 & 2.				
Range: 0 to 63.				

(continued...)

Table 10.40/GSM 04.08: Measurement Results information element (concluded)

<p>BCCH-FREQ-NCELL <i>i</i>, BCCH carrier of the <i>i</i>'th neighbouring cell (octet 6, 8,10, 12, 14, 15, 16 and 17)</p> <p>The BCCH-FREQ-NCELL <i>i</i> field is coded as the binary representation of the position, starting with 0, of the <i>i</i>'th neighbouring cells BCCH carrier in the BCCH channel list. The BCCH channel list is composed of one or two BCCH channel sub lists, each sub list is derived from the set of frequencies defined by reference neighbour cells description information element or elements. In the latter case the set is the union of the two sets defined by the two neighbour cells description information elements.</p> <p>In each BCCH channel sub list the absolute RF channel numbers are placed in increasing order of ARFCN, except that ARFCN 0, if included in the set, is put in the last position in the sub list. The BCCH channel list consists either of only the sub list derived from the neighbour cells description information element(s) in System Information 2/5 (and possible 2bis/5bis) or of that sub list immediately followed by the sub list derived from the neighbour cells description information element in System Information 2ter/5ter for the case System Information 2ter/5ter is also received. If the set of ARFCNs defined by the reference neighbour cells description information element or elements includes frequencies that the mobile station does not support then these ARFCNs shall be included in the list. The notation 2/5 etc. means that the rules above apply to the neighbour cells description information elements received in System Information 2, 2bis and 2ter and to those received in System Information 5, 5bis and 5ter separately.</p> <p>See note 1 & 2.</p> <p>Range: 0 to 31.</p> <p>BSIC-NCELL <i>i</i>, Base station identity code of the <i>i</i>'th neighbouring cell (octet 6, 7, 8, 9, 10, 11, 13, 15 and 17)</p> <p>The BSIC-NCELL <i>i</i> field is coded as the binary representation of the base station identity code of the <i>i</i>'th neighbouring cell. See note 1 & 2.</p> <p>Range: 0 to 63.</p> <p>NOTE 1: If the field extends over two octets the highest numbered bit of the lowest numbered octet is the most significant and the lowest numbered bit of the highest numbered octet is the least significant.</p> <p>NOTE 2: If NO-NCELL-M < 6 the remaining RXLEV-NCELL <i>i</i>, BS-FREQ-NCELL <i>i</i> and BSIC-NCELL <i>i</i> fields (NO-NCELL-M < <i>i</i> <= 6) shall be coded with a "0" in each bit.</p>

10.5.2.20a GPRS Measurement Results

The purpose of the *GPRS Measurement Results* information element is to provide the results of the GPRS measurements made by the GPRS mobile station on the serving cell.

The *GPRS Measurement Results* information element is coded as shown in figure 10.38a/GSM 04.08 and table 10.40a/GSM 04.08.

The *GPRS Measurement Results* is a type 3 information element with 3 octets length.

8	7	6	5	4	3	2	1	
GPRS Measurement Results IEI								octet 1
C_VALUE						RXQUAL (high part)		octet 2
RXQ-L (low)	0 spare	SIGN_VAR						octet 3

Figure 10.38a/GSM 04.08 GPRS Measurement Results information element

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Table 10.40a/GSM 04.08: GPRS Measurement Results information element

C_VALUE (octet 1), the value of the C parameter calculated by the GPRS mobile station (see GSM 05.08). This field is encoded as the binary representation of the C parameter value defined in GSM 05.08. Range 0 to 63.

RXQUAL (octets 1 and 2), contains the RXQUAL parameter field calculated by the GPRS mobile station (see GSM 05.08). This field is encoded as defined in GSM 05.08. Range 0 to 7.

SIGN_VAR (octet 3), contains the signal variance parameter SIGN_VAR calculated by the mobile station (see GSM 05.08). This field is encoded as defined in GSM 04.60.

10.5.2.21 Mobile Allocation

The purpose of the *Mobile Allocation* information element is to provide that part of the RF channels belonging to the cell allocation (coded with a "1" in the cell channel description information element) which is used in the mobile hopping sequence.

The *Mobile Allocation* information element is coded as shown in figure 10.39/GSM 04.08 and table 10.41/GSM 04.08.

The *Mobile Allocation* is a type 4 information element with 3 to 10 octets length except for the cases specified in section 9.1.18.1 and 9.1.19.2.

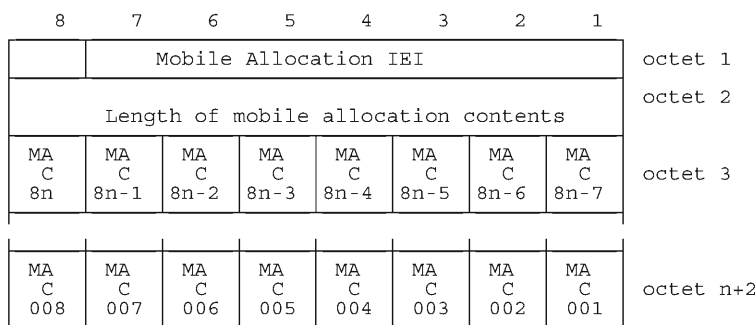


Figure 10.39/GSM 04.08 Mobile Allocation information element

Table 10.41/GSM 04.08: Mobile Allocation information element

MA C i, Mobile allocation RF channel i (octet 3 etc.), i = 1, 2, ..., NF
 The MA C i bit indicates whether or not the Mobile allocation frequency list includes the i'th frequency in the cell allocation frequency list. The cell allocation frequency list is derived from the set of frequencies defined by the reference cell channel description information element. NF denotes the number of frequencies in the cell allocation frequency list.
 In the cell allocation frequency list the absolute RF channel numbers are placed in increasing order of ARFCN, except that ARFCN 0, if included in the set, is put in the last position in the list,
 For a RF channel belonging to the mobile allocation the MA C i bit is coded with a "1"; i = 1, 2, ..., NF.
 For a RF channel not belonging to the mobile allocation the MA C i bit is coded with a "0"; i = 1, 2, ..., NF.
 If $NF \bmod 8 \neq 0$ then bits NF to 8n in octet 3 must be coded with a "0" in each.

10.5.2.21a Mobile Time Difference

A *Mobile Time Difference* information element encodes a time related to the synchronization difference between the time bases of two base stations. This type of information is used in conjunction with the HANDOVER COMPLETE message.

The *Mobile Time Difference* information element is coded as shown in figure 10.39a/GSM 04.08 and table 10.41a/GSM 04.08.

The *Mobile Time Difference* information element is a type 4 information element with 5 octets length.

8	7	6	5	4	3	2	1	
Mobile Time Difference IEI								Octet 1
Length of Mobile Time difference contents								Octet 2
Mobile Time Difference value (high)								Octet 3
Mobile Time Difference value (contd)								Octet 4
Mobile Time Difference value (low)				0 spare	0 spare	0 spare		Octet 5

Figure 10.39a/GSM 04.08 Mobile Time Difference information element

Table 10.41a/GSM 04.08: Mobile Time Difference information element

Mobile Time Difference value (octet 3, 4 and 5)
 The coding of the Mobile Time Difference value field is the binary representation of the time difference in half bit periods and modulo 2^{21} half bit periods; 1/2 bit period = 24/13 μ s.

10.5.2.21b Multislot Allocation

The purpose of the *Multislot Allocation* information element is to provide a description of which channels are used in downlink and uplink respectively, in a multislot configuration. It also groups the channels into channel sets, the channel mode for each channel set can be defined by a separate information element.

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The *Multislot Allocation* information element is coded as shown in figure 10.39b/GSM 04.08 and table 10.41b/GSM 04.08.

The multislot allocation information element is a type 4 information element with a minimum length of 3 octets and a maximum length of 12 octets.

8	7	6	5	4	3	2	1	
Multislot allocation IEI								octet 1
Length of the multislot allocation contents								octet 2
0/1 ext	DA 7	DA 6	DA 5	DA 4	DA 3	DA 2	DA 1	octet 3
1 ext	UA 7	UA 6	UA 5	UA 4	UA 3	UA 2	UA 1	octet 3a*
Channel set 1								octet 4*
Channel set 2								octet 5*
⋮							⋮	
Channel set 8								octet 11*

Figure 10.39b /GSM 04.08 *Multislot Allocation* information element

Table 10.41b/GSM 04.08 Multislot allocation information element

<p>DA 1-7, Downlink assignment (octet 3)</p> <p>Indicates additional downlink channel allocation. If bit DA n is set to "1" this indicates that timeslot $TN = (n + TN_m) \bmod 8$ is assigned. If bit DA n is set to "0" the corresponding timeslot is not assigned. TN_m is the timeslot number of the main link.</p> <p>UA 1-7, Uplink assignment (octet 3a)</p> <p>Indicates additional uplink channel allocation. If bit UA n is set to "1" this indicates that timeslot $TN = (n + TN_m) \bmod 8$ is assigned. If bit UA n is set to "0" the corresponding timeslot is not assigned. TN_m is the timeslot number of the main link.</p> <p>If octet 3a is not included the timeslots indicated by octet 3 are allocated in both downlink and uplink direction.</p> <p>Note1: Allocation of timeslots only in uplink is FFS. Note2: In combination with the channel description IE, all types of channels can be indicated. The channel carrying the main signalling link (indicated by the channel description IE is of type 1 (see below)), all other channels allocated both in downlink and uplink are of type 2 and channels with allocation in only one direction are of type 3.</p> <p>Type 1: TCH/F + FACCH/F + SACCH/M bidirectional Type 2: TCH/F + SACCH/M bidirectional Type 3: TCH/F + SACCH/M unidirectional</p> <p>Channel set n (octet 4 to 11 (if included)) If octets 4-11 are omitted, all channels belong to channel set 1.</p> <p>If bit m of Channel set n is set to "1" then timeslot m-1 is included in channel set n. If bit m of Channel set n is set to "0" then timeslot m-1 is not included in channel set n.</p> <p>Each allocated timeslot, including the timeslot carrying the main signalling link, shall be included in one (and only one) channel set.</p>

10.5.2.21c NC mode

The purpose of the *NC mode* information element is for the network to inform the mobile station of the NC mode to be implemented on the target cell.

The *NC mode* information element is coded as shown in figure 10.39c/GSM 04.08 and table 10.41c/GSM 04.08.

The *NC mode* is a type 1 information element.

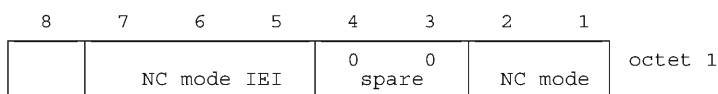


Figure 10.39c/GSM 04.08 NC mode information element

Table 10.41c/GSM 04.08: NC Mode information element

```

NC mode
This field indicates to the mobile the NC mode for
the target cell (see GSM 04.60). The field is encoded
according to the following table:
bits
2 1
0 0 NC 0
0 1 NC 1
1 0 NC 2
1 1 information on NC mode to be gathered from the
target cell
    
```

10.5.2.22 Neighbour Cells Description

The purpose of the *Neighbour Cells Description* information element is to provide the absolute radio frequency channel numbers of the BCCH carriers to be monitored by the mobile stations in the cell.

The *Neighbour Cells Description* information element is coded as the *Cell Channel Description* information element, as specified in section 10.5.2.1b, with the exception of bits 5 and 6 of octet 2. Figure 10.40/GSM 04.08 and table 10.42/GSM 04.08 contains the difference of specifications.

The *Neighbour Cells Description* information element is a type 3 information element with 17 octets length.

	8	7	6	5	4	3	2	1	
	Neighbour Cells Description IEI								octet 1
Bit 128	Bit 127	EXT-IND	BA-IND	Bit 124	Bit 123	Bit 122	Bit 121		octet 2
Bit 120	Bit 119	Bit 118	Bit 117	Bit 116	Bit 115	Bit 114	Bit 113		octet 3
Bit 008	Bit 007	Bit 006	Bit 005	Bit 004	Bit 003	Bit 002	Bit 001		octet 17

Figure 10.40/GSM 04.08 Neighbour Cells Description information element

Table 10.42/GSM 04.08: Neighbour Cells Description information element

<p>EXT-IND, Extension indication (octet 2, bit 6)</p> <p>If received in System Information 2, 2bis, 5 or 5bis this bit indicates whether the information element carries the complete information of a BCCH channel sub list or whether a complementary information element is sent in another message. A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. GSM 05.05) may consider this bit as a spare bit and assume that the information element carries the complete BA, see section 3.2.2.1.</p> <p>NOTE: This indicator is set to 1 in the neighbour cells description information elements in System Information 2 and 2bis and 5 and 5bis respectively when more than one is needed to describe a BCCH channel sub list.</p> <p>Bit 6</p> <p>0 The information element carries the complete BA</p> <p>1 The information element carries only a part of the BA</p> <p>BA-IND, BCCH allocation sequence number indication (octet 2). Range 0 to 1</p> <p>The BA-IND is needed to allow the network to discriminate measurements results related to different BAs (e.g. BA(BCCH) and BA(SACCH)) sent to the MS.</p>

10.5.2.22a Neighbour Cells Description 2

The purpose of the *Neighbour Cells Description 2* information element is to provide the absolute radio frequency channel numbers of the BCCH carriers to be monitored by the mobile stations in the cell.

The *Neighbour Cells Description 2* information element is coded as the *Cell Channel Description* information element, as specified in section 10.5.2.1b, with the exception of bits 5 to 7 of octet 2. figure 10.41/GSM 04.08 and table 10.42a/GSM 04.08 contains the difference of specifications.

The *Neighbour Cells Description 2* information element is a type 3 information element with 17 octets length.

	8	7	6	5	4	3	2	1	
	Neighbour Cells Description IEI								octet 1
Bit 128	Multiband reporting		BA IND	Bit 124	Bit 123	Bit 122	Bit 121		octet 2
Bit 120	Bit 119	Bit 118	Bit 117	Bit 116	Bit 115	Bit 114	Bit 113		octet 3
Bit 008	Bit 007	Bit 006	Bit 005	Bit 004	Bit 003	Bit 002	Bit 001		octet 17

Figure 10.41/GSM 04.08 Neighbour Cells Description 2 information element

Table 10.42a/GSM 04.08: *Neighbour Cells Description 2* information element

Octet 2 bit 8, 4, 3 and 2				
FORMAT-ID, Format Identifier (Bit 128 and next)				
The different formats are distinguished by the bits of higher number. As an exception to the general format for the neighbour cell description the format ID is coded as follows :				
Bit	Bit	Bit	Bit	format notation
128	124	123	122	
0	X	X	X	bit map 0
1	0	X	X	1024 range
1	1	0	0	512 range
1	1	0	1	256 range
1	1	1	0	128 range
1	1	1	1	variable bit map
Bits 6 and 7 of Octet 2				
Multiband reporting				
Binary encoding of multiband reporting parameter as specified in GSM 05.08.				
Range: 0 to 3				
Bit 5 of octet 2				
BA-IND, BCCH allocation sequence number indication.				
The BA-IND is needed to allow the network to discriminate measurements results related to different BAs (e.g. BA(BCCH) and BA(SACCH)) sent to the MS.				
Range 0 to 1.				

10.5.2.22c NT/N Rest Octets

<pre> NT/N Rest Octets ::= {0 1 <NLN(PCH) : bit (2)>} <list of Group Call NCH information> <Spare padding>; <List of Group Call NCH information> ::= 0 1 <Group Call information> <List of Group Call NCH information>; NLN(PCH) This field gives the NLN value to be used as specified in 3.3.3 <Group Call information> See clause 9.1.21a </pre>
--

10.5.2.23 P1 Rest Octets

The *P1 Rest Octets* information element contains information about the status of information on an existing NCH, priority levels and packet page indications applied for mobile station identities and spare bits.

The *P1 Rest Octets* information element is a type 5 information element with 1-18 octets length.

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```

<P1 Rest Octets> ::=
  {L | H <NLN(PCH) : bit (2)>}
  {L | H <Priority1 ::= Priority>}
  {L | H <Priority2 ::= Priority>}
  < Packet Page Indication 1 : {L | H} >
  < Packet Page Indication 2 : {L | H} >
  {L | H <Group Call information>}
  {L | H <NLN status : bit>}
  <spare padding>;

<Priority> ::= <bit (3)>;

<Group Call information>
See clause 9.1.21a

```

NOTE 1: The value 17h shall not be used as a value of the first octet when this information element is used in the PAGING REQUEST TYPE 1 message. This will prevent mobile stations misinterpreting this information as the Mobile Identity IE1.

Table 10.42d/GSM 04.08 P1 Rest Octets information element

NLN(PCH) Notification List Number

The presence of the *NLN(PCH)* field indicates that if an NCH is present, reduced NCH monitoring can be used, and gives the *NLN(PCH)* value, to be used as specified in 3.3.3.

Priority: Priority *i* relates to *Mobile Station Identity i* (*i* = 1, 2)

0 0 0	no priority applied
0 0 1	call priority level 4
0 1 0	call priority level 3
0 1 1	call priority level 2
1 0 0	call priority level 1
1 0 1	call priority level 0
1 1 0	call priority level B
1 1 1	call priority level A

The **Packet Page Indication *i*** field relates to *Mobile Station Identity i* (*i* = 1, 2) and indicates the kind of paging procedure associated with the mobile station identity:

L	paging procedure for RR connection establishment;
H	packet paging procedure.

10.5.2.24 P2 Rest Octets

The *P2 Rest Octets* information element contains information on the channel needed by the network and information about the status of information on an existing NCH, priority levels and packet page indications applied for mobile station identities and spare bits.

The *P2 Rest Octets* information element is a type 5 information element with 2-12 octets length.


```

<P2 Rest Octets> ::=
  {L | H <CN3: bit (2)>}
  {L | H <NLN: bit (2)>}
  {L | H <Priority1 ::= Priority>}
  {L | H <Priority2 ::= Priority>}
  {L | H <Priority3 ::= Priority>}
  {L | H <NLN status: bit>}
  <Packet Page Indication 3 : {L | H}>
  <spare padding>;

<Priority> ::= <bit(3)>;

```

NOTE 1: The value 17h shall not be used as a value of the first octet when this information element is used in the PAGING REQUEST TYPE 2 message. This will prevent mobile stations misinterpreting this information as the Mobile Identity IE1.

Table 10.43/GSM 04.08: P2 Rest Octets information element

CN3 Channel Needed for Mobile Identity 3

The values and semantics used in the *CN3* field are those of the CHANNEL field of *Channel Needed* IE (see 10.5.2.8). The *CN3* field is associated with the Mobile Identity 3 IE of the PAGING REQUEST TYPE 2 message.

If the *CN3* field is not present, the default value is 00 (any channel).

NLN Notification List Number

See P1 Rest Octets.

Priority: Priority *i* relates to *Mobile Station Identity i* (*i* = 1, 2, 3)

0 0 0	no priority applied
0 0 1	call priority level 4
0 1 0	call priority level 3
0 1 1	call priority level 2
1 0 0	call priority level 1
1 0 1	call priority level 0
1 1 0	call priority level B
1 1 1	call priority level A

The **Packet Page Indication 3** field relates to *Mobile Station Identity 3* and indicates the kind of paging procedure associated with the mobile station identity:

L	paging procedure for RR connection establishment;
H	packet paging procedure.

10.5.2.25 P3 Rest Octets

The *P3 Rest Octets* information element contains information on the channel needed by the network and information about the status of information on an existing NCH, priority levels applied for mobile station identities and spare bits. The purpose of the spare bits is to allow the upward compatible introduction of new information on the PCH in later phases.

The *P3 Rest Octets* information element is a type 5 information element with 4 octets length.

ETSI

```

<P3 Rest Octets> ::=
  {L I H <CN3 : bit (2)> <CN4 : bit (2)>}
  {L I H <NLN : bit (2)>}
  {L I H <Priority1 ::= Priority>}
  {L I H <Priority2 ::= Priority>}
  {L I H <Priority3 ::= Priority>}
  {L I H <Priority4 ::= Priority>}
  {L | H <NLN status : bit>}
  <spare padding>;

<Priority> ::= <bit(3)>;

```

Table 10.44/GSM 04.08: P3 Rest Octets information element

CN3 Channel Needed for Mobile Identity 3
 The values and semantics used in the CN3 field are those of the CHANNEL field of Channel Needed IE (see 10.5.2.8). The CN3 field is associated with the Mobile Identity 3 IE of the PAGING REQUEST TYPE 3 message.

 If the CN3 field is not present, the default value is 00 (any channel)

CN4 Channel Needed for Mobile Identity 4
 The values and semantics used in the CN4 field are those of the CHANNEL field of Channel Needed IE (see 10.5.2.8). The CN4 field is associated with the Mobile Identity 4 IE of the PAGING REQUEST TYPE 3 message.

 If the CN4 field is not present, the default value is 00 (any channel)

NLN Notification List Number
 See P1 Rest Octets

Priority: Priority *i* relates to Mobile Station Identity *i* (*i* = 1,2,3,4)

0 0 0	no priority applied
0 0 1	call priority level 4
0 1 0	call priority level 3
0 1 1	call priority level 2
1 0 0	call priority level 1
1 0 1	call priority level 0
1 1 0	call priority level B
1 1 1	call priority level A

10.5.2.25a Packet Channel Description and Packet Response or

The purpose of the *Packet Channel Description* information element is to provide a description of an allocable packet data physical channel.

The *Packet Channel Description* information element is coded according to the syntax specified below and described in table 10.44a/GSM 04.08.

The *Packet Channel Description* is a type 3 information element with 4 octets length.

```

< Packet Channel Description > ::=
< Channel type : bit (5) >
< TN : bit (3) >
< TSC : bit (3) >
{ 0
  0 0
  < ARFCN : bit (10) >
| 1
  < MA_NUMBER : bit (4) >
  < MAIO : bit (6) >
  < MA_CHANGE_MARK : bit (2) >
};

```

Table 10.44a/GSM 04.08: *Packet Channel Description* information element

The **Channel type** field (5 bit) is the binary representation of the type of packet data channel:

```

0 0 0 0 1   PDCH;
           all other values are reserved for future use; shall be interpreted by the receiver
           as binary '0 0 0 0 1'.

```

The **TN** field (3 bit) is the binary representation of the timeslot number as defined in GSM 05.10.
Range: 0 to 7

The **TSC** field (3 bit) is the binary representation of the training sequence code as defined in GSM 05.02.
Range: 0 to 7.

The **TSC** field is valid only for the non-hopping single RF channel configuration. For the RF hopping channel configuration, the training sequence code associated with the mobile allocation shall be used.

RF hopping channel

The presence of an **ARFCN** field in the packet channel description specifies a non-hopping single RF channel. The presence of a **MAIO** field and a **MA_NUMBER** field specifies an RF hopping channel:

The **ARFCN** field (10 bit) is the binary representation of the absolute RF channel number, see GSM 05.05.
Range: 0 to 1023.

The **MAIO** field (6 bit) provides the binary representation of the mobile allocation index offset, see GSM 05.02.
Range: 0 to 63.

The **MA_CHANGE_MARK** field (2 bit) is the identification of the consistent set of SI 14 messages for the decoding of the **MA_NUMBER** field, see SI 14 message.

The **MA_NUMBER** field (4 bit) is the binary reference to the mobile allocation and the associated hopping sequence number and training sequence code (defined in GSM 05.02) received in a consistent set of SI 14 messages. Range: 0 to 15.

10.5.2.25b Packet Response Type and Dedicated mode or TBF

The purpose of the *Packet Response Type* information element is to indicate the distinction between the immediate assignment procedure for RR connection establishment and the packet immediate assignment or the packet downlink assignment procedures. It also provides the indication to select between channel description using the *Channel Description* IE or the *Packet Channel Description* IE in case of the packet immediate assignment or the packet downlink assignment procedures.

The *Packet Response Type* information element is coded as shown in figure 10.43/GSM 04.08 and table 10.44b/GSM 04.08.

ETSI

The *Packet Response Type* is a type 1 information element.

The *Dedicated mode or TBF* information element is used by the network to indicate to the mobile station whether the rest of the message shall be decoded as an IMMEDIATE ASSIGNMENT message allocating a channel in dedicated mode or whether the rest of the message shall be decoded as the allocation of a Temporary Block Flow.

This IE also indicates whether the IMMEDIATE ASSIGNMENT message relates to a downlink TBF for a mobile station in the GPRS Ready state.

The *Dedicated mode or TBF* information element is coded as shown in figure 10.43/GSM 04.08 and table 10.44b/GSM 04.08.

The *Dedicated mode or TBF* is a type 1 information element.

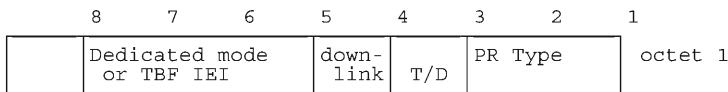


Figure 10.43/GSM 04.08 Packet Response Type and Dedicated mode or TBF information element

Table 10.44b/GSM 04.08: Packet Response Type and Dedicated mode or TBF information element

The PR Type field (2 bit) is binary coded using the following values:	
0 0	immediate assignment procedure for RR connection establishment;
0 1	packet immediate assignment or packet downlink assignment procedure using the <i>Channel Description</i> IE;
1 0	packet immediate assignment or packet downlink assignment procedure using the <i>Packet Channel Description</i> IE;
1 1	reserved for future use; shall be interpreted by the receiver as binary '0 0'.
T/D : TBF or dedicated mode (octet 1)	
Bit	
1	
0	this message assigns a dedicated mode resource
1	this message assigns a Temporary Block Flow
Downlink : Downlink assignment to mobile in Ready state	
Bit	
2	
0	No meaning
1	this message assigns a resource to the mobile station identified in the IAR rest octets. The type of resource (either dedicated mode or TBF) is indicated by bit 1

10.5.2.25c RR Packet Uplink Assignment


The *RR Packet Uplink Assignment* information element is sent by the network to the mobile station to indicate the assigned uplink resources.

The *RR Packet Uplink Assignment* information element is coded as shown in tables 10.44c/GSM 04.08 and 10.44d/GSM 04.08.

The *RR Packet Uplink Assignment* is a type 4 information element.

ETSI

Table 44c: RR PACKET UPLINK ASSIGNMENT information element



```

< RR Packet Uplink Assignment message content > ::=
  < LENGTH_IN_OTECTS : bit (8) >
  < MAC_MODE : bit (2) >
  < CHANNEL_CODING_COMMAND : bit (2) >
  < RESPONSE_INDICATOR : bit (1) >
  < TLLI_BLOCK_CHANNEL_CODING : bit (1) >
  { 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (7) >
  < Packet Timing Advance : Packet Timing Advance IE >
  { 0 < TIMESLOT_ALLOCATION : bit (8) >
  | 1 < Power Control Parameters : Power Control Parameters IE > }
  { 0 | 1 < RLC_DATA_BLOCKS_GRANTED : bit (8) > }
  { 0 { 0 {
    < USF_TN0 : bit (3) >
    < USF_TN1 : bit (3) >
    < USF_TN2 : bit (3) >
    < USF_TN3 : bit (3) >
    < USF_TN4 : bit (3) >
    < USF_TN5 : bit (3) >
    < USF_TN6 : bit (3) >
    < USF_TN7 : bit (3) >
    < USF_GRANULARITY : bit (1) > }
  | 1 { < TIMESLOT_NUMBER : bit (3) > }
  | 1 {
    { 0 | 1 < BLOCKS_OR_BLOCK_PERIODS : bit (1) >
      < ALLOCATION_BITMAP_LENGTH : bit (7) > }
    < ALLOCATION_BITMAP : bit (n) > } } }
  < N_SPARE_BITS : bit(N) > ;

```

Editors note: This IE has a number of differences to the contents of the PACKET UPLINK ASSIGNMENT message described in GSM 04.60:

- the PAGE_MODE is not included because this IE is sent on a DCCH, not on the PCH/AGCH;
- the Referenced Address is not included because this IE is sent in a dedicated mode message and hence has only one intended recipient;
- the CONTENTION_RESOLUTION_TLLI is not included because this IE is sent after dedicated mode contention resolution;
- the GSM 04.60 Frequency Parameters are not included because the dedicated mode message(s) carry this information in other information elements (eg Mobile Allocation);
- the TBF_STARTING_TIME is not included because it duplicates the information in the *Starting Time* IE;
- the ALLOCATION_REFERENCE is not included because this IE is in a message sent in dedicated mode using a reliable data link.

Table 44d: RR PACKET UPLINK ASSIGNMENT information element details

<p>LENGTH_IN_OCTETS (8 bit field) This field encodes (in binary) the number that is equal to one eighth of the number of bits in the <i>RR Packet Uplink Assignment</i> information element that follow the end of this field.</p>
<p>MAC_MODE (2 bit field) This field is encoded as the MAC_MODE information field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>TIMESLOT_ALLOCATION (8 bit field) This field is encoded as the TIMESLOT_ALLOCATION field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>CHANNEL_CODING_COMMAND (2 bit field) This field is encoded as the CHANNEL_CODING_COMMAND field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>Response Indicator (RI) (1 bit field) This field is encoded as the RESPONSE_INDICATOR bit in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>TLLI_BLOCK_CHANNEL_CODING (1 bit field) This field is encoded as the TLLI_BLOCK_CHANNEL_CODING field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>Packet Timing Advance IE This field is encoded as the Packet Timing Advance IE in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>UPLINK_TFI_ASSIGNMENT (7 bit field) If present, this field is encoded as the UPLINK_TFI_ASSIGNMENT information element in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>Power Control Parameters IE If present, this field is encoded as the Power Control Parameters IE in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>RLC_DATA_BLOCKS_GRANTED (8 bit field) If present, this field is encoded as the RLC_DATA_BLOCKS_GRANTED field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>RLC_OCTET_COUNT_REQUIRED (1 bit field) If present, this field is encoded as the RLC_OCTET_COUNT_REQUIRED field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>USF for Timeslot Number 0 (TN0) (3 bit field) USF for Timeslot Number 1 (TN1) (3 bit field) USF for Timeslot Number 2 (TN2) (3 bit field) USF for Timeslot Number 3 (TN3) (3 bit field) USF for Timeslot Number 4 (TN4) (3 bit field) USF for Timeslot Number 5 (TN5) (3 bit field) USF for Timeslot Number 6 (TN6) (3 bit field) USF for Timeslot Number 7 (TN7) (3 bit field) If present, these fields are encoded as the USF for Timeslot Number X field (where $0 \leq X < 8$) in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.</p>
<p>N_SPARE_BITS (N bit field) This field contains N spare bits. $0 \leq N < 8$. The sender shall set the spare bits are set to 0. The receiver shall ignore the value of these bits. N is chosen so that the <i>RR Packet Uplink Assignment</i> IE contains an integer number of octets.</p>

ETSI

TIMESLOT_NUMBER (3 bit field)

If present, this field is encoded as the TIMESLOT_NUMBER field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

BLOCKS_OR_BLOCK_PERIODS (1 bit field)

If present, this field is encoded as the BLOCKS_OR_BLOCK_PERIODS field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

ALLOCATION_BITMAP_LENGTH (7 bit field)

If present, this field is encoded as the ALLOCATION_BITMAP_LENGTH field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

ALLOCATION_BITMAP (variable length field)

If present, this field is encoded as the ALLOCATION_BITMAP field in the PACKET UPLINK ASSIGNMENT message in GSM 04.60.

10.5.2.25d RR Packet Downlink Assignment

The *RR Packet Downlink Assignment* information element is sent by the network to the mobile station to indicate the assigned downlink resources.

The *RR Packet Downlink Assignment* information element is coded as shown in tables 10.44e/GSM 04.08 and 10.44f/GSM 04.08.

The *RR Packet Downlink Assignment* is a type 4 information element.

For a mobile station assigned to operate in the fixed allocation MAC mode, the network may assign regularly repeating intervals during which the mobile station shall measure neighbour cell power levels.

Table 44e: RR PACKET DOWNLINK ASSIGNMENT information element

```

< RR Packet Downlink Assignment IE > ::=
  < LENGTH_IN_OCTETS : bit (8) >
  < MAC_MODE : bit (2) >
  < RLC_MODE : bit (1) >
  < TIMESLOT_ALLOCATION : bit (8) >
  < Packet Timing Advance : Packet Timing Advance IE >
  { 0 | 1 < Power Control Parameters : Power Control Parameters IE > }
  { 0 | 1 < DOWNLINK_TFI_ASSIGNMENT : bit (7) > }
  { 0 | 1 < MEASUREMENT_STARTING_TIME : bit (16) >
    < MEASUREMENT_INTERVAL : bit (5) >
    < MEASUREMENT_BITMAP : bit (8) > }
  < N_SPARE_BITS : bit (N) >;

```

Editors note: This IE has a number of differences to the contents of the PACKET DOWNLINK ASSIGNMENT message described in GSM 04.60:

- the PAGE_MODE is not included because this IE is sent on a DCCH not on the PCH/AGCH;
- Referenced Address is not included because this IE is sent in a dedicated mode message and hence has only one intended recipient.
- the GSM 04.60 Frequency Parameters are not included because the dedicated mode message(s) carry this information in other information elements (eg Mobile Allocation);
- the TBF_STARTING_TIME is not included because it duplicates the information in the *Starting Time* IE.

ETSI

Table44f: RR PACKET DOWNLINK ASSIGNMENT information element details

<p>LENGTH_IN_OCTETS (8 bit field) This field encodes (in binary) the number that is equal to one eighth of the number of bits in the <i>RR Packet Downlink Assignment</i> information element that follow the end of this field.</p> <p>MAC_MODE (2 bit field) This field is encoded as the MAC_MODE information field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>RLC_MODE (1 bit field) This field is encoded as the RLC_MODE field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>TIMESLOT_ALLOCATION (8 bit field) This field is encoded as the TIMESLOT_ALLOCATION field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>Packet Timing Advance IE This field is encoded as the Packet Timing Advance IE in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>Power Control Parameters IE This field is encoded as the Power Control Parameters IE in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>DOWNLINK_TFI_ASSIGNMENT (7 bit field) If present, this field is encoded as the DOWNLINK_TFI_ASSIGNMENT information element in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>MEASUREMNT_STARTING_TIME (16 bit field) If present, this field is encoded as the MEASUREMNT_STARTING_TIME field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>MEASUREMENT_BITMAP (8 bit field) If present, this field is encoded as the MEASUREMENT_BITMAP information field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>MEASUREMENT_INTERVAL (5 bit field) If present, this field is encoded as the MEASUREMENT_INTERVAL field in the PACKET DOWNLINK ASSIGNMENT message in GSM 04.60.</p> <p>N_SPARE_BITS (N bit field) This field contains N spare bits. $0 \leq N < 8$. The sender shall set the spare bits are set to 0. The receiver shall ignore the value of these bits. N is chosen so that the <i>RR Packet Downlink Assignment</i> IE contains an integer number of octets.</p>

10.5.2.26 Page Mode

The purpose of the *Page Mode* information element is to control the action of the mobile station belonging to the paging subgroup corresponding to the paging subchannel.

The *Page Mode* information element is coded as shown in figure 10.44/GSM 04.08 and table 10.45/GSM 04.08.

The *Page Mode* is a type 1 information element.

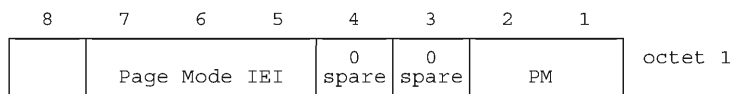


Figure 10.44/GSM 04.08 Page Mode information element

Table 10.45/GSM 04.08: *Page Mode* information element

PM (octet 1)	
Bits	
2 1	
0 0	Normal paging.
0 1	Extended paging.
1 0	Paging reorganization.
1 1	Same as before.
Note: The value "same as before" has been defined instead of "reserved" to allow the use of this coding with another meaning in an upwards compatible way in later phases of the GSM system.	

10.5.2.26a Spare

10.5.2.26b Spare

10.5.2.26c Spare

10.5.2.26d Spare

10.5.2.27 NCC Permitted

The purpose of the *NCC Permitted* information element is to provide a definition of the allowed NCCs on the BCCH carriers to be reported in the MEASUREMENT REPORT message by the mobile stations in the cell.

The *NCC Permitted* information element is coded as shown in figure 10.45/GSM 04.08 and table 10.46/GSM 04.08.

The *NCC Permitted* is a type 3 information element with 2 octets length.

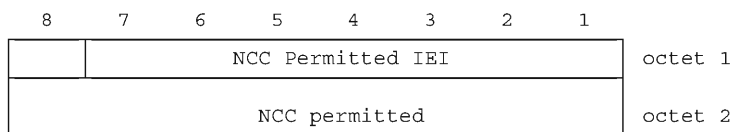


Figure 10.45/GSM 04.08 *NCC Permitted* information element

Table 10.46/GSM 04.08: *NCC Permitted* information element

NCC permitted (octet 2)
The NCC permitted field is coded as a bit map, i.e. bit N is coded with a "0" if the BCCH carrier with NCC = N-1 is not permitted for monitoring and with a "1" if the BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1,2,...,8.

10.5.2.28 Power Command

The purpose of the *Power Command* information element is to provide the power level to be used by the mobile station.

The *Power Command* information element is coded as shown in figure 10.46/GSM 04.08 and table 10.47/GSM 04.08.

The *Power Command* is a type 3 information element with 2 octets length.

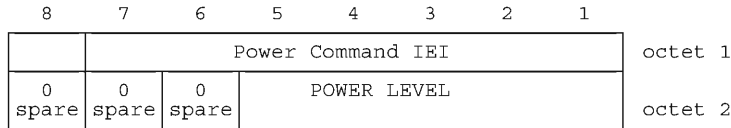


Figure 10.46/GSM 04.08 *Power Command* information element

Table 10.47/GSM 04.08: *Power Command* information element

Power level (octet 2) The power level field is coded as the binary representation of the "power control level", see TS GSM 05.05. This value shall be used by the mobile station according to GSM 05.08. Range: 0 to 31.

10.5.2.28a Power Command and access type

The purpose of the *Power Command and access type* information element is to provide the power level to be used by the mobile station and the indication that the mobile station can avoid the transmission of handover access.

The *Power Command and access type* information element is coded as shown in figure 10.46a/GSM 04.08 and table 10.47a/GSM 04.08.

The *Power Command and access type* is a type 3 information element with 2 octets length.

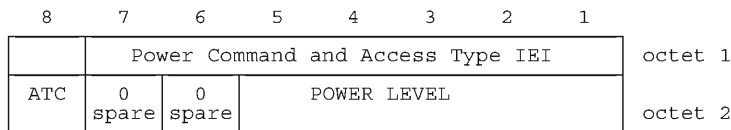


Figure 10.46a/GSM 04.08 *Power Command and access type* information element

Table 10.47a/GSM 04.08: Power Command and access type information element

ATC (Access Type Control) (octet 2) bit 8 0 Sending of Handover access is mandatory 1 Sending of Handover access is optional Power level (octet 2) The power level field is coded as the binary representation of the "power control level", see TS GSMá05.05. This value shall be used by the mobile station according to GSMá05.08. Range: 0 to 31.
--

10.5.2.29 RACH Control Parameters

The purpose of the *RACH Control Parameters* information element is to provide parameters used to control the RACH utilization. This information element is broadcast to mobile stations in SYSTEM INFORMATION TYPE 1, 2, 2bis, 3, and 4 messages.

The *RACH Control Parameters* information element is coded as shown in figure 10.47/GSM 04.08 and table 10.48/GSM 04.08.

The *RACH Control Parameters* is a type 3 information element with 4 octets length.

8	7	6	5	4	3	2	1	
RACH Control Parameters IEI								octet 1
Max retrans		Tx-integer				CELL BARR ACCESS	RE	octet 2
AC C15	AC C14	AC C13	AC C12	AC C11	EC C10	AC C09	AC C08	octet 3
AC C07	AC C06	AC C05	AC C04	AC C03	AC C02	AC C01	AC C00	octet 4

Figure 10.47/GSM 04.08 RACH Control Parameters information element

Table 10.48/GSM 04.08: RACH Control Parameters information element

Max retrans, Maximum number of retransmissions (octet 2)	
Bits	
8 7	
0 0	Maximum 1 retransmission
0 1	Maximum 2 retransmissions
1 0	Maximum 4 retransmissions
1 1	Maximum 7 retransmissions
Tx-integer, Number of slots to spread transmission (octet 2)	
Bits	
6 5 4 3	
0 0 0 0	3 slots used to spread transmission
0 0 0 1	4 slots used to spread transmission
0 0 1 0	5 slots used to spread transmission
0 0 1 1	6 slots used to spread transmission
0 1 0 0	7 slots used to spread transmission
0 1 0 1	8 slots used to spread transmission
0 1 1 0	9 slots used to spread transmission
0 1 1 1	10 slots used to spread transmission
1 0 0 0	11 slots used to spread transmission
1 0 0 1	12 slots used to spread transmission
1 0 1 0	14 slots used to spread transmission
1 0 1 1	16 slots used to spread transmission
1 1 0 0	20 slots used to spread transmission
1 1 0 1	25 slots used to spread transmission
1 1 1 0	32 slots used to spread transmission
1 1 1 1	50 slots used to spread transmission

Table 10.48/GSM 04.08: RACH Control Parameters information element (continued)

CELL_BAR_ACCESS, Cell Barred for Access (octet 2)	
Bit	
2	
0	The cell is not barred, see TS. GSM 03.22
1	The cell is barred, see TS. GSM 03.22
RE, Call reestablishment allowed (octet 2)	
Bit	
1	
0	Call Reestablishment allowed in the cell
1	Call Reestablishment not allowed in the cell
EC Emergency Call allowed (octet 3 bit 3)	
3	
0	Emergency call allowed in the cell to all MSs
1	Emergency call not allowed in the cell except for the MSs that belong to one of the classes between 11 to 15
AC CN, Access Control Class N (octet 3 (except bit 3) and octet 4)	
For a mobile station with AC C = N access is not barred if the AC CN bit is coded with a "0"; N = 0, 1, .. 9, 11, .., 15.	

10.5.2.30 Request Reference

The purpose of the *Request Reference* information element is to provide the random access information used in the channel request and the frame number, FN modulo 42432 in which the channel request was received.

The *Request Reference* information element is coded as shown in figure 10.48/GSM 04.08 and table 10.49/GSM 04.08.

The *Request Reference* is a type 3 information element with 4 octets length.

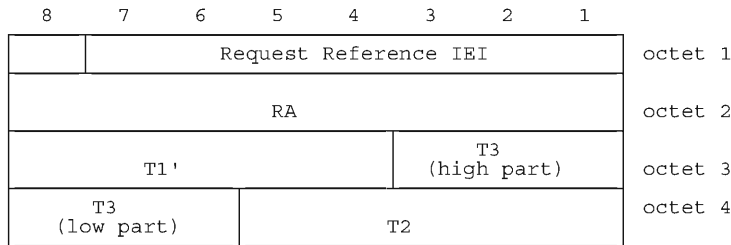


Figure 10.48/GSM 04.08 Request Reference information element

Table 10.49/GSM 04.08: Request Reference information element

<p>RA, Random Access Information (octet 2) This is an unformatted 8 bit field. Typically the contents of this field are coded the same as the CHANNEL REQUEST message shown in Table 9.9, section 9.1.8</p> <p>T1' (octet 2) The T1' field is coded as the binary representation of $(FN \text{ div } 1326) \text{ mod } 32$.</p> <p>T3 (octet 3 and 4) The T3 field is coded as the binary representation of $FN \text{ mod } 51$. Bit 3 of octet 2 is the most significant bit and bit 6 of octet 3 is the least significant bit.</p> <p>T2 (octet 4) The T2 field is coded as the binary representation of $FN \text{ mod } 26$.</p> <p>NOTE 1: The frame number, FN modulo 42432 can be calculated as $51 \times ((T3 - T2) \text{ mod } 26) + T3 + 51 \times 26 \times T1'$</p>
--

10.5.2.31 RR Cause

The purpose of the *RR Cause* information element is to provide the reason for release or the reason for completion of an assignment or handover.

The *RR Cause* information element is coded as shown in figure 10.49/GSM 04.08 and table 10.50/GSM 04.08.

The *RR Cause* is a type 3 information element with 2 octets length.

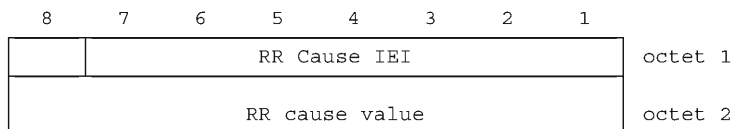


Figure 10.49/GSM 04.08 RR Cause information element

Table 10.50/GSM 04.08: RR Cause information element

RR cause value (octet 2)	
Bits	
8	7 6 5 4 3 2 1
0 0 0 0 0 0 0 0	Normal event
0 0 0 0 0 0 0 1	Abnormal release, unspecified
0 0 0 0 0 0 1 0	Abnormal release, channel unacceptable
0 0 0 0 0 0 1 1	Abnormal release, timer expired
0 0 0 0 0 1 0 0	Abnormal release, no activity on the radio path
0 0 0 0 0 1 0 1	Preemptive release
0 0 0 0 1 0 0 0	Handover impossible, timing advance out of range
0 0 0 0 1 0 0 1	Channel mode unacceptable
0 0 0 0 1 0 1 0	Frequency not implemented
0 1 0 0 0 0 0 1	Call already cleared
0 1 0 1 1 1 1 1	Semantically incorrect message
0 1 1 0 0 0 0 0	Invalid mandatory information
0 1 1 0 0 0 0 1	Message type non-existent or not implemented
0 1 1 0 0 0 1 0	Message type not compatible with protocol state
0 1 1 0 0 1 0 0	Conditional IE error
0 1 1 0 0 1 0 1	No cell allocation available
0 1 1 0 1 1 1 1	Protocol error unspecified

All other cause values shall be treated as 0000 0000, 'normal event'

The listed RR cause values are defined in Annex F.

10.5.2.32 SI 1 Rest Octets

The *SI 1 Rest Octets* information element contains the position about the NCH and spare bits.

The *SI 1 Rest Octets* information element is a type 5 information element with 2 octets length.

```
<SI1 Rest Octets> ::=
  {L |H <NCH Position : bit (5)> };
  <spare padding> ;
```

Table 10.50a/GSM 04.08 SI 1 Rest Octets information element

NCH Position on the CCCH

The values in the NCH Position field indicates the block number of the CCCH block which is used for the first NCH block and the number of blocks used for the NCH. (The block numbering corresponds to table 5 in section 7 of GSMá05.02)

The absence of the NCH position field indicates that there is no NCH in the cell/on the carrying CCCH slot

The following coding applies if 1 or more basic physical channels are used for CCCH, not combined with SDCCHs.

Value	No of blocks	Number of first block
0 0 0 0 0	1	0
0 0 0 0 1	1	1
0 0 0 1 0	1	2
0 0 0 1 1	1	3
0 0 1 0 0	1	4
0 0 1 0 1	1	5
0 0 1 1 0	1	6
0 0 1 1 1	2	0
0 1 0 0 0	2	1
0 1 0 0 1	2	2
0 1 0 1 0	2	3
0 1 0 1 1	2	4
0 1 1 0 0	2	5
0 1 1 0 1	3	0
0 1 1 1 0	3	1
0 1 1 1 1	3	2
1 0 0 0 0	3	3
1 0 0 0 1	3	4
1 0 0 1 0	4	0
1 0 0 1 1	4	1
1 0 1 0 0	4	2
1 0 1 0 1	4	3
1 0 1 1 0	5	0
1 0 1 1 1	5	1
1 1 0 0 0	5	2
1 1 0 0 1	6	0
1 1 0 1 0	6	1
1 1 0 1 1	7	0

Other values are reserved for future use. A mobile station receiving a reserved value shall behave as if the NCH position was not present

In the case the CCCH configuration is not compatible with the NCH position (e.g., CCCH with combined SDCCH and the value different from 00001, 00010 or 00111), the mobile station shall behave as if the NCH Position field was not present.

10.5.2.33 SI 2bis Rest Octets

The *SI 2bis Rest Octets* information element contains only spare bits. Its purpose is to allow the upward compatible introduction of new information on the BCCH in later phases.

The *SI 2bis Rest Octets* information element is a type 5 information element with 2 octets length.

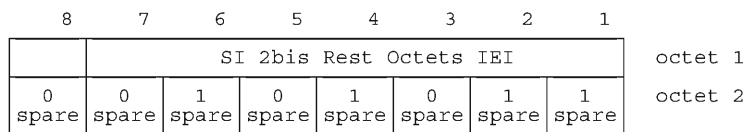


Figure 10.51/GSM 04.08 SI 2bis Rest Octets information element

NOTE: The compact notation for this element follows. This should be equivalent to the specification given by the figure.

```

<SI2bis Rest Octets> ::=
    <spare padding> ;
    
```

10.5.2.33a SI 2ter Rest Octets

The *SI 2ter Rest Octets* information element contains only spare bits. Its purpose is to allow the upward compatible introduction of new information on the BCCH in later phases.

The *SI 2ter Rest Octets* information element is a type 5 information element with 5 octets length.

	8	7	6	5	4	3	2	1	
	SI 2ter Rest Octets IEI								octet 1
0	0	1	0	1	0	1	1		octet 2
spare	spare	spare	spare	spare	spare	spare	spare	spare	
0	0	1	0	1	0	1	1		octet 3
spare	spare	spare	spare	spare	spare	spare	spare	spare	
0	0	1	0	1	0	1	1		octet 4
spare	spare	spare	spare	spare	spare	spare	spare	spare	
0	0	1	0	1	0	1	1		octet 5
spare	spare	spare	spare	spare	spare	spare	spare	spare	

Figure 10.51a/GSM 04.08 *SI 2ter Rest Octets* information element

NOTE: The compact notation for this element follows. This should be equivalent to the specification given by the figure.

```

<SI2ter Rest Octets> ::=
    <spare padding> ;
    
```

10.5.2.34 SI 3 Rest Octets

The *SI 3 Rest Octets* information element is coded according to the syntax specified below and described in tables 10.51a-c/GSM 04.08 and 10.52/GSM 04.08 (See section 10.5.2.35).

The *SI 3 Rest Octets* information element is a type 5 information element with 5 octets length.

Table 10.51a/GSM 04.08: SI 3 Rest Octets information element is a type 5 information element

<pre> <SI3 Rest Octet> ::= <Optional selection parameters> <Optional Power offset> <System Information 2ter Indicator> <Early Classmark Sending Control> <Scheduling if and where> <GPRS Indicator> <spare padding> : <Optional Selection Parameters> ::= L H <Selection Parameters>; <Selection Parameters> ::= <CBQ: bit (1)> <CELL_RESELECT_OFFSET: bit (6)> <TEMPORARY_OFFSET: bit (3)> <PENALTY_TIME: bit (5)>; <Optional Power Offset> ::= L H <Power Offset: bit (2)>; <System Information 2ter Indicator> ::= L H; <Early Classmark Sending Control> ::= L H; <Scheduling if and where> ::= L H <WHERE: bit (3)>; <GPRS Indicator> ::= L H <RA COLOUR : bit (3)>; </pre>
--

CBQ, CELL_BAR_QUALIFY (1 bit field)

CELL_BAR_QUALIFY is used by the network to control mobile station cell selection and reselection. The use and coding of this parameter is defined in GSM 05.08.

CELL_RESELECT_OFFSET (6 bit field)

CELL_RESELECT_OFFSET is coded as the binary representation of the "CELL_RESELECT_OFFSET" in GSM 05.08. It is a value used by the mobile station to apply a positive or negative offset to the value of C2 as defined in GSM 03.22 and GSM 05.08.

TEMPORARY_OFFSET (3 bit field)

The TEMPORARY_OFFSET field is coded as the binary representation of the "TEMPORARY_OFFSET" in GSM 05.08. It is used by the mobile station as part of its calculation of C2 for the cell reselection process as described in GSM 05.08. It is used to apply a negative offset to C2 for the duration of PENALTY_TIME.

PENALTY_TIME (5 bit field)

The PENALTY_TIME is coded as the binary representation of the "PENALTY_TIME" in GSM 05.08. It defines the length of time for which TEMPORARY_OFFSET is active. The usage of PENALTY_TIME is described in GSM 03.22 and GSM 05.08.

WHERE (3 bit field)

If the **WHERE** field is not contained in the information element, this indicates that BCCH scheduling information is not sent in SYSTEM INFORMATION TYPE 9 on the BCCH.

If the **WHERE** field is contained in the information element, this indicates that BCCH scheduling information is sent in

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SYSTEM INFORMATION TYPE 9 on the BCCH and that SYSTEM INFORMATION TYPE 9 messages are sent in the blocks of the BCCH norm for which $((FN \text{ DIV } 51) \bmod (8) = 4 \text{ AND } (((FN \text{ DIV } 51) \text{ DIV } 8) \bmod (n+1)) = 0)$, where n is the value encoded in binary in WHERE.

RA COLOUR (3 bit field)

If the RA COLOUR field is not contained in the information element, it indicates that GPRS is not supported in the cell.

If the RA COLOUR field is contained in the information element, it indicates that GPRS is supported in the cell. If the mobile station receives different values of the RA COLOUR field in different cell, the mobile station shall interpret the cell re-selection information as if the two cells belong to different routing areas.

10.5.2.35 SI 4 Rest Octets

The *SI 4 Rest Octets* information element includes parameters which are used by the mobile station for cell reselection purposes. It may also include the POWER OFFSET parameter used by DCS 1800 Class 3 MS.

Its content is described in Table 10.51b-c/GSM 04.08.

NOTE: In the future evolution of this standard the values 64h and 72h shall not be used as values of the first octet when this information element is used in the SYSTEM INFORMATION TYPE 4 message. This will prevent mobile stations misinterpreting this information as the CBCH IEs.

The *SI 4 Rest Octets* information element is a type 5 information element with 1 to 11 octets length.

```

<SI4 Rest Octets> ::= <Optional selection parameters>
    <Optional Power offset>
    <GPRS Indicator >
    <spare padding>;

<SI7 Rest Octets> ::= <SI4 Rest Octets>;

<SI8 Rest Octets> ::= <SI4 Rest Octets>;

<Optional Selection Parameters> ::= L | H <Selection Parameters>;

<Selection Parameters> ::=
    <CBQ : bit (1)>
    <CELL_RESELECT_OFFSET : bit (6)>
    <TEMPORARY_OFFSET : bit (3)>
    <PENALTY_TIME : bit (5)>;

<Optional Power Offset> ::= L | H <Power Offset : bit(2)>;

<GPRS Indicator> ::= L | H <RA COLOUR : bit (3)>;

```

Table 10.51b/GSM 04.08

<p>CBQ, CELL_BAR_QUALIFY (1 bit field)</p> <p>CELL_BAR_QUALIFY is used by the network to control mobile station cell selection and reselection. The use and coding of this parameter is defined in GSM 05.08.</p> <p>CELL_RESELECT_OFFSET (6 bit field)</p> <p>CELL_RESELECT_OFFSET is coded as the binary representation of the "CELL_RESELECT_OFFSET" in GSM 05.08. It is a value used by the mobile station to apply a positive or negative offset to the value of C2 as defined in GSM 03.22 and GSM 05.08.</p> <p>TEMPORARY_OFFSET (3 bit field)</p> <p>The TEMPORARY_OFFSET field is coded as the binary representation of the "TEMPORARY_OFFSET" in GSM 05.08. It is used by the mobile station as part of its calculation of C2 for the cell reselection process as described in GSM 05.08. It is used to apply a negative offset to C2 for the duration of PENALTY_TIME.</p> <p>PENALTY_TIME (5 bit field)</p> <p>The PENALTY_TIME is coded as the binary representation of the "PENALTY_TIME" in GSM 05.08. It defines the length of time for which TEMPORARY_OFFSET is active. The usage of PENALTY_TIME is described in GSM 03.22 and GSM 05.08.</p>
--

Table 10.51c/GSM 04.08

<p>POWER OFFSET (2 bit field)</p> <p>POWER OFFSET is used only by DCS 1800 Class 3 MSs to add a power offset to the value of MS_TXPWR_MAX_CCH used for its random access attempts. It is also used by the MS in its calculation of C1 and C2 parameters. Its use is defined in GSM 05.08</p> <p>If this parameter is transmitted on a BCCH carrier within the DCS 1800 band, its meaning shall be described below:</p> <table border="0"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>0 dB power offset</td> </tr> <tr> <td>01</td> <td>2 dB power offset</td> </tr> <tr> <td>10</td> <td>4 dB power offset</td> </tr> <tr> <td>11</td> <td>6 dB power offset</td> </tr> </tbody> </table> <p>If this parameter is transmitted on a BCCH carrier outside the DCS 1800 band, then all bit positions shall be treated as spare.</p> <p>RA COLOUR (3 bit field)</p> <p>If the RA COLOUR field is not contained in the information element, it indicates that GPRS is not supported in the cell.</p> <p>If the RA COLOUR field is contained in the information element, it indicates that GPRS is supported in the cell. If the mobile station receives different values of the RA COLOUR field in different cell, the mobile station shall interpret the cell re-selection information as if the two cells belong to different routing areas.</p>	Value	Meaning	00	0 dB power offset	01	2 dB power offset	10	4 dB power offset	11	6 dB power offset
Value	Meaning									
00	0 dB power offset									
01	2 dB power offset									
10	4 dB power offset									
11	6 dB power offset									

10.5.2.35a SI 6 Rest Octets

The *SI 6 Rest Octet* information element may contain information concerning the paging, notification channels, VBS and VGCS services of the cell.

Mobile stations not supporting VGCS listening or VBS listening can ignore the information contained in this information element.

The value part is as shown below:

```

<SI6 rest octets> ::= { L I H <PCH and NCH info> } ;
                    <VBS/VGCS options : bit(2)>
                    <implicit spare >;

<PCH and NCH info> ::= <Paging channel restructuring>
                    <NLN(SACCH) : bit(2)>;
                    { 0 I 1 <Call priority : bit (3)> };
                    <NLN status : bit >;

<paging channel restructuring> ::=
  1|  -- paging channel is restructured
  0  -- paging channel is not restructured

<VBS/VGCS options> ::= <inband notifications>
                    <inband pagings>

<inband notifications> ::=
  L|  -- the network does not provide notification on FACCH so that the mobile should
      inspect the NCH for notifications
  H  -- the mobile shall be notified on incoming high priority VBS/VGCS calls through
      NOTIFICATION/FACCH, the mobile need not to inspect the NCH

<inband pagings> ::=
  L|  -- the network does not provide paging information on FACCH so that the mobile
      should inspect the PCH for pagings
  H  -- the mobile shall be notified on incoming high priority point-to-point calls
      through NOTIFICATION/FACCH, the mobile need not to inspect the PCH

```

Attributes, field contents:

1. For <NLN(SACCH): bit(2)>: see 10.5.2.23.
2. For <call priority>: see 10.5.2.23. Indication of the highest priority associated with VBS/VGCS calls in a cell.

10.5.2.36 SI 7 Rest Octets

The *SI 7 Rest Octets* information element includes parameters which are used by the mobile station for cell reselection purposes. It may also include the POWER OFFSET parameter used by a DCS 1800 Class 3 MS.

The *SI 7 Rest Octets* information element is a type 5 information element with 1 to 21 octets length.

The *SI 7 Rest Octets* information element is coded as the *SI 4 Rest Octets*. Its contents is described in Table 10.51b-c/GSM 04.08.

10.5.2.37 SI 8 Rest Octets

The *SI 8 Rest Octets* information element includes parameters which are used by the mobile station for cell reselection purposes. It may also include the POWER OFFSET parameter used by a DCS 1800 Class 3 MS.

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The *SI 8 Rest Octets* information element is a type 5 information element with 1 to 21 octets length.

The *SI 8 Rest Octets* information element is coded as the *SI 4 Rest Octets*. Its contents is described in Table 10.51b-c/GSM 04.08.

10.5.2.37a SI 9 Rest Octets

The *SI 9 Rest Octets* information element contains information about scheduling of some or all of the information on the BCCH.

The *SI 9 Rest Octets* information element is a type 5 information element with 17 octets length.

<SI9 rest octets>	::=	{ L H <Scheduling info>} <spare padding>;
<Scheduling info>	::=	<Info type> <Positions> { 0 1 <Scheduling info>;
<Info type>	::=	0 <Info_type_4: bit (4)> 1 0 <Info_type_5: bit (5)> 1 1 <Info_type_6: bit(6)>;
<Positions>	::=	<Position> { 0 1 <Position>}
<Position>	::=	<Modulus: bit(4)> <Relative_position: <bit>> --length depends on modulus <Bch_type: bit(1)>;

Attributes

The *scheduling info* indicates one or more information types (in *info type*) together with their *positions*. Here, a *position* specifies at which relative position P (specified in **relative_position**) modulo a position modulus M (specified in **modulus**) messages of the given information type are sent, on the BCCH norm or BCCH ext (see GSM 05.02) as indicated in **bch_type**. Precisely, messages of the given information type are sent in the multiframes for which

$$((\text{frame number}) \text{DIV } 51) \bmod (M) = P.$$

If the position modulus M equals 0, the information type is not sent.

Field contents

The fields of the *SI 9 Rest Octets* information element are coded as shown in table 10.52/GSM 04.08.

Table 10.52/GSM 04.08 SI 9 rest octet information element

Info_type_4 (4 bits)

This field contains a binary encoded non-negative integer number assigned to a type of information sent on the BCCH. All values indicate unknown, unnecessary information and are reserved for future use.

Info_type_5 (5 bits)

This field contains a binary encoded non-negative integer number assigned to a type of information sent on the BCCH. All values except those defined below indicate unknown, unnecessary information and are reserved for future use.

Info_type_5:

- 0 0000 System Information type 1
- 0 0001 System Information type 2
- 0 0010 System Information type 2bis
- 0 0011 System Information type 2ter
- 0 0100 System Information type 3
- 0 0101 System Information type 4
- 0 0110 System Information type 7
- 0 0111 System Information type 8
- 0 1000 System Information type 9
- 0 1001 System Information type 13
- 0 1010 System Information type 14
- 0 1011 System Information type 15

Info_type_6 (6 bits)

This field contains a binary encoded non-negative integer number assigned to a type of information sent on the BCCH. All values indicate unknown, unnecessary information and are reserved for future use.

modulus (4 bits)

This field encodes the **position modulus**, according to the following encoding method. Let N be the integer encoded in binary in the **modulus** field; the **position modulus** is then defined as follows :

- If $N=0$, the **position modulus** is 0,
- if $N>0$, the **position modulus** is 2^{N+1} .

relative position (0 bits if the non-negative integer n contained in the **modulus** field is 0; n+1 bits, if the non-negative integer N encoded in the **modulus** field is > 0).

This field contains the N+1 bit binary encoding of a non-negative integer number $< 2^{N+1}$.

bcch_type (1 bit)

- 0 BCCH norm(as defined in GSM 05.08)
- 1 BCCH ext (as defined in GSM 05.08)

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10.5.2.37b SI 13 Rest Octets

The *SI 13 Rest Octets* information element is coded according to the syntax specified below and described in tables 10.52a/GSM 04.08.

The *SI 13 Rest Octets* information element is a type 5 information element with 21 octets length.

```

< SI 13 Rest Octets > ::=
{ L | H
  < RA_CODE : bit (8) >
  { 0
    < EXT_DYN_ALLOCATION_SUPPORTED : bit >
    < FIXED_ALLOCATION_SUPPORTED : bit >
    < ACC_BURST_TY : bit >
    < CONTROL_ACK_TYPE : bit >
    < NETWORK_CONTROL_ORDER : bit (2) >
    < N_AVG_I : bit (4) >
    < T_AVG_W : bit (5) >
    < T_AVG_T : bit (5) >
    < PC_MEAS_CHAN : bit >
    < Pb : bit (4) >
    < DRX_TIMER_MAX : bit (3) >
    < PRIORITY_ACCESS_THR : bit (3) >
    < BS_CV_MAX : bit (4) >
    < PAN_DEC : bit (3) >
    < PAN_INC : bit (3) >
    < PAN_MAX : bit (3) >
    < SI_1_CA_INDICATION : bit >
    { 0 | 1 < MA_CHANGE_MARK : bit (2) > }
    { 0 | 1 < IM_CHANGE_MARK : bit (2) > }
  }
  | 1
  < PCCCH Description >
}
}
< spare padding >;

< PCCCH Description > ::=
< PCCCH Type : bit >
< TN : bit(3) >
< TSC : bit (3) >
{ 0
  < ARFCN : bit (10) >
}
| 1
  < MAIO : bit (6) >
  < HSN : bit (6) >
  < Length of MA : bit (6) >
  < Mobile Allocation : < bit > * >
};

```


Table 10.52a/GSM 04.08: SI 13 Rest Octets information element (page 1 of 3)

The RA_CODE field (8 bit) is the binary representation of the Routing Area Code. The coding of the Routing Area Code is left open for each administration using the structure specified in GSM 03.03.	
The EXT_DYN_ALLOCATION_SUPPORTED field (1 bit) indicates the support for extended dynamic allocation:	
0	extended dynamic allocation is not supported in the cell;
1	extended dynamic allocation is supported in the cell (see GSM 04.60).
The FIXED_ALLOCATION_SUPPORTED field (1 bit) indicates the support for fixed allocation:	
0	fixed allocation is not supported in the cell;
1	fixed allocation is supported in the cell (see GSM 04.60).
The ACC_BURST_TY field (1 bit) indicates the type of access burst is used on uplink PDCH:	
0	8 bit access burst shall be used by mobile station;
1	11 bit access burst shall be used by mobile station (see GSM 05.02).
The CONTROL_ACK_TYPE field (1 bit) indicates the format of the PACKET CONTROL ACKNOWLEDGEMENT message to be used by the mobile station, see GSM 04.60.	
0	PACKET CONTROL ACKNOWLEDGEMENT format is four access bursts;
1	PACKET CONTROL ACKNOWLEDGEMENT format is RLC/MAC control block.
The NETWORK_CONTROL_ORDER field (2 bit) is the binary representation of the parameter NETWORK_CONTROL_ORDER, see GSM 04.60:	
0 0	NC0: MS controlled cell re-selection, no measurement reporting;
0 1	NC1: MS controlled cell re-selection, MS sends measurement reports;
1 0	NC2: Network controlled cell reselection, MS sends measurement reports;
1 1	Reserved for future use, interpreted as NC0 by mobile station.
The N_AVG_I field (4 bit) is the binary representation of the parameter N_{AVG_I} for MS output power control, see GSM 05.08: Range: 0 to 15.	
The T_AVG_W field (5 bit) is the binary representation of the parameter T_{AVG_W} for MS output power control, see GSM 05.08: Range: 0 to 25. Values higher than 25 shall be interpreted as 25 by the mobile station.	
The T_AVG_T field (5 bit) is the binary representation of the parameter T_{AVG_T} for MS output power control, see GSM 05.08: Range: 0 to 25. Values higher than 25 shall be interpreted as 25 by the mobile station.	
The PC_MEAS_CHAN field (bit) indicates which type of channel shall be used for downlink measurements for power control:	
0	BCCH;
1	PDCH.
The Pb field (4 bit) is a binary representation of the parameter P_b for MS output power control, see GSM 05.08:	
0 0 0 0	$P_b = 0$ dB
0 0 0 1	$P_b = -2$ dB
:	:
	(steps of 2 dB size)
1 1 1 1	$P_b = -30$ dB

Table 10.52a/GSM 04.08: SI 13 Rest Octets information element (continued, page 2 of 3)

The **DRX_TIMER_MAX** field (3 bit) is the binary representation of the parameter DRX_TIMER_MAX, see GSM 04.60:

0 0 0	non-DRX mode is not supported by the network;
0 0 1	Maximum: 1 second of non-DRX mode supported by the network;
0 1 0	2 seconds of non-DRX mode supported by the network;
0 1 1	4 seconds of non-DRX mode supported by the network;
1 0 0	8 seconds of non-DRX mode supported by the network;
1 0 1	16 seconds of non-DRX mode supported by the network;
1 1 0	32 seconds of non-DRX mode supported by the network;
1 1 1	64 seconds of non-DRX mode supported by the network.

The **PRIORITY_ACCESS_THR** field (3 bit) is the binary representation of the parameter PRIORITY_ACCESS_THR:

0 0 0	packet access is not allowed in the cell;
0 0 1	spare, shall be interpreted as '000' (packet access not allowed);
0 1 0	spare, shall be interpreted as '000' (packet access not allowed);
0 1 1	packet access is allowed for priority level 1;
1 0 0	packet access is allowed for priority level 1 to 2;
1 0 1	packet access is allowed for priority level 1 to 3;
1 1 0	packet access is allowed for priority level 1 to 4;
1 1 1	spare, shall be interpreted as '110' (packet access allowed).

The **BS_CV_MAX** field (4 bit) is the binary representation of the BS_CV_MAX parameter, see GSM 04.60. Range: 1 to 15 (value 0 is reserved).

The **PAN_DEC** and **PAN_INC** fields (3 bit each) are the binary representations of the respective PAN_DEC and PAN_INC parameters, see GSM 04.60. Range: 0 to 7.

The **PAN_MAX** field (3 bit) is a binary representation to the PAN_MAX parameter, see GSM 04.60. The PAN_MAX field is coded:

0 0 0	maximum value for PAN counter is 4;
0 0 1	maximum value for PAN counter is 8;
:	:
	(steps of size 4)
1 1 1	maximum value for PAN counter is 32.

The **SI_1_CA_INDICATION** field (1 bit) indicates if the information from the SI 1 message is required for packet access in the cell:

0	information from SI 1 message is not required for packet access;
1	information from SI 1 message is required for packet access;

The **MA_CHANGE_MARK** field (2 bit) is the identification of the currently consistent set of SI 14 messages, see SI 14 message. If the MA_CHANGE_MARK field is not present, the mobile station shall assume there is no SI 14 message broadcast in the cell.

The **IM_CHANGE_MARK** field (2 bit) is the identification of the currently consistent set of SI 15 messages, see SI 15 message. If the IM_CHANGE_MARK field is not present, the mobile station shall assume there is no SI 15 message broadcast in the cell.

Table 10.52a/GSM 04.08: *SI 13 Rest Octets* information element (continued, page 3 of 3)

The **PCCCH Type** field (1 bit) indicates the type of multiframe used for PCCCH:

- 0 PCCCH uses 52-multiframe;
- 1 PCCCH uses 51-multiframe (see GSM 05.02).

The **TN** field (3 bit) is binary representation of the timeslot number for PCCCH. Range 0 to 7.

The **TSC** field (3 bit) is binary representation of the training sequence code used for PCCCH, see GSM 05.02. Range 0 to 7.

The **ARFCN** field (10 bit) is the binary representation of the absolute RF channel number for PCCCH, see GSM 05.05. Range: 0 to 1023.

The **MAIO** field (6 bit) provides the binary representation of the mobile allocation index offset, see GSM 05.02. Range: 0 to 63.

The **HSN** field (6 bit) is binary representation of the hopping sequence number, see GSM 05.02. Range 0 to 63.

The **Length of MA** field (6 bit) is a binary indication of the number of bit positions in the *Mobile Allocation* bitmap. The value of the *Length of MA* field equals NF-1. Range: 0 to 63.

The **Mobile Allocation** field (1 to 64 bit) is a bitmap referring to the *Cell Channel Description* IE in SI 1 message. The length of the bitmap is NF bit positions, where NF denotes the number of ARFCNs contained in the cell channel description. The different bit positions in the mobile allocation bitmap are assigned indices $i = 1$ to NF, starting with $i = NF$ in the most significant bit position and ending with $i = 1$ in the least significant bit position. The bit position with index i corresponds to the i 'th frequency in the cell channel description arranged in the ascending order of ARFCN (except that ARFCN = 0, if included in the Cell Channel Description, is put last) and numbered from 1 to NF. Each bit position is coded:

- 0 RF channel not belonging to mobile allocation;
- 1 RF channel belonging to mobile allocation.

10.5.2.37c SI 14 Rest Octets

The *SI 14 Rest Octets* information element is coded according to the syntax specified below and described in tables 10.52b/GSM 04.08.

The *SI 14 Rest Octets* information element is a type 5 information element with 21 octets length.

```

<SI14 Rest Octets> ::=
  < MA_CHANGE_MARK : bit (2) >
  < SI 14 index : bit (3) > < SI 14 count : bit (3) >
  { L | H < Reference Frequency list : < octet > * > } *
  { L | H < Mobile Allocation > } *
  < spare padding >;

< Mobile Allocation > ::=
  < SI 1 CA indication : bit >
  { 0 | 1 < RFL_NUMBER : bit (4) > } *
  { 0 < MA length : bit (6) >
    < MA bitmap : < bit > * >
  | 1 { 0 | 1 < ARFCN_NUMBER : bit (6) > } * }
  { 0 | 1 < HSN : bit (6) > }
  < TSC : bit (3) >;

```

Table 10.52b/GSM 04.08: SI 14 Rest Octets information element

MA_CHANGE_MARK (2 bit field)

The purpose of the MA_CHANGE_MARK field is to identify a consistent set of the SI 14 messages. The MA_CHANGE_MARK field is binary coded. The value is network dependent.

SI 14 index (3 bit field) and **SI 14 count** (3 bit field)

The purpose of the *SI 14 index* field and the *SI 14 count* field is to indicate the number of individual messages within the sequence of SI 14 messages and to assign an index to identify each one of them.

The *SI 14 index* field is binary coded, range: 0 to 7, and provides an index to identify the individual SI 14 messages.

The *SI 14 count* field is binary coded, range: 0 to 7, and provides the *SI 14 index* value for the last (highest indexed) message in the sequence of SI 14 messages.

Reference Frequency list (variable length information element)

The purpose of the *Reference Frequency list* information element is to provide a reference frequency list or part of a reference frequency list to be used for the decoding of a mobile allocation. The coding of the *Reference Frequency list* information element is defined by the LV format of the type 4 information element *Frequency List*. All available formats of the information element *Frequency List* are allowed.

SI 1 CA indication (1 bit field)

The *SI 1 CA indication* field indicates if the cell channel description defined in SI 1 message on BCCH shall be included in the reference frequency list for the decoding of the mobile allocation:

- 0 cell channel description defined in SI 1 message shall not be included;
- 1 cell channel description defined in SI 1 message shall be included.

RFL_NUMBER (4 bit field) is the binary reference to a *Reference Frequency list* IE in a SI 14 message, see section 9.1.43b.2. Range: 0 to 15..

The **MA length** (6 bit field) is a binary indication of the number of bit positions in the *MA bitmap* field. The value of the *Length of MA* field equals NF-1. Range: 0 to 63.

The **MA bitmap** (variable length, 1 to 64 bit field) refers to the reference frequency list defined by the associated *SI 1 CA Indication* field and the list of *RFL_NUMBER* fields, see 9.1.43b.2. The length of the bitmap is NF bit positions, where NF is the number of ARFCNs contained in the reference frequency list. The different bit positions in the *MA bitmap* field corresponds to the different ARFCN_NUMBER values assigned to the ARFCNs contained in the reference frequency list, starting with ARFCN_NUMBER = NF-1 in the first bit position and ending with ARFCN_NUMBER = 0 in the last bit position. Each bit position is coded:

- 0 RF channel not belonging to mobile allocation;
- 1 RF channel belonging to mobile allocation.

ARFCN_NUMBER (6 bit field) is the binary reference to one RF channel in the *Reference Frequency list* IEs in a SI 14 message, see section 9.1.43b.2. Range: 0 to 63.

HSN (6 bit field)

The purpose of the HSN field is to provide a hopping sequence number for the physical channel description. The HSN field is binary coded, range: 0 to 63, see GSM 05.02. Default value: HSN = 0 (cyclic hopping).

TSC (3 bit field)

The purpose of the TSC field is to provide a training sequence code for the physical channel description. The TSC field is binary coded, range: 0 to 7, see GSM 05.02.

10.5.2.37d SI 15 Rest Octets

The *SI 15 Rest Octets* information element contains a sequence of one or more lists of candidate channels to be monitored by a mobile station in packet idle mode for interference signal strength measurements.

The *SI 15 Rest Octets* information element is a type 5 information element with 21 octets length.

ETSI

```

<SI15 Rest Octets> ::=
< IM_CHANGE_MARK : bit (2) >
< SI 15 index : bit (3) > < SI 15 count : bit (3) >
{ L | H
  < MA_CHANGE_MARK : bit (2) >
  < Channel Description for Interference Measurements >*
}
<spare padding>;

< Channel Description for Interference Measurements > ::=
{ 0 < ARFCN : bit (10) >
| 1 < MA_NUMBER : bit (4) >
  < MAIO : bit (6) > }
< TIMESLOT_ALLOCATION : bit (8) >;

```

Table 10.52c/GSM 04.08: SI 15 Rest Octets information element

IM_CHANGE_MARK (2 bit field)

The purpose of the *IM_CHANGE_MARK* field is to identify a consistent set of the SI 15 messages. The *IM_CHANGE_MARK* field is binary coded. The value is network dependent.

SI 15 index (3 bit field) and **SI 15 count** (3 bit field)

The purpose of the *SI 15 index* field and the *SI 15 count* field is to indicate the number of individual messages within the sequence of SI 15 messages and to assign an index to identify each one of them.

The *SI 15 index* field is binary coded, range: 0 to 7, and provides an index to identify the individual SI 15 messages.

The *SI 15 count* field is binary coded, range: 0 to 7, and provides the *SI 15 index* value for the last (highest indexed) message in the sequence of SI 15 messages.

The **MA_CHANGE_MARK** field (2 bit) is the identification of the consistent set of SI 14 messages for the decoding of the **MA_NUMBER** field, see SI 14 message.

The **ARFCN** field (10 bit) is the binary representation of the absolute RF channel number, see GSM 05.05. Range: 0 to 1023.

The **MA_NUMBER** field (4 bit) is the binary reference to the mobile allocation and the associated hopping sequence number and training sequence code (see GSM 05.02) received in a consistent set of SI 14 messages. Range: 0 to 15.

The **MAIO** field (6 bit) provides the binary representation of the mobile allocation index offset, see GSM 05.02. Range: 0 to 63.

The **TIMESLOT_ALLOCATION** field (8 bit) is a bitmap indicating the timeslots that are allocated on an RF channel in the Channel List for Interference Measurements. Each bit position in the **TIMESLOT_ALLOCATION** bitmap represents, in order from the least significant to the most significant bit position, the corresponding timeslot numbers from 0 to 7:

- 0 timeslot not belonging to **TIMESLOT_ALLOCATION**;
- 1 timeslot belonging to **TIMESLOT_ALLOCATION**.

10.5.2.38 Starting Time

The purpose of the *Starting Time* information element is to provide the start TDMA frame number, FN modulo 42432.

The *Starting Time* information element is coded as shown in figure 10.55/GSM 04.08 and table 10.53/GSM 04.08.

The *Starting Time* is a type 3 information element with 3 octets length.

ETSI

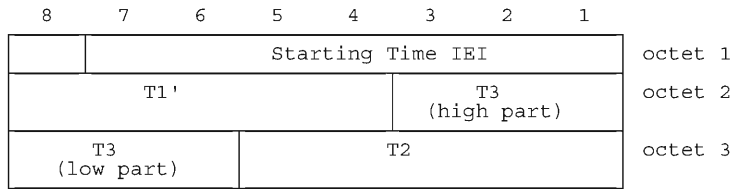


Figure 10.55/GSM 04.08 Starting Time information element

Table 10.53/GSM 04.08: Starting Time information element

<p>T1' (octet 2) The T1' field is coded as the binary representation of (FN div 1326) mod 32.</p> <p>T3 (octet 2 and 3) The T3 field is coded as the binary representation of FN mod 51. Bit 3 of octet 2 is the most significant bit and bit 6 of octet 3 is the least significant bit.</p> <p>T2 (octet 3) The T2 field is coded as the binary representation of FN mod 26.</p> <p>NOTE 1: The frame number, FN modulo 42432 can be calculated as $51 \times ((T3 - T2) \bmod 26) + T3 + 51 \times 26 \times T1'$</p>
--

The starting time and the times mentioned above are with reference to the frame numbering in the concerned cell. They are given in units of frames (around 4.615 ms).

The Starting Time IE can encode only an interval of time of 42 432 frames, that is to say around 195.8 seconds. To remove any ambiguity, the specification for a reception at time T is that the encoded interval is (T-10808, T+31623). In rigorous terms, if we note ST the starting time:

if $0 \leq (ST - T) \bmod 42432 \leq 31623$, the indicated time is the next time when FN mod 42432 is equal to ST.

If $32024 \leq (ST - T) \bmod 42432 \leq 42431$, the indicated time has already elapsed.

The reception time T is not specified here precisely. To allow room for various MS implementations, the limit between the two behaviours above may be anywhere within the interval defined by

$31624 \leq (ST - T) \bmod 42432 \leq 32023$.

10.5.2.39 Synchronization Indication

The purpose of Synchronization Indication information element is to indicate which type of handover is to be performed.

The Synchronization Indication information element is coded as shown in figure 10.56/GSM 04.08 and table 10.55/GSM 04.08.

The Synchronization Indication is a type 1 information element.

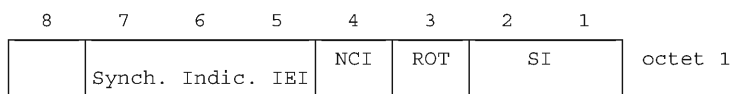


Figure 10.56/GSM 04.08 Synchronization Indication information element

Table 10.55/GSM 04.08: Synchronization Indication information element

ROT: Report Observed Time Difference (Octet1 bit 3)	
0	Mobile Time Difference IE shall not be included in the HANDOVER COMPLETE message
1	Mobile Time Difference IE shall be included in the HANDOVER COMPLETE message
SI: Synchronization indication (octet 1)	
Bit	
2	1
0	0 Non-synchronized
0	1 Synchronized
1	0 Pre-synchronised
1	1 Pseudo-synchronised
NCI: Normal cell indication (octet 1, bit 4)	
0	Out of range timing advance is ignored
1	Out of range timing advance shall trigger a handover failure procedure

10.5.2.40 Timing Advance

The purpose of the *Timing Advance* information element is to provide the timing advance value.

The *Timing Advance* information element is coded as shown in figure 10.57/GSM 04.08 and table 10.56/GSM 04.08

The *Timing Advance* is a type 3 information element with 2 octets length.

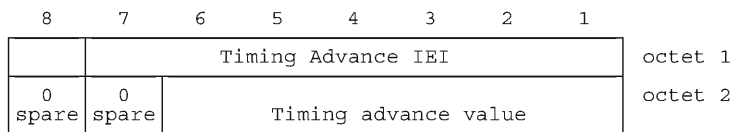


Figure 10.57/GSM 04.08 Timing Advance information element

Table 10.56/GSM 04.08: Timing Advance information element

Timing advance value (octet 2) The coding of the timing advance value field is the binary representation of the timing advance in bit periods; 1 bit period = 48/13 μs.
--

10.5.2.41 Time Difference

The purpose of the *Time Difference* information element is to provide information about the synchronization difference between the time bases of two Base Stations. This type of information element is used in relation with the pseudo-synchronization scheme, see GSM 05.10.

The *Time Difference* information element is coded as shown in figure 10.58/GSM 04.08 and table 10.57/GSM 04.08.

The *Time Difference* information element is a type 4 information element with 3 octets length.

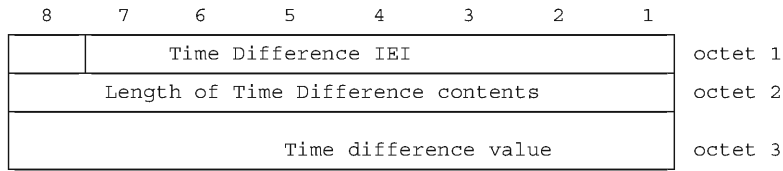


Figure 10.58/GSM 04.08 *Time Difference* information element

Table 10.57/GSM 04.08: *Time Difference* information element

Time Difference value (octet 3) The coding of the time difference value field is the binary representation of time difference in half bit periods, modulo 256 half bit periods; $1/2$ bit period = $24/13$ μ s.

10.5.2.41a TLLI

The purpose of the *TLLI* information element is to provide the Temporary Logical Link Identifier.

The *TLLI* information element is coded as shown in figure 10.58a/GSM 04.08 and table 10.57a/GSM 04.08.

The *TLLI* is a type 3 information element with 5 octets length.

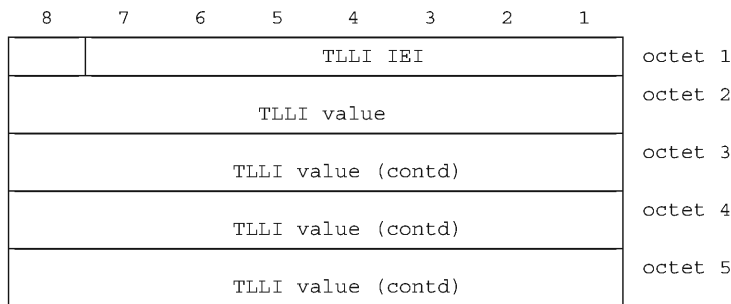


Figure 10.58a/GSM 04.08 *TLLI* information element

Table 10.57a/GSM 04.08: *TLLI* information element

TLLI value (octet 2, 3, 4 and 5) Bit 8 of octet 2 is the most significant bit and bit 1 of octet 5 is the least significant bit. The <i>TLLI</i> is encoded as a binary number with a length of 4 octets. <i>TLLI</i> is defined in GSM 03.03.
--

10.5.2.42 TMSI

The purpose of the *TMSI* information element is to provide the Temporary Mobile Subscriber Identity for paging purposes.

The *TMSI* information element is coded as shown in figure 10.59/GSM 04.08 and table 10.58/GSM 04.08.

ETSI

The *TMSI* is a type 3 information element with 5 octets length.

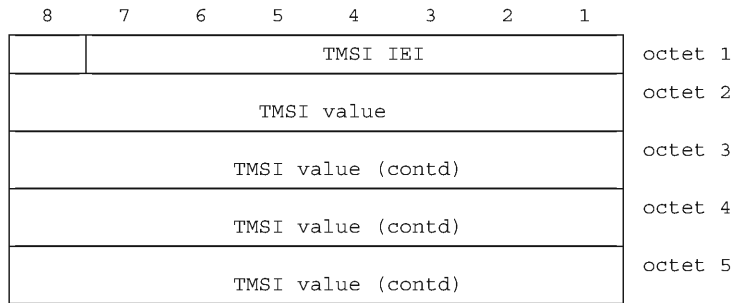


Figure 10.59/GSM 04.08 *TMSI* information element

Table 10.58/GSM 04.08: *TMSI* information element

<p>TMSI value (octet 2, 3, 4 and 5) Bit 8 of octet 2 is the most significant bit and bit 1 of octet 5 is the least significant bit. The coding of the TMSI is left open for each administration according to GSM 03.03. The length is 4 octets.</p>
--

NOTE: For purposes other than paging the TMSI should be provided using the mobile identity information element.

10.5.2.42c VGCS target mode Indication

The *VGCS target mode Indication* information element is a type 3 information element with 2 octets length.

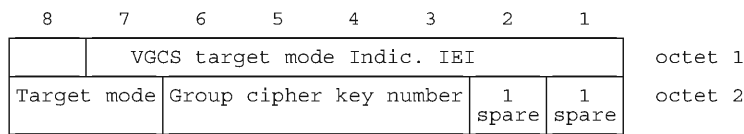


Figure 10.59c/GSM 04.08 *VGCS target mode Indication* information element

Table 10.58b/GSM 04.08 VGCS target mode information element

Target mode (octet 2)	
Bit	
8 7	
0 0	dedicated mode
0 1	group transmit mode
Other values are reserved for future use.	
Group cipher key number (octet 2)	
Bit	
6 5 4 3	
0 0 0 0	no ciphering
0 0 0 1	cipher key number 1
0 0 1 0	cipher key number 2
0 0 1 1	cipher key number 3
0 1 0 0	cipher key number 4
0 1 0 1	cipher key number 5
0 1 1 0	cipher key number 6
0 1 1 1	cipher key number 7
1 0 0 0	cipher key number 8
1 0 0 1	cipher key number 9
1 0 1 0	cipher key number A
1 0 1 1	cipher key number B
1 1 0 0	cipher key number C
1 1 0 1	cipher key number D
1 1 1 0	cipher key number E
1 1 1 1	cipher key number F

10.5.2.43 Wait Indication

The purpose of the *Wait Indication* information element is to provide the time the mobile station shall wait before attempting another channel request.

The *Wait Indication* information element is coded as shown in figure 10.60/GSM 04.08 and table 10.59/GSM 04.08.

The *Wait Indication* is a type 3 information element with 2 octets length.

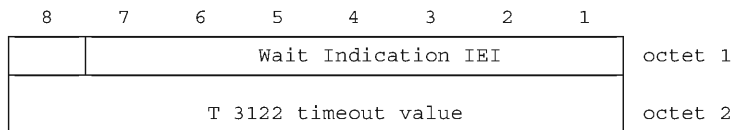


Figure 10.60/GSM 04.08 Wait Indication information element

Table 10.59/GSM 04.08: Wait Indication information element

T3122 timeout value (octet 2) This field is coded as the binary representation of the T3122 timeout value in seconds.
--

10.5.2.44 SI10 rest octets \$(ASCII)\$

The *SI 10 rest octets* information element contains information for cell re-selection in group receive mode.

The value part is coded as shown below:

```

<S110 rest octets> ::= <BA ind : bitstring(1)>
    { L <implicit spare> | H <neighbour information> };
<neighbour information> ::= <first frequency: bitstring(5)> <cell info>
    { H <info field> } * L <implicit spare>;
<cell info> ::= <bsic : bitstring(6)> { H <cell parameters> | L }
<cell parameters> ::= <cell barred> | L <further cell info>
<cell barred> ::= H
<further cell info> ::= <la different>
    <ms txpwr max cch : bitstring(5)>
    <rxlev access min : bitstring(6)>
    <cell reselect offset : bitstring(6)>
    <temporary offset : bitstring(3)>
    <penalty time : bitstring(5)>
<la different> ::= { H <cell reselect hysteresis : bitstring(3)> | L }
<info field> ::= <next frequency> * L <differential cell info>;
<next frequency> ::= H;
<differential cell info> ::= { H <BCC : bitstring(3)> | L <bsic : bitstring(6)> }
    { H <diff cell pars> | L }
<diff cell pars> ::= <cell barred> | L <further diff cell info>
<further diff cell info> ::= <la different>
    { H <ms txpwr max cch : bitstring(5)> | L }
    { H <rxlev access min : bitstring(6)> L }
    { H <cell reselect offset : bitstring(6)> L }
    { H <temporary offset : bitstring(3)> L }
    { H <penalty time : bitstring(5)> L }

```

Static and dynamic conditions:

1. 1) Information from the last received neighbour cells description in SYSTEM INFORMATION TYPE 5/5bis/5ter is necessary for the mobile station to interpret <neighbour information>. If <BA ind> is different from the last received BA IND value indicated in SYSTEM INFORMATION TYPE 5/5bis/5ter, <neighbour information> cannot be interpreted by the mobile station.
2. 2) If the correspondence between neighbour cell frequencies and sets of pairs (BSIC, cell information) cannot be established following the rules below, or if more than one set of such pairs corresponds to one neighbour cell frequency, the mobile station shall diagnose an imperative message part error.

Attributes, field contents:

- 1) <cell info> defines a BSIC given by <bsic : bitstring(6)>. It also defines cell information. If <cell parameters> is contained in <cell info>, this cell information is the cell information given by <cell parameters>; if <cell parameters> is not contained in <cell info>, this cell information is empty.
- 2) <differential cell info> defines a BSIC given by <bsic : bitstring(6)> or by <BCC : bitstring(3)>, see below. It also defines cell information. If <diff cell pars> is contained in <differential cell info>, this cell information is the cell information given by <diff cell pars>; if <diff cell pars> is not contained in <differential cell info>, this cell information is empty.
- 3) <cell parameters> either indicates a barred cell (by presence of <cell barred>) or specifies cell information given by <further cell info>.

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- 4) Each occurrence of <diff cell pars> either indicates a barred cell (by presence of <cell barred>) or specifies cell information given by <further diff cell info>.
- 5) <further cell info> specifies cell information given by its components

- <la different>
- <ms txpwr max cch : bitstring(5)>
- <rxlev access min : bitstring(6)>
- <cell reselect offset : bitstring(6)>
- <temporary offset : bitstring(3)>
- <penalty time : bitstring(5)>,

as defined below.

- 6) For each occurrence of <further diff cell info>, a cell information is defined. This information is given by <la different> and remaining cell information established as follows:

The remaining cell information defined for the first occurrence of <further diff cell info> consists of the cell information given by its actual components plus the cell information specified by <further cell info> corresponding to its missing components.

The remaining cell information defined for a later occurrence of <further diff cell info> consists of the cell information given by its actual components plus the remaining cell information corresponding to its missing components which is defined for the previous occurrence of <further diff cell info>.

Here, the

“actual components” of an occurrence of <further diff cell info> denotes those parameters among

- <ms txpwr max cch : bitstring(5)>
- <rxlev access min : bitstring(6)>
- <cell reselect offset : bitstring(6)>
- <temporary offset : bitstring(3)>
- <penalty time : bitstring(5)>

which are present in that occurrence.

“missing components” of an occurrence of <differential cell info> denote those parameters among

- <ms txpwr max cch : bitstring(5)>
- <rxlev access min : bitstring(6)>
- <cell reselect offset : bitstring(6)>
- <temporary offset : bitstring(3)>
- <penalty time : bitstring(5)>

which are not present in that occurrence.

- 7) Each occurrence of <bsic : bitstring(6)> specifies a BSIC by encoding its binary representation. <BCC : bitstring(3)> specifies a BCC by encoding its binary representation; it specifies the BSIC given by that BCC and the NCC of the BSIC specified by the previous occurrence of <BCC : bitstring(3)> or <bsic : bitstring(6)>. All occurrences of <bsic : bitstring(6)> and <BCC : bitstring(3)> establish a list of BSIC.
- 8) <first frequency : bitstring(5)> is the 5 bit binary coding of an integer n with $0 \leq n \leq 31$. It specifies a first frequency number n+1.

- 9) <SII0 rest octets> defines a correspondence between neighbour cell frequencies and sets of pairs (BSIC, cell information) defining the parameters for cell re-selection of any corresponding neighbour cell with BCCH on that frequency and having that BSIC:

Let $a(1), \dots, a(n)$ be the list of neighbour cell frequencies, in the order determined by the mobile station. Let i be the first frequency number specified by <first frequency : bitstring(5)> (see above).

The first BSIC and the cell information specified by <cell info> build a pair belonging to the set corresponding to $a(i)$.

If an m -th occurrence of <info field> is present (where $m \geq 2$), having established the correspondence of the $(m-1)$ -th BSIC to a neighbour frequency $a(k)$, the m -th BSIC and following <differential cell info>

- belong to $a(k)$, if <next frequency> is not present in the m -th occurrence of <info field>,
- belong to $a(\text{smod}(k+t))$, if <next frequency> is present exactly t times in the m -th occurrence of <info field>.

Here, for an integer j , $\text{smod}(j) := ((j-1) \bmod n) + 1$.

- 10) If <la different> contains a <cell reselect hysteresis : bitstring(3)>, this means that the cell is to be considered by the mobile station to belong to a different location area and that for the cell, the cell reselect hysteresis specified in <cell reselect hysteresis : bitstring(3)> applies.

If <la different> doesn't contain a <cell reselect hysteresis : bitstring(3)>, this means that the cell is to be considered by the mobile station to belong to the same location area.

- 11) <same LA indicator : bitstring(1)> defines whether the location area is the same as the location area of the serving cell

- 12) For <cell reselect hysteresis : bitstring(3)>: see 10.5.2.4.

- 13) For <ms txpwr max cch : bitstring(5)>: see 10.5.2.4.

- 14) For <rxlev access min : bitstring(6)> see 10.5.2.4.

- 15) For <cell reselect offset : bitstring(6)>: see 10.5.2.35.

- 16) For <temporary offset : bitstring(3)>: see 10.5.2.35.

- 17) For <penalty time : bitstring(5)>: see 10.5.2.35.

10.5.2.45 EXTENDED MEASUREMENT RESULTS \$(MAFA)\$

The purpose of the *Extended Measurement Results* information element is to provide the results of the measurements made by the mobile station on the carriers specified in the EXTENDED MEASUREMENT ORDER.

The *Extended Measurement Results* information element is coded as shown in figure 10.5.2.45.1/GSM 04.08 and table 10.5.2.45.1/GSM 04.08.

The *Extended Measurement Results* is a type 3 information element with 17 octets length.

8	7	6	5	4	3	2	1	
Extended Measurement Results IEI								octet 1
SC USED	DTX USED	RXLEV carrier 0						octet 2
RXLEV carrier 1						RXLEV carrier 2 (high part)		octet 3
RXLEV carrier 2 (low part)				RXLEV carrier 3 (high part)				octet 4
RXLEV carrier 3 (low part)		RXLEV carrier 4						octet 5
RXLEV carrier 5						RXLEV carrier 6 (high part)		octet 6
RXLEV carrier 6 (low part)				RXLEV carrier 7 (high part)				octet 7
RXLEV carrier 7 (low part)		RXLEV carrier 8						octet 8

(continued..)

Figure 10.5.2.45.1/GSM 04.08 *Extended Measurement Results* information element

RXLEV carrier 9						RXLEV carrier 10 (high part)		octet 9
RXLEV carrier 10 (low part)				RXLEV carrier 11 (high part)				octet 10
RXLEV carrier 11 (low part)		RXLEV carrier 12						octet 11
RXLEV carrier 13						RXLEV carrier 14 (high part)		octet 12
RXLEV carrier 14 (low part)				RXLEV carrier 15 (high part)				octet 13
RXLEV carrier 15 (low part)		RXLEV carrier 16						octet 14
RXLEV carrier 17						RXLEV carrier 18 (high part)		octet 15
RXLEV carrier 18 (low part)				RXLEV carrier 19 (high part)				octet 16
RXLEV carrier 19 (low part)		RXLEV carrier 20						octet 17

Figure 10.5.2.45.1/GSM 04.08 *Extended Measurement Results* information element

Table 10.5.2.45.1/GSM 04.08: *Extended Measurement Results* information element

<p>SC USED (octet 2), indicates the value of the SEQ-CODE in the extended measurement frequency list information element used for defining the list of frequencies reported on.</p> <p>Range: 0 to 1.</p> <p>DTX USED (octet 2) This bit indicates whether or not the mobile station used DTX during the previous measurement period.</p> <p>Bit 7 0 DTX was not used 1 DTX was used</p> <p>RXLEV carrier 'N' (octets 2 to 17). This field is coded as the binary representation of a value M. M corresponds according to the mapping defined in TS. GSM 05.08 to the received signal strength on carrier N. N is the index to the frequency in the sorted list of frequencies defined in the EXTENDED MEASUREMENT ORDER message. The list is sorted in increasing order of ARFCN, except that ARFCN 0, if included in the EXTENDED MEASUREMENT ORDER, is put in the last position of the sorted list. If the EXTENDED MEASUREMENT ORDER contains more than 21 carriers, only the signal strength of the carriers 0-20 shall be measured and reported.</p> <p>Range: 0 to 63</p> <p>If the EXTENDED MEASUREMENT ORDER message contains less than 21 carriers, the fields in the EXTENDED MEASUREMENT REPORT not referring to any specified carrier shall have RXLEV values set to zero.</p>

10.5.3 Mobility management information elements.

10.5.3.1 Authentication parameter RAND

The purpose of the *Authentication Parameter RAND* information element is to provide the mobile station with a non-predictable number to be used to calculate the authentication response signature SRES and the ciphering key Kc.

The *Authentication Parameter RAND* information element is coded as shown in figure 10.61/GSM 04.08 and table 10.61/GSM 04.08.

The *Authentication Parameter RAND* is a type 3 information element with 17 octets length.

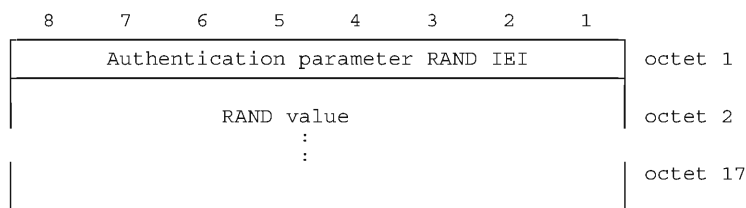


Figure 10.61/GSM 04.08 *Authentication Parameter RAND* information element

Table 10.61/GSM 04.08: Authentication Parameter RAND information element

RAND value (octet 2, 3, ... and 17)
 The RAND value consists of 128 bits. Bit 8 of octet 2 is the most significant bit while bit 1 of octet 17 is the least significant bit.

10.5.3.2 Authentication parameter SRES

The purpose of the *authentication parameter SRES* information element is to provide the network with the authentication response signature calculated in the mobile station.

The *Authentication Parameter SRES* information element is coded as shown in figure 10.62/GSM 04.08 and table 10.62/GSM 04.08.

The *Authentication Parameter SRES* is a type 3 information element with 5 octets length.

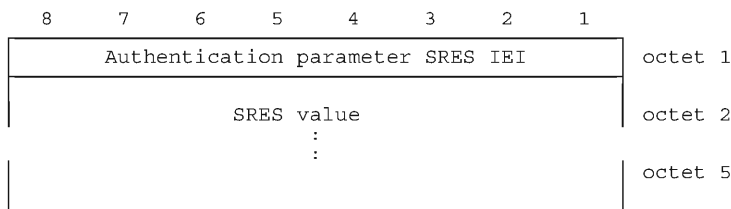


Figure 10.62/GSM 04.08 Authentication Parameter SRES information element

Table 10.62/GSM 04.08: Authentication Parameter SRES information element

SRES value (octet 2, 3, 4 and 5)
 The SRES value consists of 32 bits. Bit 8 of octet 2 is the most significant bit while bit 1 of octet 5 is the least significant bit.

10.5.3.3 CM service type

The purpose of the *CM Service Type* information element is to specify which service is requested from the network.

The *CM Service Type* information element is coded as shown in figure 10.63/GSM 04.08 and table 10.63/GSM 04.08.

The *CM Service Type* is a type 1 information element.

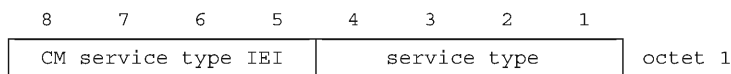


Figure 10.63/GSM 04.08 CM Service Type information element

Table 10.63/GSM 04.08: CM Service Type information element

Service type (octet 1)	
Bits	
4 3 2 1	
0 0 0 1	Mobile originating call establishment or packet mode connection establishment
0 0 1 0	Emergency call establishment
0 1 0 0	Short message service
1 0 0 0	Supplementary service activation
1 0 0 1	Voice group call establishment
1 0 1 0	Voice broadcast call establishment
All other values are reserved.	

10.5.3.4 Identity type

The purpose of the *Identity Type* information element is to specify which identity is requested.

The *Identity Type* information element is coded as shown in figure 10.64/GSM 04.08 and table 10.64/GSM 04.08.

The *Identity Type* is a type 1 information element .

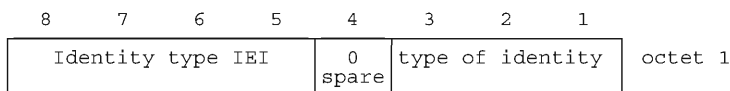


Figure 10.64/GSM 04.08 Identity Type information element

Table 10.64/GSM 04.08: Identity Type information element

Type of identity (octet 1)	
Bits	
3 2 1	
0 0 1	IMSI
0 1 0	IMEI
0 1 1	IMEISV
1 0 0	TMSI
All other values are reserved.	

10.5.3.5 Location updating type

The purpose of the *Location Updating Type* information element is to indicate whether a normal updating, a periodic updating or an IMSI attach is wanted. It may also indicate that a follow-on request has been received from the mobile station CM layer.

The *Location Updating Type* information element is coded as shown in figure 10.65/GSM 04.08 and table 10.65/GSM 04.08.

The *Location Updating Type* is a type 1 information element.

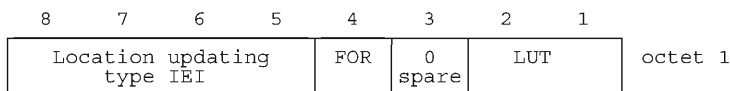


Figure 10.65/GSM 04.08 Location Updating Type information element

Table 10.65/GSM 04.08: Location Updating Type information element

LUT (octet 1)		
Bits		
2	1	
0	0	Normal location updating
0	1	Periodic updating
1	0	IMSI attach
1	1	Reserved
FOR (octet 1)		
The Follow-On Request bit (FOR) is coded as follows:		
Bit		
4		
0		No follow-on request pending
1		Follow-on request pending

10.5.3.5a Network Name

The purpose of this information element is to pass a text string to the mobile station.

The *Network Name* information element is coded as shown in figure 10.65a/GSM 04.08 and table 10.65a/GSM 04.08.

The *Network Name* is a type 4 information element with a minimum length of 3 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

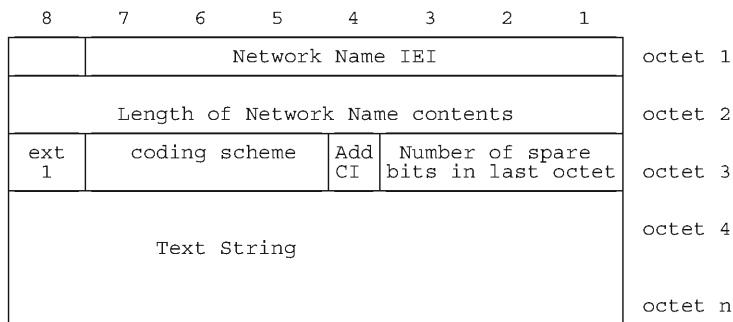


Figure 10.65a/GSM 04.08 Network Name information element

Table 10.65a/GSM 04.08 Network Name information element

Number of spare bits in last octet (octet 3, bits 1 to 3)	
0 0 1	bit 8 is spare and set to "0" in octet n
0 1 0	bits 7 and 8 are spare and set to "0" in octet n
0 1 1	bits 6 to 8(inclusive) are spare and set to "0" in octet n
1 0 0	bits 5 to 8(inclusive) are spare and set to "0" in octet n
1 0 1	bits 4 to 8(inclusive) are spare and set to "0" in octet n
1 1 0	bits 3 to 8(inclusive) are spare and set to "0" in octet n
1 1 1	bits 2 to 8(inclusive) are spare and set to "0" in octet n
0 0 0	this field carries no information about the number of spare bits in octet n
Add CI (octet 3, bit 4)	
0	The MS should not add the letters for the Country's Initials to the text string
1	The MS should add the letters for the Country's Initials and a separator (e.g. a space) to the text string
Coding Scheme (octet 3, bits 5-7)	
0 0 0	SMS Cell Broadcast coding scheme defined in GSM 03.38
0 0 1	UCS2 (16 bit) [72]
0 1 0	to reserved
1 1 1	
Text String (octet 4 to octet n, inclusive)	
Encoded according to the Coding Scheme defined by octet 3, bits 5-7	

10.5.3.6 Reject cause

The purpose of the *Reject Cause* information element is to indicate the reason why a request from the mobile station is rejected by the network.

The *Reject Cause* information element is coded as shown in figure 10.66/GSM 04.08 and table 10.66/GSM 04.08.

The *Reject Cause* is a type 3 information element with 2 octets length.

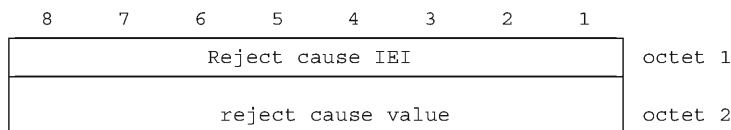


Figure 10.66/GSM 04.08 Reject Cause information element

Table 10.66/GSM 04.08: *Reject Cause* information element

Reject cause value (octet 2)								
Bits								
8	7	6	5	4	3	2	1	
0	0	0	0	0	0	1	0	IMSI unknown in HLR
0	0	0	0	0	0	1	1	Illegal MS
0	0	0	0	0	1	0	0	IMSI unknown in VLR
0	0	0	0	0	1	0	1	IMEI not accepted
0	0	0	0	0	1	1	0	Illegal ME
0	0	0	0	1	0	1	1	PLMN not allowed
0	0	0	0	1	1	0	0	Location Area not allowed
0	0	0	0	1	1	0	1	Roaming not allowed in this location area
0	0	0	1	0	0	0	1	Network failure
0	0	0	1	0	1	1	0	Congestion
0	0	1	0	0	0	0	0	Service option not supported
0	0	1	0	0	0	0	1	Requested service option not subscribed
0	0	1	0	0	0	1	0	Service option temporarily out of order
0	0	1	0	0	1	1	0	Call cannot be identified
0	0	1	1	0	0	0	0	} } retry upon entry into a new cell to
0	0	1	1	1	1	1	1	
0	1	0	1	1	1	1	1	Semantically incorrect message
0	1	1	0	0	0	0	0	Invalid mandatory information
0	1	1	0	0	0	0	1	Message type non-existent or not implemented
0	1	1	0	0	0	1	0	Message type not compatible with the protocol state
0	1	1	0	0	0	1	1	Information element non-existent or not implemented
0	1	1	0	0	1	0	0	Conditional IE error
0	1	1	0	0	1	0	1	Message not compatible with the protocol state
0	1	1	0	1	1	1	1	Protocol error, unspecified

Any other value received by the mobile station shall be treated as 0010 0010, 'Service option temporarily out of order'. Any other value received by the network shall be treated as 0110 1111, 'Protocol error, unspecified'.

NOTE: The listed reject cause values are defined in Annex G.

10.5.3.7 Follow-on Proceed

The purpose of the *Follow-on Proceed* information element is to indicate that an MM connection may be established on an existing RR connection.

The *Follow-on Proceed* information element is coded as shown in figure 10.67/GSM 04.08.

The *Follow-on Proceed* is a type 2 information element.

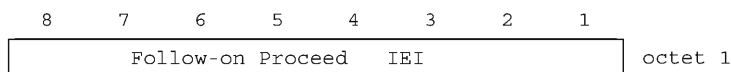


Figure 10.67/GSM 04.08 *Follow-on Proceed* information element

10.5.3.8 Time Zone

The purpose of this information element is to encode the local timezone in steps of 15 minutes.

The *Time Zone* information element is coded as shown in figure 10.67a/GSM 04.08 and table 10.66a/GSM 04.08.

The *Time Zone* is a type 3 information element with a length of 2 octets.

ETSI

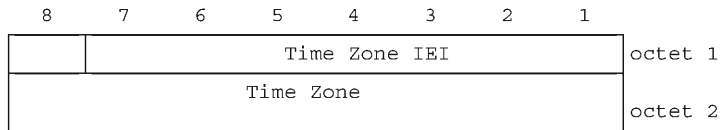


Figure 10.67a/GSM 04.08 Time Zone information element

Table 10.66a/GSM 04.08 Time Zone information element

Time Zone (octet 2, bits 1-8) This field is encoded in exactly the same way as the Time Zone field of the TP-Service-Centre-Time-Stamp in GSMá03.40
--

10.5.3.9 Time Zone and Time

The purpose of this information element is to encode the local timezone in steps of 15 minutes and to indicate the time at which this information element may have been sent by the network.

The *Time Zone and Time* information element is coded as shown in figure 10.68a/GSM 04.08 and table 10.67a/GSM 04.08.

The *Time Zone and Time* is a type 3 information element with a length of 8 octets.

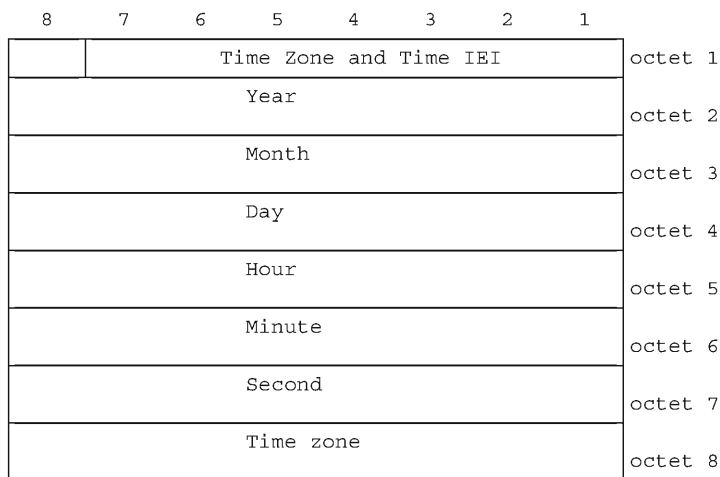


Figure 10.68a/GSM 04.08 Time Zone and Time information element

Table 10.67a/GSM 04.08 *Timezone and Time* information element

Year (octet 2, bits 1-8) This field is encoded in exactly the same way as the Year field of the TP-Service-Centre-Time-Stamp in GSM 03.40.
Month (octet 3, bits 1-8) This field is encoded in exactly the same way as the Month field of the TP-Service-Centre-Time-Stamp in GSM 03.40 ETS 300 536).
Day (octet 4, bits 1-8) This field is encoded in exactly the same way as the Day field of the TP-Service-Centre-Time-Stamp in GSM 03.40.
Hour (octet 5, bits 1-8) This field is encoded in exactly the same way as the Hour field of the TP-Service-Centre-Time-Stamp in GSM 03.40.
Minute (octet 6, bits 1-8) This field is encoded in exactly the same way as the Minute field of the TP-Service-Centre-Time-Stamp in GSM 03.40.
Second (octet 7, bits 1-8) This field is encoded in exactly the same way as the Second field of the TP-Service-Centre-Time-Stamp in GSM 03.40.
Time Zone (octet 8, bits 1-8) This field is encoded in exactly the same way as the Time Zone field of the TP-Service-Centre-Time-Stamp in GSM 03.40)

10.5.4 Call control information elements.

10.5.4.1 Extensions of codesets

There is a certain number of possible information element identifier values using the formatting rules described in section 10.5: 128 from the type 3 & 4 information element format and at least 8 from the type 1 & 2 information element format.

One value in the type 1 format is specified for shift operations described below. One other value in both the type 3 & 4 and type 1 format is reserved. This leaves 133 information element identifier values available for assignment.

It is possible to expand this structure to eight codesets of 133 information element identifier values each. One common value in the type 1 format is employed in each codeset to facilitate shifting from one codeset to another. The contents of this shift information element identifies the codeset to be used for the next information element or elements. The codeset in use at any given time is referred to as the "active codeset". By convention, codeset 0 is the initially active codeset.

Two codeset shifting procedures are supported: locking shift and non-locking shift.

Codeset 5 is reserved for information elements reserved for national use.

Codeset 6 is reserved for information elements specific to the local network (either public or private).

Codeset 7 is reserved for user-specific information elements.

The coding rules specified in section 10.5 shall apply for information elements belonging to any active codeset.

Transitions from one active codeset to another (i.e. by means of the locking shift procedure) may only be made to a codeset with a higher numerical value than the codeset being left.

An information element belonging to codeset 5, 6 or 7 may appear together with information elements belonging to codeset 0, by using the non-locking shift procedure (see section 10.5.4.3).

A user or network equipment shall have the capability to recognize a shift information element and to determine the length of the following information element, although the equipment need not be able to interpret and act on the content of the information element. This enables the equipment to determine the start of the subsequent information element.

ETSI

10.5.4.2 Locking shift procedure

The locking shift procedure employs an information element to indicate the new active codeset. The specified codeset remains active until another locking shift information element is encountered which specifies the use of another codeset. For example, codeset 0 is active at the start of message content analysis. If a locking shift to codeset 5 is encountered, the next information elements will be interpreted according to the information element identifiers assigned in codeset 5, until another shift information element is encountered. This procedure is used only to shift to a higher order codeset than the one being left.

The locking shift is valid only within that message which contains the locking shift information element. At the start of every message content analysis, the active codeset is codeset 0.

The locking shift information element uses the type 1 information element format and coding shown in figure 10.68/GSM 04.08 and table 10.68/GSM 04.08.

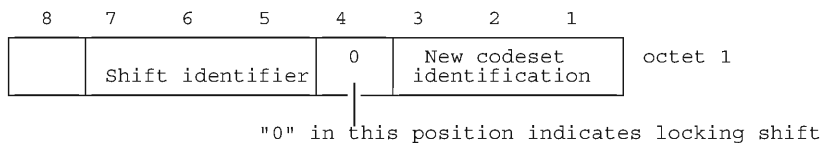


Figure 10.68/GSM 04.08 Locking shift element

Table 10.68/GSM 04.08: Locking shift element

Codeset identification (octet 1):	
bits 3 2 1	
0 0 0	not applicable
0 0 1	
to 1 0 0	reserved
1 0 1	codeset 5: information elements for national use
1 1 0	codeset 6: information elements specific to the local network (either public or private)
1 1 1	codeset 7: user-specific information elements

10.5.4.3 Non-locking shift procedure

The non-locking shift procedure provides a temporary shift to the specified lower or higher codeset. The non-locking shift procedure uses a type 1 information element to indicate the codeset to be used to interpret the next information element. After the interpretation of the next information element, the active codeset is again used for interpreting any following information elements. For example, codeset 0 is active at the beginning of message content analysis. If a non-locking shift to codeset 6 is encountered, only the next information element is interpreted according to the information element identifiers assigned in codeset 6. After this information element is interpreted, codeset 0 will again be used to interpret the following information elements. A non-locking shift information element indicating the current codeset shall not be regarded as an error.

A locking shift information element shall not follow directly a non-locking shift information element. If this combination is received, it shall be interpreted as though a locking shift information element had been received.

The non-locking shift information element uses the type 1 information format and coding shown in figure 10.69/GSM 04.08 and table 10.69/GSM 04.08.

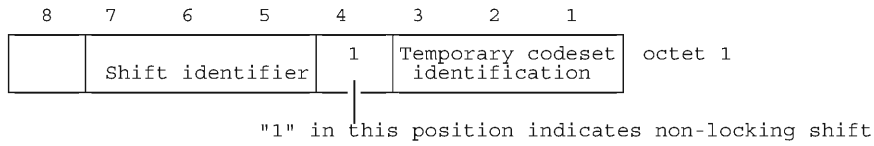


Figure 10.69/GSM 04.08 Non-locking shift element

Table 10.69/GSM 04.08: Non-locking shift element

Codeset identification (octet 1):	
bits 3 2 1	
0 0 0	codeset 0 (initially active): GSMá04.08 information elements
0 0 1	reserved
to 1 0 0	
1 0 1	codeset 5: information elements for national use
1 1 0	codeset 6: information elements specific to the local network (either public or private)
1 1 1	codeset 7: user-specific information elements.

10.5.4.4 Auxiliary states

The purpose of the auxiliary states information element is to describe the current status of the auxiliary states of a call in the call control states "active" and "mobile originating modify". (See TSs GSM 04.83 and 04.84)

The auxiliary states information element is coded as shown in figure 10.70/GSM 04.08, table 10.70/GSM 04.08 and table 10.71/GSM 04.08.

The auxiliary states is a type 4 information element with 3 octets length.

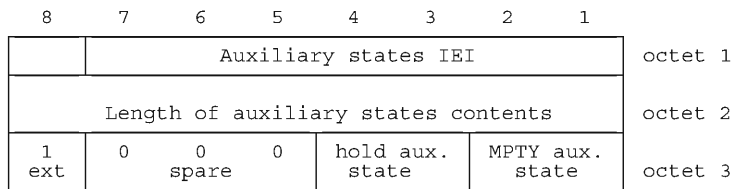


Figure 10.70/GSM 04.08 Auxiliary states information element

Table 10.70/GSM 04.08: Auxiliary states information element

Hold auxiliary state (octet 3)	
Bits	
4 3	
0 0	idle Note 1
0 1	hold request Note 1
1 0	call held Note 1
1 1	retrieve request Note 1
Note 1: These states are defined in Rec GSMá04.83.	

Table 10.71/GSM 04.08: Auxiliary states information element

Multi party auxiliary state (octet 3)			
Bits			
2	1		
0	0	idle	Note 2
0	1	MPTY request	Note 2
1	0	call in MPTY	Note 2
1	1	split request	Note 2
NOTE 2: These states are defined in Rec GSM 04.84.			

10.5.4.5 Bearer capability

The purpose of the bearer capability information element is to describe a bearer service. The use of the bearer capability information element in relation to compatibility checking is described in annex B.

The bearer capability information element is coded as shown in figure 10.71/GSM 04.08 and tables 10.72/GSM 04.08 to 10.79/GSM 04.08.

The bearer capability is a type 4 information element with a minimum length of 3 octets and a maximum length of 15 octets.

	8	7	6	5	4	3	2	1	
	Bearer capability IEI								octet 1
	Length of the bearer capability contents								octet 2
0/1 ext	radio channel requirement		co-ding std	trans fer mode	information transfer capability				octet 3
0/1 ext	0 co-ding	0 spare	speech version indication						octet 3a etc*
1 ext	comp-ress.	structure		dupl. mode	confi-gur.	NIRR	esta-bli.		octet 4*
0/1 ext	0 access id.	0	rate adaption		signalling access protocol				octet 5*
0/1 ext	Other ITC		Other rate adaption		0	0 Spare	0		octet 5a*
1 ext	Hdr/noHdr	Multi frame	Mode	LLI	Assig nor/e	Inb. neg	0 Spare		octet 5b*
0/1 ext	0 layer 1 id.	1	User information layer 1 protocol				sync/async		octet 6*
0/1 ext	numb. stop bits	nego-tia-tion	numb. data bits	user rate					octet 6a*
0/1 ext	intermed. rate		NIC on TX	NIC on RX	Parity				octet 6b*
0/1 ext	connection element		modem type						octet 6c*
0/1 ext	Other modem type		Fixed network user rate						octet 6d*
0/1 ext	Acceptable channel codings				Maximum number of traffic channels				octet 6e*
1 ext	UIMI			Wanted air interface user rate					octet 6f*
1 ext	1 layer 2 id.	0	User information layer 2 protocol						octet 7*

Figure 10.71/GSM 04.08 Bearer capability information element

NOTE: The coding of the octets of the bearer capability information element is not conforming to TS CCITT Q.931.

Table 10.72/GSM 04.08: Bearer capability information element

Radio channel requirement (octet 3), network to MS direction
Bits 6 and 7 are spare bits. The sending side (i.e. the network) shall set bit 7 to value 0 and bit 6 to value 1.
Radio channel requirement (octet 3) MS to network direction
When information transfer capability (octet 3) indicates other values than speech:
Bits
7 6
0 0 reserved
0 1 full rate support only MS
1 0 dual rate support MS/half rate preferred
1 1 dual rate support MS/full rate preferred
When information transfer capability (octet 3) indicates the value speech and no speech version indication is present in octet 3a etc.:
Bits
7 6
0 0 reserved
0 1 full rate support only MS/fullrate speech version 1 supported
1 0 dual rate support MS/half rate speech version 1 preferred, full rate speech version 1 also supported
1 1 dual rate support MS/full rate speech version 1 preferred, half rate speech version 1 also supported
When information transfer capability (octet 3) indicates the value speech and speech version indication(s) is(are) present in octet 3a etc.:
Bits
7 6
0 0 reserved
0 1 the mobile station supports at least full rate speech version 1 but does not support half rate speech version 1. The complete voice codec preference is specified in octet(s) 3a etc.
1 0 The mobile station supports at least full rate speech version 1 and half rate speech version 1. The mobile station has a greater preference for half rate speech version 1 than for full rate speech version 1. The complete voice codec preference is specified in octet(s) 3a etc.
1 1 The mobile station supports at least full rate speech version 1 and half rate speech version 1. The mobile station has a greater preference for full rate speech version 1 than for half rate speech version 1. The complete voice codec preference is specified in octet(s) 3a etc.
Coding standard (octet 3)
Bit
5
0 GSM standardized coding as described below
1 reserved

(continued...)

Table 10.72/GSM 04.08: Bearer capability information element (continued)

Transfer mode (octet 3)
Bit
4
0 circuit mode
1 packet mode
Information transfer capability (octet 3)
Bits
3 2 1
0 0 0 speech
0 0 1 unrestricted digital information
0 1 0 3.1 kHz audio, ex PLMN
0 1 1 facsimile group 3
1 0 1 Other ITC (See Octet 5a)
1 1 1 reserved, to be used in the network.
The meaning is: alternate speech/facsimile group 3 - starting with speech.
All other values are reserved

Table 10.72a/GSM 04.08 Bearer capability information element

Octet(s) 3a etc. MS to network direction
Coding
Bit
7
0 octet used for extension of information transfer capability
1 octet used for other extension of octet 3
When information transfer capability (octet 3) indicates speech and coding (bit 7 in octet 3a etc.) is coded as 0, bits 1 through 6 are coded:
Bits 5 and 6 are spare.
Speech version indication (octet(s) 3a etc.)
Bits
4 3 2 1
0 0 0 0 GSM full rate speech version 1
0 0 1 0 GSM full rate speech version 2
0 0 0 1 GSM half rate speech version 1
All other values have the meaning "speech version tbd" and shall be ignored when received.
If octet 3 is extended with speech version indication(s) (octets 3a etc.), all speech versions supported shall be indicated and be included in order of preference (the first octet (3a) has the highest preference and so on).
If information transfer capability (octet 3) indicates speech and coding (bit 7 in octet 3a etc.) is coded as 1, or the information transfer capability does not indicate speech, then the extension octet shall be ignored.
Octet(s) 3a etc. network to MS direction
The octet(s) 3a etc. shall be ignored by the MS.

Table 10.73/GSM 04.08: Bearer capability information element

Compression (octet 4), network to MS direction:	
Bit	
7	
0	data compression not possible
1	data compression possible
Compression (octet 4), MS to network direction:	
Bit	
7	
0	data compression not allowed
1	data compression allowed
Structure (octet 4)	
Bits	
6 5	
0 0	service data unit integrity
1 1	unstructured
All other values are reserved.	
Duplex mode (octet 4)	
Bit	
4	
0	half duplex
1	full duplex
Configuration (octet 4)	
Bit	
3	
0	point-to-point
All other values are reserved.	
NIRR (octet 4)	
(Negotiation of Intermediate Rate Requested)	
Bit	
2	
0	No meaning is associated with this value.
1	Data up to and including 4.8 kb/s, full rate, non-transparent, 6 kb/s radio interface rate is requested.
Establishment (octet 4)	
Bit	
1	
0	demand
All other values are reserved	

Table 10.74/GSM 04.08: Bearer capability information element

Access identity (octet 5)
Bits
7 6
0 0 octet identifier
All other values are reserved
Rate adaption (octet 5)
Bits
5 4
0 0 no rate adaption
0 1 V.110/X.30 rate adaptation
1 0 CCITT X.31 flag stuffing
1 1 Other rate adaption (see octet 5a)
Signalling access protocol (octet 5)
Bits
3 2 1
0 0 1 I.440/450
0 1 0 X.21
0 1 1 X.28 - dedicated PAD, individual NUI
1 0 0 X.28 - dedicated PAD, universal NUI
1 0 1 X.28 - non dedicated PAD
1 1 0 X.32
All other values are reserved.

Table 10.74a/GSM 04.08: Bearer capability information element

Other ITC (octet 5a)
If the value "Other ITC" is not signalled in the field "ITC" then the contents of this field shall be ignored.
Bit
7 6
0 0 restricted digital information
All other values are reserved
Other rate adaption (octet 5a)
If the value " Other rate adaption" is not signalled in the field "Rate adaption" then the contents of this field shall be ignored.
Bit
5 4
0 0 V.120
All other values are reserved.

Table 10.74b/GSM 04.08: Bearer capability information element

Rate adaption header/no header (octet 5b)	
Bit	
7	
0	Rate adaption header not included
1	Rate adaption header included
Multiple frame establishment support in data link (octet 5b)	
Bit	
6	
0	Multiple frame establishment not supported, only UI frames allowed
1	Multiple frame establishment supported
Mode of operation (octet 5b)	
Bit	
5	
0	Bit transparent mode of operation
1	Protocol sensitive mode of operation
Logical link identifier negotiation (octet 5b)	
Bit	
4	
0	Default, LLI=256 only
1	Full protocol negotiation, (note: A connection over which protocol negotiation will be executed is indicated in bit 2 of octet 5b)
Assignor/Assignee (octet 5b)	
Bit	
3	
0	Message originator is "default assignee"
1	Message originator is "assignor only"
In band/Out of band negotiation (octet 5b)	
Bit	
2	
0	Negotiation is done in-band using logical link zero
1	Negotiation is done with USER INFORMATION messages on a temporary signalling connection
Bit 1 is spare and set to the value "0"	

Table 10.75/GSM 04.08: Bearer capability information element

Layer 1 identity (octet 6)
Bits
7 6
0 1 octet identifier
All other values are reserved
User information layer 1 protocol (octet 6)
Bits
5 4 3 2
0 0 0 0 default layer 1 protocol
All other values reserved.
Synchronous/asynchronous (octet 6)
Bit
1
0 synchronous
1 asynchronous

Table 10.76/GSM 04.08: Bearer capability information element

Number of Stop Bits (octet 6a)
Bit
7
0 1 bit (This value is also used in the case of synchronous mode)
1 2 bits
Negotiation (octet 6a)
Bit
6
0 in-band negotiation not possible
NOTE: See Rec. V.110 and X.30
All other values are reserved
Number of data bits excluding parity bit if present (octet 6a)
Bit
5
0 7 bits
1 8 bits (this value is also used in the case of bit oriented protocols)
User rate (octet 6a)
Bits
4 3 2 1
0 0 0 10.3 kbit/s Recommendation X.1 and V.110
0 0 1 01.2 kbit/s Recommendation X.1 and V.110
0 0 1 12.4 kbit/s Recommendation X.1 and V.110
0 1 0 04.8 kbit/s Recommendation X.1 and V.110
0 1 0 19.6 kbit/s Recommendation X.1 and V.110
0 1 1 012.0 kbit/s transparent (non compliance with X.1 and V.110)
0 1 1 11.2 kbit/s/75 bit/s Recommendation V.23, (asymmetric) X.1,V.110.
All other values are reserved.
For facsimile group 3 calls the user rate indicates the first and maximum speed the mobile station is using.

Table 10.77/GSM 04.08: Bearer capability information element

Octet 6b for V.110/X.30 rate adaptation Intermediate rate (octet 6b)
Bits
7 6
0 0 reserved
0 1 reserved
1 0 8 kbit/s
1 1 16 kbit/s
Network independent clock (NIC) on transmission (Tx) (octet 6b) (See Rec. V.110 and X.30)
Bit
5
0 does not require to send data with network independent clock
1 requires to send data with network independent clock
Network independent clock (NIC) on reception (Rx) (octet 6b) (See Rec. V.110 and X.30)
Bit
4
0 cannot accept data with network independent clock (i.e. sender does not support this optional procedure)
1 can accept data with network independent clock (i.e. sender does support this optional procedure)
Parity information (octet 6b)
Bits
3 2 1
0 0 0 odd
0 1 0 even
0 1 1 none
1 0 0 forced to 0
1 0 1 forced to 1
All other values are reserved.

Table 10.78/GSM 04.08: Bearer capability information element

Connection element (octet 6c)	
Bit	
7 6	
0 0	transparent
0 1	non transparent (RLP)
1 0	both, transparent preferred
1 1	both, non transparent preferred
<p>The requesting end (e.g. the one sending the SETUP message) should use the 4 values depending on its capabilities to support the different modes. The answering party shall only use the codings 00 or 01, based on its own capabilities and the proposed choice if any. If both MS and network support both transparent and non transparent, priority should be given to the MS preference.</p>	
Modem type (octet 6c)	
Bits	
5 4 3 2 1	
0 0 0 0 0	none
0 0 0 0 1	V.21
0 0 0 1 0	V.22
0 0 0 1 1	V.22 bis
0 0 1 0 0	V.23
0 0 1 0 1	V.26 ter
0 0 1 1 0	V.32
0 0 1 1 1	modem for undefined interface
0 1 0 0 0	autobauding type 1
All other values are reserved.	

Table 10.78a/GSM 04.08: Bearer capability information element

Other modem type (octet 6d)	
Bits	
7 6	
0 0	no other modem type specified in this field
0 1	V.32bis
1 0	V.34
All other values are reserved.	
Fixed network user rate (octet 6d)	
Bit	
5 4 3 2 1	
0 0 0 0 0	Fixed network user rate not applicable/No meaning is associated with this value.
0 0 0 0 1	9.6 kbit/s Recommendation X.1 and V.110
0 0 0 1 0	14.4 kbit/s Recommendation X.1 and V.110
0 0 0 1 1	19.2 kbit/s Recommendation X.1 and V.110
0 0 1 0 0	28.8 kbit/s Recommendation X.1 and V.110
0 0 1 0 1	38.4 kbit/s Recommendation X.1 and V.110
0 0 1 1 0	48.0 kbit/s Recommendation X.1 and V.110(synch)
0 0 1 1 1	56.0 kbit/s Recommendation X.1 and V.110(synch) /bit transparent
0 1 0 0 0	64.0 kbit/s bit transparent
All other values are reserved.	

Table 10.78b/GSM 04.08: Bearer capability information element

Acceptable channel codings (octet 6e), mobile station to network direction:	
Bit	
7	
0	TCH/F14.4 not acceptable
1	TCH/F14.4 acceptable
Bit	
6	
0	Spare
Bit	
5	
0	TCH/F9.6 not acceptable
1	TCH/F9.6 acceptable
Bit	
4	
0	TCH/F4.8 not acceptable
1	TCH/F4.8 acceptable
Acceptable channel codings (octet 6e), network to MS direction: Bits 4 to 7 are spare and shall be set to "0".	
Maximum number of traffic channels (octet 6e), MS to network direction:	
Bits	
3 2 1	
0 0 0	1 TCH
0 0 1	2 TCH
0 1 0	3 TCH
0 1 1	4 TCH
1 0 0	5 TCH
1 0 1	6 TCH
1 1 0	7 TCH
1 1 1	8 TCH
Maximum number of traffic channels (octet 6e), network to MS direction: Bits 1 to 3 are spare and shall be set to "0".	

Table 10.78c/GSM 04.08: Bearer capability information element

UIMI, User initiated modification indication (octet 6f),	
7 6 5	
0 0 0	User initiated modification not allowed/required
0 0 1	User initiated modification up to 1 TCH/F allowed/may be requested
0 1 0	User initiated modification up to 2 TCH/F allowed/may be requested
0 1 1	User initiated modification up to 3 TCH/F allowed/may be requested
1 0 0	User initiated modification up to 4 TCH/F allowed/may be requested
All other values shall be interpreted as "User initiated modification up to 4 TCH/F may be requested".	
Wanted air interface user rate (octet 6f), MS to network direction:	
Bits	
4 3 2 1	
0 0 0 0	Air interface user rate not applicable/No meaning associated with this value
0 0 0 1	19.6 kbit/s
0 0 1 0	14.4 kbit/s
0 0 1 1	119.2 kbit/s
0 1 0 0	128.8 kbit/s
0 1 1 0	38.4 kbit/s
0 1 1 1	143.2 kbit/s
1 0 0 0	057.6 kbit/s
1 0 0 1	interpreted by the network as 38.4 kbit/s in this version of the protocol
1 0 1 0	interpreted by the network as 38.4 kbit/s in this version of the protocol
1 0 1 1	interpreted by the network as 38.4 kbit/s in this version of the protocol
1 1 0 0	interpreted by the network as 38.4 kbit/s in this version of the protocol
All other values are reserved.	
Wanted air interface user rate (octet 6f), network to MS direction:	
Bits 1 to 4 are spare and shall be set to "0".	

Table 10.79/GSM 04.08: Bearer capability information element

Layer 2 identity (octet 7)	
Bits	
7 6	
1 0	octet identifier
All other values are reserved	
User information layer 2 protocol (octet 7)	
Bits	
5 4 3 2 1	
0 0 1 1 0	recommendation X.25, link level
0 1 0 0 0	ISO 6429, codeset 0 (DC1/DC3)
0 1 0 0 1	reserved: was allocated but never used in earlier phases of the protocol
0 1 0 1 0	videotex profile 1
0 1 1 0 0	COPnoFICt (Character oriented Protocol with no Flow Control mechanism)
0 1 1 0 1	X.75 layer 2 modified (CAPI)
All other values are reserved.	

10.5.4.5.1 Static conditions for the bearer capability IE contents

If the information transfer capability field (octet 3) indicates "speech", octets 4, 5, 5a, 5b, 6, 6a, 6b, 6c, 6d, 6e, 6f and 7 shall not be included.

ETSI

If the information transfer capability field (octet 3) indicates "speech", octet 3a etc. shall be included only if the mobile station supports at least one speech version other than:

- GSM full rate speech version 1; or
- GSM half rate speech version 1.

If the information transfer capability field (octet 3) indicates a value different from "speech", octets 4, 5, 6, 6a, 6b, and 6c shall be included, octets 6d, 6e, and 6f are optional. In the network to MS direction in case octet 6d is included, octet 6e and octet 6f may be included. In the MS to network direction in case octet 6d is included octet 6e shall also be included and 6f may be included.

If the information transfer capability field (octet 3) indicates "facsimile group 3", the modem type field (octet 6c) shall indicate "none".

If the information transfer capability field (octet 3) indicates "other ITC" or the rate adaption field (octet 5) indicates "other rate adaption", octet 5a shall be included.

If the rate adaption field (octet 5) indicates "other rate adaption" and the other rate adaption field (octet 5a) indicates "V.120", octet 5b shall be included.

The modem type field (octet 6c) shall not indicate "autobauding type 1" unless the connection element field (octet 6e) indicates "non transparent".

10.5.4.5a Call Control Capabilities

The purpose of the Call Control Capabilities information element is to identify the call control capabilities of the mobile station.

The Call Control Capabilities information element is coded as shown in figure 10.71a/GSM 04.08 and table 10.79a/GSM 04.08.

The Call Control Capabilities is a type 4 information element with a length of 3 octets.

	8	7	6	5	4	3	2	1	
	Call Control Capabilities IEI								octet 1
	Length of Call Control Capabilities contents								octet 2
	0	0	0	0	0	0	0	0	octet 3
	spare						PCP	DTMF	

Figure 10.71a/GSM 04.08 Call Control Capabilities information element

Table 10.79a/GSM 04.08: Call Control Capabilities

DTMF (octet 3, bit 1)	
0	This value is reserved for earlier versions of the protocol.
1	This value indicates that the mobile station supports DTMF as specified in section 5.5.7 of this specification.
PCP (octet 3, bit 2)	
0	This value indicates that the mobile station does not support the Prolonged Clearing Procedure.
1	This value indicates that the mobile station supports the Prolonged Clearing Procedure.

10.5.4.6 Call state

The purpose of the call state information element is to describe the current status of a call, (see section 5.1).

The call state information element is coded as shown in figure 10.72/GSM 04.08 and table 10.80/GSM 04.08.

The call state is a type 3 information element with 2 octets length.

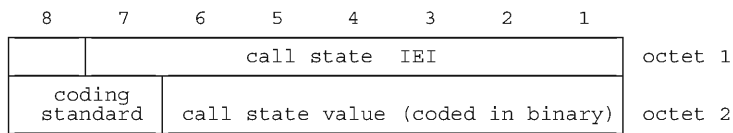


Figure 10.72/GSM 04.08 Call state information element

Table 10.80/GSM 04.08: Call state information element

Coding standard (octet 2)		
Bits		
8 7		
0 0	standardized coding as described in CCITT Rec. Q.931	
0 1	reserved for other international standards	
1 0	national standard	
1 1	standard defined for the GSMáPLMNS as described below	
Coding standards other than "1 1 - Standard defined for the GSMáPLMNS" shall not be used if the call state can be represented with the GSMástandardized coding.		
The mobile station or network need not support any other coding standard than "1 1 - Standard defined for the GSMáPLMNS".		
If a call state IE indicating a coding standard not supported by the receiver is received, call state "active" shall be assumed.		
Call state value (octet 2)		
Bits		
6 5 4 3 2 1		
0 0 0 0 0 0	U0 - null	N0 - null
0 0 0 0 1 0	U0.1- MM connection pending	N0.1- MM connection pending
1 0 0 0 1 0	U0.2- CC prompt present	N0.2- CC connection pending
1 0 0 0 1 1	U0.3- Wait for network information	N0.3- Network answer pending
1 0 0 1 0 0	U0.4- CC-Establishment present	N0.4- CC-Establishment present
1 0 0 1 0 1	U0.5- CC-Establishment confirmed	N0.5- CC-Establishment confirmed
1 0 0 1 1 0	U0.6- Recall present	N0.6- Recall present
0 0 0 0 0 1	U1 - call initiated	N1 - call initiated
0 0 0 0 1 1	U3 - mobile originating call proceeding	N3 - mobile originating call proceeding
0 0 0 1 0 0	U4 - call delivered	N4 - call delivered
0 0 0 1 1 0	U6 - call present	N6 - call present
0 0 0 1 1 1	U7 - call received	N7 - call received
0 0 1 0 0 0	U8 - connect request	N8 - connect request
0 0 1 0 0 1	U9 - mobile terminating call confirmed	N9 - mobile terminating call confirmed
0 0 1 0 1 0	U10- active	N10- active
0 0 1 0 1 1	U11- disconnect request	
0 0 1 1 0 0	U12- disconnect indication	N12-disconnect indication
0 1 0 0 1 1	U19- release request	N19- release request
0 1 1 0 1 0	U26- mobile originating modify	N26- mobile originating modify
0 1 1 0 1 1	U27- mobile terminating modify	N27- mobile terminating modify
0 1 1 1 0 0		N28- connect indication

10.5.4.7 Called party BCD number

The purpose of the called party BCD number information element is to identify the called party.

The called party BCD number information element is coded as shown in figure 10.73/GSM 04.08 and table 10.81/GSM 04.08.

The called party BCD number is a type 4 information element with a minimum length of 3 octets and a maximum length of 43 octets.

ETSI

8	7	6	5	4	3	2	1	
Called party BCD number IEI								octet 1
Length of called party BCD number contents								octet 2
1 ext	type of number			Numbering plan identification				octet 3
Number digit 2				Number digit 1				octet 4*
Number digit 4				Number digit 3				octet 5*
2)								: :

Figure 10.73/GSM 04.08 Called party BCD number information element

NOTE 1: The number digit(s) in octet 4 precedes the digit(s) in octet 5 etc. The number digit which would be entered first is located in octet 4, bits 1 to 4.

NOTE 2: If the called party BCD number contains an odd number of digits, bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111".

Since the information element must contain the complete called party BCD number there is no need for an additional complete indication.

Table 10.81/GSM 04.08: Called party BCD number

Type of number (octet 3) (Note 1)	
Bits	
7 6 5	
0 0 0	unknown (Note 2)
0 0 1	international number (Note 3, Note 5)
0 1 0	national number (Note 3)
0 1 1	network specific number (Note 4)
1 0 0	dedicated access, short code
1 0 1	reserved
1 1 0	reserved
1 1 1	reserved for extension

NOTE 1: For the definition of "number" see CCITT Recommendation I.330 and GSM 03.03.

NOTE 2: The type of number "unknown" is used when the user or the network has no knowledge of the type of number, e.g. international number, national number, etc. In this case the number digits field is organized according to the network dialling plan, e.g. prefix or escape digits might be present.

NOTE 3: Prefix or escape digits shall not be included.

NOTE 4: The type of number "network specific number" is used to indicate administration/service number specific to the serving network, e.g. used to access an operator.

NOTE 5: The international format shall be accepted by the MSC when the call is destined to a destination in the same country as the MSC.

Table 10.81/GSM 04.08: Called party BCD number (continued)

Numbering plan identification (octet 3)	
Number plan (applies for type of number = 000, 001, 010 and 100)	
Bits	
4 3 2 1	
0 0 0 0	unknown
0 0 0 1	ISDN/telephony numbering plan (Rec. E.164/E.163)
0 0 1 1	data numbering plan (Recommendation X.121)
0 1 0 0	telex numbering plan (Recommendation F.69)
1 0 0 0	national numbering plan
1 0 0 1	private numbering plan
1 1 1 1	reserved for extension
All other values are reserved.	

When an MS is the recipient of number information from the network, any incompatibility between the number digits and the number plan identification shall be ignored and a STATUS message shall not be sent to the network.

In the case of numbering plan "unknown", the number digits field is organized according to the network dialling plan; e.g. prefix or escape digits might be present.

Table 10.81/GSM 04.08: Called party BCD number (continued)

Number digits (octets 4, etc.)	
Bits	Number digit value
4 3 2 1 or	
8 7 6 5	
0 0 0 0	0
0 0 0 1	1
0 0 1 0	2
0 0 1 1	3
0 1 0 0	4
0 1 0 1	5
0 1 1 0	6
0 1 1 1	7
1 0 0 0	8
1 0 0 1	9
1 0 1 0	*
1 0 1 1	#
1 1 0 0	a
1 1 0 1	b
1 1 1 0	c
1 1 1 1	used as an endmark in the case of an odd number of number digits

10.5.4.8 Called party subaddress

The purpose of the Called party subaddress is to identify the subaddress of the called party of a call. For the definition of a subaddress see Rec. CCITT I.330.

The Called party subaddress information element is coded as shown in figure 10.74/GSM 04.08 and Table 10.82/GSM 04.08

The called party subaddress is a type 4 information element with a minimum length of 2 octets and a maximum length of 23 octets.

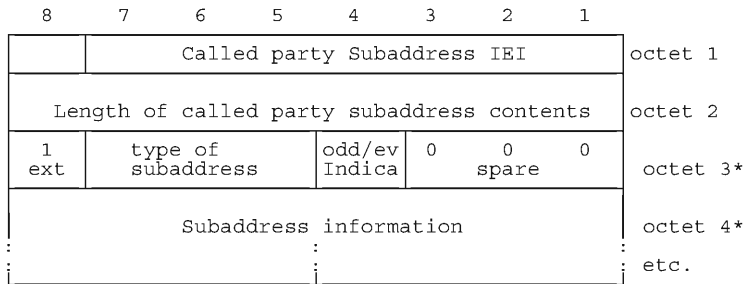


Figure 10.74/GSM 04.08 Called party subaddress

Table 10.82/GSM 04.08: Called party subaddress

Type of subaddress (octet 3)	
Bits	
7 6 5	
0 0 0	NSAP (X.213/ISO 8348 AD2)
0 1 0	User specified
All other values are reserved	
Odd/even indicator (octet 3)	
Bit	
4	
0	even number of address signals
1	odd number of address signals
NOTE: The odd/even indicator is used when the type of subaddress is "user specified" and the coding is BCD.	
Subaddress information (octet 4, etc...)	
The NSAP X.213/ISO8348AD2 address shall be formatted as specified by octet 4 which contains the Authority and Format Identifier (AFI). The encoding is made according to the "preferred binary encoding" as defined in X.213/ISO8348AD2. For the definition of this type of subaddress, see Rec. CCITT I.334.	
A coding example is given in ANNEX A.	
For User-specific subaddress, this field is encoded according to the user specification, subject to a maximum length of 20 octets. When interworking with X.25 networks BCD coding should be applied.	
NOTE: It is recommended that users apply NSAP subaddress type since this subaddress type allows the use of decimal, binary and IA5 characters in a standardised manner.	

10.5.4.9 Calling party BCD number

The purpose of the calling party BCD number information element is to identify the origin of a call.

The calling party BCD number information element is coded as shown in figure 10.75/GSM 04.08 and table 10.83/GSM 04.08.

The calling party BCD number is a type 4 information element. In the network to mobile station direction it has a minimum length of 3 octets and a maximum length of 14 octets. (This information element is not used in the mobile station to network direction.)

ETSI

8	7	6	5	4	3	2	1		
Calling party BCD number IEI								octet 1	
Length of calling party BCD number contents								octet 2	
0/1 ext	type of number		Numbering plan identification					octet 3	
1 ext	presentat. indicator	0	0	0	spare			screening indicator	octet 3a*
Number digit 2				Number digit 1				octet 4*	
Number digit 4				Number digit 3				octet 5*	
								:	
								:	

Figure 10.75/GSM 04.08 Calling party BCD number information element

The contents of octets 3, 4, etc. are coded as shown in table 10.81. The coding of octet 3a is defined in table 10.83 below.

If the calling party BCD number contains an odd number of digits, bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111".

Table 10.83/GSM 04.08: Calling party BCD number

Presentation indicator (octet 3a)		
Bits		
7	6	
0	0	Presentation allowed
0	1	Presentation restricted
1	0	Number not available due to interworking
1	1	Reserved
If octet 3a is omitted the value "00 - Presentation allowed" is assumed.		
Screening indicator (octet 3a)		
Bits		
2	1	
0	0	User-provided, not screened
0	1	User-provided, verified and passed
1	0	User-provided, verified and failed
1	1	Network provided
If octet 3a is omitted the value "0 0 - User provided, not screened" is assumed.		

10.5.4.10 Calling party subaddress

The purpose of the Calling party subaddress is to identify a subaddress associated with the origin of a call. For the definition of a subaddress see Rec. CCITT I.330.

The Calling party subaddress information element is coded as shown in figure 10.76/GSM 04.08 and table 10.84/GSM 04.08

The calling party subaddress is a type 4 information element with a minimum length of 2 octets and a maximum length of 23 octets.

ETSI

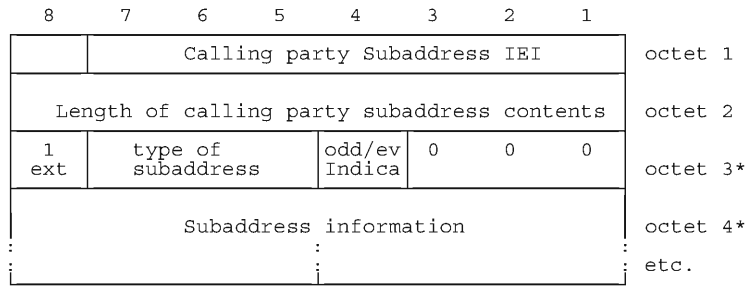


Figure 10.76/GSM 04.08 Calling party subaddress

Table 10.84/GSM 04.08: Calling party subaddress

Type of subaddress (octet 3)	
Bits	
7 6 5	
0 0 0	NSAP (X.213/ISO 8348 AD2)
0 1 0	User specified
All other values are reserved	
Odd/even indicator (octet 3)	
Bit	
4	
0	even number of address signals
1	odd number of address signals
The odd/even indicator is used when the type of subaddress is "user specified" and the coding is BCD	
Subaddress information (octet 4, etc...)	
The NSAP X.213/ISO8348AD2 address shall be formatted as specified by octet 4 which contains the Authority and Format Identifier (AFI). The encoding is made according to the "preferred binary encoding" as defined in X.213/ISO8348AD2. For the definition of this type of this type of subaddress, see Rec. CCITT I.332.	
A coding example is given in ANNEX A.	
For User-specific subaddress, this field is encoded according to the user specification, subject to a maximum length of 20 octets. When interworking with X.25 networks BCD coding should be applied.	
NOTE: It is recommended that users apply NSAP subaddress type since this subaddress type allows the use of decimal, binary and IA5 characters in a standardised manner.	

10.5.4.11 Cause

The purpose of the cause information element is to describe the reason for generating certain messages, to provide diagnostic information in the event of procedural errors and to indicate the location of the cause originator.

The cause information element is coded as shown in figure 10.77/GSM 04.08 and tables 10.85 and 10.86/GSM 04.08.

The cause is a type 4 information element with a minimum length of 4 octets and a maximum length of 32 octets.

The cause information element may be repeated in a message.

ETSI

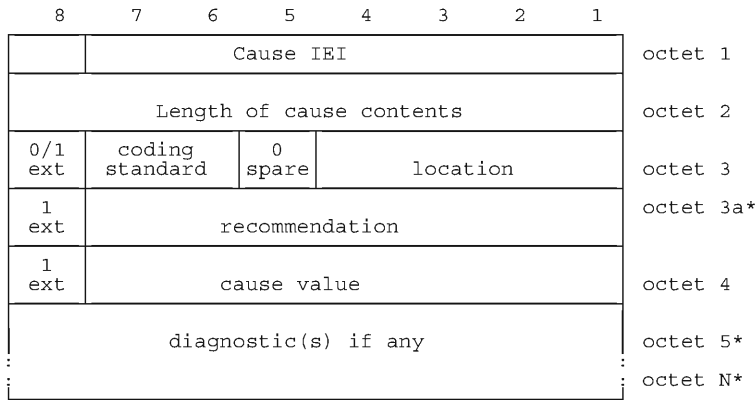


Figure 10.77/GSM 04.08 Cause information element

If the default value applies for the recommendation field, octet 3a shall be omitted.

Table 10.85/GSM 04.08: Cause information element

Coding standard (octet 3)	
Bits	
7 6	
0 0	Coding as specified in CCITT Rec. Q.931
0 1	Reserved for other international standards
1 0	National standard
1 1	Standard defined for the GSMáPLMNS as described below and in table 10.86/GSMá04.08
Coding standards other than "1 1 - Standard defined for the GSMáPLMNS" shall not be used if the cause can be represented with the GSMástandardized coding.	
The mobile station or network need not support any other coding standard than "1 1 - Standard defined for the GSMá PLMNS".	
If a cause IE indicating a coding standard not supported by the receiver is received, cause "interworking, unspecified" shall be assumed.	
Location (octet 3)	
Bits	
4 3 2 1	
0 0 0 0	user
0 0 0 1	private network serving the local user
0 0 1 0	public network serving the local user
0 0 1 1	transit network
0 1 0 0	public network serving the remote user
0 1 0 1	private network serving the remote user
0 1 1 1	international network
1 0 1 0	network beyond interworking point
All other values are reserved.	
Recommendation (octet 3a)	
Octet 3a shall not be included if the coding standard is coded as "1 1 - Standard defined for GSMáPLMNS".	
If the coding standard is different from "1 1 - Standard defined for GSMáPLMNS", the coding of octet 3a, if included, and octets 4 to N is according to that coding standard.	

Table 10.85/GSM 04.08: Cause information element (continued)

Cause value (octet 4)	
The cause value is divided in two fields: a class (bits 5 through 7) and a value within the class (bits 1 through 4).	
The class indicates the general nature of the event.	
Class (000):	normal event
Class (001):	normal event
Class (010):	resource unavailable
Class (011):	service or option not available
Class (100):	service or option not implemented
Class (101):	invalid message (e.g. parameter out of range)
Class (110):	protocol error (e.g. unknown message)
Class (111):	interworking
The cause values are listed in Table 10.86/GSMá04.08 below and defined in Annex H.	
Diagnostic(s) (octet 5)	
Diagnostic information is not available for every cause, see Table 10.86/GSMá04.08 below.	
When available, the diagnostic(s) is coded in the same way as the corresponding information element in section 10.	
The inclusion of diagnostic(s) is optional.	

Table 10.86/GSM 04.08: Cause information element values

Cause Class	value	Cause num.	Cause	Diagnostic	Remarks
7 6 5 4 3 2 1					
0 0 0 0 0 0 1		1.	Unassigned (unallocated) number	Note 9	
0 0 0 0 0 1 1		3.	No route to destination	Note 9	
0 0 0 0 1 1 0		6.	Channel unacceptable	-	
0 0 0 1 0 0 0		8.	Operator determined barring	-	
0 0 1 0 0 0 0		16.	Normal call clearing	Note 9	
0 0 1 0 0 0 1		17.	User busy	Note 1	
0 0 1 0 0 1 0		18.	No user responding	-	
0 0 1 0 0 1 1		19.	User alerting, no answer	-	
0 0 1 0 1 0 1		21.	Call rejected	Note 9 - user supplied diagnostic (note 4)	
0 0 1 0 1 1 0		22.	Number changed	New destination (note 5)	
0 0 1 1 0 1 0		26.	Non selected user clearing	-	
0 0 1 1 0 1 1		27.	Destination out of order	-	
0 0 1 1 1 0 0		28.	Invalid number format (incomplete number)	-	
0 0 1 1 1 0 1		29.	Facility rejected	Note 1	
0 0 1 1 1 1 0		30.	Response to STATUS ENQUIRY	-	
0 0 1 1 1 1 1		31.	Normal, unspecified	-	
0 1 0 0 0 1 0		34.	No circuit/channel available	Note 1	
0 1 0 0 1 1 0		38.	Network out of order	-	
0 1 0 1 0 0 1		41.	Temporary failure	-	
0 1 0 1 0 1 0		42.	Switching equipment congestion	-	
0 1 0 1 0 1 1		43.	Access information discarded	Discarded information element identifiers (note 6)	
0 1 0 1 1 0 0		44.	requested circuit/channel not available	-	
0 1 0 1 1 1 1		47.	Resources unavailable, unspecified	-	
0 1 1 0 0 0 1		49.	Quality of service unavailable	Note 9	
0 1 1 0 0 1 0		50.	Requested facility not subscribed	Note 1	
0 1 1 0 1 1 1		55.	Incoming calls barred within the CUG	Note 1	
0 1 1 1 0 0 1		57.	Bearer capability not authorized	Note 3	
0 1 1 1 0 1 0		58.	Bearer capability not presently available	Note 3	
0 1 1 1 1 1 1		63.	Service or option not available, unspecified	-	
1 0 0 0 0 0 1		65.	Bearer service not implemented	Note 3	

(continued...)

Table 10.86/GSM 04.08 (concluded): Cause information element values

Cause value Class	Value	Cause number	Cause	Diagnostic	Remarks
7 6 5 4 3 2 1					
1 0 0 0 1 0 0		68.	ACM equal to or greater than ACMmax		
1 0 0 0 1 0 1		69.	Requested facility not implemented	Note 1	
1 0 0 0 1 1 0		70.	Only restricted digital information bearer capability is available		
1 0 0 1 1 1 1		79.	Service or option not implemented, unspecified	-	
1 0 1 0 0 0 1		81.	Invalid transaction identifier value	-	
1 0 1 0 1 1 1		87.	User not member of CUG	Note 1	
1 0 1 1 0 0 0		88.	Incompatible destination	Incompatible parameter (Note 2)	
1 0 1 1 0 1 1		91.	Invalid transit network selection	-	
1 0 1 1 1 1 1		95.	Semantically incorrect message	-	
1 1 0 0 0 0 0		96.	Invalid mandatory information	Information element identifier(s)	
1 1 0 0 0 0 1		97.	Message type non-existent or not implemented	Message type	
1 1 0 0 0 1 0		98.	Message type not compatible with protocol state	Message type	
1 1 0 0 0 1 1		99.	Information element non-existent or not implemented	Information element identifier(s)	
1 1 0 0 1 0 0		100.	Conditional IE error	(notes 6,7) Information element identifier(s)	
1 1 0 0 1 0 1		101.	Message not compatible with protocol state	(note 6) Message type	
1 1 0 0 1 1 0		102.	Recovery on timer expiry	Timer number (note 8)	
1 1 0 1 1 1 1		111.	Protocol error, unspecified	-	
1 1 1 1 1 1 1		127.	Interworking, unspecified	-	

All other values in the range 0 to 31 shall be treated as cause 31.

All other values in the range 32 to 47 shall be treated as cause 47.

All other values in the range 48 to 63 shall be treated as cause 63.

All other values in the range 64 to 79 shall be treated as cause 79.

All other values in the range 80 to 95 shall be treated as cause 95.

All other values in the range 96 to 111 shall be treated as cause 111.

All other values in the range 112 to 127 shall be treated as cause 127.

NOTE 1: Diagnostics for supplementary services are handled as follows:

octet 5, bit 8:

This is an extension bit as defined in the preliminary part of section 10.5. In this version of this protocol, this bit shall be set to 1. If it is set to zero, the contents of the following octets shall be ignored.

octet 5, bit 7-1:

000001 - Outgoing calls barred within CUG

0000010 - No CUG selected
0000011 - Unknown CUG index
0000100 - CUG index incompatible with requested basic service
0000101 - CUG call failure, unspecified
0000110 - CLIR not subscribed
0000111 - CCBS possible
0001000 - CCBS not possible

All other values shall be ignored.

NOTE 2: The incompatible parameter is composed of the incompatible information element identifier.

NOTE 3: The format of the diagnostic field for cause numbers 57, 58 and 65 is as shown in figure 10.71/GSM 04.08 and tables 10.7248a/GSM 04.08 to 10.79/GSM 04.08.

NOTE 4: The user supplied diagnostics field is encoded according to the user specification, subject to the maximum length of the cause information element. The coding of user supplied diagnostics should be made in such a way that it does not conflict with the coding described in note 9 below.

NOTE 5: The new destination is formatted as the called party BCD number information element, including information element identifier.

NOTE 6: Locking and non-locking shift procedures described in sections 10.5.4.2 and 3 are applied. In principle, information element identifiers are ordered in the same order as the information elements in the received message.

NOTE 7: When only the locking shift information element is included and no information element identifier follows, it means that the codeset in the locking shift itself is not implemented.

NOTE 8: The timer number is coded in IA5 characters, e.g., T308 is coded as "3" "0" "8". The following coding is used in each octet:

bit 8 : spare "0"
bits 7-1 : IA5 character
Octet 5 carries "3", octet 5a carries "0", etc.

NOTE 9: The following coding is used for octet 5:

bit 8 : 1
bits 7-3 : 00000
bits 2-1 : condition as follows:
00 - unknown
01 - permanent
10 - transient

10.5.4.11a CLIR suppression

The CLIR suppression information element may be sent by the mobile station to the network in the SETUP message. The use is defined in GSM 04.81.

The CLIR suppression information element is coded as shown in figure 10.78/GSM 04.08.

The CLIR suppression is a type 2 information element.

ETSI

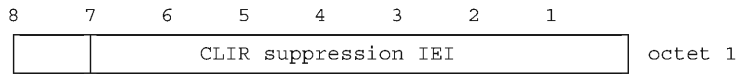


Figure 10.78/GSM 04.08 CLIR suppression information element

10.5.4.11b CLIR invocation

The CLIR invocation information element may be sent by the mobile station to the network in the SETUP message. The use is defined in GSM 04.81.

The CLIR invocation information element is coded as shown in figure 10.78a/GSM 04.08.

The CLIR invocation is a type 2 information element.

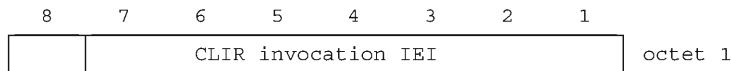


Figure 10.78a/GSM 04.08 CLIR invocation information element

10.5.4.12 Congestion level

The purpose of the congestion level information element is to describe the congestion status of the call.

The congestion level information element is coded as shown in figure 10.79/GSM 04.08 and table 10.87/GSM 04.08.

The congestion level is a type 1 information element.

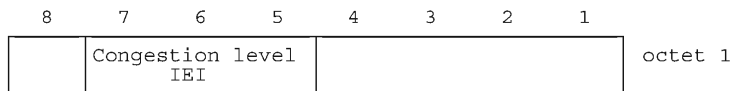


Figure 10.79/GSM 04.08 Congestion level information element

Table 10.87/GSM 04.08: Congestion level information element

Congestion level (octet 1)			
bits			
4	3	2	1
0	0	0	0
			receiver ready
1	1	1	1
			receiver not ready
All other values are reserved.			

10.5.4.13 Connected number

The purpose of the connected number information element is to identify the connected party of a call.

The connected number information element is coded as shown in figure 10.80/GSM 04.08

The connected number is a type 4 information element with a minimum length of 3 octets and a maximum length of 14 octets.

8	7	6	5	4	3	2	1		
Connected number IEI								octet 1	
Length of connected number contents								octet 2	
0/1 ext	Type of number			Number plan identification				octet 3 note 1)	
1 ext	Presentation indicator	0	0	0	Spare			Screening indicator	octet 3a* note 1)
Number digit 2				Number digit 1				octet 4* note 1)	
Number digit 4				Number digit 3				octet 5* note 1)	
note 2)								:	
								:	

Figure 10.80/GSM 04.08

The contents of octets 3,4,5, etc. ... are coded as shown in table 10.81/GSM 04.08. The coding of octet 3a is defined in table 10.83/GSM 04.08.

If the connected number contains an odd number of digits, bits 5 to 8 of the last octet shall be filled with the end mark coded as "1111".

10.5.4.14 Connected subaddress

The purpose of the connected subaddress information element is to identify a subaddress associated with the connected party of a call.

The connected subaddress information element is coded as shown in figure 10.81/GSM 04.08

The connected subaddress is a type 4 information element with a minimum length of 2 octets and a maximum length of 23 octets.

8	7	6	5	4	3	2	1		
Connected subaddress IEI								octet 1	
Length of connected subaddress contents								octet 2	
1 ext	Type of subaddress		odd/even indicator	0	0	Spare		octet 3*	
:	Subaddress information							octet 4*	
:								etc.	

Figure 10.81/GSM 04.08

The coding for Type of subaddress, odd/even indicator, and subaddress information is in table 10.82/GSM 04.08.

10.5.4.15 Facility

The purpose of the facility information element is to transport supplementary service related information. Within the scope of GSM 04.08 the content of the Facility information field is an array of octets. The usage of this transportation mechanism is defined in GSM 04.80.

The facility information element is coded as shown in figure 10.82/GSM 04.08

The facility is a type 4 information element with a minimum length of 2 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

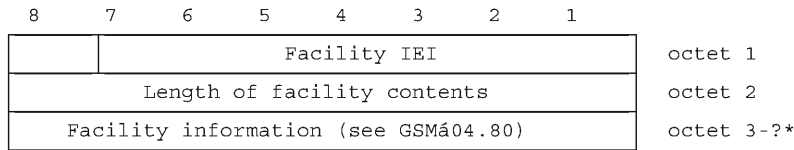


Figure 10.82/GSM 04.08

10.5.4.16 High layer compatibility

The purpose of the high layer compatibility information element is to provide a means which should be used by the remote user for compatibility checking. See annex B.

The high layer compatibility information element is coded as shown in figure 10.83/GSM 04.08 and table 10.88/GSM 04.08.

The high layer compatibility is a type 4 information element with a minimum length of 2 octets and a maximum length of 5 octets.

NOTE: The high layer compatibility information element is transported transparently by a PLMN between a call originating entity (e.g. a calling user) and the addressed entity (e.g. a remote user or a high layer function network node addressed by the call originating entity). However, if explicitly requested by the user (at subscription time), a network which provides some capabilities to realize teleservices may interpret this information to provide a particular service.

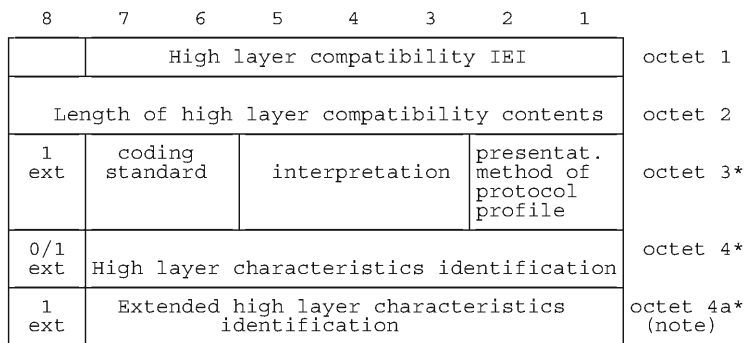


Figure 10.83/GSM 04.08 High layer compatibility information element

If the value part of the IE is empty, the IE indicates "not applicable".

NOTE: Octet 4a may be present e.g. when octet 4 indicates Maintenance or Management.

Table 10.88/GSM 04.08: High layer compatibility information element

Coding standard (octet 3) see CCITT Recommendation Q.931.
Interpretation (octet 3) see CCITT Recommendation Q.931.
Presentation method of protocol profile (octet 3) see CCITT Recommendation Q.931.
High layer characteristics identification (octet 4) see CCITT Recommendation Q.931.
Extended high layer characteristics identification (octet 4a) see CCITT Recommendation Q.931.

10.5.4.16.1 Static conditions for the high layer compatibility IE contents

Either the value part of the IE is empty, or it contains at least octet 3 and 4.

10.5.4.17 Keypad facility

The purpose of the keypad facility information element is to convey IA5 characters, e.g. entered by means of a terminal keypad. (Note).

The keypad facility information element is coded as shown in figure 10.84/GSM 04.08.

The keypad facility is a type 3 information element with 2 octets length.

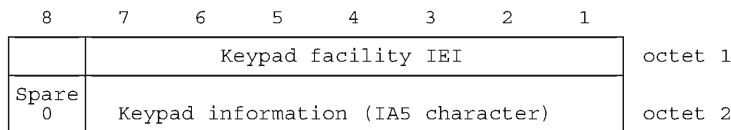


Figure 10.84/GSM 04.08 Keypad facility information element

NOTE: In the GSM system this information element is only used to transfer one DTMF digit (0, 1, ..., 9, A, B, C, D, *, #) as one IA5 character.

10.5.4.18 Low layer compatibility

The purpose of the low layer compatibility information element is to provide a means which should be used for compatibility checking by an addressed entity (e.g., a remote user or an interworking unit or a high layer function network node addressed by the calling user). The low layer compatibility information element is transferred transparently by a PLMN between the call originating entity (e.g. the calling user) and the addressed entity.

Except for the information element identifier, the low layer compatibility information element is coded as in ETS 300 102-1.

The low layer compatibility is a type 4 information element with a minimum length of 2 octets and a maximum length of 15 octets.

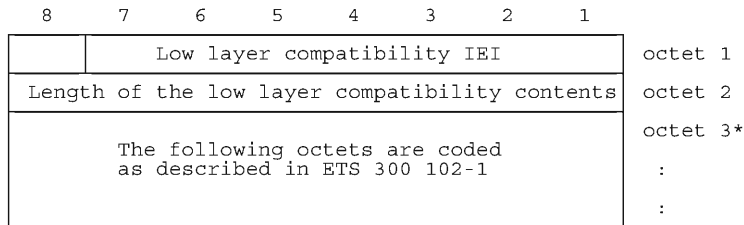


Figure 10.85/GSM 04.08 Low layer compatibility information element

If the value part of the IE is empty, the IE indicates "not applicable".

10.5.4.19 More data

The more data information element is sent by the mobile station to the network or to the network to the mobile station in a USER INFORMATION message. The presence of the more data information element indicates to the destination remote user/mobile station that another USER INFORMATION message will follow containing information belonging to the same block.

The use of the more data information element is not supervised by the network.

The more data information element is coded as shown in figure 10.86/GSM 04.08.

The more data is a type 2 information element.

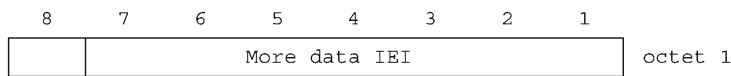


Figure 10.86/GSM 04.08 More data information element

10.5.4.20 Notification indicator

The purpose of the notification indicator information element is to indicate information pertaining to a call.

The notification indicator element is coded as shown in figure 10.87/GSM 04.08 and table 10.89/ GSM 04.08.

The notification indicator is a type 3 information element with 2 octets length.

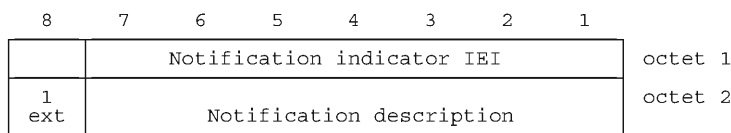


Figure 10.87/GSM 04.08 Notification indicator information element

Table 10.89/GSM 04.08: Notification indicator information element

Notification description (octet 2)							
Bits							
7	6	5	4	3	2	1	
0	0	0	0	0	0	0	User suspended
0	0	0	0	0	0	1	User resumed
0	0	0	0	1	0		Bearer change
All other values are reserved.							

10.5.4.21 Progress indicator

The purpose of the progress indicator information element is to describe an event which has occurred during the life of a call.

The progress indicator information element is coded as shown in figure 10.88/GSM 04.08 and table 10.90/GSM 04.08.

The progress indicator is a type 4 information element with a length of 4 octets.

	8	7	6	5	4	3	2	1	
	Progress indicator IEI								octet 1
	Length of progress indicator contents								octet 2
1	ext	coding	standard	0	spare	location			octet 3
1	ext	progress description							octet 4

Figure 10.88/GSM 04.08 Progress indicator information element

Table 10.90/GSM 04.08: Progress indicator information element

Coding standard (octet 3)		
Bits		
7 6		
0 0	Standardized coding, as described in CCITT Rec. Q.931	
0 1	Reserved for other international standards	
1 0	National standard	
1 1	Standard defined for the GSMáPLMNS as described below	
Coding standards other than "1 1 - Standard defined for the GSMáPLMNS" shall not be used if the progress description can be represented with the GSMástandardized coding.		
The mobile station or network need not support any other coding standard than "1 1 - Standard defined for the GSMáPLMNS".		
If a progress indicator IE indicating a coding standard not supported by the receiver is received, progress description "Unspecific" shall be assumed.		
Location (octet 3)		
Bits		
4 3 2 1		
0 0 0 0	User	
0 0 0 1	Private network serving the local user	
0 0 1 0	Public network serving the local user	
0 1 0 0	Public network serving the remote user	
0 1 0 1	Private network serving the remote user	
1 0 1 0	Network beyond interworking point	
All other values are reserved.		
Note: Depending on the location of the users, the local public network and remote public network may be the same network.		
Progress description (octet 4)		
Bits		
7 6 5 4 3 2 1	No.	
0 0 0 0 0 0 1	1.	Call is not end-to-end PLMN/ISDN, further call progress information may be available in-band
0 0 0 0 0 1 0	2.	Destination address in non-PLMN/ISDN
0 0 0 0 0 1 1	3.	Origination address in non-PLMN/ISDN
0 0 0 0 1 0 0	4.	Call has returned to the PLMN/ISDN
0 0 0 1 0 0 0	8.	In-band information or appropriate pattern now available
0 1 0 0 0 0 0	32.	Call is end-to-end PLMN/ISDN
1 0 0 0 0 0 0	64.	Queueing
All other values		Unspecific

10.5.4.21a Recall type \$(CCBS)\$

The purpose of the recall type information element is to describe the reason for the recall.

The recall type information element is coded as shown in Figure 10.88a/GSM 04.08 and Table 10.90a/GSM 04.08.

The recall type is a type 3 information element with 2 octets length.

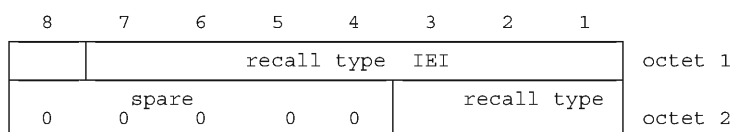


Figure 10.88a/GSM 04.08 Recall type information element

Table 10.90a/GSM 04.08: Recall type information element

recall type (octet 2, bits 1 to 4)	
Bits	
3 2 1	
0 0 0	- CCBS
0 0 1	}- shall be treated as CCBS (intended for other to } similar types of Recall)
1 1 0	
1 1 1	- reserved

10.5.4.22 Repeat indicator

The purpose of the repeat indicator information element is to indicate how the associated repeated information elements shall be interpreted, when included in a message. The repeat indicator information element is included immediately before the first occurrence of the associated information element which will be repeated in a message. "Mode 1" refers to the first occurrence of that information element, "mode 2" refers to the second occurrence of that information element in the same message.

The repeat indicator information element is coded as shown in figure 10.89/GSM 04.08 and table 10.91/GSM 04.08.

The repeat indicator is a type 1 information element.

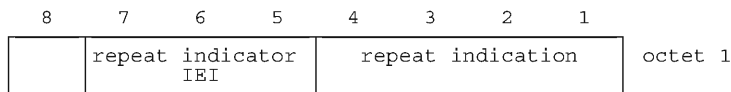


Figure 10.89/GSM 04.08 Repeat indicator information element

Table 10.91/GSM 04.08: Repeat indicator information element

Repeat indication (octet 1)	
Bits	
4 3 2 1	
0 0 0 1	Circular for successive selection "mode 1 alternate mode 2"
0 0 1 1	Sequential for successive selection "mode 1 and then mode 2"
All other values are reserved.	

10.5.4.22a Reverse call setup direction

This information element may be included in a MODIFY and MODIFY COMPLETE message to indicate that the direction of the data call to which the MODIFY message relates is opposite to the call setup direction.

The *reverse call setup direction* information element is coded as shown in figure 10.89a/GSM 04.08.

The *reverse call setup direction* is a type 2 information element

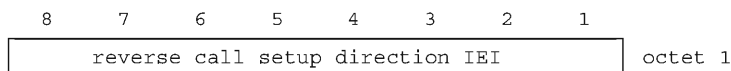


Figure 10.89a/GSM 04.08 Reverse call setup direction information element

10.5.4.22b SETUP Container \$(CCBS)\$

This information element contains the contents of a SETUP message (Mobile Station to Network). This means that the Call Control protocol discriminator IE, the Transaction Identifier IE and the Setup message type IE are not included.

The SETUP Container information element is coded as shown in figure 10.89b/GSM 04.08

The SETUP Container is a type 4 information. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

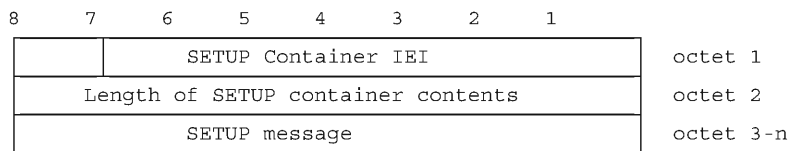


Figure 10.89b/GSM 04.08 Octet j (j = 3, 4 ... n) is the unchanged octet j of the SETUP message.

10.5.4.23 Signal

The purpose of the signal information element is to allow the network to convey information to a user regarding tones and alerting signals (see sections 5.2.2.3.2 and 7.3.3.).

The signal information element is coded as shown in figure 10.90/GSM 04.08 and table 10.92/GSM 04.08.

The signal is a type 3 information element with 2 octets length.

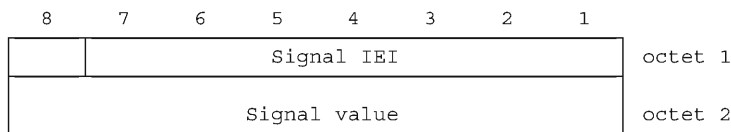


Figure 10.90/GSM 04.08 Signal information element

Table 10.92/GSM 04.08: Signal information element

Signal value (octet 2)								
Bits								
8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	dial tone on
0	0	0	0	0	0	0	1	ring back tone on
0	0	0	0	0	0	1	0	intercept tone on
0	0	0	0	0	0	1	1	network congestion tone on
0	0	0	0	0	1	0	0	busy tone on
0	0	0	0	0	1	0	1	confirm tone on
0	0	0	0	0	1	1	0	answer tone on
0	0	0	0	0	1	1	1	call waiting tone on
0	0	0	0	1	0	0	0	off-hook warning tone on
0	0	1	1	1	1	1	1	tones off
0	1	0	0	1	1	1	1	alerting off
All other values are reserved.								

10.5.4.24 SS Version Indicator

The purpose of the SS version indicator information element is to aid the decoding of the Facility information element as described in GSM 04.10. Within the scope of GSM 04.08 the contents of the SS Version information field is an array of one or more octets. The usage of the SS version information field is defined in GSM 04.80.

The SS version indicator information element is coded as shown in figure 10.91/GSM 04.08

ETSI

The SS version indicator is a type 4 information element with a minimum length of 2 octets. No upper length limit is specified except for that given by the maximum number of octets in a L3 message (see GSM 04.06).

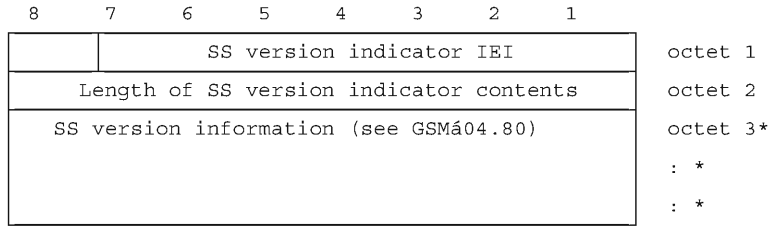


Figure 10.91/GSM 04.08

NOTE: Usually, this information element has only one octet of content.

10.5.4.25 User-user

The purpose of the user-user information element is to convey information between the mobile station and the remote ISDN user.

The user-user information element is coded as shown in figure 10.92/GSM 04.08 and table 10.93/GSM 04.08. There are no restrictions on the content of the user-user information field.

The user-user is a type 4 information element with a minimum length of 3 octets and a maximum length of either 35 or 131 octets. In the SETUP, ALERTING, CONNECT, DISCONNECT, RELEASE and RELEASE COMPLETE messages, the user-user information element has a maximum size of 35 octets in a GSM PLMN. In USER INFORMATION messages the user-user information element has a maximum size of 131 octets in a GSM PLMN.

In other networks than GSM PLMNs the maximum size of the user-user information element is 35 or 131 octets in the messages mentioned above. The evolution to a single maximum value is the long term objective; the exact maximum value is the subject of further study.

NOTE: The user-user information element is transported transparently through a GSM PLMN.

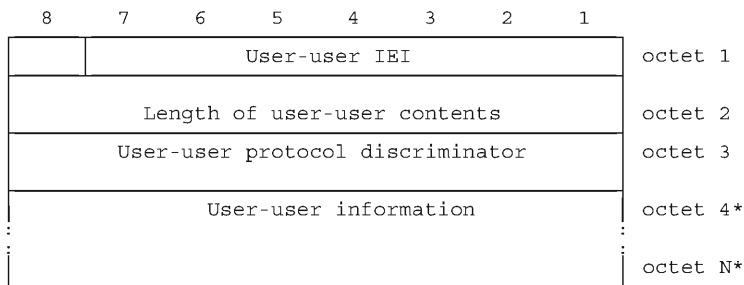


Figure 10.92/GSM 04.08 User-user information element

Table 10.93/GSM 04.08: User-user information element

User-user protocol discriminator (octet 3)								
Bits								
8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	User specific protocol (Note 1)
0	0	0	0	0	0	0	1	OSI high layer protocols
0	0	0	0	0	0	1	0	X.244 (Note 2)
0	0	0	0	0	0	1	1	Reserved for system management convergence function
0	0	0	0	0	1	0	0	IA5 characters (Note 3)
0	0	0	0	0	1	1	1	Rec.V.120 rate adaption
0	0	0	0	1	0	0	0	Q.931 (I.451) user-network call control messages
0	0	0	1	0	0	0	0	Reserved for other network layer or through
0	0	1	1	1	1	1	1	layer 3 protocols including Rec.X.25 (Note 4)
0	1	0	0	0	0	0	0	through
0	1	0	0	1	1	1	1	National use
0	1	0	1	0	0	0	0	through
1	1	1	1	1	1	1	0	Reserved for other network layer or layer 3 protocols including Rec.X.25 (Note 4)
All other values are reserved								
Note 1: The user information is structured according to user needs.								
Note 2: The user information is structured according to Rec.X.244 which specifies the structure of X.25 call user data.								
Note 3: The user information consists of IA5 characters.								
Note 4: These values are reserved to discriminate these protocol discriminators from the first octet of a X.25 packet including general format identifier.								

10.5.4.26 Alerting Pattern \$(NIA)\$

The purpose of the Alerting Pattern information element is to allow the network to convey information related to the alert to be used by the MS (see GSM 02.07).

The Alerting Pattern information element is coded as shown in figure 93/GSM 04.08 and table 94/GSM 04.08.

The Alerting Pattern IE is a type 4 information element with 3 octet length.

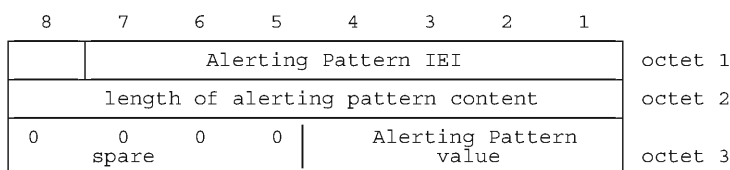


Figure 10.93/GSM 04.08 Alerting Pattern information element

Table 10.94/GSM 04.08: Alerting Pattern information element

Alerting Pattern value (octet 3)	
Bits	
4 3 2 1	
0 0 0 0	alerting pattern 1
0 0 0 1	alerting pattern 2
0 0 1 0	alerting pattern 3
0 1 0 0	alerting pattern 5
0 1 0 1	alerting pattern 6
0 1 1 0	alerting pattern 7
0 1 1 1	alerting pattern 8
1 0 0 0	alerting pattern 9
all other values are reserved	

Alerting pattern 1, 2 and 3 indicate alerting levels 0, 1 and 2.

Alerting pattern 5 to 9 indicate alerting categories 1 to 5

10.5.4.27 Allowed actions \$(CCBS)\$

The purpose of the *Allowed actions* information element is to provide the mobile station with information about further allowed procedures.

The *Allowed actions* information element is coded as shown in figure 10.94/GSM 04.08 and table 10.95/GSM 04.08

The *Allowed actions* is a type 4 information element with 3 octets length

	8	7	6	5	4	3	2	1	
	Allowed Actions IEI								octet 1
	Length of allowed actions contents								octet 2
CCBS act.	0	0	0	0	0	0	0	0	octet 3
	spare								

Figure 10.94/GSM 04.08 Allowed actions information element

Table 10.95/GSM 04.08: Allowed actions information element

CCBS activation (octet 3)	
Bit	
8	
0	Activation of CCBS not possible
1	Activation of CCBS possible

10.5.5 GPRS mobility management information elements

10.5.5.1 Attach result

The purpose of the *attach result* information element is to specify the result of a GPRS attach procedure.

The *attach result* is a type 1 information element.

The *attach result* information element is coded as shown in figure 10.95/GSM 04.08 and table 10.96/GSM 04.08.

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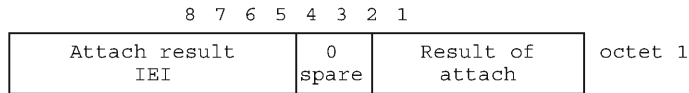


Figure 10.95/GSM 04.08: *Attach result* information element

Table 10.96/GSM 04.08: *Attach result* information element

Result of attach (octet 1) Bits 3 2 1 0 0 1 GPRS only attached 0 1 1 Combined GPRS/IMSI attached All other values are reserved.
--

10.5.5.2 Attach type

The purpose of the *attach type* information element is to indicate the type of the requested attach, i.e. whether the MS wants to perform a GPRS or combined GPRS attach.

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

The *attach type* information element is coded as shown in figure 10.96/GSM 04.08 and table 10.97/GSM 04.08.

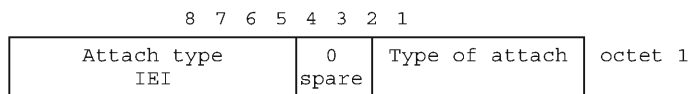


Figure 10.96/GSM 04.08: *Attach type* information element

Table 10.97/GSM 04.08: *Attach type* information element

Type of attach (octet 1) Bits 3 2 1 0 0 1 GPRS attach 0 1 0 GPRS attach while IMSI attached 0 1 1 Combined GPRS/IMSI attach All other values are interpreted as <i>GPRS attach</i> in this version of the protocol.

10.5.5.3 Cipherring algorithm

The purpose of the *cipherring algorithm* information element is to specify which cipherring algorithm shall be used.

The *cipherring algorithm* is a type 1 information element.

The *cipherring algorithm* information element is coded as shown in figure 10.97/GSM 04.08 and table 10.98/GSM 04.08.

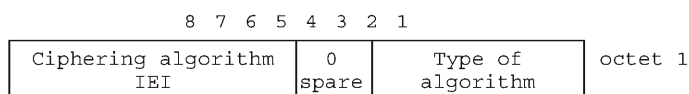


Figure 10.97/GSM 04.08: *Cipherring algorithm* information element

Table 10.98/GSM 04.08: *Ciphering algorithm* information element

Type of ciphering algorithm	(octet 1)
Bits	
3 2 1	
0 0 1	GPRS A5/1
0 1 0	GPRS A5/2
All other values are interpreted as <i>GPRS A5/1</i> by this version of the protocol.	

10.5.5.4 Ciphering indicator

The purpose of the *ciphering indicator* information element is to indicate whether ciphering shall be used or not.

The *ciphering indicator* is a type 1 information element.

The *ciphering indicator* information element is coded as shown in figure 10.98/GSM 04.08 and table 10.99/GSM 04.08.

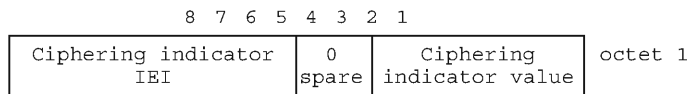


Figure 10.98/GSM 04.08: *Ciphering indicator* information element

Table 10.99/GSM 04.08: *Ciphering indicator* information element

Ciphering indicator value	(octet 1)
Bits	
3 2 1	
0 0 0	Ciphering mode on
0 0 1	Ciphering mode off
All other values are interpreted as <i>Ciphering mode off</i> by this version of the protocol.	

10.5.5.5 Detach type

The purpose of the *detach type* information element is to indicate which type of detach is requested by the MS. In the network to MS direction the *detach type* information element is used to indicate the reason why a detach request is sent.

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

The *detach type* information element is coded as shown in figure 10.99/GSM 04.08 and table 10.100/GSM 04.08.

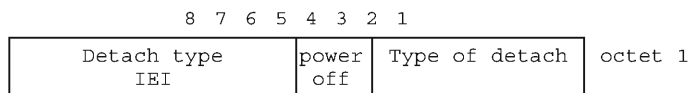


Figure 10.99/GSM 04.08: *Detach type* information element

Table 10.100/GSM 04.08: Detach type information element

Type of detach (octet 1)	
In the MS to network direction:	
Bits	
3 2 1	
0 0 1	GPRS detach
0 1 0	IMSI detach
0 1 1	Combined GPRS/IMSI detach
All other values are interpreted as Combined GPRS/IMSI detach by this version of the protocol.	
In the network to MS direction:	
Bits	
3 2 1	
0 0 1	re-attach required
0 1 0	re-attach not required
0 1 1	IMSI detach (after VLR failure)
All other values are interpreted as re-attach not required by this version of the protocol.	
power off (octet 1)	
Bit	
4	
0	normal detach
1	power switched off

10.5.5.6 DRX parameter

The purpose of the *DRX parameter* information element is to indicate whether the MS uses DRX mode or not.

The *DRX parameter* is a type 3 information element with a length of 3 octets.

The value part of a *DRX parameter* information element is coded as shown in table 10.101/GSM 04.08.

8 7 6 5 4 3 2 1		
DRX parameter IEI		octet 1
SPLIT PG CYCLE CODE		octet 2
0 0 0 0 0	non-DRX timer	octet 3
spare		

Figure 10.100/GSM 04.08: DRX parameter information element

Table 10.101/GSM 04.08: DRX parameter information element

SPLIT PG CYCLE CODE, octet 2
The octet contains the binary coded value of the SPLIT PG CYCLE CODE. The SPLIT PG CYCLE value is derived from the SPLIT PG CYCLE CODE as follows:

SPLIT PG CYCLE CODE	SPLIT PG CYCLE value
0	no DRX used by the MS
1 to 64	1 to 64, respectively
65	71
66	72
67	74
68	75
69	77
70	79
71	80
72	83
73	86
74	88
75	90
76	92
77	96
78	101
79	103
80	107
81	112
82	116
83	118
84	128
85	141
86	144
87	150
88	160
89	171
90	176
91	192
92	214
93	224
94	235
95	256
96	288
97	320
98	352

All other values are reserved and shall be interpreted as 1 by this version of the protocol.

non-DRX timer, octet 3
bit

3	2	1	
0	0	0	no non-DRX mode after transfer state
0	0	1	max. 1 sec non-DRX mode after transfer state
0	1	0	max. 2 sec non-DRX mode after transfer state
0	1	1	max. 4 sec non-DRX mode after transfer state
1	0	0	max. 8 sec non-DRX mode after transfer state
1	0	1	max. 16 sec non-DRX mode after transfer state
1	1	0	max. 32 sec non-DRX mode after transfer state
1	1	1	max. 64 sec non-DRX mode after transfer state

Bits 8 to 4 of octet 3 are spare and shall be coded all zeros.

10.5.5.7 Force to standby

The purpose of the *force to standby* information element is to request the start of the STANDBY timer or to acknowledge such a request.

The *force to standby* is a type 1 information element.

The *force to standby* information element is coded as shown in figure 10.101/GSM 04.08 and table 10.102/GSM 04.08.

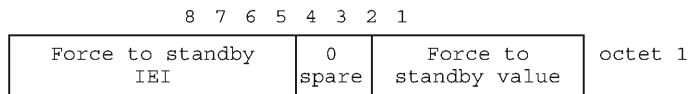


Figure 10.101/GSM 04.08: Force to standby information element

Table 10.102/GSM 04.08: Force to standby information element

Force to standby value (octet 1) Bits 3 2 1 0 0 0 Force to standby not indicated 0 0 1 Force to standby indicated All other values are interpreted as <i>force to standby not indicated</i> by this version of the protocol.

10.5.5.8 P-TMSI signature

The purpose of the *P-TMSI signature* information element is to identify a GMM context of an MS.

The *P-TMSI signature* is a type 3 information element with 4 octets length.

The *P-TMSI signature* information element is coded as shown in figure 10.102/GSM 04.08 and table 10.103/GSM 04.08.

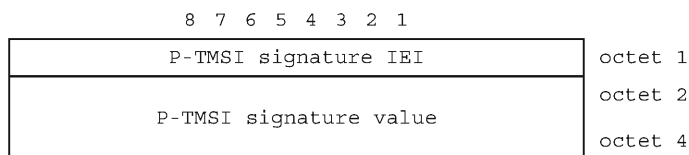


Figure 10.102/GSM 04.08: P-TMSI signature information element

Table 10.103/GSM 04.08: P-TMSI signature information element

P-TMSI signature value Octets 2, 3 and 4 contain the binary representation of the P-TMSI signature. Bit 1 of octet 4 is the least significant bit and bit 8 of octet 2 is the most significant bit.
--

10.5.5.9 Identity type 2

The purpose of the *identity type 2* information element is to specify which identity is requested.

The *identity type 2* is a type 1 information element.

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The *identity type 2* information element is coded as shown in figure 10.103/GSM 04.08 and table 10.104/GSM 04.08.

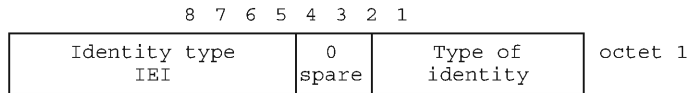


Figure 10.103/GSM 04.08: *Identity type 2* information element

Table 10.104/GSM 04.08: *Identity type 2* information element

Type of identity (octet 1)		
Bits		
3	2	1
0 0 1	IMSI	
0 1 0	IMEI	
0 1 1	IMEISV	
All other values are interpreted as IMSI by this version of the protocol.		

10.5.5.10 IMEISV request

The purpose of the *IMEISV request* information element is to indicate that the IMEISV shall be included by the MS in the authentication and ciphering response message.

The *IMEISV request* is a type 1 information element.

The *IMEISV request* information element is coded as shown in figure 10.104/GSM 04.08 and table 10.105/GSM 04.08.

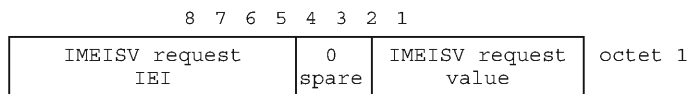


Figure 10.104/GSM 04.08: *IMEISV request* information element

Table 10.105/GSM 04.08: *IMEISV request* information element

IMEISV request value (octet 1)		
Bits		
3	2	1
0 0 0	IMEISV not requested	
0 0 1	IMEISV requested	
All other values are interpreted as IMEISV not requested by this version of the protocol.		

10.5.5.11 LLC V(R) list

The purpose of the *LLC V(R) list* information element is to specify the current LLC sequence number values.

The *LLC V(R) list* is a type 4 information element with a length of 4 to 9 octets.

The value part of an *LLC V(R) list* information element is coded as shown in table 10.106/GSM 04.08 and figure 10.105/GSM 04.08.

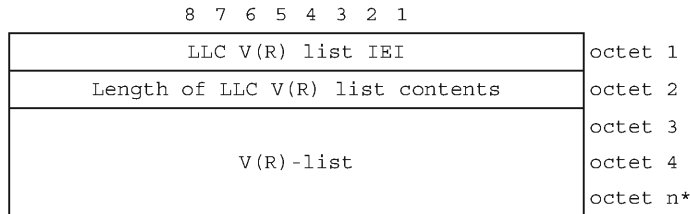


Figure 10.105/GSM 04.08: LLC V(R) list information element

Table 10.106/GSM 04.08: LLC V(R) list information element

<pre> V(R)-list value ::= { < V(R)-list > < spare padding > }; < V(R)-list > ::= < sapi : bit-string(4) > <V(R)-value : bit-string(9) > { <V(R)- list> < null > } ; < sapi > ::= { 0011 } -- SAPI 3 { 0101 } -- SAPI 5 { 1001 } -- SAPI 9 { 1011 }; -- SAPI 11 < V(R)-value > ::= { 0 1 } (9); -- Contains the binary coded representation of the receive sequence number value. -- The first bit in transmission order is the most significant bit. </pre>
--

10.5.5.12.a MS Radio Access capability

The purpose of the *MS RA capability* information element is to provide the radio part of the network with information concerning radio aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station.

The *MS RA capability* is a type 4 information element.

The value part of a *MS RA capability* information element is coded as shown table 10.106a/GSM 04.08.

- SEMANTIC RULE : Among the three Access Type Technologies GSM 900-P, GSM 900-E and GSM 900-R only one shall be present.
- Error handling : If a received Access Technology Type is unknown to the receiver, it shall ignore all the corresponding fields;
- If within a known Access Technology Type a receiver recognizes an unknown field it shall ignore it.
- See more details about error handling of MS radio access capability in TS GSM 08.18.

Table 10.106a/GSM 04.08 : *Mobile Station Radio Access Capability* Information Element

```

<MS Radio Access capability IEI> ::= <octet>
<Length in octets of MS RA capability contents > ::= <octet>
<MS RA capability value part > ::=
{
{ 0| 1 <GSM 900-P Access Technology Type> }
{ 0| 1 <GSM 900-E Access Technology Type> }
{ 0| 1 <GSM 900-R Access Technology Type> }
{ 0| 1 <GSM 1800 Access Technology Type> }
<padding>;

<GSM 900-P Access Technology Type> ::=
{
<Access Technology Type length : bit (8)>
<GSM 900-P PS capabilities>: <PS>
<GSM 900-P A5 bits > : <A5 bits>
<GSM 900-P VGCS >: <VGCS>
<GSM 900-P VBS > : <VBS>
<GSM 900-P RF Power Cap>: <GSM 900 RF Power Capability>
<GSM 900-P Measurement Cap > : <MS Measurement Capability >
<GSM 900-P Revision level> : <GSM Revision level>
<GSM 900-P ES IND> : <ES IND>
<GSM 900-P Multislot capability > : <Multislot capability>
};

<GSM 900-E Access Technology Type> ::=
{
<Access Technology Type length : bit (8)>
<GSM 900-E PS capabilities>: <PS>
<GSM 900-E A5 bits > : <A5 bits>
<GSM 900-E VGCS >: <VGCS>
<GSM 900-E VBS > : <VBS>
<GSM 900-E RF Power Cap : : <GSM 900 RF Power Capability>
<GSM 900-E Measurement Cap> : <MS Measurement Capability >
<GSM 900-E Revision level> : <GSM Revision level>
<GSM 900-E ES IND> : <ES IND>
<GSM 900-E Multislot capability > : <Multislot capability>
};

<GSM 900-R Access Technology Type> ::=
{
<Access Technology Type length : bit (8)>
<GSM 900-R PS capabilities>: <PS>
<GSM 900-R A5 bits > : <A5 bits>
<GSM 900-R VGCS >: <VGCS>
<GSM 900-R VBS > : <VBS>
<GSM 900-R RF Power Cap : : <GSM 900 RF Power Capability>
<GSM 900-R Measurement Cap> : <MS Measurement Capability >
<GSM 900-R Revision level> : <GSM Revision level>
<GSM 900-R ES IND> : <ES IND>
<GSM 900-R Multislot capability > : <Multislot capability>
};

```

Table 10.106a/GSM 04.08 (continued): *Mobile Station Radio Access Capability* Information Element

```

<GSM 1800 Access Technology Type> ::=
{
  <Access Technology Type length : bit (8)>
  <GSM 1800 PS capabilities> : <PS>
  <GSM 1800 A5 bits > : <A5 bits>
  <GSM 1800 VGCS > : <VGCS>
  <GSM 1800 VBS > : <VBS>
  <GSM 1800 RF Power Cap : <GSM 1800 RF Power Capability>
  <GSM 1800 Measurement Cap> : <MS Measurement Capability >
  <GSM 1800 Revision level> : <GSM Revision level>
  <GSM 1800 ES IND> : <ES IND>
  <GSM 1800 Multislot capability > : <Multislot capability>
};
<Access Technology Type length>

This field contains the length in bits of the subsequent structure starting at the first bit after this field.
<padding> ::= null | <padding bit> ;
<padding bit> ::= 0 {null | <padding bit>} ;

The length of the <padding> field is such that the <MS RA capability value part> field extends up to the next octet boundary.

<GSM 900 RF Power Capability> ::= bit (3) ;
<GSM 1800 RF Power Capability > ::= bit (3) ;

<PS> ::= -- Pseudo Synchronisation
0 | -- PS capability not present
1; -- PS capability present
<A5 bits> ::= < A5/1 : bit> <A5/2 : bit> <A5/3 : bit> <A5/4 : bit> <A5/5 : bit> <A5/6 : bit> <A5/7 : bit>; -- bits for circuit mode ciphering algorithms
<VGCS > ::= -- (Voice Group Call Service)
0 | -- no VGCS capability or no notifications wanted
1; -- VGCS capability and notifications wanted
< VBS > ::= -- (Voice Broadcast Service)
0 | -- no VBS capability or no notifications wanted
1; -- VBS capability and notifications wanted
<GSM Revision level : bit (2)>
0 0 Reserved for phase 1
0 1 Used by phase 2 mobile stations
All other values are reserved for future use

later.
<Multi Slot Capability> ::=
{ 0 0 } <GPRS Multi Slot Class : bit (5)> |
{ 0 1 } <Multi Slot Class : bit (5)> |
{ 1 0 } <Multi Slot Class : bit (5)> <GPRS Multi Slot Class : bit (5)> ;
A5/1
0 encryption algorithm A5/1 not available
1 encryption algorithm A5/1 available
A5/2
0 encryption algorithm A5/2 not available
1 encryption algorithm A5/2 available
A5/3
0 encryption algorithm A5/3 not available
1 encryption algorithm A5/3 available
A5/4
0 encryption algorithm A5/4 not available
1 encryption algorithm A5/4 available
A5/5
0 encryption algorithm A5/5 not available
1 encryption algorithm A5/5 available
A5/6
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

```

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Table 10.106a/GSM 04.08 (concluded): *Mobile Station Radio Access Capability* Information Element**GSM 900 RF Power Capability**

This field is coded as radio capability in Classmark 3 when GSM 900 P, E [or R] band is used : it contains the binary coding of the power class associated (see GSM 05.05 paragraph 4.1 output power and paragraph 4.1.1 Mobile Station .

GSM 1800 RF Power Capability

This field is coded as radio capability in Classmark 3 when GSM 1800 band is used : it contains the binary coding of the power class associated (see GSM 05.05 paragraph 4.1 output power and paragraph 4.1.1 Mobile Station .

ES IND – (Controlled early Classmark Sending

0 "controlled early Classmark Sending" option is not implemented
1 "controlled early Classmark Sending" option is implemented

Multi Slot Class

The Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02. Range 1 to 18, all other values are reserved.

GPRS Multi Slot Class

The GPRS Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02.

< MS Measurement capability > ::=

< SMS_VALUE : bit (4) >

< SM_VALUE : bit (4) > ;

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 neighbor cell power measurement, and the switch from that radio channel to another radio channel.

Bits

4 3 2 1

0 0 0 0 1/8 timeslot (~72 microseconds)

0 0 0 1 2/8 timeslot (~144 microseconds)

0 0 1 0 3/8 timeslot (~216 microseconds)

...

1 1 1 1 16/8 timeslot (~1154 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 neighbor cell power measurement.

Bits

4 3 2 1

0 0 0 0 1/8 timeslot (~72 microseconds)

0 0 0 1 2/8 timeslot (~144 microseconds)

0 0 1 0 3/8 timeslot (~216 microseconds)

...

1 1 1 1 16/8 timeslot (~1154 microseconds)

10.5.5.12 MS classmark 4

The purpose of the *Mobile Station classmark 4* information element is to provide the network with information concerning aspects of the mobile station related to GPRS. The contents might affect the manner in which the network handles the operation of the mobile station. The MS classmark 4 information indicates general mobile station

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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 4* is a type 4 information element with a maximum of 16 octets length.

The value part of a *MS Classmark 4* information element is coded as shown in figure 10.106/GSM 04.08 and table 10.107/GSM 04.08.

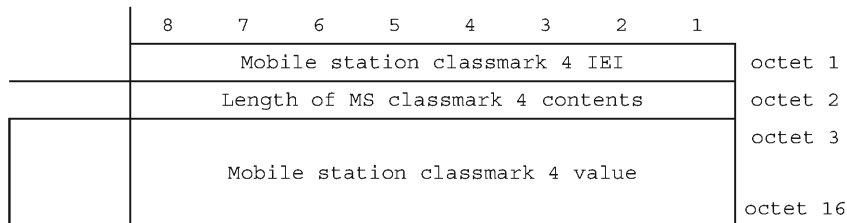


Figure 10.106/GSM 04.08 *Mobile Station Classmark 4* information element

Table 10.107/GSM 04.08 *Mobile Station Classmark 4* information element

```

< MS classmark 4 value part > ::=
{
  <FC>
  <PS capabilities>
  <GPRS A5 bits>
  <VGCS >
  <VBS >
  <R Pres>
  <SM capabilities via dedicated channels : bit >
  <SM capabilities via GPRS channels : bit >
  <UCS2 support : bit>
  <RF power capability : bit string(3)>
  <SS Screening Indicator : bit string(2)>
  <Revision level : bit string(3)>
  {
    <Multiband supported> : {000} |
    <Multiband supported> : { 101 | 110 }
    <Associated Radio Capability 2 : bit string(4)>
    <Associated Radio Capability 1 : bit string(4)> |
    <Multiband supported> : {001 | 010 | 100 }
    <Associated Radio Capability 1 : bit string(4)>
  }
  <Multi Slot Capability>
  <spare padding>
};
-- When GSM 900 P, E [or R] band is used (for exceptions see 3.4.18):
<FC> ::= -- (For definition of frequency bands see GSM 05.05)
0 | -- The MS does not support the extension band G1 in addition to the primary GSM band.
1; -- The MS does support the extension band G1 in addition to the primary GSM band

-- When the DCS 1800 band is used (for exceptions see 3.4.18):
<FC> ::=
0; -- Reserved for future use (for definition of frequency bands see GSM 05.05)

-- Note: The FC bit conveys no information about support or non support of the G1 extension band when
transmitted on a DCS 1800 channel.

<PS> ::=
0 | -- PS capability not present
1; -- PS capability present
<GPRS A5 bits> ::= < GPRS A5/2 :bit > < GPRS A5/1 :bit >;

```



```

<VGCS> ::=
0| -- no VGCS capability or no notifications wanted
1; -- VGCS capability and notifications wanted
<VBS> ::=
0| -- no VBS capability or no notifications wanted
1; -- VBS capability and notifications wanted
<R Pres> ::=
0| -- R band not supported
1 <R band Associated Radio Capability: bit string(3)>;
<Multi Slot Capability> ::=
{ 0 0 }| -- single slot capability
{ 0 1 } <Multi Slot Class : bit string(5)> |
{ 1 0 } <Multi Slot Class : bit string(5)> <GPRS Multi Slot Class : bit string(5)> ;

```

RF power capability

When GSM 900 P, E [or R] band is used (for exceptions see 3.4.18):

```

0 0 0 class 1
0 0 1 class 2
0 1 0 class 3
0 1 1 class 4
1 0 0 class 5

```

All other values are reserved.

When the DCS 1800 band is used (for exceptions see 3.4.18):

```

0 0 0 class 1
0 0 1 class 2
0 1 0 class 3

```

All other values are reserved.

SS Screening Indicator

```

0 0 defined in GSM 04.80
0 1 defined in GSM 04.80
1 0 defined in GSM 04.80
1 1 defined in GSM 04.80

```

SM capabilities via dedicated channels

```

0 Mobile station does not support mobile terminated point to point SMS via dedicated signalling channels
1 Mobile station supports mobile terminated point to point SMS via dedicated signalling channels

```

SM capabilities via GPRS channels

```

0 Mobile station does not support mobile terminated point to point SMS via GPRS packet data channels
1 Mobile station supports mobile terminated point to point SMS via GPRS packet data channels

```

Revision level

```

0 0 Reserved for phase 1
0 1 Used by phase 2 mobile stations

```

All other values are reserved for future use

Associated Radio Capability 1 and Associated Radio Capability 2

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

If P-GSM or E-GSM are not 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 GSM 05.05).

UCS2 support

This information field indicates the likely treatment by the mobile station of UCS2 encoded character strings.

```

0 the ME has a preference for the default alphabet (defined in GSM 03.38)
  over UCS2.
1 the ME has no preference between the use of the default alphabet and the
  use of UCS2.

```

GPRS A5/2

ETSI

0 encryption algorithm GPRS A5/2 not available
 1 encryption algorithm GPRS A5/2 available

GPRS A5/1
 0 encryption algorithm GPRS A5/1 not available
 1 encryption algorithm GPRS A5/1 available

R band Associated Radio Capability
 In case where the R band is supported, the R band associated radio capability (3 bit field) contains the binary coding of the power class associated (see GSM 05.05).

Multi Slot Class
 The Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02. Range 1 to 18, all other values are reserved.

GPRS Multi Slot Class
 The GPRS Multi Slot Class field is coded as the binary representation of the multislot class defined in TS GSM 05.02.

10.5.5.13 Mobile station identity

The purpose of the *mobile station identity* information element is to provide either the international mobile subscriber identity, IMSI, the temporary mobile subscriber identity, TMSI, the Packet-TMSI, P-TMSI, the international mobile equipment identity, IMEI or the international mobile equipment identity together with the software version number, IMEISV.

The P-TMSI is 4 octets long. For further details about the identifies see section 10.5.1.4.

The *mobile station identity* information element is coded as shown in figure 10.107/GSM 04.08 and table 10.108/GSM 04.08.

The *mobile Identity* is a type 4 information element with a minimum length of 3 octets and a maximum length of 11 octets. Further restriction on the length may be applied, e.g. number plans.

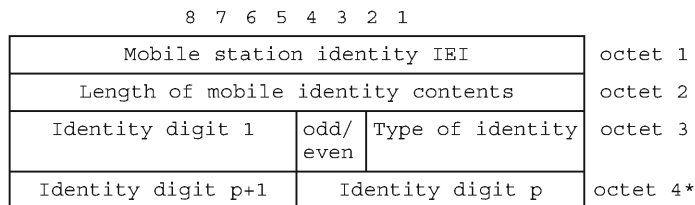


Figure 10.107/GSM 04.08: *Mobile station identity* information element

Table 10.108/GSM 04.08: Mobile station identity information element

Type of identity (octet 3)	
Bits	
3 2 1	
0 0 1	IMSI
0 1 0	IMEI
0 1 1	IMEISV
1 0 0	TMSI
1 1 0	P-TMSI
All other values are reserved.	
Odd/even indication (octet 3)	
Bit	
4	
0	even number of identity digits and also when the TMSI is used
1	odd number of identity digits
Identity digits (octet 3 etc.)	
For the IMSI, IMEI and IMEISV this field is coded using BCD coding. If the number of identity digits is even then bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111".	
If the mobile identity is the TMSI or P-TMSI then bits 5 to 8 of octet 3 are coded as "1111" and bit 8 of octet 4 is the most significant bit and bit 1 of the last octet the least significant bit. The coding of the TMSI or P-TMSI is defined in GSM 03.03.	

10.5.5.14 GMM cause

The purpose of the GMM cause information element is to indicate the reason why a GMM request from the mobile station is rejected by the network.

The GMM cause information element is coded as shown in figure 10.108/GSM 04.08 and table 10.109/GSM 04.08.

The GMM cause is a type 3 information element with 2 octets length.

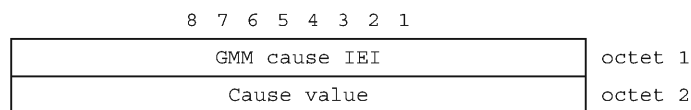


Figure 10.108/GSM 04.08: GMM cause information element

Table 10.109/GSM 04.08: GMM causeinformation element

Cause value (octet 2)		a
Bits		
8	7 6 5 4 3 2 1	
0	0 0 0 0 0 0 1 0	IMSI unknown in HLR
0	0 0 0 0 0 0 1 1	Illegal MS
0	0 0 0 0 1 0 1 1	IMEI not accepted
0	0 0 0 0 1 1 1 0	Illegal ME
0	0 0 0 0 1 1 1 1	GPRS services not allowed
0	0 0 0 0 1 0 0 0	GPRS services and non-GPRS services not allowed
0	0 0 0 0 1 0 0 1	MS identity cannot be derived by the network
0	0 0 0 0 1 0 1 1	PLMN not allowed
0	0 0 0 0 1 1 0 0	Location Area not allowed
0	0 0 0 0 1 1 0 1	Roaming not allowed in this location area
0	0 0 0 1 0 0 0 0	MSC temporarily not reachable
0	0 0 0 1 0 0 0 1	Network failure
0	0 0 0 1 0 1 1 0	Congestion
0	0 0 1 1 0 0 0 0	} retry upon entry into a new cell
0	0 0 1 1 1 1 1 1	
0	1 0 1 1 1 1 1 1	Semantically incorrect message
0	1 1 0 0 0 0 0 0	Invalid mandatory information
0	1 1 0 0 0 0 0 1	Message type non-existent or not implemented
0	1 1 0 0 0 1 0 0	Message type not compatible with the protocol state
0	1 1 0 0 0 1 1 1	Information element non-existent or not implemented
0	1 1 0 0 1 0 0 0	Conditional IE error
0	1 1 0 0 1 0 0 1	Message not compatible with the protocol state
0	1 1 0 1 1 1 1 1	Protocol error, unspecified
Any other value received by the mobile station shall be treated as 0110 1111, 'Protocol error, unspecified'. Any other value received by the network shall be treated as 0110 1111, 'Protocol error, unspecified'.		
NOTE: The listed reject cause values are defined in Annex G.		

10.5.5.15 Routing area identification

The purpose of the *routing area identification* information element is to provide an unambiguous identification of routing areas within the area covered by the GSM system.

The *routing area identification* is a type 3 information element with 7 octets length.

The *routing area identification* information element is coded as shown in figure 10.109/GSM 04.08 and table 10.110/GSM 04.08.

8 7 6 5 4 3 2 1	Routing Area Identification IEI	octet 1
	MCC digit 2 MCC digit 1	octet 2
	1 1 1 1 MCC digit 3	octet 3
	MNC digit 2 MNC digit 1	octet 4
	LAC	octet 5
	LAC cont'd	octet 6
	RAC	octet 7

Figure 10.109/GSM 04.08: Routing area identification information element

Table 10.110/GSM 04.08: Routing area identification information element

MCC, Mobile country code (octet 2 and 3)

The MCC field is coded as in CCITT Rec. E212, Annex A.
If the RAI is deleted, the MCC and MNC shall take the value from the deleted RAI.

In abnormal cases, the MCC stored in the mobile station can contain elements not in the set {0, 1 ... 9}. In such cases the mobile station should transmit the stored values using full hexadecimal encoding. When receiving such an MCC, the network shall treat the RAI as deleted.

MNC, Mobile network code (octet 4)

The coding of this field is the responsibility of each administration but BCD coding shall be used. If an administration decides to include only one digit in the MNC, then bits 5 to 8 of octet 4 are coded as "1111".

Note: GSM 03.03 defines that a 2 digit MNC shall be used, however the possibility to use a one digit MNC in LAI is provided on the radio interface

In abnormal cases, the MNC stored in the mobile station can have digit 1 not in the set {0, 1 ... 9} and/or digit 2 not in the set {0, 1 ... 9, F} hex. In such cases the mobile station should transmit the stored values using full hexadecimal encoding. When receiving such an MNC, the network shall treat the RAI as deleted.

RAC, Routing area code (octet 7)

In the RAC field bit 8 of octet 7 is the most significant. The coding of the routing area code is the responsibility of each administration except that two values are used to mark the RAC, and hence the RAI, as deleted. Coding using full hexadecimal representation may be used. The location area code consists of 2 octets.

If a RAI has to be deleted then all bits of the routing area code shall be set to one with the exception of the least significant bit which shall be set to zero. If a SIM is inserted in a Mobile Equipment with the routing area code containing all zeros, then the Mobile Equipment shall recognise this RAC as part of a deleted RAI.

10.5.5.16 Timer

The purpose of the *timer* information element is to specify GPRS specific timer values, e.g. for the READY and STANDBY timer.

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

The *timer* information element is coded as shown in figure 10.110/GSM 04.08 and table 10.111/GSM 04.08.

ETSI

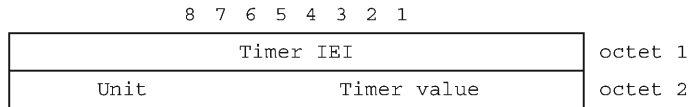


Figure 10.110/GSM 04.08: *Timer value* information element

Table 10.111/GSM 04.08: *Timer value* information element

<p>Timer value (octet 2)</p> <p>Bits 5 to 1 represent the binary coded timer value.</p> <p>Bits 6 to 8 defines the timer value unit for the READY and AA-READY timer as follows:</p> <p>Bits</p> <table style="margin-left: 20px;"> <tr><td style="padding-right: 5px;">8</td><td style="padding-right: 5px;">7</td><td style="padding-right: 5px;">6</td><td></td></tr> <tr><td>0</td><td>0</td><td>0</td><td>value is incremented in steps of 2 seconds</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>value is incremented in steps of 1 minute</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>value indicates that the timer is deactivated.</td></tr> </table> <p>Other values shall be interpreted as incremental steps of 2 seconds in this version of the protocol.</p> <p>Bits 6 to 8 defines the timer value unit for the STANDBY and PRAU timer (periodic routing routing area update timer) as follows:</p> <p>Bits</p> <table style="margin-left: 20px;"> <tr><td style="padding-right: 5px;">8</td><td style="padding-right: 5px;">7</td><td style="padding-right: 5px;">6</td><td></td></tr> <tr><td>0</td><td>0</td><td>0</td><td>value is incremented in steps of decihours</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>value indicates that the timer is deactivated.</td></tr> </table> <p>Other values shall be interpreted as incremental steps of decihours in this version of the protocol.</p>	8	7	6		0	0	0	value is incremented in steps of 2 seconds	0	0	1	value is incremented in steps of 1 minute	1	1	1	value indicates that the timer is deactivated.	8	7	6		0	0	0	value is incremented in steps of decihours	1	1	1	value indicates that the timer is deactivated.
8	7	6																										
0	0	0	value is incremented in steps of 2 seconds																									
0	0	1	value is incremented in steps of 1 minute																									
1	1	1	value indicates that the timer is deactivated.																									
8	7	6																										
0	0	0	value is incremented in steps of decihours																									
1	1	1	value indicates that the timer is deactivated.																									

10.5.5.17 Update result

The purpose of the *update result* information element is to specify the result of the associated updating procedure.

The *update result* is a type 1 information element.

The *update result* information element is coded as shown in figure 10.111/GSM 04.08 and table 10.112/GSM 04.08.

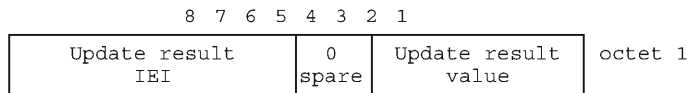


Figure 10.111/GSM 04.08: *Update result* information element

Table 10.112/GSM 04.08: Update result information element

Update result value (octet 1)	
Bits	
3	2 1
0 0 0	RA updated
0 0 1	combined RA/LA updated
All other values are reserved.	

10.5.5.18 Update type

The purpose of the *update type* information element is to specify the area the updating procedure is associated with.

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

The *update type* information element is coded as shown in figure 10.112/GSM 04.08 and table 10.113/GSM 04.08.

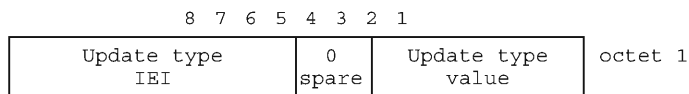


Figure 10.112/GSM 04.08: Update type information element

Table 10.113/GSM 04.08: Update type information element

Update type value (octet 1)	
Bits	
3	2 1
0 0 0	RA updating
0 0 1	combined RA/LA updating
0 1 0	combined RA/LA updating with IMSI attach
0 1 1	Periodic updating
All other values are reserved.	

10.5.5.19 CS connected

The purpose of the *CS connected* information element is to indicate whether or not there is an circuit switched connection established.

The *CS connected* is a type 1 information element.

The *CS connected* information element is coded as shown in figure 10.113/GSM 04.08 and table 10.114/GSM 04.08.

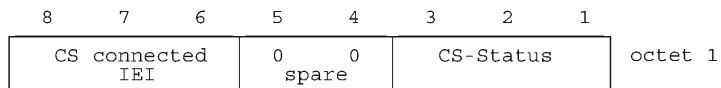


Figure 10.113/GSM 04.08: CS connected information element

Table 10.114/GSM 04.08: CS *connected* information element

<pre> CS status (octet 1) Bits 3 2 1 0 0 1 Dedicated mode 0 1 0 Idle mode All other values are reserved. </pre>
--

10.5.6 Session management information elements

10.5.6.1 Access Point Name

The purpose of the *access point name* information element is to identify the packet data network to which the GPRS user wishes to connect.

The Access Point Name is a label or a full qualified domain name according to DNS naming conventions (see GSM 03.03 [10]).

The *access point name* is a type 4 information element with a minimum length of 3 octets and a maximum length of 255 octets.

The *access point name* information element is coded as shown in figure 10.114/GSM 04.08 and table 10.114a/GSM 04.08; the value part is coded according to 03.03 [10].

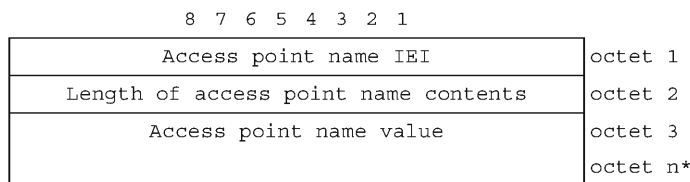


Figure 10.114/GSM 04.08: Access point name information element

Table 10.114a/GSM 04.08: Access point name information element

<pre> < Access point name Value part> := <octet> { <octet> <null> } ; </pre>
--

10.5.6.2 Network service access point identifier

The purpose of the *network service access point identifier* information element is to identify the service access point that is used for the GPRS data transfer at layer 3.

The *network service access point identifier* is a type 3 information element with a length of 2 octets.

The value part of a *network service access point identifier* information element is coded as shown in figure 10.115/GSM 04.08 and table 10.115/GSM 04.08.

8 7 6 5 4 3 2 1			
Protocol configuration options IEI			octet 1
Length of protocol config. options contents			octet 2
1 ext	0 0 0 0 Spare	Configuration protocol	octet 3
Protocol ID 1			octet 4 octet 5
Length of protocol ID 1 contents			octet 6
Protocol ID 1 contents			octet 7 octet m
Protocol ID 2			octet m+1 octet m+2
Protocol ID 2 contents			octet m+4 octet n
. . . .			octet n+1 octet x
Protocol ID n-1			octet x+1 octet x+2
Length of protocol ID n-1 contents			octet x+3
Protocol ID n-1 contents			octet x+4 octet y
Protocol ID n			octet y+1 octet y+2
Length of protocol ID n contents			octet y+3
Protocol ID n contents			octet y+4 octet z

Figure 10.116/GSM 04.08: *Protocol configuration options* information element

Table 10.116/GSM 04.08: *Protocol configuration options* information element

<p>Configuration protocol (octet 3)</p> <p>Bits</p> <p>3 2 1</p> <p>0 0 0 PPP</p> <p>All other values are interpreted as PPP in this version of the protocol.</p> <p>Configuration protocol options list (octets 4 to z)</p> <p>The <i>configuration protocol options list</i> contains a variable number of logical units, the may occur in an arbitrary order within the <i>configuration protocol options list</i>.</p> <p>Each unit is of variable length and consists of a</p> <ul style="list-style-type: none"> - protocol identifier (2 octets); - the length of the protocol identifier contents of the unit (1 octet); and - the protocol identifier contents itself (n octets). <p>The <i>protocol identifier</i> field contains the hexadecimal coding of the configuration protocol identifier as defined in RFC 1700. Bit 8 of the first octet of the <i>protocol identifier</i> field contains the most significant bit and bit 1 of the second octet of the <i>protocol identifier</i> field contains the least significant bit.</p> <p>At least the following protocol identifiers shall be supported in this version of the protocol:</p> <ul style="list-style-type: none"> - C021H (LCP); - C023H (PAP); - C223H (CHAP);and - 8021H (IPCP). <p>The support of other protocol identifiers is implementation dependent and outside the scope of this specification. If the <i>configuration protocol options list</i> contains a protocol identifier that is not supported by the receiving entity the corresponding unit shall be discarded.</p> <p>The <i>length of the protocol identifier contents</i> field contains the binary coded representation of the length of the <i>protocol identifier contents</i> field of a unit. The first bit in transmission order is the most significant bit.</p> <p>The <i>protocol identifier contents</i> field of each unit corresponds to a ‘Packet’ as defined in RFC 1661 that is stripped off the ‘Protocol’ and the ‘Padding’ octets.</p> <p>The detailed coding of the <i>protocol identifier contents</i> field is specified in the RFC that is associated with the protocol identifier of that unit.</p>

10.5.6.4 Packet data protocol address

The purpose of the *packet data protocol address* information element is to identify an address associated with a PDP.

The *packet data protocol address* is a type 4 information element with minimum length of 4 octets and a maximum length of 19 octets.

The *packet data protocol address* information element is coded as shown in figure 10.118/GSM 04.08 and table 10.118/GSM 04.08.

ETSI

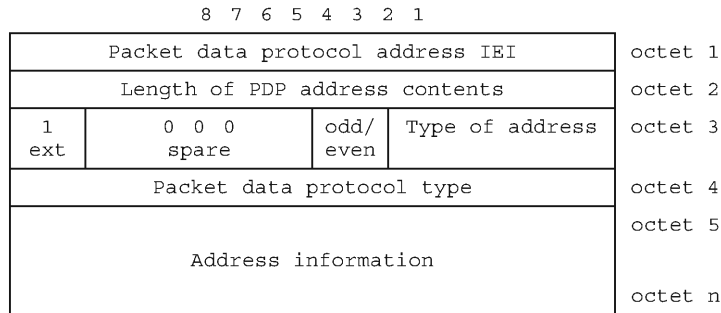


Figure 10.118/GSM 04.08: Packet data protocol address information element

Table 10.118/GSM 04.08: Packet data protocol address information element

<p>Length of PDP address contents (octet 2)</p> <p>If the value of octet 2 indicates that the PDP address information field is empty, dynamic PDP addressing is applied.</p> <p>Type of address (octet 3)</p> <p>Bits</p> <p>3 2 1</p> <p>0 0 0 ETSI specified address (X.121)</p> <p>0 0 1 reserved</p> <p>0 1 0 IETF specified address</p> <p>All other values are reserved.</p> <p>PDP type value (octet 4)</p> <p>Bits</p> <p>8 7 6 5 4 3 2 1</p> <p>0 0 0 0 1 0 0 0 X.25</p> <p>0 0 0 0 0 0 0 1 IPv4</p> <p>0 0 0 0 0 0 1 0 This value shall be interpreted as IPv4 in this version of the protocol</p> <p>All other values are reserved.</p> <p>If Type of address is coded 0 0 0 then odd/even indicator, octet 3</p> <p>Bit</p> <p>4</p> <p>0 even number of X.121 digits</p> <p>1 odd number of X.121 digits</p> <p>If Type of address is coded 0 1 0 then odd/even indicator is spare and shall be coded 0.</p> <p>Octet 3, bit 7, 6 and 5 are spare and shall be coded all 0.</p>
--

If Type of address indicator is coded 0 0 0 the Address information is coded:

ETSI

8 7 6 5 4 3 2 1			
digit 2	digit 1	octet 5	
digit 4	digit 3	octet 6	
digit n+1	digit n	octet n*	

Digit 1 contains the first BCD coded digit of the X.121 address. If the X.121 address has an odd number of digits, the digit n+1 shall be padded with HEX(F).

If Type of address indicator is coded 0 1 0 the Address information octet 5 to octet 8 contain the IP address. Bit 8 of octet 5 represents the most significant bit of the IP address and bit 1 of octet 8 the least significant bit .

10.5.6.5 Quality of service

The purpose of the *quality of service* information element is to specify the QoS parameters for a PDP context.

The *quality of service* is a type 3 information element with 4 octets length.

The *quality of service* information element is coded as shown in figure 10.119/GSM 04.08 and table 10.119/GSM 04.08.

8 7 6 5 4 3 2 1	Quality of service IEI			octet 1	
	0 0 spare	Delay class	Reliability class	octet 2	
	Peak throughput		0 spare	Precedence class	octet 3
	0 0 0 spare	Mean throughput		octet 4	

Figure 10.119/GSM 04.08: *Quality of service* information element

Table 10.119/GSM 04.08: *Quality of service* information element

Reliability class, octet 2 (see GSM 03.60)

Bits

3 2 1

0 0 0 Subscribed reliability class
 0 0 1 Acknowledged GTP, LLC, and RLC; Protected data
 0 1 0 Unacknowledged GTP; Acknowledged LLC and RLC, Protected data
 0 1 1 Unacknowledged GTP and LLC; Acknowledged RLC, Protected data
 1 0 0 Unacknowledged GTP, LLC, and RLC, Protected data
 1 0 1 Unacknowledged GTP, LLC, and RLC, Unprotected data

All other values are interpreted as *Subscribed reliability class* in this version of the protocol.

Delay class, octet 2 (see GSM 02.60 and GSM 03.60)

Bits

6 5 4

0 0 0 Subscribed delay class
 0 0 1 Delay class 1
 0 1 0 Delay class 2
 0 1 1 Delay class 3

1 0 0 Delay class 4 (best effort)

All other values are interpreted as *Subscribed delay class* in this version of the protocol.

Bit 7 and 8 of octet 2 are spare and shall be coded all 0.

Precedence class, octet 3 (see GSM 03.60)

Bits

3 2 1

0 0 0 Subscribed precedence
 0 0 1 High priority
 0 1 0 Normal priority
 0 1 1 Low priority

All other values are interpreted as *Unspecified Subscribed precedence* in this version of the protocol.

Peak throughput, octet 3

Bits

8 7 6 5

0 0 0 0 Subscribed peak throughput
 0 0 0 1 Up to 1 000 octet/s
 0 0 1 0 Up to 2 000 octet/s
 0 0 1 1 Up to 4 000 octet/s
 0 1 0 0 Up to 8 000 octet/s
 0 1 0 1 Up to 16 000 octet/s
 0 1 1 0 Up to 32 000 octet/s
 0 1 1 1 Up to 64 000 octet/s
 1 0 0 0 Up to 128 000 octet/s
 1 0 0 1 Up to 256 000 octet/s

All other values are interpreted as *Subscribed peak throughput* in this version of the protocol.

Mean throughput, octet 4

Bits

5 4 2 3 1

0 0 0 0 0 Subscribed mean throughput
 0 0 0 0 1 100 octet/h
 0 0 0 1 0 200 octet/h
 0 0 0 1 1 500 octet/h
 0 0 1 0 0 1 000 octet/h
 0 0 1 0 1 2 000 octet/h
 0 0 1 1 0 5 000 octet/h
 0 0 1 1 1 10 000 octet/h
 0 1 0 0 0 20 000 octet/h
 0 1 0 0 1 50 000 octet/h
 0 1 0 1 0 100 000 octet/h
 0 1 0 1 1 200 000 octet/h
 0 1 1 0 0 500 000 octet/h
 0 1 1 0 1 1 000 000 octet/h
 0 1 1 1 0 2 000 000 octet/h

ETSI

10.5.6.6 SM cause

The purpose of the *SM cause* information element is to indicate the reason why a session management request is rejected.

The *SM cause* is a type 3 information element with 2 octets length.

The *SM cause* information element is coded as shown in figure 10.120/GSM 04.08 and table 10.120/GSM 04.08.

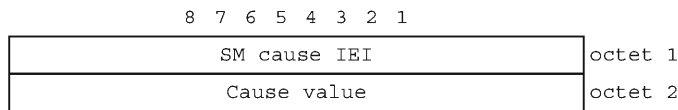


Figure 10.120/GSM 04.08: *SM cause* information element

Table 10.120/GSM 04.08: *SM cause* information element

Cause value (octet 2)	
Bits	
8 7 6 5 4 3 2 1	
0 0 0 1 1 0 1 0	Insufficient resources
0 0 0 1 1 0 1 1	Missing or unknown APN
0 0 0 1 1 1 0 0	Unknown PDP address or PDP type
0 0 0 1 1 1 0 1	User Aauthentication failed
0 0 0 1 1 1 1 0	Activation rejected by GGSN
0 0 0 1 1 1 1 1	Activation rejected, unspecified
0 0 1 0 0 0 0 0	Service option not supported
0 0 1 0 0 0 0 1	Requested service option not subscribed
0 0 1 0 0 0 1 0	Service option temporarily out of order
0 0 1 0 0 0 1 1	NSAPI already used
0 0 1 0 0 1 0 0	Regular deactivation
0 0 1 0 0 1 0 1	QoS not accepted
0 0 1 0 0 1 1 0	Network failure
0 0 1 0 0 1 1 1	Reactivation required
0 1 0 1 1 1 1 1	Semantically incorrect message
0 1 1 0 0 0 0 0	Invalid mandatory information
0 1 1 0 0 0 0 1	Message type non-existent or not implemented
0 1 1 0 0 0 1 0	Message type not compatible with the protocol state
0 1 1 0 0 0 1 1	Information element non-existent or not implemented
0 1 1 0 0 1 0 0	Conditional IE error
0 1 1 0 0 1 0 1	Message not compatible with the protocol state
0 1 1 0 1 1 1 1	Protocol error, unspecified
Any other value received by the mobile station shall be treated as 0010 0010, 'Service option temporarily out of order'. Any other value received by the network shall be treated as 0110 1111, 'Protocol error, unspecified'.	
NOTE: The listed cause values are defined in Annex I	

10.5.6.7 Spare

This is intentionally left spare.

ETSI

10.5.6.8 AA deactivation cause

The purpose of the *AA deactivation cause* information element is to indicate the reason why a AA PDP context was deactivated by the network.

The *AA deactivation cause* information element is coded as shown in figure 10.122/GSM 04.08 and table 10.122/GSM 04.08.

The *AA deactivation cause* is a type 1 information element.

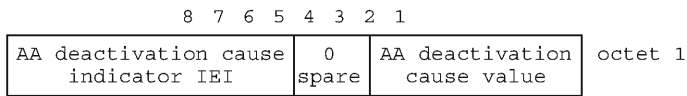


Figure 10.122/GSM 04.08: *AA deactivation cause* information element

Table 10.122/GSM 04.08: *AA deactivation cause* information element

AA deactivation cause value (octet 1)	
Bits	
3 2 1	
0 0 0	Normal, unspecified
0 0 1	Server address violation
0 1 0	Network overload
0 1 1	Server not reachable
All other values are interpreted as <i>Normal, unspecified</i> by this version of the protocol.	

10.5.6.9 LLC service access point identifier

The purpose of the *LLC service access point identifier* information element is to identify the service access point that is used for the GPRS data transfer at LLC layer.

The *network service access point identifier* is a type 3 information element with a length of 2 octets.

The value part of a *LLC service access point identifier* information element is coded as shown in figure 10.123/GSM 04.08 and table 10.123/GSM 04.08.

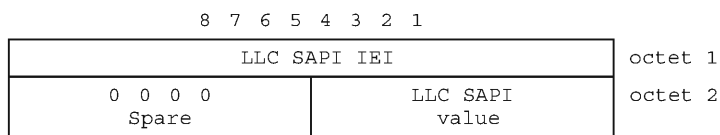


Figure 10.123/GSM 04.08: *LLC service access point identifier* information element

Table 10.123/GSM 04.08: LLC service access point identifier information element

LLC SAPI value (octet 2)	
Bit	
4 3 2 1	
0 0 1 1	SAPI 3
0 1 0 1	SAPI 5
1 0 0 1	SAPI 9
1 0 1 1	SAPI 11
All other values are reserved.	

10.5.6.10 Radio priority level

The purpose of the *radio priority level* 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.

The *radio priority level* information element is coded as shown in figure 10.124/GSM 04.08 and table 10.124/GSM 04.08.

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

	8 7 6 5 4 3 2 1	
	Radio priority level IEI	0 spare
	Radio priority level value	octet 1

Figure 10.124/GSM 04.08: Radio priority level information element**Table 10.124/GSM 04.08: Radio priority level 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.	

11 List of system parameters

The description of timers in the following table should be considered a brief summary. The precise details are found in sections 3 to 6, which should be considered the definitive descriptions.

11.1 Timers and counters for radio resource management

11.1.1 Timers on the mobile station side

T3122: This timer is used during random access, after the receipt of an IMMEDIATE ASSIGN REJECT message.

Its value is given by the network in the IMMEDIATE ASSIGN REJECT message.

- T3124:** This timer is used in the seizure procedure during a hand-over, when the two cells are not synchronized.
- Its purpose is to detect the lack of answer from the network to the special signal.
- Its value is set to 675 ms if the channel type of the channel allocated in the HANDOVER COMMAND is an SDCCH (+ SACCH); otherwise its value is set to 320 ms.
- T3126:** This timer is started either
- after sending the maximum allowed number of CHANNEL REQUEST messages during an immediate assignment procedure.
- or
- on receipt of an IMMEDIATE ASSIGNMENT REJECT message,
- whichever occurs first.
- It is stopped at receipt of an IMMEDIATE ASSIGNMENT message, or an IMMEDIATE ASSIGNMENT EXTENDED message.
- At its expiry, the immediate assignment procedure is aborted.
- The minimum value of this timer is equal to the time taken by T+2S slots of the mobile station's RACH. S and T are defined in section 3.3.1.2. The maximum value of this timer is 5 seconds.
- T3128:** This timer is started when the mobile station starts the uplink investigation procedure and the uplink is busy.
- It is stopped at receipt of the first UPLINK FREE message.
- At its expiry, the uplink investigation procedure is aborted.
- The value of this timer is set to 1 second.
- T3130:** This timer is started after sending the first UPLINK ACCESS message during a VGCS uplink access procedure.
- It is stopped at receipt of a VGCS ACCESS GRANT message.
- At its expiry, the uplink access procedure is aborted.
- The value of this timer is set to 5 seconds.
- T3110:** This timer is used to delay the channel deactivation after the receipt of a (full) CHANNEL RELEASE. Its purpose is to let some time for disconnection of the main signalling link.
- Its value is set to such that the DISC frame is sent twice in case of no answer from the network. (It should be chosen to obtain a good probability of normal termination (i.e. no time out of T3109) of the channel release procedure.)
- T3132:** This timer is used in the seizure procedure during the assignment to PDCH procedure. Its purpose is to detect the lack of a suitable PDCH.
- Its value is set to 1 second.
- T3134:** This timer is used in the seizure procedure during an RR network commanded cell change order procedure. Its purpose is to detect the lack of answer from the network or the lack of availability of the target cell.
- Its value is set to 5 seconds.
- T3142:** The timer is used during packet access on CCCH, after the receipt of an IMMEDIATE ASSIGNMENT REJECT message.

Its value is given by the network in the IMMEDIATE ASSIGNMENT REJECT message.

T3146: This timer is started either
after sending the maximum allowed number of CHANNEL REQUEST messages during a packet access procedure.

or

on receipt of an IMMEDIATE ASSIGNMENT REJECT message during a packet access procedure,

whichever occurs first.

It is stopped at receipt of an IMMEDIATE ASSIGNMENT message, or an IMMEDIATE ASSIGNMENT EXTENDED message.

At its expiry, the packet access procedure is aborted.

The minimum value of this timer is equal to the time taken by T+2S slots of the mobile station's RACH. S and T are defined in section 3.3.1.2. The maximum value of this timer is 5 seconds.

T3164: This timer is used during packet access using CCCH. It is started at the receipt of an IMMEDIATE ASSIGNMENT message.

It is stopped at the transmission of a RLC/MAC block on the assigned temporary block flow, see GSM 04.60.

At expiry, the mobile station returns to the packet idle mode.

The value of the timer is 5 seconds.

T3190: The timer is used during packet downlink assignment on CCCH. It is started at the receipt of an IMMEDIATE ASSIGNMENT message.

It is stopped at the receipt of a RLC/MAC block on the assigned temporary block flow, see GSM 04.60.

At expiry, the mobile station returns to the packet idle mode.

The value of the timer is 5 seconds.

11.1.2 Timers on the network side

T3101: This timer is started when a channel is allocated with an IMMEDIATE ASSIGNMENT message. It is stopped when the MS has correctly seized the channels.

Its value is network dependent.

NOTE: It could be higher than the maximum time for a L2 establishment attempt.

T3103: This timer is started by the sending of a HANDBOVER message and is normally stopped when the MS has correctly seized the new channel. Its purpose is to keep the old channels sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the HANDBOVER COMMAND, plus the value of T3124, plus the maximum duration of an attempt to establish a data link in multiframe mode.)

T3105: This timer is used for the repetition of the PHYSICAL INFORMATION message during the hand-over procedure.

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Its value is network dependent.

NOTE: This timer may be set to such a low value that the message is in fact continuously transmitted.

T3107: This timer is started by the sending of an ASSIGNMENT COMMAND message and is normally stopped when the MS has correctly seized the new channels.

Its purpose is to keep the old channel sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the ASSIGNMENT COMMAND message plus twice the maximum duration of an attempt to establish a data link multiframe mode.

T3109: This timer is started when a lower layer failure is detected by the network, when it is not engaged in a RF procedure. It is also used in the channel release procedure.

Its purpose is to release the channels in case of loss of communication.

Its value is network dependent.

NOTE: Its value should be large enough to ensure that the MS detects a radio link failure.

T3111: This timer is used to delay the channel deactivation after disconnection of the main signalling link. Its purpose is to let some time for possible repetition of the disconnection.

Its value is equal to the value of T3110.

T3113: This timer is started when the network has sent a PAGING REQUEST message and is stopped when the network has received the PAGING RESPONSE message.

Its value is network dependent.

NOTE: The value could allow for repetitions of the Channel Request message and the requirements associated with T3101.

T3115: This timer is used for the repetition of the VGCS UPLINK GRANT message during the uplink access procedure.

Its value is network dependent.

NOTE: This timer may be set to such a low value that the message is in fact continuously transmitted.

T3117: This timer is started by the sending of a PDCH ASSIGNMENT COMMAND message and is normally stopped when the MS has correctly accessed the target TBF.

Its purpose is to keep the old channel sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the PDCH ASSIGNMENT COMMAND message plus T3132 plus the maximum duration of an attempt to establish a data link in multiframe mode.

T3119: This timer is started by the sending of a RR-CELL CHANGE ORDER message and is normally stopped when the MS has correctly accessed the new cell. Its purpose is to keep the old channels sufficiently long for the MS to be able to return to the old channels, and to release the channels if the MS is lost.

Its value is network dependent.

NOTE: It could be higher than the maximum transmission time of the RR_CELL CHANGE ORDER, plus T3134, plus the maximum duration of an attempt to establish a data link in multiframe mode.

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T3141: This timer is started when a temporary block flow is allocated with an IMMEDIATE ASSIGNMENT message during a packet access procedure. It is stopped when the mobile station has correctly seized the temporary block flow.

Its value is network dependent.

11.1.3 Other parameters

Ny1: The maximum number of repetitions for the PHYSICAL INFORMATION message during a handover (see section 3.4.4.2.2). The value is network dependent.

Ny2: The maximum number of repetitions for the VGCS UPLINK GRANT message during an uplink access procedure (see section 3.3.1.2.2). The value is network dependent.

11.2 Timers of mobility management

Table 11.1/GSM 04.08: Mobility management timers - MS-side

TIMER NUM.	MM STATE	TIME OUT VAL.	CAUSE FOR START	NORMAL STOP	AT THE EXPIRY
T3210	3	20s	-LOC_UPD_REQ sent	- LOC_UPD_ACC - LOC_UPD_REJ - AUTH_REJ - Lower layer failure	Start T3211
T3211	1 2	15s	-LOC_UPD_REJ with cause #17 netw. failure -lower layer failure or RR conn. released after RR conn. abort during loc. updating	- Time out - cell change - request for MM connection establishment - change of LA	Restart the Location update proc.
T3212	1, 2	Note 1	-termination of MM service or MM signalling	-initiation of MM service or MM signalling	initiate periodic updating
T3213	1 2 11	4s	-location updating failure	- expiry - change of BCCH parameter	new random attempt
T3220	7	5s	-IMSI DETACH	- release from RM-sublayer	enter Null or Idle, ATTEMPTING TO UPDATE
T3230	5	15s	-CM SERV REQ CM REEST REQ	- Cipher mode setting - CM SERV REJ - CM SERV ACC	provide release ind.
T3240	9 10	10s	see section 11.2.1	see section 11.2.1	abort the RR connection

NOTE 1: The timeout value is broadcasted in a SYSTEM INFORMATION message

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Table 11.2/GSM 04.08: Mobility management timers - network-side

TIMER NUM.	MM ST AT	TIME OUT VAL.	CAUSE FOR START	NORMAL STOP	AT THE FIRST EXPIRY	AT THE SECOND EXPIRY
T3250	6	12s	TMSI-REAL-CMD or LOC UPD ACC with new TMSI sent	TMSI-REAL-COM received	Optionally Release RR connection	
T3255		Note	LOC UPD ACC sent with "Follow on Proceed"	CM SERVICE REQUEST	Release RR Connection or use for mobile station terminating call	
T3260	5	12s	AUTHENT-REQUEST sent	AUTHENT-RESPONSE received	Optionally Release RR connection	
T3270	4	12s	IDENTITY REQUEST sent	IDENTITY RESPONSE received	Optionally Release RR connection	

NOTE 2: The value of this timer is not specified by this recommendation.

11.2.1 Timer T3240

Timer T3240 is started in the mobile station when:

- the mobile station receives a LOCATION UPDATING ACCEPT message completing a location updating procedure in the cases specified in section 4.4.4.6 and 4.4.4.8;
- the mobile station receives a LOCATION UPDATING REJECT message in the cases specified in section 4.4.4.7;
- the mobile station has sent a CM SERVICE ABORT message as specified in section 4.5.1.7;
- the mobile station has released or aborted all MM connections in the cases specified in 4.3.2.5, 4.3.5.2, 4.5.1.1, and 4.5.3.1.

Timer T3240 is stopped, reset, and started again at receipt of an MM message.

Timer T3240 is stopped and reset (but not started) at receipt of a CM message that initiates establishment of an CM connection (an appropriate SETUP, REGISTER, or CP-DATA message as defined in GSM 04.08, GSM 04.10 or GSM 04.11).

11.2.2 Timers of GPRS mobility management

Table 11.2a/GSM 04.08: GPRS Mobility management timers - MS side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1 st , 2 nd , 3 rd , 4 th EXPIRY
T3302	T3212 Note 4	GMM-DEREG or GMM-REG	At attach failure and the attempt counter is greater than or equal to 4 At routing area updating failure and the attempt counter is equal to 4	At successful attach At successful routing area updating	On every expiry, initiation of the GPRS attach procedure
T3310	15s	GMM-REG-INIT	ATTACH REQ sent	ATTACH ACCEPT received	Retransmission of ATTACH REQ
T3311	15s	GMM-DEREG or GMM-REG	ATTACH REJ with other cause values as described in chapter 'GPRS Attach' ROUTING AREA UPDATE REJ with other cause values as described in chapter 'Routing Area Update' Low layer failure	Change of the routing area	Restart of the Attach or the RAU procedure
T3312	Default 54 min Note1	GMM-REG	At successful completion of a periodic RA updating At start of the STANDBY timer	When entering state GMM-DEREG	Initiation of the Periodic RAU procedure
T3321	15s	GMM-DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of the message
T3330	15s	GMM-ROUTING-UPDATING-INITIATED	ROUTING AREA UPDATE REQUEST sent	ROUTING AREA UPDATE ACC received ROUTING AREA UPDATE REJ received	Retransmission of the ROUTING AREA UPDATE REQUEST message
T3314 READY	Default 32 sec Note 2	All except GMM-NULL	Transmission of a PTP PDU	Forced to Standby	Start of the STANDBY timer
T3315 STANDBY	Default 60 min Note 2	All except GMM-NULL	READY timer expiry Forced to standby	Transmission of a PTP PDU	Transition to state GMM-NULL
T3316 AA-READY	Default 32 sec Note 2	-	Transmission of a PTP PDU	-	-

NOTE 1: The value of this timer is used if the network does not indicate another value in a GMM signalling procedure.

NOTE 2: The default value of this timer is used if the MS does not request another value in a signalling procedure.

NOTE 3: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

NOTE 4: T3302 is loaded with the same value which is used to load T3212.

Table 11.2b/GSM 04.08: GPRS Mobility management timers - network side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1 st , 2 nd , 3 rd , 4 th EXPIRY
T3313	Note 1	GMM-REG	Paging procedure initiated	Paging procedure completed	Network dependent
T3322	8s	GMM- DEREG-INIT	DETACH REQ sent	DETACH ACCEPT received	Retransmission of DETACH REQUEST
T3350	8s	GMM- COMMON- PROC-INIT	ATTACH ACCEPT sent with P-TMSI and/or TMSI RAU ACCEPT sent with P-TMSI and/or TMSI P-TMSI REALLOC COMMAND sent	ATTACH COMPLETE received RAU COMPLETE received P-TMSI REALLOC COMPLETE received	Retransmission of the same message type, i.e. ATTACH ACCEPT, RAU ACCEPT or REALLOC COMMAND
T3360	8s	GMM- COMMON- PROC-INIT	AUTH AND CIPH REQUEST sent	AUTH AND CIPH RESPONSE received	Retransmission of AUTH AND CIPH REQUEST
T3370	8s	GMM- COMMON- PROC-INIT	IDENTITY REQUEST sent	IDENTITY RESPONSE received	Retransmission of IDENTITY REQUEST
T3314 READY	Default 32 sec Note 2	All except GMM- DEREG	Receipt of a PTP PDU	Forced to Standby	Start of STANDBY timer
T3315 STANDBY	Default 60 min Note 23	All except GMM- DEREG	READY timer expiry Forced to standby	PTP PDU received	Transition to state GMM-DEREG
T3316 AA- READY	Default 32 sec Note 2	-	Receipt of a PTP PDU	-	-
Mobile Reachable	Default 4 min greater than T3312	All except GMM- DEREG	Change from READY to STANDBY state or Gb interface RESUME message	PTP PDU received or Gb interface SUSPEND message	Network dependent but typically paging is halted on 1st expiry.

NOTE 1: The value of this timer is network dependent.

NOTE 2: The default value of this timer is used if the MS does not request another value in a signalling procedure.

NOTE 3: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

11.2.3 Timers of session management

Table 11.2c/GSM 04.08: Session management timers - MS side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1 st , 2 nd , 3 rd , 4 th EXPIRY
T3380	30s	PDP-ACTIVE-PEND	ACTIVATE PDP CONTEXT REQUEST sent	ACTIVATE PDP CONTEXT ACCEPT received ACTIVATE PDP CONTEXT REJECT received	Retransmission of ACTIVATE PDP CONTEXT REQ
T3390	8s	PDP-INACT-PEND	DEACTIVATE PDP CONTEXT REQUEST sent	DEACTIVATE PDP CONTEXT ACC received	Retransmission of DEACTIVATE PDP CONTEXT REQUEST

NOTE: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

Table 11.2d/GSM 04.08: Session management timers - network side

TIMER NUM.	TIMER VALUE	STATE	CAUSE OF START	NORMAL STOP	ON THE 1 st , 2 nd , 3 rd , 4 th EXPIRY
T3385	8s	PDP-ACT-PEND	REQUEST PDP CONTEXT ACTIVATION sent	ACTIVATE PDP CONTEXT REQ received	Retransmission of REQUEST PDP CONTEXT ACTIVATION
T3386	8s	PDP-MOD-PEND	MODIFY PDP CONTEXT REQUEST sent	MODIFY PDP CONTEXT ACC received	Retransmission of MODIFY PDP CONTEXT REQ
T3395	8s	PDP-INACT-PEND	DEACTIVATE PDP CONTEXT REQUEST sent	DEACTIVATE PDP CONTEXT ACC received	Retransmission of DEACTIVATE PDP CONTEXT REQ
T3397	8s	PDP-INACT-PEND	DEACTIVATE AA PDP CONTEXT REQUEST sent	DEACTIVATE AA PDP CONTEXT ACCEPT received	Retransmission of DEACTIVATE AA PDP CONTEXT REQUEST

NOTE: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.

11.3 Timers of circuit-switched call control

Table 11.3/GSM 04.08: Call control timers - MS side

TIM. NUM.	TIM VAL	STATE OF CALL	CAUSE OF START	NORMAL STOP	AT FIRST EXPIRY	AT SECOND EXPIRY
T303	30s	Call initiated	CM SER RQ sent	CALL PROC, or REL COMP received	Clear the call	Timer is not restarted
T305	30s	Disconnect Request	DISC sent	REL or DISC received	REL sent.	Timer is not restarted
T308	30s	Release request	REL sent	REL COMP or REL received	Retrans. RELEASE restart T308	Call ref. release
T310 Note 1	30s	Outgoing call Proceeding	CALL PROC received	ALERT, CONN, DISC or PROG rec.	Send DISC	Timer is not restarted
T313	30s	Connect Request	CONN sent	CONNect ACKnowledge received	Send DISC	Timer is not restarted
T323	30s	Modify Request	MOD sent	MOD COMP or MOD REJ received	Clear the call	Timer is not restarted
T332	30s	Wait for network info.	START_CC sent	CC-EST. received	Clear the call	Timer is not restarted
T334	30s	CC-Est. Confirmed	CC-EST CONF. sent	RECALL received	Clear the call	Timer is not restarted

NOTE 1: T310 is not started if progress indicator #1, #2, or #64 has been delivered in the CALL PROCEEDING message or in a previous PROGRESS message.

Table 11.4/GSM 04.08: Call control timers - network side

TIM. NUM.	DFT TIM VAL	STATE OF CALL	CAUSE FOR START	NORMAL STOP	AT FIRST EXPIRY	AT SECON EXPIRY
T301 Note 1	Min 180s	Call received	ALERT received	CONN received	Clear the call	Timer is not restarted
T303	Note 2	Call present	SETUP sent	CALL CONF or REL COMP received	Clear the call	Timer is not restarted
T305	30s	Disconnect Indication	DISC without progress indic. #8 sent or CCBS Possible	REL or DISC received	Network sends RELEASE	Timer is not restarted
T306	30s	Disconnect Indication	DISC with progress indic. #8 sent but no CCBS possible	REL or DISC received	Stop the tone/announc. Send REL	Timer is not restarted
T308	Note 2	Release request	REL sent	REL COMP or REL received	Retrans. RELEASE restart T308	Release call reference
T310	Note 2	Incoming call proceeding	CALL CONF received	ALERT, CONN or DISC received	Clear the call	Timer is not restarted
T313	Note 2	Connect Indication	CON sent	CON ACK received	Clear the call	Timer is not restarted
T323	30s	Modify request	MOD sent	MOD COMP or MOD REJ received	Clear the call	Timer is not restarted
T331	Note 2	CC Connec. Pending	CM-SERV PROMPT sent	START CC received	Clear the call	Timer is not restarted
T333	Note 2	CC-Est. Present	START CC received	CC-EST.CONF or REL COMP received	Clear the call	Timer is not restarted
T334	Min 15s	CC-Est. Confirmed	RECALL sent	SETUP received	Clear the call	Timer is not restarted
T338	Note 2	Disconnect indication	DISC with CCBS possible	REL or DISC received	stop any tone/announc. Send REL	Timer is not restarted

NOTE 1: The network may already have applied an internal alerting supervision function; e.g. incorporated within call control. If such a function is known to be operating on the call, then timer T301 is not used.

NOTE 2: These time values are set by the network operator.

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Annex A (informative): Example of subaddress information element coding

This annex is informative.

This annex gives an example of how the Called Party Subaddress IE is encoded to carry subaddress digits that use IA5 characters. This example is also applicable to the Calling Party Subaddress IE.

8	7	6	5	4	3	2	1	octet
0	1	1	0	1	1	0	1	1
called party subaddress IEI								
0	0	0	0	0	1	1	1	2
Length								
1 not ext	0	0	0	X	0	0	0	3
NSAP (X.213/ISO 8348 AD2)		odd/ev note 1		note 2				
0	1	0	1	0	0	0	0	4
AFI (note 3)								
IA5 Character (note 4)								5
IA5 Character (note 4)								6
IA5 Character (note 4)								9, note 5

NOTE 1: The value of this bit has no significance when the type of subaddress is "NSAP".

NOTE 2: These bits are spare.

NOTE 3: The Authority and Format Identifier code 50 (in BCD) indicates that the subaddress consists of IA5 characters (see ISO standard 8348 AD2).

NOTE 4: IA5 character as defined in CCITT Recommendation T.50/ISO 646 and then encoded into two semi-octets according to the "preferred binary encoding" defined in X.213/ISO 8348 AD2. (Each character is converted into a number in the range 32 to 127 using the ISO 646 encoding with zero parity and the parity bit in the most significant position. This number is then reduced by 32 to give a new number in the range 0 to 95. The new number is then treated as a pair of decimal digits with the value of each digit being encoded in a semi-octet.)

NOTE 5: the number of IA5 characters in the subaddress may vary, subject to an upper limit of 19 IA5 characters.

Annex B (normative): Compatibility checking

This annex is normative.

B.1 Introduction

This annex describes the various compatibility checks which shall be carried out to ensure that the best matched MS and network capabilities are achieved on a call between a PLMN and the ISDN.

Three different processes of compatibility checking shall be performed:

- i) at the user-to-network interface on the calling side (see B.2);
- ii) at the network-user interface on the called side (see B.3.2);
- iii) user-to-user (see B.3.3).

NOTE: In this context and throughout this annex the term "called user" is the end point entity which is explicitly addressed.

For details on the coding of the information required for compatibility checking, see annex C.

B.2 Calling side compatibility checking

B.2.1 Compatibility checking of the CM SERVICE REQUEST message

The network shall check if the service requested in the CM SERVICE REQUEST message is permitted for that subscriber.

B.2.2 Compatibility/Subscription checking of the SETUP message

At the calling side the network shall check that the basic service(s) requested by the calling MS in the Bearer Capability information element(s) match(es) with the basic services provided to that subscriber by the PLMN. If for at least one bearer capability information element contained in the SETUP message a mismatch is detected, then the network shall proceed as follows:

- if the SETUP message contained two bearer capability information elements for only one of which a mismatch is detected, the network shall either:
 - under the conditions specified in GSM 07.01 (e.g. TS 61 and TS 62), accept the SETUP message with a CALL PROCEEDING message containing the, possibly negotiated, bearer capability information element for which no mismatch is detected, or
 - reject the call using one of the causes listed in annex H.
- otherwise the network shall reject the call using one of the causes listed in annex H.

Network services are described in GSM 02.02 and GSM 02.03 as bearer services and teleservices, respectively.

B.3 Called side compatibility checking

In this section, the word "check" means that the MS examines the contents of the specified information element.

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B.3.1 Compatibility checking with addressing information

If an incoming SETUP message is offered to the MS with addressing information (i.e. sub-address or called party number) the following shall occur:

- a) if the MS has a DDI number or a sub-address, then the information in any Called Party BCD Number or any Called Party subaddress information elements of the incoming SETUP message shall be checked by the MS against the corresponding part of the number assigned to the user (e.g. for DDI) or the user's own sub-address.

In the cases of a mismatch, the MS shall release the call. In the case of a match, the compatibility checking described in B.3.2 and B.3.3 shall be performed.

- b) if the MS has no DDI number and no sub-address, then the Called Party BCD Number and Called Party Sub-address information element shall be ignored for the purposes of compatibility checking. The compatibility checking described in B.3.2 and B.3.3 shall be performed.

NOTE: According to the user's requirements, compatibility checking can be performed in various ways from the viewpoint of execution order and information to be checked, e.g. first DDI number/sub-address and then bearer capability or vice versa.

B.3.2 Network-to-MS compatibility checking

When the network is providing a basic service at the called side, the MS shall check that the basic service(s) offered by the network in the Bearer Capability information element(s) match(es) the basic services that the MS is able to support. If a mismatch is detected, then the MS shall proceed as follows:

- if the SETUP message contained two bearer capability information elements for only one of which a mismatch is detected, the MS shall either:
 - under the conditions specified in GSM 07.01 (e.g. TS 61 and TS 62), accept the SETUP message with a CALL CONFIRMED message containing the, possibly negotiated, bearer capability information element for which no mismatch is detected, or
 - reject the call using cause No. 88 "incompatible destination".
- otherwise the MS shall reject the offered call using a RELEASE COMPLETE message with cause No. 88 "incompatible destination".

When interworking with existing networks, limitations in network or distant user signalling (e.g. in the case of an incoming call from a PSTN or a call from an analogue terminal) may restrict the information available to the called MS in the incoming SETUP message (e.g. missing Bearer Capability Information Element or missing High Layer Compatibility Information Element). For compatibility checking, and handling of such calls see GSM 07.01.

B.3.3 User-to-User compatibility checking

See GSM 07.01.

B.4 High layer compatibility checking

See GSM 07.01.

Annex C (normative): Low layer information coding principles

This annex is normative.

C.1 Purpose

This annex describes principles that shall be used when the calling MS specifies information during call setup regarding low layer capabilities required in the network and by the destination terminal. Refer also to GSM 07.01.

NOTE: In this context and throughout this annex the term "called user" is the end point entity which is explicitly addressed. This may also be an explicitly addressed interworking unit (IWU) (see CCITT I.500-Series Recommendations and CCITT Recommendation X.31 case a).

C.2 Principles

C.2.1 Definition of types of information

There are three different types of information that the calling PLMN user may specify during call setup to identify low layer capabilities needed in the network and in the destination terminal:

- a) type I information is information about the calling terminal which is only used at the destination end to allow a decision regarding terminal compatibility. An example would be the user information layer 3 protocol. Type I information is encoded in octets 5 to 7 of the low layer compatibility information element;
- b) type II information is only used by the network (PLMN) to which the calling user is connected for selection of PLMN specific network resources, e.g. channel type or specific functionality within the interworking function (IWF, see TS 09.07). This type of information is always present. An example is the connection element. Type II information is coded in:
 - i) octet 3 of the bearer capability information element when the information transfer capability required by the calling user is speech ;
 - ii) octets 3, 4, 5, and optionally octet 7 of the bearer capability information element when the information transfer capability required by the calling user is not speech;
- c) type III information is required for selection of a basic service from the choice of basic services offered by the network and together with type II information for selection of an appropriate interworking function (IWF, see GSM 09.07), as well as for terminal compatibility checking at the destination terminal . An example is the information transfer capability. Type III information is always present and is encoded in:
 - i) octet 3 of the bearer capability information element when the information transfer capability required by the calling user is speech ;
 - ii) octets 3, 5, 6, 6a, 6b and 6c of the bearer capability information element when the information transfer capability required by the calling user is not speech;

C.2.2 Examination by network

Type I information is user-to-user (i.e. at the calling side not examined by network) while type II and III information should be available for examination by the destination user and the network.

NOTE: In the case of a mobile terminated call, if the type II and type III information is not sufficient for the selection of an appropriate interworking function, the type I information will also be examined by the network.

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C.2.3 Location of type I information

Type I information (i.e. terminal information only significant to the called user) shall, when used, be included in the low layer compatibility information element.

C.2.4 Location of types II and III information

Type II information is included in the bearer capability information element. Type III information is also included in the bearer capability information element. The network may use and modify type III information (e.g. to provide interworking).

In any case a modification of the bearer capability information element has to be performed when interworking to the fixed network (e.g. ISDN) is required, where the signalling of the radio interface has to be mapped to fixed network signalling (e.g. mapping of GSM BCIE to ISDN BCIE, see GSM 09.07).

C.2.5 Relationship between bearer capability and low layer compatibility information elements

There shall be no contradiction of information between the low layer compatibility and the bearer capability at the originating side. However, as some bearer capability code points may be modified during the transport of the call (e.g. by the interworking function), this principle implies that there should be minimal duplication of information between the bearer capability information element and the low layer compatibility information element.

NOTE: If as a result of duplication, a contradiction occurs at the terminating side between the bearer capability information element and the low layer compatibility information element at the terminating side, the receiving entity shall ignore the conflicting information in the low layer compatibility information element.

Annex D (informative): Examples of bearer capability information element coding

This annex is informative.

This annex gives examples of the coding of bearer capability information elements for various telecommunication services. This annex is included for information purposes only. In the case of any inconsistency between this annex and GSM 07.01 then GSM 07.01 shall take precedence over this annex.

D.1 Coding for speech for a full rate support only mobile station

D.1.1 Mobile station to network direction

8	7	6	5	4	3	2	1	
0	0	0	0	0	1	0	0	octet 1
Bearer capability IEI								
0	0	0	0	0	0	0	1	octet 2
Length of the bearer capability contents								
1 not ext	0 full rate only	1	0 GSMá	0 circ. mode	0	0	0	octet 3

D.1.2 Network to mobile station direction

8	7	6	5	4	3	2	1	
0	0	0	0	0	1	0	0	octet 1
Bearer capability IEI								
0	0	0	0	0	0	0	1	octet 2
Length of the bearer capability contents								
1 not ext	0 spare	1 spare	0 GSMá	0 circ. mode	0	0	0	octet 3

D.2 An example of a coding for modem access with V22-bis, 2.4 kbit/s, 8 bit no parity

D.2.1 Mobile station to network direction, data compression allowed

8	7	6	5	4	3	2	1	
0	0	0	0	0	1	0	0	octet 1
Bearer capability IEI								
0	0	0	0	0	1	1	1	octet 2
Length of the bearer capability contents								
1 not ext	1 dual, preferred	0	0	0	0	1	0	octet 3
3.1 kHz audio ex PLMN								
1 not ext	1 comp- ress.	0	0	1	0	0	0	octet 4
SDU integrity full dupl. pt to pt no NIRR de-mand								
1 not ext	0	0	0	0	0	0	1	octet 5
access id. no rate adaption I.440/450								
0 ext	0	1	0	0	0	0	1	octet 6
layer 1 default layer 1 async								
0 ext	0	0	1	0	0	1	1	octet 6a
1 bit no neg 8 bits 2.4 kbit/s								
0 ext	1	1	0	0	0	1	1	octet 6b
16 kbit/s inter. rate no NICTx no NICrx (parity) none								
1 not ext	0	1	0	0	0	1	1	octet 6c
non trans (RLP) V.22 bis								

D.2.2 Network to mobile station direction, data compression possible

8	7	6	5	4	3	2	1	
0	0	0	0	0	1	0	0	octet 1
Bearer capability IEI								
0	0	0	0	0	1	1	1	octet 2
Length of the bearer capability contents								
1 not ext	0	1	0	0	0	1	0	octet 3
spare spare GSMá circ. mode 3.1 kHz audio ex PLMN								
1 not ext	1 comp- ress.	0	0	1	0	0	0	octet 4
SDU integrity full dupl. pt to pt no NIRR de-mand								
1 not ext	0	0	0	0	0	0	1	octet 5
access id. no rate adaption I.440/450								
0 ext	0	1	0	0	0	0	1	octet 6
layer 1 default layer 1 async								
0 ext	0	0	1	0	0	1	1	octet 6a
1 bit no neg 8 bits 2.4 kbit/s								

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0 ext	1 16 kbit/s inter. rate	1 no NICtx	0 no NICrx	0 (parity)	1 none	1 none	octet 6b
1 not ext	0 non trans (RLP)	1 0	0 0	0 V.22 bis	1 1	1 1	octet 6c

D.3 An example of a coding for group 3 facsimile (9.6 kbit/s, transparent)

D.3.1 Mobile station to network direction

	8	7	6	5	4	3	2	1	
	0	0	0	0	0	1	0	0	octet 1
	Bearer capability IEI								
	0	0	0	0	0	1	1	1	octet 2
	Length of the bearer capability contents								
	1 not ext	0	1	0	0	0	1	1	octet 3
	full rate only MS		GSMá	circ. mode	facsimile group 3				
	1 not ext	0	1	1	1	0	0	0	octet 4
	comp- ress.	unstruc- tured	full dupl.	pt to pt	no NIRR	de- mand			
	1 not ext	0	0	0	0	0	0	1	octet 5
	access id.		no rate adaption		I.440/450				
	0 ext	0	1	0	0	0	0	0	octet 6
	layer 1		default layer 1			sync			
	0 ext	0	0	1	0	1	0	1	octet 6a
	(syn)		no neg	(syn)	9.6 kbit/s				
	0 ext	1	1	0	0	0	1	1	octet 6b
	16 kbit/s inter. rate		no NICTx	no NICrx	(parity) none				
	1 not ext	0	0	0	0	0	0	0	octet 6c
	transparent		none (modem type)						

D.3.2 Network to mobile station direction

	8	7	6	5	4	3	2	1	
	0	0 0 0 0 0 1 0 0						0	octet 1
	Bearer capability IEI								
	0	0 0 0 0 0 1 1 1						0	octet 2
	Length of the bearer capability contents								
	1	0	1	0	0	0	1	0	octet 3
	not	spare	spare	GSMá	circ.	3.1 kHz audio			
	ext			mode	ex PLMN				
	1	0	1		1	0	0	0	octet 4
	not	comp-	unstruc-		full	pt to	no	de-	
	ext	ress.	tured		dupl.	pt	NIRR	mand	
	1	0		0	0	0		1	octet 5
	not	access id.		no rate		I.440/450			
	ext			adaption					
	0	0	1	0		0	0	0	octet 6
	ext	layer 1		default layer 1				sync	
	0	0	0	1	0	1	0	1	octet 6a
	ext	(syn)	no	(syn)	9.6 kbit/s				
		neg							
	0	1	1	0	0	0	1	1	octet 6b
	ext	16 kbit/s		no	no	(parity) none			
		inter. rate		NICTx	NICrx				
	1	0	0	0	0	0	0	0	octet 6c
	not	transparent		none					
	ext			(modem type)					

Annex E (informative): Comparison between call control procedures specified in GSM 04.08 and CCITT Recommendation Q.931

This annex is informative.

This annex summarizes a comparison of the procedures for call control as specified in CCITT Recommendation Q.931 (blue book) and GSM 04.08.

If no comment is given, it means that the procedures specified in CCITT Recommendation Q.931 and GSM 04.08 are similar. However, it should be noted that even in such cases the procedures may be described in slightly different ways in the two documents.

Table E.1/GSM 04.08: Circuit-switched call control procedures

Procedure	Q.931	GSM 04.08
Call establishment at the originating interface	5.1	5.2.1
- call request	5.1.1	5.2.1.1.1 en-bloc sending only
- B-channel selection originating	5.1.2	not applicable
- overlap sending	5.1.3	not supported
- invalid call information	5.1.4	5.2.1.1.2
- call proceeding, en-bloc sending	5.1.5.1	5.2.1.1.3
- call proceeding, overlap sending	5.1.5.2	not supported
- notification of interworking at the originating interf.	5.1.6	5.2.1.1.4
- call confirmation indication	5.1.7	5.2.1.1.5
- call connected	5.1.8	5.2.1.1.6
- call rejection	5.1.9	5.2.1.1.7
- transit network selection	5.1.10	5.2.1.1.8

Table E.1/GSM 04.08: Circuit-switched call control procedures (continued)

Procedure	Q.931	GSM 04.08
Call establishment at the destination interface	5.2	5.2.2
- call indication	5.2.1	5.2.2.1 procedure for multiple terminal configuration not required, i.e. delivery of SETUP messages on broadcast data links is not supported
- compatibility checking	5.2.2	5.2.2.2 equivalent, except that delivery of SETUP messages on broadcast data links is not supported
- B-channel selection destination	5.2.3	not applicable
- overlap receiving	5.2.4	not supported
- call confirmation information	5.2.5	5.2.2.3 equivalent, except that delivery of SETUP messages on broadcast data links is not supported
- notification of interworking at the terminating interf.	5.2.6	5.2.2.4
- call accept indication	5.2.7	5.2.2.5
- active indication	5.2.8	5.2.2.6 equivalent, except that SETUP messages are not sent on broadcast data links
- non-selected user clearing	5.2.9	not applicable

Table E.1/GSM 04.08: Circuit-switched call control procedures (continued)

Procedure	Q.931	GSMá04.08
Call clearing	5.3	5.4
- terminology	5.3.1	5.4.1 terminology adapted to GSMáapplications
- exception conditions	5.3.2	5.4.2 only case a) of section 5.3.2 of Rec. Q.931 ap- plies. All other excep- tions apply to functions which are not relevant to GSMá
- clearing initiated by the user/MS	5.3.3	5.4.3
- clearing initiated by the network	5.3.4	5.4.4
- clearing when tones/announcements are provided	5.3.4.1	5.4.4.1.1 and 5.4.4.2.1 exception: if not already connected, the traffic channel is connected in order to provide the tone/announcement
- clearing when tones/announcements are not provided	5.3.4.2	5.4.4.1.2 and 5.4.4.2.3
- completion of clearing	5.3.4.3	5.4.4.1.3 and 5.4.4.2.5
Clear collision	5.3.5	5.4.5

Table E.1/GSM 04.08: Circuit-switched call control procedures (continued)

Procedure	Q.931	GSM 04.08
In-band tones and announcements	5.4	5.5.1
Restart procedure	5.5	not supported
Call rearrangements	5.6	5.3.4 call suspension/call re-establishment not supported on the radio path. The functions, if required, are to be supported locally in the MS. On the radio interface, the notification procedure of Rec. Q.931 (section 5.6.7) applies
Call collisions	5.7	5.5.2 call collisions cannot occur
Emergency call establishment at the originating interface	not specified not supported	5.2.1.2
In-call modification	Annex O Rec. Q.931 is incomplete with regard to in-call modification procedures	5.3.4
DTMF protocol control procedures	not specified not supported	5.3.3
Call re-establishment	not specified not supported	5.5.4
Status enquiry procedure	5.8.10, 5.8.11	5.5.3
User-to-user signalling	7	GSM 04.10
User notification procedure	5.9	5.3.1

Annex F (informative): GSM specific cause values for radio resource management

This annex is informative.

Cause value = 0 Normal event;

indicates that the channel is released because of a normal event or that an assignment or handover is successfully, and normally, completed.

Cause value = 1 Abnormal release, unspecified;

indicates that the channel is released because of an abnormal event without specifying further reasons.

Cause value = 2 Abnormal release, channel unacceptable;

indicates that the channel type or channel characteristics are not acceptable.

Cause value = 3 Abnormal release, timer expired;

indicates that the release is caused by a timer expiry.

Cause value = 4 Abnormal release, no activity on the radio path;

indicates that some supervisory function has detected that the channel is not active.

Cause value = 5 Pre-emptive release;

indicates that the channel is released in order to be allocated to a call with priority (e.g. an emergency call).

Cause value = 8 Handover impossible, timing advance out of range;

indicates that a handover is unsuccessful because the target BTS is beyond the normal range and the target BTS would not accept an out of range timing advance.

Cause value = 9 Channel mode unacceptable

indicates that the MS does not have the capability to handle the requested mode or type of channel.

Cause value = 10 Frequency not implemented

indicates that the MS does not have the capability to operate on (at least one of) the requested frequency(ies).

Cause value = 65 Call already cleared;

indicates that a handover is unsuccessful because the connection has been released by the network or the remote user.

Cause value = 95 Semantically incorrect message;

See annex H, section H5.10.

Cause value = 96 Invalid mandatory information;

See annex H, section H6.1.

Cause value = 97 Message type non-existent or not implemented;

See annex H, section H6.2.

Cause value = 98 Message type not compatible with protocol state;

See annex H, section H6.3

Cause value = 100 Conditional IE error;

ETSI

See annex H, section H6.5

Cause value = 101 No cell allocation available;

indicates that an assignment or handover is unsuccessful because the MS has no current CA.

Cause value = 111 Protocol error unspecified;

See annex H, section H6.8.

Annex G (informative): GSM specific cause values for mobility management

This annex is informative. It describes the cause values for the mobility management procedures for non-GPRS services (MM) and GPRS services (GMM). Sections G1 to G5 are valid for both MM and GMM. However, the following codes are applicable for non-GPRS services only:

#38 Call cannot be identified

Section G.6 applies only for GMM procedures.

G.1 Causes related to MS identification

Cause value = 2 IMSI unknown in HLR

This cause is sent to the MS if the MS is not known (registered) in the HLR. This cause code does not affect operation of the GPRS service, although it may be used by a GMM procedure.

Cause value = 3 Illegal MS

This cause is sent to the MS when the network refuses service to the MS either because an identity of the MS is not acceptable to the network or because the MS does not pass the authentication check, i.e. the SRES received from the MS is different from that generated by the network.

Cause value = 4 IMSI unknown in VLR

This cause is sent to the MS when the given IMSI is not known at the VLR.

Cause value = 5 IMEI not accepted

This cause is sent to the MS if the network does not accept emergency call establishment using an IMEI.

Cause value = 6 Illegal ME

This cause is sent to the MS if the ME used is not acceptable to the network, e.g. blacklisted.

G.2 Cause related to subscription options

Cause value = 11 PLMN not allowed

This cause is sent to the MS if it requests location updating in a PLMN where the MS, by subscription or due to operator determined barring is not allowed to operate.

Cause value = 12 Location Area not allowed

This cause is sent to the MS if it requests location updating in a location area where the MS, by subscription, is not allowed to operate.

Cause value = 13 Roaming not allowed in this location area

This cause is sent to an MS which requests location updating in a location area of a PLMN which offers roaming to that MS in that Location Area.

G.3 Causes related to PLMN specific network failures and congestion

Cause value = 17 Network failure

ETSI

This cause is sent to the MS if the MSC cannot service an MS generated request because of PLMN failures, e.g. problems in MAP.

Cause value = 22 Congestion

This cause is sent if the service request cannot be actioned because of congestion (e.g. no channel, facility busy/congested etc.)

G.4 Causes related to nature of request

Cause value = 32 Service option not supported

This cause is sent when the MS requests a service/facility in the CM SERVICE REQUEST message which is not supported by the PLMN.

Cause value = 33 Requested service option not subscribed

This cause is sent when the MS requests a service option for which it has no subscription.

Cause value = 34 Service option temporarily out of order

This cause is sent when the MSC cannot service the request because of temporary outage of one or more functions required for supporting the service.

Cause value = 38 Call cannot be identified

This cause is sent when the network cannot identify the call associated with a call re-establishment request.

G.5 Causes related to invalid messages

Cause value = 95 Semantically incorrect message.

See annex H, section H.5.10.

Cause value = 96 Invalid mandatory information.

See annex H, section H.6.1.

Cause value = 97 Message type non-existent or not implemented.

See annex H, section H.6.2.

Cause value = 98 Message not compatible with protocol state.

See annex H, section H.6.3.

Cause value = 99 Information element non-existent or not implemented

See annex H, section H.6.4.

Cause value = 100 Conditional IE error.

See annex H, section H.6.5.

Cause value = 101 Message not compatible with protocol state

See annex H, section H.6.6.

Cause value = 111 Protocol error, unspecified

See annex H, section H.6.8.

ETSI

G6 Additional cause codes for GMM

Cause value = 7 GPRS services not allowed

This cause is sent to the MS if it requests an IMSI attach for GPRS services, but is not allowed to operate GPRS services.

Cause value = 8 GPRS services and non-GPRS services not allowed

This cause is sent to the MS if it requests a combined IMSI attach for GPRS and non-GPRS services, but is not allowed to operate either of them.

Cause value = 9 MS identity cannot be derived by the network

This cause is sent to the MS when the network cannot derive the MS's identity from the P-TMSI in case of inter-SGSN routing area update.

Cause value = 16 MSC temporarily not reachable

This cause is sent to the MS if it requests a combined GPRS attach or routing area updating in a PLMN where the MSC is temporarily not reachable via the GPRS part of the GSM network.

Annex H (informative): GSM specific cause values for call control

This annex is informative.

H.1 Normal class

H.1.1 Cause No. 1 "unassigned (unallocated) number"

This cause indicates that the destination requested by the mobile station cannot be reached because, although the number is in a valid format, it is not currently assigned (allocated).

H.1.2 Cause No. 3 "no route to destination"

This cause indicates that the called user cannot be reached because the network through which the call has been routed does not serve the destination desired.

H.1.3 Cause No. 6 "channel unacceptable"

This cause indicates the channel most recently identified is not acceptable to the sending entity for use in this call.

H.1.4 Cause No. 8 "operator determined barring"

This cause indicates that the MS has tried to access a service that the MS's network operator or service provider is not prepared to allow.

H.1.5 Cause No.16 "normal call clearing"

This cause indicates that the call is being cleared because one of the users involved in the call has requested that the call be cleared.

Under normal situations, the source of this cause is not the network.

H.1.6 Cause No.17 "user busy"

This cause is used when the called user has indicated the inability to accept another call.

It is noted that the user equipment is compatible with the call.

H.1.7 Cause No. 18 "no user responding"

This cause is used when a user does not respond to a call establishment message with either an alerting or connect indication within the prescribed period of time allocated (defined by the expiry of either timer T303 or T310).

H.1.8 Cause No. 19 "user alerting, no answer"

This cause is used when a user has provided an alerting indication but has not provided a connect indication within a prescribed period of time.

ETSI

H.1.9 Cause No. 21 "call rejected"

This cause indicates that the equipment sending this cause does not wish to accept this call, although it could have accepted the call because the equipment sending this cause is neither busy nor incompatible.

H.1.10 Cause No. 22 "number changed"

This cause is returned to a calling mobile station when the called party number indicated by the calling mobile station is no longer assigned. The new called party number may optionally be included in the diagnostic field. If a network does not support this capability, cause No. 1 "unassigned (unallocated) number" shall be used.

H.1.11 Cause No. 26 "non-selected user clearing"

Not supported. Treated as cause no. 31.

H.1.12 Cause No. 27 "destination out of order"

This cause indicates that the destination indicated by the mobile station cannot be reached because the interface to the destination is not functioning correctly. The term "not functioning correctly" indicates that a signalling message was unable to be delivered to the remote user; e.g., a physical layer or data link layer failure at the remote user, user equipment off-line, etc.

H.1.13 Cause No. 28 "invalid number format (incomplete number)"

This cause indicates that the called user cannot be reached because the called party number is not a valid format or is not complete.

H.1.14 Cause No. 29 "facility rejected"

This cause is returned when a facility requested by user can not be provided by the network.

H.1.15 Cause No. 30 "response to STATUS ENQUIRY"

This cause is included in STATUS messages if the message is sent in response to a STATUS ENQUIRY message. See also section 5.5.3.

H.1.16 Cause No. 31 "normal, unspecified"

This cause is used to report a normal event only when no other cause in the normal class applies.

H.2 Resource unavailable class

H.2.1 Cause No. 34 "no circuit/channel available"

This cause indicates that there is no appropriate circuit/channel presently available to handle the call.

H.2.2 Cause No. 38 "network out of order"

This cause indicates that the network is not functioning correctly and that the condition is likely to last a relatively long period of time; e.g., immediately re-attempting the call is not likely to be successful.

ETSI

H.2.3 Cause No. 41 "temporary failure"

This cause indicates that the network is not functioning correctly and that the condition is not likely to last a long period of time; e.g., the mobile station may wish to try another call attempt almost immediately.

H.2.4 Cause No. 42 "switching equipment congestion"

This cause indicates that the switching equipment generating this cause is experiencing a period of high traffic.

H.2.5 Cause No. 43 "access information discarded"

This cause indicates that the network could not deliver access information to the remote user as requested; i.e., a user-to-user information, low layer compatibility, high layer compatibility, or sub-address as indicated in the diagnostic.

It is noted that the particular type of access information discarded is optionally included in the diagnostic.

H.2.6 Cause No. 44 "requested circuit/channel not available"

This cause is returned when the circuit or channel indicated by the requesting entity cannot be provided by the other side of the interface.

H.2.7 Cause No. 47 "resource unavailable, unspecified"

This cause is used to report a resource unavailable event only when no other cause in the resource unavailable class applies.

H.3 Service or option not available class

H.3.1 Cause No. 49 "quality of service unavailable"

This cause indicates to the mobile station that the requested quality of service, as defined in CCITT Recommendation X.213, cannot be provided.

H.3.2 Cause No. 50 "Requested facility not subscribed"

This cause indicates that the requested supplementary service could not be provided by the network because the user has not completed the necessary administrative arrangements with its supporting networks.

H.3.3 Cause No. 55 "Incoming calls barred within the CUG"

This cause indicates that although the called party is a member of the CUG for the incoming CUG call, incoming calls are not allowed within this CUG.

H.3.4 Cause No. 57 "bearer capability not authorized"

This cause indicates that the mobile station has requested a bearer capability which is implemented by the equipment which generated this cause but the mobile station is not authorized to use.

H.3.5 Cause No. 58 "bearer capability not presently available"

This cause indicates that the mobile station has requested a bearer capability which is implemented by the equipment which generated this cause but which is not available at this time.

H.3.6 Cause No. 63 "service or option not available, unspecified"

This cause is used to report a service or option not available event only when no other cause in the service or option not available class applies.

H.3.7 Cause No. 68 "ACM equal to or greater than ACMmax"

This cause is used by the mobile to indicate that call clearing is due to ACM being greater than or equal to ACMmax.

H.4 Service or option not implemented class

H.4.1 Cause No. 65 "bearer service not implemented"

This cause indicates that the equipment sending this cause does not support the bearer capability requested.

H.4.2 Cause No. 69 "Requested facility not implemented"

This cause indicates that the equipment sending this cause does not support the requested supplementary service.

H.4.3 Cause No. 70 "only restricted digital information bearer capability is available"

This cause indicates that one equipment has requested an unrestricted bearer service, but that the equipment sending this cause only supports the restricted version of the requested bearer capability.

H.4.4 Cause No. 79 "service or option not implemented, unspecified"

This cause is used to report a service or option not implemented event only when no other cause in the service or option not implemented class applies.

H.5 Invalid message (e.g., parameter out of range) class

H.5.1 Cause No. 81 "invalid transaction identifier value"

This cause indicates that the equipment sending this cause has received a message with a transaction identifier which is not currently in use on the MS-network interface.

H.5.2 Cause No. 87 "user not member of CUG"

This cause indicates that the called user for the incoming CUG call is not a member of the specified CUG.

H.5.3 Cause No. 88 "incompatible destination"

This cause indicates that the equipment sending this cause has received a request to establish a call which has low layer compatibility, high layer compatibility, or other compatibility attributes (e.g., data rate) which cannot be accommodated.

H.5.4 Cause No. 91 "invalid transit network selection"

For further study. Treated as cause no. 95.

H.5.5 Cause No. 95 "semantically incorrect message"

This cause is used to report receipt of a message with semantically incorrect contents (see section 8.8).

ETSI

H.6 Protocol error (e.g., unknown message) class

H.6.1 Cause No. 96 "invalid mandatory information"

This cause indicates that the equipment sending this cause has received a message with a non-semantic mandatory IE error (see section 8.5).

H.6.2 Cause No. 97 "message type non-existent or not implemented"

This cause indicates that the equipment sending this cause has received a message with a message type it does not recognize either because this is a message not defined, or defined but not implemented by the equipment sending this cause.

H.6.3 Cause No. 98 "message type not compatible with protocol state"

This cause indicates that the equipment sending this cause has received a message not compatible with the protocol state (section 8.4).

H.6.4 Cause No. 99 "information element non-existent or not implemented"

This cause indicates that the equipment sending this cause has received a message which includes information elements not recognized because the information element identifier is not defined or it is defined but not implemented by the equipment sending the cause. However, the information element is not required to be present in the message in order for the equipment sending the cause to process the message.

H.6.5 Cause No. 100 "conditional IE error"

This cause indicates that the equipment sending this cause has received a message with conditional IE errors (see section 8.7.2).

H.6.6 Cause No. 101 "message not compatible with protocol state"

This cause indicates that a message has been received which is incompatible with the protocol state or that a STATUS message has been received indicating an incompatible call state.

H.6.7 Cause No. 102 "recovery on timer expiry"

This cause indicates that a procedure has been initiated by the expiry of a timer in association with TS 04.08 error handling procedures.

H.6.8 Cause No. 111 "protocol error, unspecified"

This cause is used to report a protocol error event only when no other cause in the protocol error class applies.

H.7 Interworking class

H.7.1 Cause No. 127 "interworking, unspecified"

This cause indicates that there has been interworking with a network which does not provide causes for actions it takes; thus, the precise cause for a message which is being sent cannot be ascertained.

Annex I (informative): GSM specific cause values for session management

This annex is informative.

I.1 Causes related to nature of request

Cause value = 26 Insufficient resources

This cause code is used by the MS or by the network to indicate that the PDP context activation request cannot be accepted due to insufficient resources.

Cause value = 27 Unknown or missing access point name

This cause code is used by the network to indicate that the requested service was rejected by the external packet data network because the access point name was not included although required or if the access point name could not be resolved.

Cause value = 28 Unknown PDP address or PDP type

This cause code is used by the network to indicate that the requested service was rejected by the external packet data network because the PDP address or type could not be recognised.

Cause value = 29 User authentication failed

This cause code is used by the network to indicate that the requested service was rejected by the external packet data network due to a failed user authentication.

Cause value = 30 Activation rejected by GGSN

This cause code is used by the network to indicate that the requested service was rejected by the GGSN..

Cause value = 31 Activation rejected, unspecified

This cause code is used by the network to indicate that the requested service was rejected due to unspecified reasons.

Cause value = 32 Service option not supported

See Annex G, section 4, with the exception that the request has been sent within an ACTIVATE PDP CONTEXT REQUEST or ACTIVATE AA PDP CONTEXT REQUEST message.

Cause value = 33 Requested service option not subscribed

See Annex G, section 4

Cause value = 34 Service option temporarily out of order

See Annex G, section 4

Cause value = 35 NSAPI already used

This cause code is used by the network to indicate that the NSAPI requested by the MS in the PDP context activation is already used by another active PDP context of this MS.

Cause value = 36 Regular PDP context deactivation

This cause code is used to indicate a regular MS or network initiated PDP context deactivation.

Cause value = 37 QoS not accepted

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This cause code is used by the MS if the new QoS cannot be accepted that were indicated by the network in the PDP Context Modification procedure.

Cause value = 38 Network failure

This cause code is used by the network to indicate that the PDP context deactivation is caused by an error situation in the network.

Cause value = 39 Reactivation requested

This cause code is used by the network to request a PDP context reactivation after a GGSN restart.

1.2 Causes related to invalid messages

Cause value = 95 Semantically incorrect message.

See annex H, section H.5.10.

Cause value = 96 Invalid mandatory information.

See annex H, section H.6.1.

Cause value = 97 Message type non-existent or not implemented.

See annex H, section H.6.2.

Cause value = 98 Message not compatible with protocol state.

See annex H, section H.6.3.

Cause value = 99 Information element non-existent or not implemented

See annex H, section H.6.4.

Cause value = 100 Conditional IE error.

See annex H, section H.6.5.

Cause value = 101 Message not compatible with protocol state

See annex H, section H.6.6.

Cause value = 111 Protocol error, unspecified

See annex H, section H.6.8.

Annex J (informative): Algorithm to encode frequency list information elements

This annex is informative.

J.1 Introduction

Some information elements encode frequency lists with a special method. The main specification specifies the meaning of the fields and hence the way to decode them, but the corresponding encoding algorithm is difficult to infer from the decoding algorithm. This annex is intended as an aid for implementers of the encoding algorithm.

It could be shown that any set of frequency with less or the same number of frequencies as the number of words can be encoded with a careful choice of F_1 , F_2 , and so on, i.e. that a set of W_i can be found so that the decoding algorithm given in the main section will give back the frequency set. The right order is not the order of the frequency values.

J.2 General principle

The encoding algorithm is based on a recursive dichotomy of both the range (i.e. the set of values that are possible) and the subset (the values to encode).

The dichotomy is best understood if the range is seen as a circle. For instance, for the 1023 range:

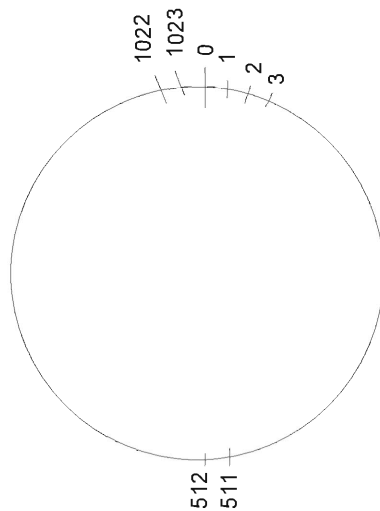


Figure J.1: Circular arrangement of 0..1023

The dichotomy consists in finding a value in the subset such that the diameter determined by this value splits the subset in two equal or nearly equal sub-subsets. In the following case, we see that value 290 is acceptable (the two sub-subsets have 3 elements), when value 250 is not acceptable (the two sub-subsets have 4 and 2 elements):

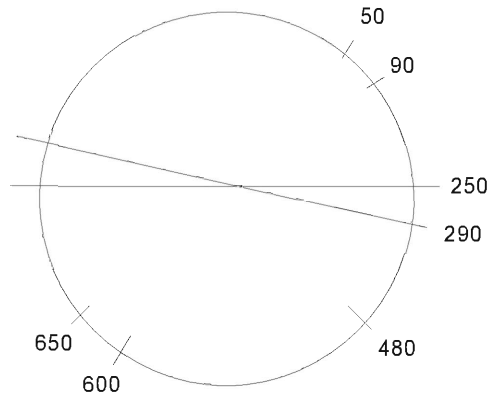


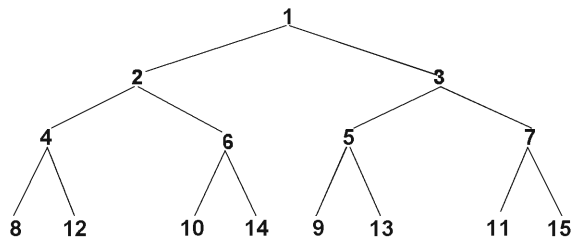
Figure J.2: Example of dichotomy

The pivot value is part of the information field, then the two sub-subsets are renumbered and the same algorithm is applied again on each of them. Because the range is halved at each step, the number of bits needed to encode a pivot value is 1 bit less than the number of bits needed to encode the parent pivot value.

The convention is that if the number of values is even, the left sub-subset (that is to say the values that can be expressed as the pivot value minus some integer between 1 and half the range) will have 1 element more than the right subset.

At each step the subset is numbered from 0 to the range minus 1. The coding in the information field of the pivot value is its value as renumbered, plus 1. Value 0 is reserved to indicate no element.

The order of appearance in the information field of the successive pivot values is particular. If we present the values as organized as a tree, with the left child being the pivot of the left sub-subset and the right child the pivot of the right sub-subset, the order of appearance is given by the following tree:



(and so on)

This order has been chosen so that

- a) whatever the number N of elements in the set, the meaningful nodes are the first N and the value for all nodes from N+1 on are null (if sent),
- b) the tree and all subtrees are balanced.

Important properties of these trees are used in the algorithms (with generation 1 corresponding to the root):

Generation g contains 2^{g-1} nodes, and their indices are 2^{g-1} to 2^g-1 ;

For generation g, nodes 2^{g-1} to $2^{g-1}+2^{g-2}-1$ are left children, the others are right children;

If node k belongs to generation g, its left child is node $k + 2^{g-1}$, and its right child is $k + 2^g$;

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Reciprocally, if k is a left child from generation g , its parent node is node $k - 2^{g-2}$, and if k is a right child of generation g , its parent is node $k - 2^{g-1}$.

J.3 Performances

The number of bits needed to encode a given set of values depends on the number of values and on the range they can span.

For the application on the BCCH and the SACCH (CA and BA information) 16 octets are available, and the number of frequencies that can be encoded in one information element is the following:

Range	Number of frequencies
513 to 1024	2 to 16 (17 if frequency 0 is in)
257 to 512	2 to 18
129 to 256	2 to 22
113 to 128	2 to 29
up to 112	any

With two messages (for the BA) the number of frequencies that can be encoded is the following:

Range	Number of frequencies
513 to 1024	2 to 36 (note 1)
257 to 512	2 to 40 (note 2)
225 to 256	2 to 51 (note 3)
up to 224	any

NOTE 1: A 1024 range can be split cyclically in to two 512 ranges each with less than 18 frequencies; each subset is coded in one message with 512 range format.

NOTE 2: A 512 range can be split in to two consecutive 256 ranges. If both sub-ranges contain 22 frequencies or less, it is possible to code each of these in a messages using the 256 range format. Otherwise one of the two ranges contains 23 frequencies or more: 22 of them can be coded in one message using the 256 range format and the remaining frequencies (numbering less than or equal to 18) can be coded in the other message using the 512 range format.

NOTE 3: The principles described in notes 1 and 2, above apply in this case.

The frequency short list information element allows the following:

Range	Number of frequencies
513 to 1024	2 to 7 (8 if frequency 0 is in)
257 to 512	2 to 8
129 to 256	2 to 9
57 to 128	2 to 12
up to 56	any

The number of frequencies as a function of the range and the length in octets of the variable length frequency list information element (including the message type and length fields) is given by the following table:

Table J.1/GSM 04.08: Performance of the variable length frequency list information element

Range	513 to 1024	257 to 512	129 to 256	up to 128	variable bit map
octets					
5	1	1	1	1	8
6	2	2	3	3	16
7	3	3	4	4	24
8	4	4	5	6	32
9	5	6	6	8	40
10	6	7	8	10	48
11	7	8	9	12	56
12	9	9	11	14	64
13	10	11	13	16	72
14	11	12	14	18	80
15	12	13	16	21	88
16	13	15	18	24	96
17	14	16	20	26	104
18	16	18	22	29	112
19	17	19	24	32	120
20	18	21	26	--	128
21	20	22	28		136
22	21	24	30		144
23	22	26	32		152
24	24	27	34		160
25	25	29	37		168
26	26	30	40		176
27	28	32	42		184
28	29	34	45		192
29	30	36	48		200
30	32	38	50		208
31	33	40	53		216
32	35	42	56		224

J.4 Encoding algorithm

The choice is done recursively as given by the following programs, written in ADA:

Let us define the recursive procedure:

```

procedure ENCODE_SUBTREE(in INDEX : INTEGER;
    in SET : SET_OF_VALUE;
    in RANGE : INTEGER);

```

This procedure is given a set of integer values and an index. It chooses one of those values and computes the corresponding $W(INDEX)$ (considered as a global variable), it splits the set less the value in two equal or nearly equal subsets, and calls itself recursively for each of those subsets, with suitable $INDEX$.

Assumption: all values in SET lie (inclusively) between 0 and $RANGE-1$, and they are all distinct.

As written, the program does not assume special values for the range. With a range such as 2^k-1 , some expressions can be simplified.

```

Declarative part:
    INDEX_IN_SET : INTEGER;
begin

```

First the program tests the leaf conditions :

```

    if SET'SIZE=0 then
        W(INDEX) := 0;
        return;
    elsif SET'SIZE=1 then
        W(INDEX) := 1 + SET(1);
        return;
    end if;

```

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The following program finds a value in the set such that exactly $(\text{SET'SIZE}-1)/2$ values from the set are between this value plus 1 and this value plus half the range :

```

declare
  N : INTEGER;
  J : INTEGER;
begin
  for I in 1..SET'SIZE loop
    N:=0;
    for J in 1..SET'SIZE loop
      if (SET(J)-SET(I)) mod RANGE <= (RANGE-1)/2 then
        N := N+1;
      end if;
    end loop;
  The test compares N-1 because the possible pivot value is counted.
  if N-1 = (SET'SIZE-1)/2 then
    INDEX_IN_SET := I;
    exit;
  end if;
end loop;
end;

```

INDEX_IN_SET is then the index in the list of the pivot value.

The following sets $W(\text{INDEX})$

```
W(INDEX) := SET(INDEX_IN_SET) + 1;
```

Then the program does the same thing for the two halves of the range delimited by $W(\text{INDEX})$ and $W(\text{INDEX})+\text{RANGE}/2$. First the left subset:

```

declare
  SUBSET : SET_OF_VALUE(1..SET'SIZE/2);
  SUBSET_INDEX : INTEGER;
  ORIGIN_VALUE : INTEGER;
begin
  ORIGIN_VALUE := (SET(INDEX_IN_SET) + (RANGE-1)/2
    + 1) mod RANGE;
  SUBSET_INDEX:=1;
  for I in 1..SET'SIZE loop
    if (SET(I)-ORIGIN_VALUE) mod RANGE < RANGE/2 then
      SUBSET(SUBSET_INDEX) :=
        (SET(I) - ORIGIN_VALUE) mod RANGE;
      SUBSET_INDEX := SUBSET_INDEX + 1;
    end if;
  end loop;

  ENCODE_SUBTREE(
    INDEX := INDEX +
      GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX),
    SET := SUBSET,
    RANGE := RANGE/2);
end;

```

Then the right subset:

```

declare
  SUBSET : SET_OF_VALUE(1..(SET'SIZE-1)/2);
  SUBSET_INDEX : INTEGER;
  ORIGIN_VALUE : INTEGER;
begin
  ORIGIN_VALUE := (SET(INDEX_IN_SET) + 1) mod RANGE;
  SUBSET_INDEX:=1;
  for I in 1..SET'SIZE loop
    if (SET(I)-ORIGIN_VALUE) mod RANGE < RANGE/2 then
      SUBSET(SUBSET_INDEX) :=
        (SET(I) - ORIGIN_VALUE) mod RANGE;
      SUBSET_INDEX := SUBSET_INDEX + 1;
    end if;
  end loop;
  ENCODE_SUBTREE(
    INDEX := INDEX +
      2*GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX),
    SET := SUBSET,
    RANGE := (RANGE-1)/2);
end;

end ENCODE_SUBTREE;

```

The initial call of the procedure depends on the format. Given some set to encode, the first problem is to verify that it can be encoded, and by so doing to choose the format.

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First the encoding process must find the minimum range of the set, that is to say the minimum value R such that there exists one frequency F_0 in the set such that all frequencies in the set can be written $(F_0 + N) \bmod 1024$, with some N , $0 \leq N \leq R-1$. The choice of the format depends on R and the number of frequencies: the 512 range format can be chosen only if $R \leq 512$, the 256 range format can be chosen only if $R \leq 256$, the 128 range format can be chosen only if $R \leq 128$.

If the chosen format is "1024 range", then the program must first check if frequency 0 is in the set. If so the F_0 subfield is set to 1, and frequency 0 is removed from the set. Otherwise, the F_0 subfield is set to 0. Then ENCODE_SUBTREE is called with INDEX := 1, SET set to the set of values equal to the ARFCN of all frequencies minus 1, and RANGE := 1023.

If the chosen format is "512 range", "256 range" or "128 range", F_0 is chosen as ORIG-ARFCN and ENCODE_SUBTREE is called with INDEX := 1, SET set to the set of values equal to the ARFCN of all frequencies except F_0 , minus F_0+1 , and RANGE set respectively to 511, 255 or 127.

J.5 Decoding

The decoding algorithm, as given below, is the inverse transform of the program given in the previous section, for the specific case where the original range is a power of 2 minus 1. It is given a set of integer values $W(i)$, and an original range R , and it builds a set of values from $0..R-1$.

The program is here written so that the fact that it is the inverse of the encoding program needs no more proof.

```
procedure DECODE(in W : array <> of INTEGER;
                out SET : SET_OF_VALUE;
                in ORIGINAL_RANGE : INTEGER);
```

```
-- local variables
INDEX : 1..W'SIZE;   RANGE : INTEGER;
N : INTEGER;
```

```
begin
  for K in 1..W'SIZE loop
```

The next loop follows the tree from child to parent, from the node of index K to the root (index 1). For each iteration the node of index INDEX is tackled. The corresponding range is RANGE, and N is the value of the element in the range defined by the node.

The data are set to their initial values :

```
INDEX := K;
RANGE := ORIGINAL_RANGE / GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
N := W(INDEX) - 1;
```

```
while INDEX > 1 loop
```

Due to the assumption that the original range is a power of two minus one, the range for the parent node can be easily computed, and does not depend upon whether the current node is a left or right child :

```
RANGE := 2*RANGE + 1;
```

Let us note $J := 2^{g-1}$, g being the generation of node INDEX. We have $J = \text{GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO}(\text{INDEX})$. The numbering used in the tree is such that the nodes of index J to $J + J/2 - 1$ are left children, and the nodes of index $J/2$ to $J+J-1$ are right children. Hence an easy test to distinguish left and right children:

```
if 2*INDEX <
   3*GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX)
then -- left child
```

The next computation gives the index of the parent node of the node of index INDEX, for a left child :

```
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```

```
INDEX := INDEX -
  GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX)/2;
```

The next formula is the inverse of the renumbering appearing in the encoding for a left child. It gives the value of the parent node in the range defined by the grand-parent node:

```
N := (N + W(INDEX) - 1 + (RANGE-1)/2 + 1)
  mod RANGE;
else      -- right child
```

The next computation gives the index of the parent node of the node of index INDEX, for a right child :

```
INDEX := INDEX - GREATEST_POWER_OF_2_LESSER_OR_EQUAL_TO(INDEX);
```

The next formula is the inverse of the renumbering appearing in the encoding for a right child:

```
N := (N + W(INDEX) - 1 + 1) mod RANGE;
end if;
end loop;
F(K) := N;
end loop;
end;
```

A careful study will show that the programs given in the main part of the Technical Specification are equivalent to the one presented here. The main difference is the use of different remanent variables to remove most of the calls to the function giving the greatest power of 2 less than or equal to some integer.

The decoding must be terminated by the correction specific to the format.

J.6 A detailed example

Let us take the following subset of 16 elements of the set [0..1023] : [13, 71, 122, 191, 251, 321, 402, 476, 521, 575, 635, 701, 765, 831, 906, 981]

Range 1024 format will be used. Frequency 0 is not in the set, thus field F0 is set to 0. The set is renumbered, so as to give a subset of 0..1022 : [12, 70, 121, 190, 250, 320, 401, 475, 520, 574, 634, 700, 764, 830, 905, 980].

For the first node (corresponding to W(1)), the value 121 satisfies the requirements. The opposite value is $121 + 511 = 632$. There are 8 values between 633 and 120 (namely the left-hand subset 634, 700, 764, 830, 905, 980, 12 and 70), and 7 values between 122 and 632 (namely the right-hand subset 190, 250, 320, 401, 475, 520 and 574).

The encoded value W(1) is $121 + 1$, i.e. 122.

The second node (corresponding to W(2)) is the left-hand child of the first node. The corresponding subtree has to encode for the left-hand subset, renumbered beginning at 633. This gives the following 8 element subset of 0..510, ordered as resulting from the example of algorithm : [402, 460, 1, 67, 131, 197, 272, 347]. Out of these values, 1 splits the set in 4 and 3, and the encoded value W(2) is 2.

Similarly, the third node (W(3)) is the right-hand child of the first node and then the corresponding subtree encodes for the right-hand subset, renumbered starting at 122. This gives the following set of 0..510 : [68, 128, 198, 279, 353, 398, 452]. Out of these values, 68 splits the set into 3 and 3, and the encoded value W(3) is 69.

The same method is applied for all nodes, giving the following encoded values per node:

node	value	node	value
1	122	9	83
2	2	10	3
3	69	11	24
4	204	12	67
5	75	13	54

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6	66	14	64
7	60	15	70
8	70	16	9

The encoding then consists in formatting, in that order :

122 on 10 bits, then 2 and 69 on 9 bits each, then 204, 75, 66 and 60 on 8 bits each, then 70, 83, 3, 24, 67, 54, 64 and 70 on 7 bits each, and finally 9 on 6 bits.

Conversely the decoding can be done easily. For instance for node 2, the original value is:

$$(122 - 512 + 2) \text{ smod } 1023 = 635$$

For node 14, we have as original value:

$$(122 - 512 + (2 + (66 + 64) \text{ smod } 255) \text{ smod } 511) \text{ smod } 1023 = 765$$

Annex K (informative): Default Codings of Information Elements

This annex is informative.

The information in this annex does NOT define the value of any IEI for any particular message. This annex exists to aid the design of new messages, in particular with regard to backward compatibility with phase 1 mobile stations.

Sections K1-K4 apply to non-GPRS services, while section K5 and K6 are dedicated to GPRS.

K.1 Common information elements.

For the common information elements types listed below, the default coding of information element identifier bits is summarized in table K.1/GSM 04.08.

Table K.1/GSM 04.08: Default information element identifier coding for common information elements

8 7 6 5 4 3 2 1		Reference section
1 : : : - - - -	Type 1 info elements	
1 1 1 1 - - - -	Note	
0 : : : : : : :	Type 3 & 4 info elements	
0 0 0 1 0 0 0 1	Note	
0 0 0 1 0 0 1 1	Location Area Identification	10.5.1.3
0 0 0 1 0 1 1 1	Mobile Identity	10.5.1.4
0 0 0 1 1 0 0 0	Note	
0 0 0 1 1 1 1 1	Note	
0 0 1 0 0 0 0 0	Mobile Station classmark 3	10.5.1.7
	Spare Half Octet	10.5.1.8
	All other values are reserved	

NOTE: These values were allocated but never used in earlier phases of the protocol.

K.2 Radio Resource management information elements.

For the Radio Resource management information elements listed below, the default coding of the information element identifier bits is summarized in table K.2/GSM 04.08.

Table K.2/GSM 04.08 (page 1 of 2): Default information element identifier coding for Radio Resource management information elements

								Reference section
8	7	6	5	4	3	2	1	
1	:	:	:	-	-	-	-	Type 1 info elements
1	0	0	1	-	-	-	-	Cipher Mode Setting 10.5.2.9
1	0	1	0	-	-	-	-	Cipher Response 10.5.2.10
1	0	1	1	-	-	-	-	Note
1	1	0	1	-	-	-	-	Synchronization Indication 10.5.2.39
1	1	1	0	-	-	-	-	Channel Needed 10.5.2.8
0	:	:	:	:	:	:	:	Type 3 & 4 info elements
0	0	0	0	0	0	1	0	Frequency Short List 10.5.2.14
0	0	0	0	0	1	0	1	Frequency List 10.5.2.13
0	1	1	0	0	0	0	1	Note
0	1	1	0	0	0	1	0	Cell Channel Description 10.5.2.1b
0	1	1	0	0	0	1	1	Channel Mode 10.5.2.6
0	1	1	0	0	1	0	0	Channel Description 10.5.2.5
0	1	1	0	0	1	1	0	Channel Mode 2 10.5.2.7
0	1	1	0	1	0	0	0	Note
0	1	1	0	1	0	0	1	Frequency Channel Sequence 10.5.2.12
0	1	1	0	1	0	1	0	Note
0	1	1	0	1	0	1	1	Note
0	1	1	0	1	1	0	0	Note

Table K.2/GSM 04.08 (page 2 of 2): Default information element identifier coding for Radio Resource management information elements

								Reference section
8	7	6	5	4	3	2	1	
0	1	1	1	0	0	0	1	Note
0	1	1	1	0	0	1	0	Mobile Allocation 10.5.2.21
0	1	1	1	0	0	1	1	BA range 10.5.2.1
0	1	1	1	0	1	0	0	Note
0	1	1	1	0	1	0	1	Note
0	1	1	1	0	1	1	0	Note
0	1	1	1	0	1	1	1	Mobile Time difference 10.5.2.21a
0	1	1	1	1	0	0	0	Note
0	1	1	1	1	0	0	1	Note
0	1	1	1	1	0	1	0	Note
0	1	1	1	1	0	1	1	Time Difference 10.5.2.41
0	1	1	1	1	1	0	0	Starting Time 10.5.2.38
0	1	1	1	1	1	0	1	Timing Advance 10.5.2.40
0	1	1	1	1	1	1	0	TMSI 10.5.2.42
0	1	1	1	1	1	1	1	Note

NOTE: These values were allocated but never used in earlier phases of the protocol.

K.3 Mobility management information elements.

For the mobility management information elements listed below, the default coding of the information element identifier bits is summarized in table K.3/GSM 04.08.

Table K.3/GSM 04.08: Default information element identifier coding for mobility management information elements

								Reference Section
8	7	6	5	4	3	2	1	
Type 1 info elements								
1	0	0	1	-	-	-	-	Note
1	1	0	0	-	-	-	-	Note
1	1	1	0	-	-	-	-	Note
Type 2 info elements								
1	0	1	0	-	-	-	-	Type 2 info elements
				0	0	0	1	Follow-on Proceed
								10.5.3.7
Type 3 & 4 info elements								
0	1	0	0	0	0	0	1	Note
0	1	0	0	0	0	1	0	Note
0	1	0	0	0	1	0	0	Note
All other values are reserved								

NOTE: These values were allocated but never used in earlier versions of the protocol

K.4 Call control information elements.

For the call control information elements listed below, the default coding of the information element identifiers is defined in table K.4/GSM 04.08.

Table K.4/GSM 04.08: Default information element identifier coding for call control information elements

	Reference section
8 7 6 5 4 3 2 1	
1 : : : - - - -	Type 1 info elements
0 0 1 - - - -	shift
	10.5.4.2 and .3
0 1 1 - - - -	Note
1 0 1 - - - -	Repeat indicator
	10.5.4.22
1 0 1 0 : : : :	Type 2 information elements
	0 0 0 0 More data
	10.5.4.19
	0 0 0 1 CLIR Suppression
	10.5.4.11a
	0 0 1 0 CLIR Invocation
	10.5.4.11b
	0 0 1 1 Reverse call setup direction
	10.5.4.22a
0 : : : : : :	Type 3 & 4 info elements
0 0 0 0 1 0 0	Bearer capability
	10.5.4.5
0 0 0 1 0 0 0	Cause
	10.5.4.11
0 0 1 0 1 0 0	Note
0 0 1 0 1 0 1	Call Control Capabilities
	10.5.4.5a
0 0 1 1 1 0 0	Facility
	10.5.4.15
0 0 1 1 1 1 0	Progress indicator
	10.5.4.21
0 1 0 0 1 0 0	Auxiliary states
	10.5.4.4
0 1 0 0 1 1 1	Note
0 1 0 1 1 0 0	Keypad facility
	10.5.4.17
0 1 1 0 1 0 0	Signal
	10.5.4.23
1 0 0 1 1 0 0	Connected number
	10.5.4.13
1 0 0 1 1 0 1	Connected subaddress
	10.5.4.14
1 0 1 1 1 0 0	Calling party BCD number
	10.5.4.9
1 0 1 1 1 0 1	Calling party subad
	10.5.4.10
1 0 1 1 1 1 0	Called party BCD number
	10.5.4.7
1 1 0 1 1 0 1	Called party subad
	10.5.4.8
1 1 1 1 1 0 0	Low layer compatib.
	10.5.4.18
1 1 1 1 1 0 1	High layer compatib.
	10.5.4.16
1 1 1 1 1 1 0	User-user
	10.5.4.25
1 1 1 1 1 1 1	SS version indicator
	10.5.4.24

NOTE: These values were allocated but never used in earlier phases of the protocol.

K.5 GPRS mobility management information elements.

For the GPRS mobility management information elements listed below, the default coding of the information element identifier bits is summarised in table K.5/GSM 04.08.

Table K.5/GSM 04.08: Default information element identifier coding for GPRS mobility management information elements

8	7	6	5	4	3	2	1	
1	:	:	:	-	-	-	-	Type 1 information elements
0	0	0						Attach result 10.5.5.1
0	0	1						Attach type 10.5.5.2
0	1	1						Ciphering algorithm 10.5.5.3
1	0	0						Ciphering indicator 10.5.5.4
1	0	1						Detach type 10.5.5.5
1	1	0						Force to standby 10.5.5.7
1	1	1						Identity type 2 10.5.5.9
0	0	1						IMEISV request 10.5.5.10
0	1	1						Update result 10.5.5.17
0	1	1						Update type 10.5.5.18
1	1	1						CS connected 10.5.5.19
0	:	:	:	:	:	:	:	Type 3 & 4 information elements
0	0	0	0	0	1	0		DRX parameter 10.5.5.6
0	0	0	0	0	1	1		P-TMSI signature 10.5.5.8
0	0	0	0	1	0	0		LLC-V(R) list 10.5.5.11
0	0	0	0	1	0	1		MS classmark 4 10.5.5.12
0	0	0	0	1	1	0		Mobile station identity 10.5.5.13
0	0	0	0	1	1	1		GMM cause 10.5.5.14
0	0	0	0	1	1	0		Routing area identification 10.5.5.15
0	0	0	0	1	1	0		Timer value 10.5.5.16
0	0	0	0	1	1	1		MS Radio Access capability 10.5.5.12a
All other values are reserved								

K.6 Session management information elements.

For the session management information elements listed below, the default coding of the information element identifier bits is summarised in table K.6/GSM 04.08.

Table K.6/GSM 04.08: Default information element identifier coding for session management information elements

8	7	6	5	4	3	2	1	
1	:	:	:	-	-	-	-	Type 1 information elements
0	0	1						SM procedure initiator indicator 10.5.6.7
0	1	0						AA deactivation cause 10.5.6.8
0	1	1						Radio priority level 10.5.6.10
0	:	:	:	:	:	:	:	Type 3 & 4 information elements
0	0	0	0	0	0	1		Access point name 10.5.6.1
0	0	0	0	0	1	0		Network service access point id 10.5.6.2
0	0	0	0	0	1	1		Protocol configuration options 10.5.6.3
0	0	0	0	1	0	1		Packet data protocol address 10.5.6.4
0	0	0	0	1	1	1		Quality of service 10.5.6.5
0	0	0	1	0	0	0		SM-cause 10.5.6.6
0	0	0	1	0	0	1		LLC service access point id 10.5.6.9
All other values are reserved								

Annex L (informative): Change Record

Change Record	
November 1995	Creation of Version 5.0.0 (Version 4.13.0 + AR04.08-058, 063)
December 1995	Publication of GTS 04.08 version 5.0.0
January 1996	(CR 04.08-A074, A075, A073 r 1, A082 r 1, A084, A087, A088)
March 1996	Publication of Version 5.1.0
April 1996	Version 5.1.0 + (CR 04.08-A109, A093, A110 r1, A111, A105, A091 r3, A112 r1, A102 r1, A099 r1, A094 r1, A053 r10, A033 r6)
May 1996	Publication of GTS 04.08 version 5.2.0
June 1996	Version 5.2.0 + (CR 04.08-A108 r1, A113, A115, A118, A119 r1, A121 r2, A124 r2, A125 r1)
July 1996	Publication of GTS 04.08 version 5.3.0
November 1996	Creation of Version 5.4.0 (Version 5.3.0 + CR 04.08-A123, A143 r2, A141, A144, A146 r1, A147 r5, A155, A156, A158, A159, A160 r2, A162, A164, A166)
May 1997	<p>Creation of Version 5.5.0 incorporating</p> <ul style="list-style-type: none"> A149 7 B Changes of CC parts for HSCSD A150 4 B HSCSD A154 2 B Indication of Multislot class A167 C compression bit in BC-IE A169 C Differentiation of sequence numbering on a PD A170 3 F UCS2 A172 3 C Condition Holding for T3212 A175 3 B V.120 A176 1 A Clarification on MM A178 A Handling of multiple frequency redefinitions A184 A Reserved values in IMM A188 3 C SI6 A189 2 F Editorial revisons (soft copy only) A191 1 C MM info A192 1 C Introduction of R band in classmark A193 C Option reduction for VGCS/VBS cell A194 F Missing timer for uplink access procedure A195 B Support of 14.4 kbit/s (Radio interface related) <p><i>Changed MS to "mobile station" as per A189 and editor's recommendation</i></p>
August 1997	<p>Creation of Version 5.6.0 incorporating</p> <ul style="list-style-type: none"> A196 1 F Deletion of Notification Type 2 A202 1 F Clarification of the usage of Priority level IE A203 1 F Correction of Channel mode modify acknowledge message description A205 1 F ASCI MS never knows the Group call area A207 1 A Handling of classmark information at band change A208 2 F Interpretation of Bearer Capability by an old network A209 F Inconsistency between v5.5 and 4.17 A213 F Deletion of code points for 7.2 service A214 A Coding of classmark information for multiband mobiles <p>New Annex L describing the responsibility split of 04.08</p>
August 1997	Creation of 5.6.1 from editorial review meeting

(continued)

Change Record	
August 1997	Creation of 5.6.2 for publication. (Fixes the text of table 10.78c regarding UIMI, from the implementation of CRs A149 and A195; Reordering subclauses 9.1.X and 10.5.2.X for alphabetic ordering of message and IE titles)
October 1997	Version 5.7.0. Included CRs approved at SMG#23 (Release, Category): A218r1 (R96, A) Protocol error handling in the network A219 (R96, D) Descriptive group or broadcast call reference A220r1 (R96, D) Editorial correction A221r1 (R97, B) BA range IE handling A223r1 (R96, A) MS handling of cipher mode setting A224r1 (R96, F) Coding of the IE of the priority level A226r2 (R96, F) Handling of mandatory information error in release A227 (R96, D) Wrong reference A228 (R96, F) Handling of ASCII information by non-supporting MS
January 1998	Version 5.8.0. Included CRs approved at SMG#24 (Release, Category) A181r5 (R97, C) System information type 10 A206r5 (R97, B) Network Alerting in the MS A245 (R96, F) Inconsistency of user rate in IE bearer capability A246 (R96, F) Frequency redefinition procedure for multislot configuration A247 (R96, F) Clarification to SACCH procedures for multislot configuration A248 (R96, A) Clarification on audio connection A251r1 (R97, B) Mobile assisted frequency allocation A253 (R97, D) Multiple allocation of IEs within one protocol A255 (R96, F) Alignment of the compact notation with the way it is used
March 1998	Version 5.9.0. Included CRs except on GPRS approved at SMG#25 (Release, Category) A198r7 (97, C) CC procedures for CCBS recall A199r6 (97, C) Messages and IEs for CCBS A225 (97, B) MM procedures for CCBS recall A230r2 (97, C) Structured procedures for CCBS recall A231r3 (97, B) Section 8 procedures for CCBS recall A232r2 (97, C) Call Control timers for CCBS recall A235r1 (97, B) Indication of CCBS possible A257r1 (2+, F) Uplink access procedures A259r2 (2+, F) Uplink free message coding A261r2 (2+, C) Indication of ASCII network options to the mobiles A262r1 (2+, F) Group Receive/Group Transmit mode definitions A264r1 (2+, F) Deletion of NOTIFICATION/SACCH A266r2 (2+, F) SI 6 rest octets A268 (2+, F) Deletion of "NCH position" IE A269 (97, B) New call state values A271 (2+, D) Introduction of message type table for messages using "short L2 header" A275 (2+, A) Clarification on channel request coding for dual rate
March 1998	Version 6.0.0. Inclusion of CRs on GPRS approved at SMG#25 (Release, Category) A250r6 (R97, B) GPRS, RR-layer A265r5 (R97, B) Inclusion of GPRS session and mobility management procedures A273r3 (R97, B) Network controlled allocation of GPRS resource
(continued)	

(concluded)

Change Record	
July 1998	<p>Version 6.1.0 Inclusion of CRs approved at SMG#26 (Release,Category) Included chapter 4.2.5, which should have been included after SMG#25 (CR A265r5). A295r2 (R97, F) Alignment of the description of the suspend/resume operation with GSM 03.60 A299 (R97, F) Alignment of GSM 04.08 with 04.93 on Disconnect message A237r2 (R97, B) CC Procedures for CCBS activation A290r5 (R97, F) Addition of the GSM implicit detach timer functionality in the SGSN A291r4 (R97, F) Addition of transaction identifiers to prevent confusion in GPRS Session Management signalling exchanges A294r2 (R97, F) Various editorial corrections of GSM 04.08 related to GPRS MM. A302r2 (R97, F) Correction of the GMM state diagram figures A298r3 (R97, F) Modification of the timer value IE coding A325 (R97, F) Clarification of CM3 and ES IND bit handling in classmark 2 and 1 A293r3 (R97, F) Various corrections of GSM 04.08 related to the GPRS MM part A296r3 (R97, F) Alignment of the SM part of GSM 04.08 to GSM 09.60 A297r3 (R97, F) Modification of the timer value IE coding A292r1 (R97, F) Various editorial corrections of GSM 04.08 related to GPRS MM. A316 (R97, F) Clarification of CM3 and ES IND bit handling in classmark 2 and 1 (R97) A288 (R97, F) Provision of requested bandwidth for uplink transfer A284 (R97, F) Coding of parameter GCH A283r1 (R97, F) GPRS coincident packet uplink/downlink assign A281r2 (R97, F) RR support for GPRS suspension A313r1 (R97, F) Corrections to the RR Packet Uplink Assignment field A308r1 (R97, F) Corrections in GSM 04.08 A309r1 (R97, F) RR Initialisation Request message A310r3 (R97, C) GPRS radio Classmark as Radio Access Capability. A312r1 (R97, F) Addition of information to SI 9 A324 Mobile Station classmark information elements A322 Radio Link Failure in Group Transmit Mode A319 Notification on the PCH A318 NCH position A321 Procedures in group receive mode A320 NLN & NLN status A328 ASCII message coding A326 NOTIFICATION RESPONSE message A317 System information 10 header clarification</p>
August	Version 6.1.1 Correction of Editorial errors for Publication

History

Document history		
V6.1.1	August 1998	Publication