

## How to Send Concatenated SMS with PDU Mode

It is known that SMS text messages are limited to 160 characters, but on most GSM networks it is possible to send longer text messages. These messages go out as multiple physical SMS messages that are logically reassembled into a single long text message by the recipient handset.

In GSM environments, an SMS message can contain up to 140 bytes (standard 8-bit bytes) of message data.

To squeeze in a few extra characters, the original SMS architects defined that SMS would use a restricted 7-bit character set which contains English characters, plus a few symbols, and some international characters for Western Europe and Greece (Greek capital letters are included).

When you send a text message, as long as the text only contains characters that are included in the GSM 7-bit character set, 160 7-bit characters are compressed into 140 8-bit bytes to produce the 160 character limit that we are so familiar with. (Note:  $160 * 7 = 140 * 8$ )

If you want to send a message that contains characters that are not part of the GSM 7-bit character set, such as Chinese, Arabic, Thai, Cyrillic, etc., then the entire text of the SMS that actually goes out over the air needs to be encoded in the Unicode UCS-2 character set. In the UCS-2 character set, each character is encoded with 16-bits (or two 8-bit bytes). This means that an SMS message is limited to 70 16-bit Unicode characters ( $70 * 16 = 140 * 8$ ).

If a message is larger than 140 8-bit bytes, then there are segmentation and reassembly standards defined, where a single logical message can be sent over the air using multiple physical SMS messages. The receiving client then has the ability to reassemble the segmented message so that it again appears as a single message on the receiving device.

When a long text message is segmented into multiple physical SMS messages, a special header is added to each physical SMS message so that the receiving client knows that it is a multipart SMS message that must be reassembled by the client. These headers are known as segmentation or concatenation headers. 6 bytes (8-bits each) are required for these concatenation headers in each physical SMS message. These headers are placed in the User Data Header (UDH) field of the message, but they do count against the overall size limit of the message.

If you send a long text message containing only characters that are part of the GSM 03.38 character set, then each SMS segment can contain up to 153 characters. (140 bytes – 6 bytes for the concatenation header leaves 134 available bytes, or  $7 * 134 = 1072$  bits. The most 7-bit characters that can be packed into 1072 bits is 153.)

If you send a long text message that includes any characters that require Unicode encoding, then each SMS segment can contain up to 67 characters. ( $67 * 16 = 1072$  bits) (Note: Some versions of NowSMS defined a 63 character limit instead of 67, so you may need an update if you are seeing a segmentation break at 63 character intervals.)

If you're submitting text via the NowSMS web interface (or direct HTTP URL submission), then NowSMS will automatically perform this segmentation to create the concatenation headers and properly encoded SMS message.

Here are some samples to show you how to encode text messages in PDU mode.

◆ Short SMS message (Not more than 160 characters)

**SMS content (142 characters):**

OpenVox is dedicated to provide Open Source Computer Telephony hardware and software product. More info pls refer our website: [www.openvox.cn](http://www.openvox.cn).

**PDU code:**

```
0891683108705505F011000D91683117449813F60000AA8E4F78D96D7DE341E939885C26A7C7617A990CA2BF417
0F9DB9E2697414F78D90D9ABEEBF27119347CB7E1757A590EA296D96538FAEDCE83D06139F91E96974161371
9347F9BE9F7B0BC0C82CBDFE4FA98EE0235DFF23228ED36BF4170F61C242F9BCB72D0BB2E07DDCBE2799A
5ED681EEF7BBEB0D2FBBED6FBC6BEC7601
```

## SMS-SUBMIT-PDU

SCA			PDUType	MR	DA			PID	DCS	VP	UDL	UD
1-12			1	1	2-12			1	1	0,1,7	1	0-140
Len	Type	Add			Len	Type	Add					
1	1	11			1	1	11					
08	91	683108705505F0	11	00	0D	91	683117449813F6	00	00	AA	8E	4F78D96...

PDU:

0891683108705505F011000D91683117449813F60000AA8E4F78D96...

SCA	Service Center Address
PDU-Type	Protocol Data Unit Type
MR	Message Reference
DA	Destination-Address
PID	Protocol-Identifier
DCS	Data Coding-Scheme
VP	Validity Period
SCTS	Service-Center-Timestamp
UDL	User-Data-Length (Amount of Characters)
UD	User-Data, The Field where your information is placed

Octet(s)	Description
08	Length of SMSC information. If the length is 00, it means that the SMSC stored in the phone will be used. Note: This octet is optional. On some phones this octet should be omitted! (Using the SMSC stored in phone is thus implicit)
91	Type-of-Address. (91 indicates international format of the phone number). Refer GSM 03.40 Page 35.
683108705505F0	SMSC number is +8613800755500. If it is odd, add a 'F' in the end, then reverse the character for each octet.
11	PDU Type, First octet of the SMS-SUBMIT message. Refer GSM 03.40 P41.
00	TP-Message-Reference. The "00" value here lets the phone set the message reference number itself.
0D	Address-Length. Length of destination phone number (13)
91	The same as above. Refer GSM 03.40 Page 35.
683117449813F6	Destination-Address. The phone number in semi octets (861314489316). The length of the phone number is odd (13), therefore a trailing F has been added, as if the phone number were "8613714489316F". Refer GSM 03.40, Section 9.1.2.5, P34.
00	TP-PID. Protocol identifier. Refer Section GSM 03.40, 9.2.3.9, P52
00	TP-DCS. Data coding scheme. This message is coded according to the 7bit default alphabet. Having "08" instead of "00" here, would indicate that the TP-User-Data field of this message should be interpreted as 16bit (USC-2) rather than 7bit. Refer Section GSM 03.40, 9.2.3.10, P54.
AA	TP-Validity-Period. "AA" means 4 days. Note: This octet is optional; see bits 4 & 3 of the first octet.
8E	TP-User-Data-Length. Length of message. The TP-DCS field indicated 7-bit data, so the length here is the number of septets (142). If the TP-DCS field were set to 8-bit data or Unicode, the length would be the number of octets.
4F78D96...	TP-User-Data. These compressed octets represent the SMS content above. How to do the transformation from 7bit septets into octets is shown here.

◆ Long SMS message (More than 160 characters)

#### SMS Content (288 characters):

With the people's expertise in design and service experience, we provide professional quality products and a 3-month "no questions asked" return policy for all OpenVox hardware.

All our hardware products are ready to be used with leading open source telephony projects including Asterisk.

#### Part 1 (153 characters):

With the people's expertise in design and service experience, we provide professional quality products and a 3-month "no questions asked" return policy f

#### PDU Code:

0891683108705505F041000D91683117449813F60000A0050003660201AE693A1A44479741F0F21BCE2E9FE6A0321E5E96D3D3F33228ED0691CBF3F4D90D0ABBC9A079596E4F8FCBA0321E5E96A7CBEE719905BA974170F9DB9E26974170F9DB5C9ECFD36F77980D8AD7C3EC343D0F82CBDFE4FA983E0785DD645018346BB5DF6E3A1A2472BF41F17A794E4FBFDD735078BE2E93452079995E97BB41F0373B3DCE83CC

#### Part 2 (135 characters):

or all OpenVox hardware.

All our hardware products are ready to be used with leading open source telephony projects including Asterisk.

#### PDU Code:

0891683108705505F041000D91683117449813F600008F050003660202DE725098CD063DE165B7F58D07A1C372F23D2C2FBB1A8A209B0D7AD7E52074584EBE87E565105CFE26D7C7F439282C2F83E4E530390FA2BF41E232A83E2F9341F7341D0D6297C3E4B4FB0C7AC3CB6ED0FC5D978FCB207A995D86A3DFEE3C082E7FABCB63FA1C94768FD97572DA7D0605E7F4B23C3D5FBB00

#### SMS-SUBMIT-PDU

SCA			PDUType	MR	DA			PID	DCS	VP	UDL	UDHL	UDH	UD
1-12			1	1	2-12			1	1	0,1,7	1	1	5	0-134
Len	Type	Add			Len	Type	Add							
1	1	11			1	1	11							
08	91	683108705505F0	41	00	0D	91	683117449813F6	00	00		A0	05	00036602	AE693A1A4447...

#### PDU:

0891683108705505F041000D91683117449813F60000A0050003660201AE693A1A4447...

SCA	Service Center Address
PDU-Type	Protocol Data Unit Type
MR	Message Reference
DA	Destination-Address
PID	Protocol-Identifier
DCS	Data Coding-Scheme
VP	Validity Period
UDL	User-Data-Length (Amount of Characters)
UDHL	User-Data-Header-Length
UDH	User-Data-Header
UD	User-Data, The Field where your information is placed

Octet(s)	Description
08	(Description blank means the same as above.)
91	
683108705505F0	
41	PDU Type, First octet of the SMS-SUBMIT message. UDH enabled for Multiple SMS messages. Refer GSM 03.40 P41.
00	
0D	
91	
683117449813F6	
00	
00	
	TP-Validity-Period. Leave it empty means 5 minutes. Note: This octet is optional; see bits 4 & 3 of the first octet.
A0	TP-User-Data-Length. Not only the length of message but also the length of UDHL&UDH (050003660201, 6 octets here). The TP-DCS field indicated 7-bit data, so the length here is the number of septets (160). In the case of uncompressed GSM Default 7-bit data, the maximum length of the short message within The TP-UD field is 153(160-7) characters.
05	TP-User-Data-Header-Length. Length of UDH, here is 5 octets (0003660201).
0003660201	TP-User-Data-Header Field, this facility allows short messages to be concatenated to form a longer message. Refer GSM 03.40, Section 9.2.3.23, P60.
AE693A1A4447...	TP-User-Data. These compressed octets represent the SMS content above. In the case of uncompressed 8-bit data, the maximum length of the short message within The TP-UD field is 134(140-6) octets.

There are some limitations with concatenated SMS messages:

The maximum length of an uncompressed concatenated message is 39015(255\*153) default alphabet characters, 34170(255\*134) octets or 17085(255\*67) UCS-2 characters.

The maximum length of a compressed concatenated message is 34170(255\*134) octets including padding bits within TP-UD field.

How to encode text message to PDU code:

<http://hiteshagja.com/net/encode-text-message-to-pdu/>

How to send concatenated SMS:

<http://hiteshagja.com/mobile-application-development/send-long-sms-using-at-command/>

A sample source code to encode Single message PDU and Multipart message PDU:

<http://hiteshagja.com/downloads/SkywardSMS.rar>