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Part 3**

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GSM 04.08-EXT - version 3.0.0 : June 1993

Preface:

This specification is an addendum to GSM 04.08 version 3.13.0 [I-ETS 300 022, February 1992] and shall only be read in connection with that specification.

The page numbers used in this document is equivalent to those used in GSM 04.08 version 3.13.0 and can be seen as a page by page replacement.

Changes with GSM 04.08 version 03.13.0 as reference are marked as follows:

Double Underline : New added text.

Strikethrough : Deleted text.

Vertical Bar in margin : Changes occur in the corresponding line.

The support of the additional functionality specified in this addendum is not mandatory, however if the functionality is supported, it shall be supported completely in accordance with this specification.

RECOMMENDATION GSM 04.08 - EXT

Title: **Mobile Radio Interface Layer 3 Specification, Part 3**
(Based on version 3.13.0 of GSM 04.08)

Date: June 1993

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1 GENERAL

This Recommendation specifies the procedures used at the radio interface (Reference Point Um, see GSM Rec. 04.02) for call control, mobility management and Radio Resource management.

When the mention for "further study" or "FS" or "FFS" is present throughout this document this means this is not relevant for ETSI-GSM phase 1 standard.

These procedures are defined in terms of messages exchanged over the control channels of the radio interface. The control channels are described in Rec. GSM 04.03.

The structured functions and procedures of this protocol and the relationship with other layers and entities are described in general terms in Rec. GSM 04.07.

1.1 Scope of the Recommendation

The procedures currently described in this Recommendation are for the call control of circuit-switched connections, the control of packet-mode communication, mobility management and radio resource management. The transport of other message-based information flows is a subject for further study.

Procedures for supplementary services are contained in Recommendation GSM 04.10.

Note 1: The term "layer 3" is used for the functions and protocol described in this Recommendation.

The terms "data link layer" and "layer 2" are used interchangeably to refer to the layer immediately below layer 3.

This delta recommendation only includes modified parts concerning the short term solution (phase 1) for support of dual ciphering algorithms (A5/1 and A5/2).

3.4.7 CIPHERING mode setting

The ciphering mode setting is used by the network to trigger the start of the stream ciphering (described in Rec. GSM 03.20).

3.4.7.1 CIPHERING mode setting initiation

The network initiates the ciphering mode setting procedure by sending a CIPHERING MODE COMMAND message to the Mobile Station on the main signalling link, indicating whether ciphering shall be used or not, and if yes which algorithm to use. In the case of ciphering, deciphering shall be started on the network side after the message has been sent.

3.4.7.2 CIPHERING mode setting response by the Mobile Station

Upon receipt of the CIPHERING MODE COMMAND message indicating ciphering, the Mobile Station shall start enciphering and deciphering using the available key.

The appropriate action on the CIPHER MODE COMMAND has been taken when the Mobile Station sends back a CIPHERING MODE COMPLETE message. Upon receipt of the CIPHERING MODE COMPLETE message or any other correct layer 2 frame which was sent enciphered, the network starts enciphering.

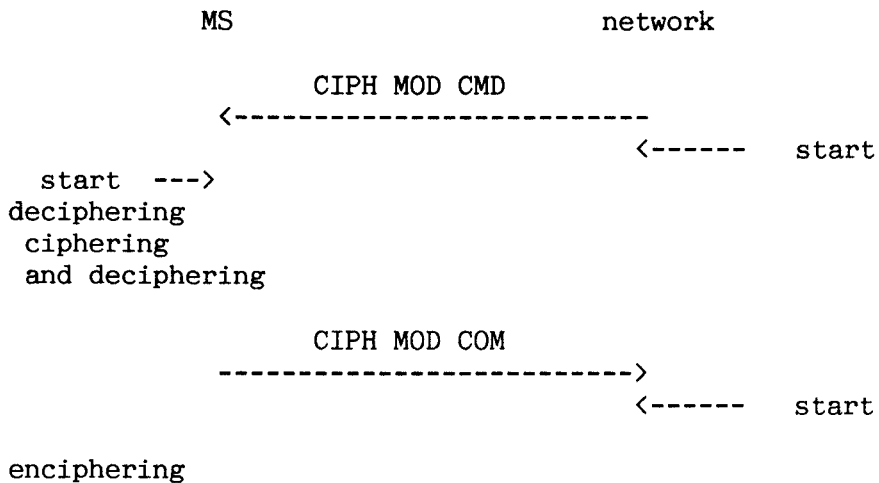


Figure 3.2/GSM 04.08
Ciphering mode setting sequence

3.4.10 Classmark change procedure

This procedure allows the MS to indicate to the network a change in the classmark (e.g. due to addition of power amplification).

The MS sends a CLASSMARK CHANGE message to the network. This message contains the new mobile station classmark 2 information element. There is no acknowledgment from the network at layer 3.

3.4.11 Classmark interrogation procedure

This procedure allows the network to request additional classmark information from the MS (e.g. if the information initially sent by the MS is not sufficient for network decisions).

3.4.11.1 Classmark interrogation initiation

The network initiates the classmark interrogation procedure by sending a CLASSMARK ENQUIRY message to the MS on the main DCCH.

3.4.11.2 Classmark interrogation completion

On receipt of the CLASSMARK ENQUIRY message the MS sends a CLASSMARK CHANGE message to the network on the main DCCH. This message contains the mobile station classmark 2 information element.

9.1 Messages for radio resources management

Table 9.1/GSM 04.08 summarizes the messages for radio resources management.

Channel establishment messages:	Reference
ADDITIONAL ASSIGNMENT	9.1.1
IMMEDIATE ASSIGNMENT	9.1.17
IMMEDIATE ASSIGNMENT EXTENDED	9.1.18
IMMEDIATE ASSIGNMENT REJECT	9.1.19
Ciphering messages:	Reference
CIPHERING MODE COMMAND	9.1.9
CIPHERING MODE COMPLETE	9.1.10
Handover messages:	Reference
ASSIGNMENT COMMAND	9.1.2
ASSIGNMENT COMPLETE	9.1.3
ASSIGNMENT FAILURE	9.1.4
HANDOVER ACCESS	9.1.13
HANDOVER COMMAND	9.1.14
HANDOVER COMPLETE	9.1.15
HANDOVER FAILURE	9.1.16
PHYSICAL INFORMATION	9.1.27
Channel release messages:	Reference
CHANNEL RELEASE	9.1.7
PARTIAL RELEASE	9.1.25
PARTIAL RELEASE COMPLETE	9.1.26
Paging messages:	Reference
PAGING REQUEST TYPE 1	9.1.21
PAGING REQUEST TYPE 2	9.1.22
PAGING REQUEST TYPE 3	9.1.23
PAGING RESPONSE	9.1.24

TABLE 9.1/GSM 04.08
Messages for radio resources management

System information messages:	Reference
SYSTEM INFORMATION TYPE 1	9.1.29
SYSTEM INFORMATION TYPE 2	9.1.30
SYSTEM INFORMATION TYPE 3	9.1.31
SYSTEM INFORMATION TYPE 4	9.1.32
SYSTEM INFORMATION TYPE 5	9.1.33
SYSTEM INFORMATION TYPE 6	9.1.34
Miscellaneous messages:	Reference
CHANNEL MODE MODIFY	9.1.5
CHANNEL MODE MODIFY ACKNOWLEDGE	9.1.6
CHANNEL REQUEST	9.1.8
CLASSMARK CHANGE	9.1.11
CLASSMARK ENQUIRY	9.1.11a
FREQUENCY REDEFINITION	9.1.12
MEASUREMENT REPORT	9.1.20
SYNCHRONISATION CHANNEL INFORMATION	9.1.28
RR-STATUS	9.1.27a

TABLE 9.1/GSM 04.08
Messages for radio resources management
(continued)

9.1.11 Classmark change

This message is sent on the main DCCH by the mobile station to the network to indicate a classmark change or as a response to a classmark enquiry. See table 9.12/GSM 04.08.

Message type: CLASSMARK CHANGE
 Significance: dual
 Direction : mobile station to network

Information element	Reference	Direction	Type	Length
Protocol discriminator	10.2	ms -> n	MF] 2
Transaction identifier	10.3	ms -> n	MF	
Message type	10.4	ms -> n	MF	
Mobile station classmark 2	10.5.1.6	ms -> n	MV	1-4

TABLE 9.12/GSM 04.08
 CLASSMARK CHANGE message content

9.1.11a Classmark enquiry

This message is sent on the main DCCH by the network to the mobile station to request classmark information. See table 9.12a/GSM 04.08.

Message type: CLASSMARK ENQUIRY

Significance: dual

Direction : network to mobile station

<u>Information element</u>	<u>Reference</u>	<u>Direction</u>	<u>Type</u>	<u>Length</u>
<u>Protocol discriminator</u>	<u>10.2</u>	<u>n -> ms</u>	<u>MF</u>	<u>1</u>
<u>Transaction identifier</u>	<u>10.3</u>	<u>n -> ms</u>	<u>MF</u>	<u>2</u>
<u>Message type</u>	<u>10.4</u>	<u>n -> ms</u>	<u>MF</u>	<u>1</u>

TABLE 9.12a/GSM 04.08
CLASSMARK ENQUIRY message content

10.4 Message Type

The purpose of the message type is to identify the function of the message being sent.

The message type is the third part of every message . The message type is coded as shown in Figure 10.4/GSM 04.08 and Tables 10.3-10.5/GSM 04.08.

Bit 8 is reserved for possible future use as an extension bit.

Bit 7 in the MM- and CM-messages sent from the mobile station is reserved for the send sequence number N(SD) (see section 2.4.1) In all other messages bit 7 is set to 0.

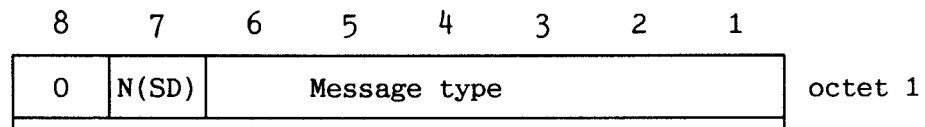


FIGURE 10.4/04.08
Message type

Messages with different protocol discriminators are permitted to have the same message type i.e. the function of a message is determined by the protocol discriminator and the message type together.

8	7	6	5	4	3	2	1	
0	0	1	1	1	-	-	-	Channel establishment messages:
				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	0	1	-	-	-	Handover messages:
				1	1	0		- ASSIGNMENT COMMAND
				0	0	1		- ASSIGNMENT COMPLETE
				1	1	1		- ASSIGNMENT FAILURE
				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	-	-	-	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 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

TABLE 10.3/GSM 04.08 (page 1 of 2)
 Message types for radio resources management

8	7	6	5	4	3	2	1	
0	0	0	1	1	-	-	-	System information messages:
			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
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

TABLE 10.3/GSM 04.08 (page 2 of 2)
 Message types for radio resources management

Note: Bit 8 is reserved for possible future use as an extension bit.

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 1 information element is coded as shown in Figure 10.18/GSM 04.08 and Table 10.11/GSM 04.08.

The mobile station classmark 2 is a type 3 information element with 2 octets length.

	8	7	6	5	4	3	2	1	
	0	0	0	1	1	0	0	0	octet 1
	Mobile station classmark 1 IEI								
	Revision level			Encryption algorithm		RF power capability			octet 2

FIGURE 10.18/GSM 04.08
Mobile station classmark 1 information element

Revision level (octet 2)	
Bits	
8 7 6	
0 0 0	
All other values are reserved for future use	
Encryption algorithm (octet 2)	
Bits	
5 4	
0 0	Algorithm <u>A5/1 algorithm</u>
All other values are reserved.	
RF power capability (octet 2)	
Bits	
3 2 1	
0 0 0	class 1, vehicle and portable
0 0 1	class 2, portable
0 1 0	class 3, handheld
0 1 1	class 4, handheld
1 0 0	class 5, handheld

TABLE 10.11/GSM 04.08
Mobile station classmark 1 information element

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 2 information element is coded as shown in Figure 10.19/GSM 04.08 and Table 10.12/GSM 04.08.

The mobile station classmark 2 is a type 4 information element with 5 octets length **maximal**.

8	7	6	5	4	3	2	1	
0	0	0	1	1	1	1	1	octet 1
Mobile station classmark 2 IEI								
Length of mobile station classmark 2 contents								octet 2
Revision level				Encryption algorithm		RF power capability		octet 3
0	0	0	0	SM ca	Frequency			octet 4
	spare	spare	spare	pabi.	Capability			
-----Spare-----								octet 5
0	0	0	0	0	0	0	A5/2	
Spare								octet 5
								Note

FIGURE 10.19/GSM 04.08
Mobile station classmark 2 information element

**Note:-This-octet-is-reserved-for-future-use-and
may-be-omitted:-**

Revision level (octet 2)	
Bits	
8 7 6	
0 0 0	
All other values are reserved for future use	
Encryption algorithm (octet 3)	
Bits	
5 4	
0 0	algorithm A5/1 available
All other values are reserved.	
RF power capability (octet 3)	
Bits	
3 2 1	
0 0 0	class 1, vehicle and portable
0 0 1	- 2, portable
0 1 0	- 3, handheld
0 1 1	- 4, handheld
1 0 0	- 5, handheld
SM capability (short message capability) (octet 4)	
Bit 4	
0	SM capability not present
1	SM capability present
Frequency Capabilty (octet 4)	
bits	
3 2 1	
0 0 0	band number 0
All other values are reserved.	
A5/2 algorithm supported (octet 5, bit 1)	
0	encryption algorithm A5/2 not available
1	encryption algorithm A5/2 available

TABLE 10.12/GSM 04.08
Mobile station classmark 2 information element

10.5.2.7 Cipher mode setting

The purpose of the cipher mode setting information element is to indicate whether stream ciphering shall be started or not.

The cipher mode setting information element is coded as shown in Figure 10.26/GSM 04.08 and Table 10.20/GSM 04.08.

The cipher mode setting is a type 1 information element.

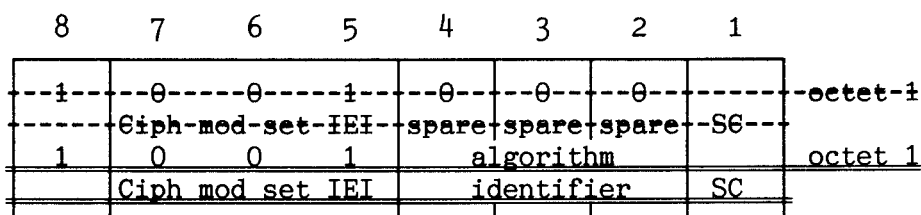


FIGURE 10.26/GSM 04.08
Cipher mode setting information element

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
All other values are reserved	
If SC=0 then bits 4, 3 and 2 are spare	
SC (octet 1)	
Bit	
1	
0	No ciphering
1	Start ciphering

TABLE 10.20/GSM 04.08.
Cipher mode setting information element