

Developer's Guide:

SMS with the M20

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1 Introduction

The SMS provides a means to transfer short messages between a GSM Mobil-Station (MS) and an Short-Message-Entity (SME) via an Service-Center (SC). The SC serves as an interworking and relaying function of the message transfer between the MS and the SME.

The short message point-to-point services comprise two basic services:

- ⇒ SM MT (Short Message Mobile Terminated Point-to-Point);
- ⇒ SM MO (Short Message Mobile Originated Point-to-Point).

The text messages to be transferred by means of the SM MT or SM MO contain up to 140 octets (max 160 Characters).

1.1 Service Center Number (+CSCA)

Service Centre (SC): Function responsible for the relaying and store-and-forwarding of a short message between an SME and an MS. The SC is not a part of the GSM PLMN, however MSC and SC may be integrated.

To use the SMS you have to declare the number of the SMSC (Short Message Service Center, SCA) in the MS (Mobile Station), provided that the MS support SMS-MO (Short Message Service-Mobile Originated).

SIM-Card	SMSC-number
A1-Mobilkom	+436640501
A3-Max.Mobil	+43676021
D1-Telekom	+491710760000
D2-Privat	+491722270333

With the command „AT+CSCA?“ the M20 shows the current Service-Center-Address stored on the SIM-Card.

With the AT-Command „AT+CSCA=<SCA>[, <TOSCA>]“ the SMSC-Number is entered.

Syntax:

Input	Execution	Comment
AT+CSCA?	<CR>	Query current Service-Center-Address (SCA) setting (read from SIM-Card)
Response:		
+CSCA: “<SCA>“ OK		

AT+CSCA=“<SCA>“	<CR>	Defines the Service-Center-Address (SCA) (stores on SIM-Card)
-----------------	------	---

Parameter:

<SCA>	Service-Center-Address (String-Type)
<TOSCA>	Type-Of-Service-Center-Address (numbering plan) optional

Examples:

AT+CSCA=“+991000“	<CR>	Defines the Service-Center-Address (SCA) in international number format.
AT+CSCA=“01000“	<CR>	Defines the Service-Center-Address (SCA) in national number format.

NOTICE:

- ⇒ Storing every address in international numbering format (beginning with „+“ continued with the country-code) is recommended to avoid problems while roaming!
- ⇒ Ask your local network provider for the right SMSC-number !
- ⇒ The SC-Address is a part of the SMS !
The SC-Address is stored together with each SMS on the SIM-card at the time the SMS ist stored !

1.2 Select Message Service (+CSMS)

This command selects messaging service . It returns the types of messages supported by the M20 and can be changed with the AT-Command „AT+CSMS=<SERVICE>“.

Syntax:

AT+CSMS=<SERVICE>	<CR>	Select Message Service
Response:		
+CSMS: <SERVICE> , <MT> , <MO> , <BM>		
OK		

Parameters:

<SERVICE>	indicates the messaging service
<MT>	service for mobile terminated messages
<MO>	service for mobile originated messages and
<BM>	service for broadcast type messages.

Examples:

Read-Command:

AT+CSMS?	<CR>	Read command returns supported message types along the current service setting.
Response:		
+CSMS: 0,1,1,1 OK		Command returns the current messaging service and a list of all services supported by the M20.

Set-Command:

AT+CSMS=1	<CR>	Set command defines supported message type.
Response:		
+CSMS: 0,1,1,1 OK		Command returns the current messaging service and a list of all services supported by the M20.

Defined Values:

Parameter	value	description
<SERVICE>	0	The syntax of SMS AT commands is compatible with GSM Phase 2 Phase 2+ features which do not require new command syntax may be supported (e.g. correct routing of messages with new Phase 2+ data coding schemes)
	1	The syntax of SMS AT commands is compatible with GSM Phase 2+ version (active acknowledgment of class 0 SMS-DELIVER-Messages)
	2...127	reserved
	128	Sets the SIEMENS M20 in a Mode compatible to the SIEMENS M1 (no Service-Center-Address added at the beginning of a PDU-SMS)
<MT> , <MO> , <BM>	0	type not supported
	1	type supported

NOTICE:

- ⇒ **When +CSMS=1, a class 0- SMS-DELIVER has to be acknowledged active with the command „AT+CNMA“ within a defined time!**
- ⇒ **For the straight forward case set this parameter to 0 (AT+CSMS=0) !**
- ⇒ **To be compatible with the SIEMENS M1 set this parameter to 128 (AT+CSMS=128) !**

1.3 Select Message Format (+CMGF)

The AT-Command „AT+CMGF=1<MODE>“ sets up the M20, which input and output format of messages to use. The Parameter indicates the format of messages used with send, list, read and write commands and unsolicited result codes resulting from received messages. Mode can be either Text mode or PDU mode (headers and body of the messages given as separate parameters).

Syntax:

AT+CMGF=<MODE>	<CR>	Select SMS-Format
Response:		
OK		

SupportedValues:

<mode>	meaning
0	PDU mode (default when)
1	Text mode

Examples:

Read-Command:

AT+CMGF?	<CR>	Read command returns current SMS-Mode.
Response:		
+CMGF: 0 OK	Command returns the current mode.	

Set-Command:

AT+CMGF=1	<CR>	Set-Command defines SMS-Mode.
-----------	------	-------------------------------

Test command returns supported modes as a compound value.

See M20 Technical Description for further details on Character-Set.

NOTICE: Text mode uses the value of parameter <CHSET> specified by AT-Command „AT+CSCS=<CHSET>“ - Select Terminal Character Set - to inform the character set to be used in the message body in the TA-TE interface.

2 SMS in Text-Mode

With the AT-Command „AT+CMGF=1“ the M20 has to be set in desired SMS-Text-Mode. From then every SMS-Input or Output is treated in Text-Mode. To switch back to PDU-Mode use the same command with the value <MODE>=0.

2.1 Text-Mode Parameter (+CSMP)

Setting the Parameter for SMS-Submit could be changed within the comand „AT+CSMP=<FO> ,<VP> ,<PID> ,<DCS>“.

Syntax:

AT+CSMP=<FO> ,<VP> ,<PID> ,<DCS>	<CR>	Sets Tex-Mode-SMS-Parameters
Response:		
OK		

Parameters:

<FO>	First Octet of the delivered / submitted SMS
<VP>	Validity-Period
<PID>	Protocol-Identifier
<DCS>	Data-Coding-Scheme

For query of the current status use the read command „AT+CSMP?“ .

Examples:

Read Command:

AT+CSMP?	<CR>	Query of the current status.
Response:		
+CSMP: 17,11,0,0	Shows the current settings.	

Set Command:

AT+CSMP=17,200,0,240	<CR>	Sets Tex-Mode-SMS-Parameters
Response:		
+CSMP: 17,200,0,240	Shows the current settings.	

The Test-Command „AT+CSMP=?“ gives as response only a „OK“.

2.1.1 Text-Mode-Parameter First-Octet <FO>

This value describes the first octet of SMS-DELIVER, SMS-SUBMIT (default 17), in integer format.

Use 17 for the standard case of a SMS-SUBMIT.

<FO> = 17&d = 11&h = 00010001&b...means:

- VP field present and integer represented (relative).
- SMS-SUBMIT (in the direction MS to SC)

NOTICE: See PDU-Mode-Parameter description for detailed description.

2.1.2 Text-Mode-Parameter Validity-Period <VP>

The Validity-Period is the information element which gives an MS submitting an SMS-SUBMIT to the SC the possibility to include a specific time period value in the short message (Validity-Period field). The TP-Validity-Period parameter value indicates the time period for which the short message is valid, i.e. for how long the SC shall guarantee its existence in the SC memory before delivery to the recipient has been carried out.

This value describes Validity-Period in integer format (default 167&d).

<VP> value [&d]	Validity period value
0 to 143	(VP + 1) x 5 minutes (i.e. 5 minutes intervals up to 12 hours)
144 to 167	12 hours + ((VP - 143) x 30 minutes)
168 to 196	(VP - 166) x 1 day
197 to 255	(VP - 192) x 1 week

The Validity-Period is counted from when the SMS-SUBMIT is received by the SC. When the first deliver attempt failed (maybe because destination ME is not in service) and the validity-periods expires the SMS will be rejected by the SC.

2.1.3 Text-Mode-Parameter Protocol Identifier <PID>

The PID is the information element by which the Transport Layer either refers to the higher layer protocol being used, or indicates interworking with a certain type of telematic device.

Some examples of PID codings:

<PID> value [&d]	Protocol
0	The SMS has to be treat as a short message
1	The SMS has to be treat as a telex
2	The SMS has to be treat as group3 telefax
3	The SMS has to be treat as group4 telefax

For further information see GSM 03.40 chapter 9.2.3.9

NOTICE: For the standard case use PID=0.

NOTICE: It is not guaranteed that the SMSC supports every PID coding!

SMS with not supported PID codings may be rejected!

Ask your local GSM-provider how to generate a SMS-Message to a FAX or e-mail-address!

2.1.4 Text-Mode-Parameter Data-Coding-Scheme <DCS>

The DCS field indicates the data coding scheme of the UD (User Data) field, and may indicate a message class.

<DCS> value [&d]	character coding	Message-Class
0	default (7-bit)	no class
240	default (7-bit)	class 0 (immediate display)
241	default (7-bit)	class 1 (Mobile Equipment- specific)
242	default (7-bit)	class 2 (SIM specific message)
243	default (7-bit)	class 3 (Class3 Terminate Equipment- specific)
244	8-bit	class 0 (immediate display)
245	8-bit	class 1 (Mobile Equipment- specific)
246	8-bit	class 2 (SIM specific message)
247	8-bit	class 3 (Class3 Terminate Equipment- specific)

For further information see GSM 03.38 chapter 4.

Default alphabet indicates that the UD (User Data) is coded from the 7-bit alphabet given in the appendix. When this alphabet is used, eight characters of the message are packed in

seven octets, and the message can consist of up to 160 characters (instead of 140 characters in 8-bit data coding)

In 8-bit data coding, you can relate to the INTEL ASCII-HEX table.

In Class 0 (immediate display) the short message is written directly in the display, as the M20T has no display the Class 0 SMS is routed direct to the Terminal.

In Class 1 to Class 3 the short message is stored on the SIM-card and TE.

In Class 2 the SMS has to be stored on the SIM-card, direct routing to Terminal is prohibited.

NOTICE:

⇒ In Case of 7 bit coding a SMS can consist on upto 160 charcters, in case of 8 bit coding only 140 characters are possible!

⇒ For the standard case on Text-SMS use <DCS>=0 !

2.2 SMS-Submit (Mobile Originated)

SMS-SUBMIT means that the GSM-Mobile sends a SMS to the Service-Center.

2.2.1 Write SMS to SIM-Card-Memory (+CMGW)

The execution command „AT+CMGW“ stores message (either SMS-DELIVER or SMS-SUBMIT) to SIM-Card memory storage.

Syntax:

AT+CMGW=<DA> [, <TODA> [, <STAT>]]	<CR>	
> TEXT	<CTRL-Z / ESC>	
Response:		
+CMGW: <INDEX> OK		If command is executed correct the SMS-Storage-index-number is presented.

Parameter:

<DA>	Destination-Address (String-Type)
<TODA>	Type-Of- Destination-Address (numbering plan) optional
<STAT>	allows other status values to be given than 'stored unsent'.
<INDEX>	Memory location

Examples:

AT+CMGW="+12345"	<CR>	Switches to SMS-Input-Mode, the SMS will be stored as „unsent“ with the destiantion address: „+12345“.
> THE BIG BROWN FOX *)	<CTRL-Z / ESC> **)	Input of the SMS-Message upto 160/140***) Characters. Stores a SMS onto the SIM-card.
Response:		
+CMGW: 1 OK		The SMS has been stored on the SIM-Card in index 1.

*) The prompt sign „>“ is generated by the M20.

**) The key <CTRL> +<Z> executes the command, <ESC> -key quits execution without storing/sending

***) Depends on Data-Coding-Scheme: 160 Character on 7 bit coding, 140 Character on 8 bit coding.

2.2.2 Send SMS from SIM-Card-Storage (+CMSS)

The AT-Command „AT +CMSS=<INDEX>[, <DA>[, <TODA>]]“ sends message with location value <INDEX> from SIM-Card message storage to the network (SMS-SUBMIT). If new recipient address <DA> is given given for SMS-SUBMIT, it shall be used instead of the one stored with the message.

Reference value <MR> is returned to the TE on successful message delivery. Optionally (when +CSMS <SERVICE> value is 1 and network supports) <SCTS> is returned.

Syntax:

AT+CMSS=<INDEX>	<CR>	
Response:		
+CMSS: <MR>[, <SCTS>]	The SMS has been sent from the SIM-storage successfully. Reference value <MR> is returned to the Terminal on successful message delivery. Optionally (when +CSMS <SERVICE> value is 1 and network supports) <SCTS> is returned..	

Parameter:

<INDEX>	SIM-Card-Memory location
<MR>	Message Reference
<SCTS>	Srvce-Center-Time-Stamp

Examples:

AT+CMSS=1	<CR>	The SMS stored on the SIM-Card in <INDEX> will be sent to the Service-Center.
Response:		
+CMSS: 255 OK	The Message Reference number is returned.	

2.2.3 Send SMS direct from Terminal (+CMGS)

This execution command sends message from a Terminal to the network (SMS-SUBMIT), without storing the SMS-Message onto the SIM-Card.

Reference value <MR> is returned to the TE on successful message delivery. Optionally (when +CSMS <SERVICE> value is 1 and network supports) <SCTS> is returned.

Syntax:

AT+CMGS=<DA>[, <TODA>]	<CR>	
> TEXT OF SMS	<CTRL-Z> / <ESC>	
Response:		
+CMGS: <MR>[, <SCTS>] OK	The Message Reference number is returned when sending was successful.	

Parameter:

<INDEX>	SIM-Card-Memory location
<DA>	Destination-Address (String-Type)
<TODA>	Type-Of- Destination-Address (numbering plan), optional.
<MR>	Message Reference
<SCTS>	Srvce-Center-Time-Stamp

Examples:

AT+CMGS="+991234567"	<CR>	Switches to SMS-Input-Mode, the SMS will be send to the destination address: „+991234567“.
> THE BIG BROWN FOX *)	<CTRL-Z / ESC> **)	Input of the SMS-Message upto 160/140***) Characters. Stores a SMS onto the SIM-card.
Response:		
+CMGS: 255 OK	The SMS has been send to the SC with Message Reference 255.	

*) The prompt sign „>“ is generated by the M20.

**) The key <CTRL> +<Z> executes the command, <ESC> -key quits execution without sending

***) Depends on Data-Coding-Scheme: 160 Character on 7 bit coding, 140 Character on 8 bit coding.

NOTICE: There is no possibility to resend this SMS-Message again!

2.3 SMS-DELIVER (Mobile Terminated)

SMS-DELIVER means that the M20 receives a SMS-Message from the Service-Center.

There are two principle ways to show the SMS.

⇒ If SMS-DELIVER is stored into SIM-Card, indication of the memory location is routed to the Terminal using unsolicited result code: „+CMTI: <MEM>, <INDEX>“.

⇒ SMS-DELIVERS (except class 2 messages (store message)) are routed directly to the Terminal using unsolicited result code: „+CMT: <OA>, [<ALPHA>], <SCTS> [<TOOA>, <FO>, <PID>, <DCS>, <SCA>, <TOSCA>, <LENGTH>] <CR><LF><DATA>“

NOTICE:

⇒ **About amount of parameters presented, refer command Show Text Mode Parameters +CSDH!**

⇒ **About conditions on displaying either SMS-DELIVER-stored on SIM-Card or routed directly to the Terminal refer command „at+cnmi“ in M20 Technical description.**

2.3.1 Indication about new SMS-DELIVER

An information is send to the Terminal that a new SMS-Message has arrived and it is stored on the SIM-Card.

Syntax:

+CMTI: <MEM>, <INDEX>	indication of the memory location is routed to the Terminal using unsolicited result code
-----------------------	---

Parameter:

<MEM>	preferred message storage („SM“)
<INDEX>	location value from preferred message storage <mem>.

Syntax for read new SMS:

AT+CMGR=<INDEX>	<CR>	
Response:		
+CMGR: <STAT>, <OA>, [<ALPHA>], <SCTS> [, <TOOA>, <FO>, <PID>, <DCS>, <SCA>, <TOSCA>, <LENGTH>] <DATA>		SIM-Card index 1 contains this SMS.
OK		

Parameter:

<STAT>	integer type in PDU mode (default 0), or string type in text mode (default "REC UNREAD"); indicates the status of message in memory;	
	defined values:	
	0	"REC UNREAD" received unread message (i.e. new message)
	1	"REC READ" received read message
	2	"STO UNSENT" stored unsent message
	3	"STO SENT" stored sent message
<OA>	Originating-Address Address-Value field in string format	
<TOOA>	Type of Originator-Address	
<ALPHA>	String type alphanumeric representation of <OA> corresponding to the entry found in SIM-phonebook	
<SCTS>	Service-Centre-Time-Stamp in time-string format.	
<FO> *)	First octet of SMS-DELIVER, SMS-SUBMIT (default 17), in integer format.	
<PID> *)	Protocol-Identifier in integer format (default 0).	
<DCS> *)	SMS Data Coding Scheme (default 0), or Cell Broadcast Data Coding Scheme in integer format	
<SCA> *)	SC Address-Value field in string format.	
<TOSCA> *)	SC address Type-of-Address octet in integer format.	
<LENGTH>	Integer type value indicating in the text mode (+CMGF=1) the length of the message body <DATA> in characters.	
<DATA>	Content of Message	

*) header values not shown when +CSDH=0

Delete new SMS:

AT+CMGD=<INDEX>	<CR>	Deletes the SMS on SIM-Card index <index>
Response:		
OK		

Example:

+CMTI: "SM", 1	A SMS has been delivered and stored on the SIM-Card in index 1
----------------	--

To read the new SMS:

AT+CMGR=1	<CR>	
Response:		
+CMGR: "REC READ"+991234567", "MR.SMS", "99/12/31,23:59:59+00" THE BIG BROWN FOX OK		SIM-Card index 1 contains this SMS.
or (when +CSDH=1):		
+CMGR: "REC READ", "+991234567", "MR.SMS", "99/12/31,23:59:59+00",145,17,0,0, "+1000",145,17 THE BIG BROWN FOX OK		SIM-Card index 1 contains this SMS (shown with extended header information elements).

Header Parameter:

<STAT>	"REC UNREAD"	received unread message
<OA>	"+991234567"	Originating-Address Address is +991234567
<TOOA>	145	International Originator-Address
<ALPHA>	"MR.SMS"	Originator found in SIM-phonebook as Mr. SMS
<SCTS>	"99/12/31,23:59:59+00"	Service-Centre-Time-Stamp: 31th of December 1999 23h59m59s, Time Zone 0
<FO> *)	17	SMS-DELIVER
<PID> *)	0	Treat SMS as normal Text
<DCS> *)	0	Data Coding Scheme =0 = default alphabet, 7bit coding
<SCA> *)	"+1000"	SC Address in string format.
<TOSCA> *)	145	International SC Address format.
<LENGTH>	17	Message body (<data>) consists of 17 characters

NOTICE: Don't try to SUBMIT a DELIVER- SMS ! Because of the different header-information it will not work!

2.3.2 Direct routing of new SMS-DELIVER

The SMS-Message is routed direct to the Terminal without storing onto the SIM-Card.

Syntax:

+CMT: <OA>, [<ALPHA>], <SCTS> [, <TOOA>, <FO>, <PID>, <DCS>, <SCA>, <TOSCA>, <LENGTH>] <DATA>	A new SMS is routed to the Terminal using unsolicited result code
---	---

Example:

+CMT: "+991234567", "MR.SMS", "99/12/31,23:59:59+00" THE BIG BROWN FOX	A SMS has been delivered and routed directly to the Terminal.
or (when +CSDH=1):	
+CMT: "+991234567", "MR.SMS", "99/12/31,23:59:59+00",145,17,0,0, "+1000",145,17 THE BIG BROWN FOX OK	A SMS has been delivered and routed direct to the Terminal (shown with extended header information elements).AT+CSDH=1

NOTICE:

⇒ **See M20-Technical Description for further information about the parameters given in the header of the SMS!**

⇒ **See command „AT+CSDH“ to show the extended header!**

Refer M20 Technical description for information on direct routing of SMS to the Terminal with the AT-Command „AT+CNMI“. Ex.:AT+CNMI=2,2.

3 SMS in Protocol-Data-Unit-Mode (PDU-Mode)

The PDU mode uses the same commands and responses as the Text Mode. However, the following commands and responses have a different format. In the PDU mode, a complete SMS Message including all header information is passed as a binary string. This binary string is composed of hexadecimal IA5 characters.

Use the AT-Command „AT+CMGF=0“ to switch to Protocol Data Mode:

From now every display and input of SMS will be executed in PDU-Mode.

3.1 SMS-Submit (Mobile Originated)

SMS-SUBMIT means that the GSM-Mobile sends a SMS to the Service-Center (Mobile Originated).

3.1.1 Write SMS to SIM-Card-Storage (+CMGW)

The execution command „AT+CMGW“ stores message (either SMS-DELIVER or SMS-SUBMIT) to SIM-Card memory storage.

Syntax:

AT+CMGW=<LENGTH> [, <STAT>]	<CR>	
> <PDU>	<CTRL-Z / ESC> **)	
Response:		
+CMGW: <INDEX> OK		If command is executed correctly the SMS-Storage-index-number is presented.

Parameter:

<LENGTH>	The number of octets coded in the TP layer data unit to be given (i.e. SC Address octets are excluded)
<STAT>	allows other status values to be given than 'stored unsent'.
<PDU>	SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number.
<INDEX>	Memory location

Examples:

AT+CMGW=28	<CR>	Switches to SMS-Input-Mode, the SMS will be stored as „unsent“
> 039101001100099199214365F7 0000FF11546411244C1E4142E9F3EA041 99F58 *)	<CTRL-Z / ESC> **)	Input of the SMS-PDU. Stores a SMS onto the SIM-card.
Response:		
+CMGW: 1 OK		The SMS has been stored on the SIM-Card in index 1.

*) The prompt sign „>“ is generated by the M20.

**) The key <CTRL> +<Z> executes the command, <ESC> -key quits execution without storing/sending

3.1.2 Send SMS from SIM-Card-Storage (+CMSS)

The AT-Command „AT +CMSS=<INDEX>[, <DA>[, <TODA>]]“ sends message with location value <INDEX> from SIM-Card message storage to the network (SMS-SUBMIT). If new recipient address <DA> is given given for SMS-SUBMIT, it shall be used instead of the one stored with the message.

Reference value <MR> is returned to the TE on successful message delivery. Optionally (when +CSMS <SERVICE> value is 1 and network supports) <SCTS> is returned.

Syntax:

AT+CMSS=<INDEX>	<CR>	
Response:		
+CMSS: <MR>[, <SCTS>]	The SMS has been sent from the SIM-storage successfully. Reference value <MR> is returned to the Terminal on successful message delivery. Optionally (when +CSMS <SERVICE> value is 1 and network supports) <SCTS> is returned..	

Parameter:

<INDEX>	SIM-Card-Memory location
<MR>	Message Reference
<SCTS>	Srvice-Center-Time-Stamp

Examples:

AT+CMSS=1	<CR>	The SMS stored on the SIM-Card in <INDEX> will be sent to the Service-Center.
Response:		
+CMSS: 255 OK	The SMS has been send to the SC with Message Reference 255.	

3.1.3 Send SMS direct from Terminal (+CMGS)

This execution command sends message from a Terminal to the network (SMS-SUBMIT), without storing the SMS-Message onto the SIM-Card. Reference value <MR> is returned to the TE on successful message delivery. Optionally (when +CSMS <SERVICE> value is 1 and network supports) <SCTS> is returned.

Syntax:

AT+CMGS=<LENGTH>	<CR>	Switches to SMS-Input-Mode, the SMS will be stored as „unsent“. The length of the PDU-String to follow must be determind within this command.
> <PDU>	<CTRL-Z / ESC>	Sends a SMS direct from Terminal without storing on SIM-Card.
Response:		
+CMGS: <MR>[, <SCTS>] OK	The Message Reference number is returned when sending was successful.	

Parameter:

<LENGTH>	Destination-Address (String-Type)
<PDU>	SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number.
<MR>	Message Reference
<SCTS>	Srvice-Center-Time-Stamp

Examples:

AT+CMGS=28	<CR>	Switches to SMS-Input-Mode, the SMS will be stored as „unsent“
> 039101001100099199214365F7 0000FF11546411244C1E4142E9F3EA041 99F58 *)	<CTRL-Z / ESC> **)	Input of the SMS-PDU. Stores a SMS onto the SIM-card.
Response:		
+CMGS: 255 OK	The SMS has been send to the SC with Message Reference 255.	

*) The prompt sign „>“ is generated by the M20.

***) The key <CTRL> +<Z> executes the command, <ESC> -key quits execution without sending

SMS-Submit direct from Terminal means that a SMS-Message is sent direct from the Terminal to the Service-Center without storing the SMS-Message onto the SIM-Card.

NOTICE: There is no possibility to resent this SMS-Message again!

3.2 SMS-DELIVER (Mobile Terminated)

SMS-DELIVER means that the M20 receives a SMS-Message from the Service-Center.

There are two principle ways to display the SMS.

⇒ If SMS-DELIVER is stored into SIM-Card, indication of the memory location is routed to the Terminal using unsolicited result code: „+CMTI: <MEM>, <INDEX>“.

⇒ SMS-DELIVERS (except class 2 messages (store message)) are routed directly to the Terminal using unsolicited result code: +CMT: [<ALPHA>], <LENGTH><CR><LF> <PDU>.

NOTICE:

⇒ **About conditions on displaying either SMS-DELIVER-stored on SIM-Card or routed directly to the Terminal refer command „at+cnmi“ in the M20 Technical description.**

3.2.1 Indication about new SMS-DELIVER

An information is send to the Terminal that a new SMS-Message has arrived and it is stored on the SIM-Card.

Syntax:

+CMTI: <MEM>, <INDEX>	indication of the memory location is routed to the Terminal using unsolicited result code
-----------------------	---

Parameter:

<MEM>	preferred message storage („SM“)
<INDEX>	location value from preferred message storage <mem>.

Syntax to read new SMS:

AT+CMGR=<INDEX>	<CR>	
Response:		
+CMGR: <STAT>, [<ALPHA>], <LENGTH> <PDU>	SIM-Card index 1 contains this SMS.	
OK		

Parameter:

<STAT>	integer type in PDU mode (default 0), or string type in text mode (default "REC UNREAD"); indicates the status of message in memory; defined values:
0	"REC UNREAD" received unread message (i.e. new message)
1	"REC READ" received read message
2	"STO UNSENT" stored unsent message
3	"STO SENT" stored sent message
<ALPHA>	String type alphanumeric representation of <OA> corresponding to the entry found in SIM-phonebook
<LENGTH>	Integer type value indicating the number of octets coded in the TP layer data unit to be given (i.e.SMSC address octets are excluded)
<PDU>	SC-Address followed by GSM 03.40 TPDU in hexadecimal format.

Syntax to delete new SMS:

AT+CMGD=<INDEX>	<CR>	Deletes the SMS on SIM-Card index <index>
Response:		
OK		

Example:

+CMTI: "SM",1	A SMS has been delivered and stored on the SIM-Card in index 1
---------------	--

To read the new SMS:

AT+CMGR=1	<CR>	
Response:		
+CMGR: 0,"MR. SMS",33 0391010004099199214365F70000992113329595001154 6411244C1E4142E9F3EA04199F58	A SMS has been delivered and stored on the SIM-Card in index 1	
OK		

NOTICE:

- ⇒ Don't try to SUBMIT a DELIVER- SMS ! Because of the different header-information it will not work!
- ⇒ Always keep at least one location in your memory (SIM) free to be able to receive a new SMS!

3.2.2 Direct routing of new SMS-DELIVER

The SMS-Message is routed direct to the Terminal without storing onto the SIM-Card.

Syntax:

+CMT: [<ALPHA>] ,<LENGTH> <PDU>	A new SMS is routed to the Terminal using unsolicited result code
------------------------------------	---

Parameter:

<ALPHA>	String type alphanumeric representation of <OA> corresponding to the entry found in SIM-phonebook
<LENGTH>	Integer type value indicating the number of octets coded in the TP layer data unit to be given (i.e.SMSC address octets are excluded)
<PDU>	SC-Address followed by GSM 03.40 TPDU in hexadecimal format.

Example:

+CMT: "MR.SMS", 33 0391010004099199214365F70000992113329595001154 6411244C1E4142E9F3EA04199F58	A SMS has been delivered and routed direct to the Terminal.
--	---

NOTICE: Refer M20 Technical description for parameter to set M20 in mode to route SMS to the Terminal with the AT-Command „AT+CNMI“.

3.3 The Basic elements of the SMS-PDU:

These Elements are partly used for SMS-SUBMIT and SMS-DELIVER.

Element	Field	Reference	Provision	Representation	Description
SCA		Service-Center-Address	M **)	1 – 12 Octets	Address of the SC
	length	Length of Address-Field		1 Octet (integer)	Defines the Length of the SCA over all in amount of Bytes
	tosca	Type Of SCA		1 Octet	Defines the type of Number according the numbering plan
	address	SCA-Field		2-10 Octets	Address of the originating or terminating SC
FO		First Octet	M	1 Octet	First Octet of the SMS-PDU
	MIT	Message-Type-Indicator	M	2 Bit	Parameter describing the message type
	RD	Reject-Duplicates	M	1 Bit	Parameter indicating whether or not the SC shall accept an SMS-SUBMIT for an SM still held in the SC which has the sam MR and the same DA as a previously submitted SM from the same OA
	MMS	More-Messages-to-Send	M	1 Bit	Parameter indicating whether or not there are more messages to send
	VPF	Validity-Period-Format	M	2 Bit	Parameter indicating whether or not the VP field is present.
	RP	Reply-Path	M	1 Bit	Parameter indicating that Reply Path exists.
	UDHI	User-Data-Header-Indicator	O	1 Bit	Parameter indicating that the UD field contains a Header
	SRR	Status-Report-Request	O	1 Bit	Parameter indicating if the MS is requesting a status report.
	SRI	Status-Report-Indication	O	1 Bit	Parameter indicating if the SME has requested a status report.
MR		Message-Reference	M	1 Octet	Integer representation of a reference number of the SMS-SUBMIT
OA		Originating-Address	M	2-12 Octets	Address of the originating SME.
	length	Length of OA-Field	M	1 Octet (integer)	Defines the Length of the OA in amount of digits
	toda	Type Of DA	M	1 Octets	Defines the type of Number according the numbering plan
DA		Destination-Address	M	2-12 Octets	Address of the terminating SME.
	length	Length of DA-Field	M	1 Octet (integer)	Defines the Length of the DA in amount of digits
	toda	Type Of DA	M	1 Octets	Defines the type of Number according the numbering plan
PID		Protocol-Identifier	M	1 Octet	Parameter identifying the above layer protocol, if any.
DCS		Data-Coding-Scheme	M	1 Octet	Parameter identifying the coding scheme within the User-Data.

SCTS		Service-Centre-Time-Stamp	M	7 Octets	Parameter identifying time when the SC received the message.
UDL		User-Data-Length	M	1 Octet (Integer)	Parameter indicating the length of the User-Data field to follow.
UD	UDH	User-Data-Header (***)	O	0-140 Octets	UDH can consist on upto the max.length of UD
		User-Data	O	0-140 Octets	140 Octets max. gives 140 or 160 Characters *)

*) Depends on setting +CSMS

***) Dependent on the DCS (Data Coding Scheme)

****) Only present when UDHI-Bit set.

3.3.1 The Basic elements of the SMS-DELIVER-PDU (Mobile Terminated)

Fields of a SMS-DELIVER-PDU:

SCA	FO	OA	PID	DCS	SCTS	UDL	UD
-----	----	----	-----	-----	------	-----	----

SCA: Service Center Address

FO: „First Octet“ of the delivered SMS (PDU-Type).

OA: Originator-Address

PID: Protocol-Identifier

DCS: DataCoding-Scheme

SCTS: Serviec-Center-Timestamp

UDL: User-Data-Length (Amount of Characters)

UD: User-Data (The Field where your information is placed)

3.3.2 The Basic elements of the SMS-SUBMIT-PDU (Mobile Originated)

Fields of a SMS-SUBMIT-PDU:

SCA	FO	MR	DA	PID	DCS	VP	UDL	UD
-----	----	----	----	-----	-----	----	-----	----

SCA: Service Center Address

FO: „First Octet“ of the submitted SMS (PDU-Type).

MR: Message Reference

DA: Destination-Address

PID: Protocol-Identifier

DCS: DataCoding-Scheme

UDL: User-Data-Length (Amount of Characters)

UD: User-Data (The Field where your information is placed)

Parameter Description

3.3.3 Service-Center-Address (SCA)

The Service-Center-Address (SCA) field consists of three parts:

Parts of SCA: 1-12 Octets

1 Octet	0-1 Octet	0-10 Octets
Length of SCA	Type of SCA	Address-Field

- **Length indicator:** indicating the length of the Service-Center-Address to following fields (Numbering-Plan + Service-CenterAddress) integer representativ the amount of Octets. If set to 00&h the following fields are not present and the M20 files in the SCA to SMS-PDU from the SIM-stored SCA (set with „at+cscs=xxxx“).

- **Type of SCA:** indicating either national or international numbering plan (81&h for national, 91&h for international numbering plan)
- **The SCA-Field:** containing the Address of the Service-Center according to the ISDN numbering plan.

The SCA is coded as follows

Octet Nr.	Content	
1	Length of Service-Center-Address contents [Octets]	
2	type of number *)	Numbering plan identification **)
3	Number digit 2	Number digit 1
4	Number digit 4	Number digit 3
5	Number digit 6	Number digit 5
...
n	Number last digit (or F&h)	Number (last digit or last (digit-1))

*) Type of number: 9&h = international (starts with „+“)

***) Numbering plan identification: 1&h = ISDN numbering plan (also valid for GSM)

The number digit(s) in octet 3 precede the digit(s) in octet 4 etc. The number digit which would be entered first is located in octet 3, bits 0 to 3. If the Service-Center-Address contains an odd number of digits, bits 5 to 8 of the last octet shall be filled with an end mark coded as 1111&b = F&h.

A field which is semi-octet represented, will consist of a number of complete octets and - possibly - one half octet. Each half octet within the field represents one decimal digit. The octets with the lowest octet numbers will contain the most significant decimal digits. Within one octet, the half octet containing the bits with bit numbers 0 to 3, will represent the most significant digit. In the case where a semi-octet represented field comprises an odd number of digits, the bits with bit numbers 4 to 7 within the last octet are fill bits and shall always be set to 1111&b = F&h. Within each semi octet, the bits with the highest bit numbers will be the most significant.

Example:

The Service-Center-Number „+1234567“ in PDU-Format looks like: „0591214365F7“.

05	91	214365F7
Five Octets length	International numbering plan	The coded Service-Center-Number, last digit filled with end mark F&h

:
:

Examples:

Service-Center-Number	PDU-Format Coded
+1234567	05 91 21 43 65 F7
+436640501	06 91 34 66 04 05 F1
+43676021	05 91 34 76 06 12
06640501	05 81 60 46 50 10
+ABCDEFGH *)	05 91 BA DC FC HG *)
ABCDEFGH *)	05 81 BA DC FC HG *)

*) not a valid address! This example shows only the location of the digids!

3.3.4 First Octet

The first octet of SMS-DELIVER (default 04&d = 04&h), SMS-SUBMIT (default 17&d = 11&h), defines the PDU-Type containing the following parameters:

First Octet on SMS-DELIVER:

Bit	7	6	5	4	3	2	1	0
Param.	RP	UDHI	SRI	-	-	MMS	MTI	MTI

First Octet on SMS-SUBMIT:

Bit	7	6	5	4	3	2	1	0
Param.	RP	UDHI	SRR	VPF	VPF	RD	MTI	MIT

NOTICE: The First Octet ist the first Byte right afther the Service-Center-Number (According to GSM-Specification) !

3.3.4.1 Message-Type-Indicator (MTI)

The Message-Type-Indicator is a 2-bit field, located within bits no 0 and 1 of the first octet of SMS-DELIVER, SMS-SUBMIT.

bit 1	bit 0	Message type
0	0	SMS-DELIVER (in the direction SC to MS)
0	0	SMS-DELIVER REPORT (in the direction MS to SC)
1	0	SMS-STATUS-REPORT (in the direction SC to MS)
1	0	SMS-COMMAND (in the direction MS to SC)
0	1	SMS-SUBMIT (in the direction MS to SC)
0	1	SMS-SUBMIT-REPORT (in the direction SC to MS)
1	1	Reserved

NOTICE: In M20 only the cases SMS-DELIVER and SMS-SUBMIT are supported !

3.3.4.2 More-Messages-to-Send (MMS)

The More-Messages-to-Send is a 1-bit field, located within bit no 2 of the first octet of SMS-DELIVER.

bit 2	meaning
0	More messages are waiting for the MS in this SC
1	No more messages are waiting for the MS in this SC

3.3.4.3 Validity-Period-Format (VPF)

The Validity-Period-Format is a 2-bit field, located within bit no 3 and 4 of the first octet of SMS-SUBMIT.

bit4	bit3	meaning
0	0	VP field not present
1	0	VP field present and integer represented (relative)
0	1	Reserved
1	1	VP field present and semi-octet represented (absolute)

! Any reserved values may be rejected by the SC.

! For the standard case use VP=10&b.

3.3.4.4 Status-Report-Indication (SRI)

The Status-Report-Indication is a 1-bit field, located within bit no. 5 of the first octet of SMS-DELIVER.

bit 5	meaning
0	A status report will not be returned to the SME
1	A status report will be returned to the SME

3.3.4.5 Status-Report-Request (SRR)

The Status-Report-Request is a 1-bit field, located within bit no. 5 of the first octet of SMS-SUBMIT.

bit 5	meaning
0	A status report is not requested
1	A status report is requested

3.3.4.6 User-Data-Header-Indicator (UDHI)

The User-Data-Header-Indicator is a 1 bit field within bit 6 of the first octet of an SMS-SUBMIT and SMS-DELIVER PDU.

bit 6	meaning
0	The UD field contains only the short message
1	The beginning of the UD field contains a Header in addition to the short message

3.3.4.7 Reply-Path (RP)

The Reply-Path is a 1-bit field, located within bit no 7 of the first octet of both SMS-DELIVER and SMS-SUBMIT.

bit 7	meaning
0	Reply-Path parameter is not set in this SMS-SUBMIT/DELIVER
1	Reply-Path parameter is set in this SMS-SUBMIT/DELIVER

3.3.4.8 Reject-Duplicates (RD)

The Reject-Duplicates is a 1 bit field located within bit 2 of the first octet of SMS-SUBMIT.

bit 2	meaning
0	Instruct the SC to accept an SMS-SUBMIT for an SM still held in the SC which has the same MR and the same DA as a previously submitted SM from the same OA.
1	Instruct the SC to reject an SMS-SUBMIT for an SM still held in the SC which has the same MR and the same DA as the previously submitted SM from the same OA. In this case an appropriate FCS value will be returned in the SMS-SUBMIT-REPORT.

3.3.5 Protocol-Identifier (PID)

The Protocol-Identifier is the information element by which the SM-TL either refers to the higher layer protocol being used, or indicates interworking with a certain type of telematic device. The Protocol-Identifier information element makes use of a particular field in the message types SMS-SUBMIT, SMS-DELIVER -Protocol-Identifier <PID>.

The Protocol-Identifier parameter consists of one octet. The MS will not interpret reserved or unsupported values but shall store them as received.

Note that for the standard case of simple MS-to-SC short message transfer the Protocol Identifier is set to the value 0 (PID=0="Standard-Text-SMS" implementation in the SC is Mandatory).

NOTICE: The SC may reject messages with a Protocol-Identifier containing a reserved value or one which is not supported.

NOTICE: Ask your local Provider which values of PID are supported!

NOTE: All values are possible, they are not changed by the M20

3.3.6 Data-Coding-Scheme (DCS)

The DCS field indicates the data coding scheme of the UD (User Data) field, and may indicate a message class. This field is given in hexadecimal format.

<DCS> value [&h]	character coding	Message-Class
00	default (7-bit)	no class
F0	default (7-bit)	class 0 (immediate display)
F1	default (7-bit)	class 1 (Mobile Equipment- specific)
F2	default (7-bit)	class 2 (SIM specific message)
F3	default (7-bit)	class 3 (Class3 Terminate Equipment- specific)
F4	8-bit	class 0 (immediate display)
F5	8-bit	class 1 (Mobile Equipment- specific)
F6	8-bit	class 2 (SIM specific message)
F7	8-bit	class 3 (Class3 Terminate Equipment- specific)

For further information see GSM 03.38 chapter 4.

Default alphabet indicates that the UD (User Data) is coded from the 7-bit alphabet given in the appendix. When this alphabet is used, eight characters of the message are packed in seven octets, and the message can consist of up to 160 characters (instead of 140 characters in 8-bit data coding)

In 8-bit data coding, you can relate to the INTEL ASCII-HEX table.

In Class 0 (immediate display) the short message is written directly in the display, as the M20T has no display the Class 0 SMS is routed direct to the Terminal.

In Class 1 to Class 3 the short message is stored on the SIM-card and TE.

In Class 2 the SMS has to be stored on the SIM-card, direct routing to Terminal is prohibited.

NOTICE:

⇒ **In Case of 7 bit coding a SMS can consist on upto 160 charcters, in case of 8 bit coding only 140 characters are possible!**

⇒ **For the standard case on Text-SMS use <DCS>=00&h !**

3.3.7 Originator Address (OA)

The Originator Address (OA) field consists of three parts:

OA: 1-12 Octets

1 Octet	0-1 Octet	0-10 Octets
Length of OA	Type of OA	Address-Field

- Length indicator: indicating the length of the Originator Address in integer representation the amount of digits.
- Type of OA: indicating either national or international numbering plan (81&h for national, 91&h for international numbering plan)
- The OA: coded as follows:

Octet Nr.	Content	
1	Length of Originator Address contents [digits]	
2	type of number *)	Numbering plan identification **)
3	Number digit 2	Number digit 1
4	Number digit 4	Number digit 3
5	Number digit 6	Number digit 5
...
n	Number last digit (or F&h)	Number (last digit or last (digit-1))

*) Type of number: 9&h = international (starts with „+“)

***) Numbering plan identification: 01&h = ISDN numbering plan (also valid for GSM)

The number digit(s) in octet 3 precede the digit(s) in octet 4 etc. The number digit which would be entered first is located in octet 3, bits 0 to 3. If the Originator Address contains an odd number of digits, bits 5 to 8 of the last octet shall be filled with an end mark coded as 1111&b = F&h.

A field which is semi-octet represented, will consist of a number of complete octets and - possibly – one half octet. Each half octet within the field represents one decimal digit. The octets with the lowest octet numbers will contain the most significant decimal digits. Within one octet, the half octet containing the bits with bit numbers 0 to 3, will represent the most significant digit. In the case where a semi-octet represented field comprises an odd number of digits, the bits with bit numbers 4 to 7 within the last octet are fill bits and shall always be

set to 1111&b = F&h. Within each semi octet, the bits with the highest bit numbers will be the most significant.

Example:

The Originator Address „+1234567“ in PDU-Format looks like: „0791214365F7“.

07: Seven digits length.

91: International numbering plan.

214365F7: The coded Originator Address, last digit filled with end mark F&h.

Examples:

Originator Address	PDU-Format Coded
+1234567	07 91 21 43 65 F7
+436640501	09 91 34 66 04 05 F1
+43676021	08 91 76 06 12
06640501	08 81 60 46 50 10
+ABCDEFGH IJKL *)	0C 91 BA DC FC HG *)
ABCDEFGHIJKLMN OPQRST *)	14 81 BA DC FC HG *)

*) not a valid address! This example shows only the location of the digids!

3.3.8 Destination-Address (DA)

The Destination-Address field is formatted according to the formatting rules of address fields as described in Originator-Address.

3.3.9 Message-Reference (MR)

The MR field gives an integer (0..255) representation of a reference number of the SMS-SUBMIT submitted to the SMSC by the MS. The M20 increments Message-Reference by 1 for each SMS-SUBMIT being submitted. The reference number may possess values in the range 0 to 255.

NOTICE: At the M20 the MR is generated automatically, -anyway you have to generate it- a possible entry is for example "00&h".

3.3.10 Validity-Period (VP)

The Validity-Period is the information element which gives an MS submitting an SMS-SUBMIT to the SMSC the possibility to include a specific time period value in the short message. The Validity Period parameter value indicates the time period for which the short message is valid, i.e. for how long the SMSC shall guarantee its existence in the SMSC memory before delivery to the recipient has been carried out.

The Validity-Period field is given in either integer or semi-octet representation. In the first case, the Validity-Period comprises 1 octet, giving the length of the validity period, counted from when the SMS-SUBMIT is received by the SC. The case of representation is set in the VPF (Validity Period Format) in the PDU-type (First Octet).

• Relative:

VPF (in First Octed) = 10&b

VP = A8&h = 2 days,

VP value [&h]	relative Validity period value
00 to 8F	$(VP + 1) \times 5$ minutes (i.e. 5 minutes intervals up to 12 hours)
90 to A7	12 hours + $((VP - 143) \times 30)$ minutes
A8 to C4	$(VP - 166) \times 1$ day
C5 to FF	$(VP - 192) \times 1$ week

3.3.11 User Data Length (UDL)

If the User-Data is coded using the default alphabet (7 bit coding), the User-Data-Length field gives an integer representation of the number of characters (septets) within the User-Data field to follow. If a User-Data-Header field is present, then the User-Data-Length value is the sum of the number of septets in the User-Data-Header field (including any padding) and the number of septets in the User-Data field which follows.

If the User-Data is coded using 8-bit data, the User-Data-Length field gives an integer representation of the number of octets within the User-Data field to follow. If a User-Data-Header field is present, then the User-Data-Length value is the sum of the number of octets in the User-Data-Header field and the number of octets in the User-Data field which follows.

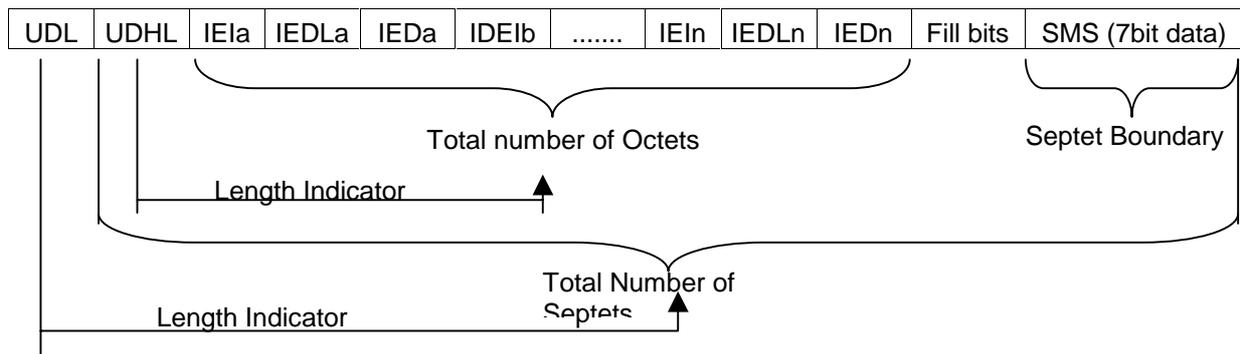
If this field is zero (00&h), the User-Data is not present.

3.3.12 User Data (UD)

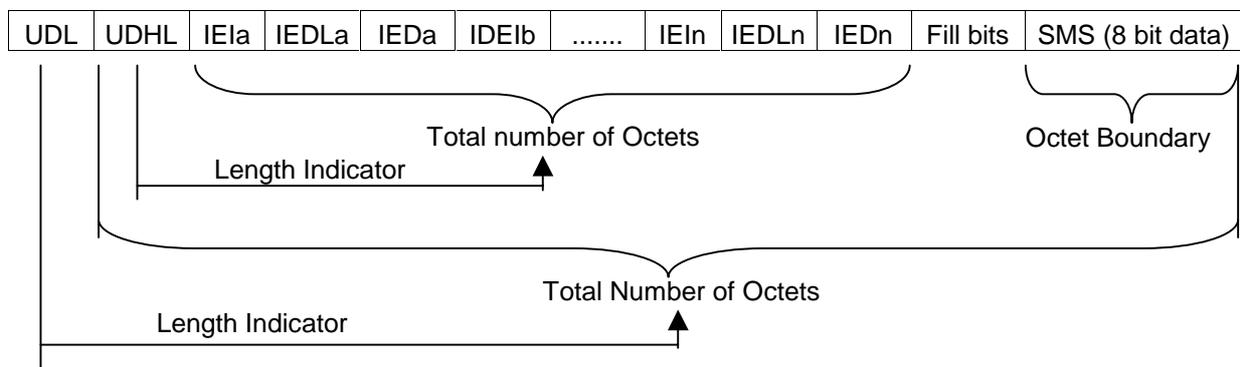
The User-Data field contains up to 140 octets of user data. The User-Data field may comprise just the short message itself or a Header in addition to the short message depending upon the setting of UDHI. Where the UDHI value is set to 0 the User-Data field comprises the short message only, where the user data can be 7 bit (default alphabet) data, 8 bit data, or 16 bit (UCS2) data. Where the UDHI value is set to 1 the first octets of the User-Data field contains a Header in the following order starting at the least significant octet of the User-Data field:

- Field Length
- Length of User Data Header 1 octet
- Information-Element-Identifier "A" 1 octet
- Length of Information-Element "A" 1 octet
- Information-Element "A" Data 1 to "n" octets
- Information-Element-Identifier "B" 1 octet
- Length of Information-Element "B" 1 octet
- Information-Element "B" Data 1 to "n" octets
- Information-Element-Identifier "n" 1 octet
- Length of Information-Element "n" 1 octet
- Information-Element "n" Data 1 to "n" octets

The diagram below shows the layout of the User-Data for seven bit SM data.



The diagram below shows the layout of the User-Data for eight bit SM data.



- UDL User Data Length
- UDHL User Data Header Length
- IEI Information Element Identifier
- IEDL Information Element Data Length
- IED Information Element Data

The "Length-of-Information-Element" fields shall be the integer representation of the number of octets within its associated "Information-Element-Data" field which follows and shall not include itself in its count value.

The "Length-of-User-Data-Header" field shall be the integer representation of the number of octets within the "User-Data-Header" information fields which follow and shall not include itself in its count or any fill bits which may be present (see text below).

The Information Element Identifier octet shall be coded as follows:

Value [&h]	Meaning
00	Concatenated short messages
01	Special SMS Message Indication
02	Reserved
03	Value not used to avoid misinterpretation as <LF> character
04 - 7F	Reserved for future use
80 - 9F	SME to SME specific use
A0 – BF	Reserved for future use
C0 – DF	SC specific use
E0 – FF	Reserved for future use

A receiving entity shall ignore any value which is not understood or supported.

The SM itself may be coded as 7, 8 or 16 bit data.

NOTICE: See M20-Technical Description or GSM 03.40 for detailed information about parameters.

4 PDU Examples

4.1 SMS-SUBMIT-PDU

AT+CMGS=28 (AT+CMGW=28) <RET>

> 039101001100099199214365F70000FF11546411244C1E4142E9F3EA04199F58 <CTRL-Z>

03	91	0100	11	00	09	91	99214365F7	00	00	FF	11	546411244C1E4142E9F3EA04199F58
Length of SCA	Type of SCA	Address-Field	First Octet	Message-Reference	Length of OA	Type of OA	Address-Field	Protocol-Identifier	Data-Coding-Scheme	Validity-Period	User Data Length	User-Data
												↳ „THE BIG BROWN FOX“ (7bit)
												↳ 11&h = 17&d, number of characters
												↳ FF&h = 255-192xweeks=63 weeks
												↳ 00&h = default alphabet, 7bit, no message-class
												↳ 00&h = treat as normal SMS
												↳ 99214365F7 = „991234567“
												↳ 91&h = international numbering plan -> „+991234567“ (00991234567)
												↳ 09&h= 09&d = number of digits of OA
												↳ 00 (will be changed automatically by Originating Mobile)
												↳ 11&h=00010001&b= VPF is present and relative, SMS is MS -> SC
												↳ 0100 = „1000“
												↳ 91&h = international numbering plan -> „+991000“ (00991000)
												↳ 03&h = 03&d = length of SCA, number of bytes

4.2 SMS-DELIVER-PDU

+CMT: ,33

0391010004099199214365F700009921133295950011546411244C1E4142E9F3EA04199F58

03	91	0100	04	09	91	99214365F7	00	00	99211332959500	11	546411244C1E4142E9F3EA04199F58
Length of SCA	Type of SCA	Address-Field	First Octet	Length of OA	Type of OA	Address-Field	Protocol-Identifier	Data-Coding-Scheme	SC-Time Stamp	User Data Length	User-Data
											↳ „THE BIG BROWN FOX“ (7bit)
											↳ 11&h = 17&d, number of characters
											↳ 31th December 1999, 23h59m59s, TZ=+00
											↳ 00&h = default alphabet, 7bit, no message-class
											↳ 00&h = treat as normal SMS
											↳ 99214365F7 = „991234567“
											↳ 91&h = international numbering plan -> „+991234567“ (00991234567)
											↳ 09&h= 09&d = number of digits of OA
											↳ 04&h=00000100&b= SMS is SC -> MS
											↳ 0100 = „1000“
											↳ 91&h = international numbering plan -> „+991000“ (00991000)
											↳ 03&h = 03&d = length of SCA, number of bytes

5 Appendix

5.1 Default alphabet

GSM 03.38 default alphabet.

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	2	0	1	0	1
b4	b3	b2	b1		00	10	20	30	40	50	60	70
0	0	0	0	00	@	Δ	SP	0	i	P	ı	p
0	0	0	1	01	£	_	!	1	A	Q	a	q
0	0	1	0	02	\$	Φ	”	2	B	R	b	r
0	0	1	1	03	¥	Γ	#	3	C	S	c	s
0	1	0	0	04	è	Λ	¤	4	D	T	d	t
0	1	0	1	05	é	Ω	%	5	E	U	e	u
0	1	1	0	06	ù	Π	&	6	F	V	f	v
0	1	1	1	07	ì	Ψ	'	7	G	W	g	w
1	0	0	0	08	ò	Σ	(	8	H	X	h	x
1	0	0	1	09	ç	Θ	)	9	I	Y	i	y
1	0	1	0	0A	LF	Ξ	*	:	J	Z	j	z
1	0	1	1	0B	ø	1)	+	;	K	Ä	k	ä
1	1	0	0	0C	ø	Æ	,	<	L	Ö	l	ö
1	1	0	1	0D	CR	æ	-	=	M	Ñ	m	ñ
1	1	1	0	0E	Å	ß	.	>	N	Ü	n	ü
1	1	1	1	0F	å	É	/	?	O	Ş	o	à

5.2 Abbreviations

MS	Mobile Station
SME	Short Message Entity
SMSC	Short Message Service Center
SC	Short Message Service Center
PDU	Protocol Data Unit
PDU-Type	Protocol Data Unit Type
MR	Message Reference
OA	Originator Adress
DA	Destination Adress
PID	Protocol Identifier
DCS	Data Coding Scheme
SCTS	Service Center Time Stamp
VP	Validity Period
UDL	User Data Length
UD	User Data
UDHI	User Data Header Indicator
RP	Reply Path
SRI	Status Report Indication
SRR	Status Report Request
VPF	Validity Period Format
MMS	More Messages to Send
RD	Reject Duplicate
MTI	Message Type Indicator
ME	Mobile Equipment
TE	Terminal Equipment
SIM	Subscriber Identity Modul
&h	Hexadecimal format
&d	Decimal format
&b	Binary format

5.3 Packing of 7-bit characters

If a character number α is noted in the following way:

b7	b6	b5	b4	b3	b2	b1
αa	αb	αc	αd	αe	αf	αg

The packing of the 7-bits characters in octets is done by completing the octets with zeros on the left.

Examples, packing: α

- one character in one octet:

bits number:

	bit							
Octet	7	6	5	4	3	2	1	0
1	0	1a	1b	1c	1d	1e	1f	1g

- two characters in two octets:

	bit							
Octet	7	6	5	4	3	2	1	0
1	2g	1a	1b	1c	1d	1e	1f	1g
2	0	0	2a	2b	2c	2d	2e	2f

- three characters in three octets:

	bit							
Octet	7	6	5	4	3	2	1	0
1	2g	1a	1b	1c	1d	1e	1f	1g
2	3f	3g	2a	2b	2c	2d	2e	2f
3	0	0	0	3a	3b	3c	3d	3e

- seven characters in seven octets:

	bit							
Octet	7	6	5	4	3	2	1	0
1	2g	1a	1b	1c	1d	1e	1f	1g
2	3f	3g	2a	2b	2c	2d	2e	2f
3	4e	4f	4g	3a	3b	3c	3d	3e
4	5d	5e	5f	5g	4a	4b	4c	4d
5	6c	6d	6e	6f	6g	5a	5b	5c
6	7b	7c	7d	7e	7f	7g	6a	6b
7	0	0	0	0	0	0	0	7a

- eight characters in seven octets:

	bit							
Octet	7	6	5	4	3	2	1	0
1	2g	1a	1b	1c	1d	1e	1f	1g
2	3f	3g	2a	2b	2c	2d	2e	2f
3	4e	4f	4g	3a	3b	3c	3d	3e
4	5d	5e	5f	5g	4a	4b	4c	4d
5	6c	6d	6e	6f	6g	5a	5b	5c
6	7b	7c	7d	7e	7f	7g	6a	6b
7	8a	8b	8c	8d	8e	8f	8g	7a

The bit number zero is always transmitted first.

Therefore, in 140 octets, it is possible to pack $(140 \times 8) / 7 = 160$ characters.

5.4 SMS-specific error codes

Code of <err>	Meaning
0...127	GSM 04.11 Annex E-2 values, see CMS ERROR codes related to GSM 07.07
128...255	GSM 03.40 subclause 9.2.3.22 values
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network timeout
340	no +CNMA acknowledgment expected
500	unknown error
...511	all other values in range 256...511 are reserved
512	SIM not ready
513	Unread records on SIM
514	CB unknown error