

# SMS Application Note

Version 2.6



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## Notice

This document provides guide for users to use the **N720 / N10 / M660 / M680 / M590E**.

This document is intended for system engineers (SEs), development engineers, and test engineers.

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## Revision Record

Issue	Changes	Date
V1.0	Initial draft	2010-01-26
V2.1	Added SMS sending process.	2011-05-09
V2.2	Changed the formatting.	2012-11-22
V2.3	Added some description.	2012-12-18
V2.4	Deleted duplicated contents.	2013-08-18
V2.5	Added SMS function using outside of China	2014-07-09
V2.6	Added N10 module	2017-01-12
V2.7	Added N720 module	2017-02-15

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# 1 SMS TX/RX Overview

SMS messages can be transmitted or received in text and PDU modes. With simple coding, text mode is easy to use; PDU mode allows long SMS messages though the coding is complex.

SMS messages transmitted and received in PDU mode are coded in 7 bits, 8 bits, and 16 bits. In general, the 7 bits packing format is used for characters in a message contains only GSM Default Alphabets. This allows maximum characters in a message to be 160 characters. 8-bit coding is to send data messages such as picture and the maximum characters in a message are 140. 16 bits coding is used when the message contains UCS2 alphabets. Since two bytes is needed to represent a character, this results maximum of 70 characters is allowed in a message.

## 2 SMS Messages in Text Mode

### 2.1 Sending SMS Messages in Text Mode

AT+CSQ

+CSQ: 21,99

OK

AT+CREG?

+CREG: 0,1

OK

AT+CMGF=1 (Set to the text mode)

OK

AT+CSCS="GSM" (Configure the character set)

OK

AT+CMGS="13570885456"<CR> (Press the Enter button and enter message content after the > symbol is displayed.)

>neoway technology → (Press Ctrl+Z. → is displayed indicating that the message is transmitting.)

+CMGS:70 Indicates that the message is transmitted successfully.

OK

### 2.2 Receiving SMS Messages in Text Mode

AT+CSQ

+CSQ: 27,99

OK

AT+CREG?

```
+CREG: 0,1
```

```
OK
```

```
AT+CMGF=1 //Set the SMS message mode
```

```
OK
```

```
AT+CSCS="GSM" //Configure character set.
```

```
OK
```

```
AT+CNMI=2,2,0,0,0
```

```
OK
```

```
+CMT: "+8613808801154",,"12/12/17,14:05:26+50"
```

```
Shenzhenneoway //SMS message content
```

### 3 Sending SMS Messages in PDU Mode

The following picture shows an example of sending PDU mode. For details about the description of the message format, see the next section.



0891683108705505F011000D91683108881051F40008AA044F60597D

**0>:19** in the **AT+CMGS=19** command indicates the half length of the TPDU (the red part above).

**1>:08** the length of the service center address (SCA) field. 08 indicates that 91683108705505F0 is 8 bytes.

**2>:91** The type of the SCA field. 91 means international format of the phone number.

**3>:683108705505F0** Service center number (in decimal semi-octets). The length of the phone number is odd (11), so a trailing F has been added to form proper octets. The phone number of this service center is "+8613800755500F". The SMSC number can be obtained from the SIM card by executing the AT+CSCA? command. **SCA has been pre-configured into the SIM card. Do not change the default SCA stored in the SIM card. If the module can receive SMS messages but cannot transmit messages, check whether the SIM card is out of credit and then whether the SMSC number of SIM card is correct.**

**4>:11** PDU type, indicating the type of the message. The setting of this parameter will affect the format of the following SMS message information.

**5>:00** Message reference (MR) field. Set it to **00**.

**6>:0D** The length of the DA field, indicating the 13 bytes of 683108881051F4 excluding F.

**7>:91** DA number type. 91 indicates that 683108881051F4 is an international number.

**8>:683108881051F4** Recipient number (decimal semi-octets) with a trailing F. For example, 8613808801154F should be **683108881051F4** after conversion.

**9>:00** Protocol identifier. Set PID to **00**.

**10>:08DSC** data coding scheme. **08** indicates that the message to be sent will be encoded in UNICODE format.

**11>:AA** TP validity period. **AA** means 4 days.

**12>:04** UDL indicates the length of the message to be sent before it is encoded)

**13>:4F60597D** The Unicode format of the content sent.

**14>: →** Indicates that the SMS message is sending (\r or 0x1A).

**15>:+CMGS:28** Indicates that the SMS message is sent to the SMS center. 28 indicates the No. of the SMS message sending and the value of the No. circulate between 0 and 255.



### CAUTION

The command should end with \r or 0x0D. If you add a line feed to the AT+CMGS command, the module probably sends the line feed as part of the SMS message content. The length of the PDU message cannot be identified correctly and then Error is returned; or the recipient cannot decode the received message correctly because of encoding errors.

---



## 4 PDU SMS Message Sending Format

### 4.1 SMS-SUBMIT-PDU

SCA	PDU Type	MR	DA	PID	DCS	VP	UDL	UD
1-12	1	1	2-12	1	1	0,1,7	1	0-140

### 4.2 SCA Format

The SCA consists of three segments, 1 to 12 bytes in total.

Len	Type	Address
SCA length	SCA type	SCA address
1 Octet	0-1 Octet	0-10 Octet
08	91	683108705505F0

#### 4.2.1 Len

The SCA length refers to the number of all bytes except the length bytes. If **Len** is set to **00**, the end device will read the SCA set in the SIM card. You can set the SCA value (the SMSC number) in the SIM card. If the SCA value is not the factory setting, the module can receive messages only.

#### 4.2.2 Type

The SCA type refers to whether the number is an international format or not. (**81&h** indicates unknown type; **91&h** indicates an international format of the number; **A1&h** indicates an national number.

Bit No.	7	6	5	4	3	2	1	0
Value	1	Type of number			Numbering plan identification			

**Bit7:**

Set it to **1**.

Type of Number:

000-Unknown; 001-International number (starting with +); 010-National number; 111-reserved

Numbering plan identification:

00-unknown; 0001-ISDN/number (E.163/E.164); 111-Reserved

### 4.2.3 Address

SCA in ISDN numbering plan. If the length of the phone number is odd (11), a trailing F is added to form proper octets. Every two bits are inverted among the SCA number.

The following table shows two formats of SCA.

SCA	PDU Coding
+8613570885456	08 91 68 31 75 80 58 54 F6
13570885456	07 81 31 75 80 58 54 F6

### 4.3 PDU Type (Octet)

PDU type is the first octet in SMS-SUBMIT.

Bit No	7	6	5	4	3	2	1	0
Value	RP	UDHI	SRR	VPF		RD	MTI	
	0	0	1	1	0	0	0	1

#### 4.3.1 RP

Relay path: The request for RP.

0: Not set

1: Set

#### 4.3.2 UDHI

User Data Header Indicator: If you want to send long SMS message, set this parameter to **1**.

0: UD does not contain a header.

1: UD contains a header.

#### 4.3.3 SRR

Status report request: This bit can be set to trace the sending result and the SMSC will send a message containing the sending result.

0: A status report is not requested.

1: A status report is requested.

#### 4.3.4 VPF

Validity Period Format: Indicates whether the VP field is present or not. You can set the validity period of the SMS in the SMSC so that the recipient can receive the message though the phone is powered off or out of the service area.

00: The VP field is not presented.

01: Reserve

10: The VP field is presented in integer format (relatively).

11: The VP field is presented in 7 semi-octet format (absolutely).

### 4.3.5 RD

Reject Duplicate: indicates whether the SC shall 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.

0: Instruct the SC to accept SMS-SUBMIT for a 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

### 4.3.6 MTI

Message Type Indicator: Indicates the status of the SMS sending or receiving.

**00: SMS-DELIVER (in the direction SMSC to MS)**

**00: SMS-DELIVER REPORT (in the direction MS to SMSC)**

**01: SMS-SUBMIT (in the direction MS to SMSC)**

00: SMS-SUBMIT REPORT (in the direction SMSC to MS)

**10: SMS-COMMAND REPORT (in the direction MS to SMSC)**

11: Reserved

Note: The parameter values in bold are supported by mobile phones but not necessary supported by SC.

## 4.4 Message Reference

Set this parameter to **00**.

## 4.5 Destination Address

The DA is 2 to 12 octets.

Len	Type	Address
1 Octet	0-1 Octet	1-10 Octets
0D	91	683158714209F8

### 4.5.1 Len

The length of the DA (863851724908 in this document). It is different from that in SCA.

## 4.5.2 Type

The SCA type refers to whether the number is an international number or not. **(81&h** indicates unknown type; **91&h** indicates an international number; **A1&h** indicates an national number.

## 4.5.3 Address

SCA in ISDN numbering format. If the length of the phone number is odd (11), a trailing F is added to form proper octets. Every two bits are inverted among the DA.

Phone Number	PDU Coding
+8613851724908	0D 91 86 31 58 71 42 09 F8
13851724908	0B 81 31 58 71 42 09 F8

## 4.6 Protocol Identifier

The PID field serves the purpose which the Transport Layer either refers to the higher layer protocol being used, or indicates interworking with a certain type of telematic device. Although there are a lot of PID definitions (refer to GSM 03.40 section), 0x00 is used. This informed SC that the PDU message must be treated as short message.

Bit No.	7	6	5	4	3	2	1	0
---------	---	---	---	---	---	---	---	---

### 4.6.1 Bit No.7 and Bit No.6

00: Allocate bit 0 to bit 5 following the below definition.

01: Refer to the definition in GSM03.40.

10: Reserved

11: Allocate bit 0 to bit 5 for special purpose of SC

### 4.6.2 Bit No.5

0: Use only the protocol between the devices.

1: Use the remote network.

### 4.6.3 Bit No.0— Bit No.4

00000— Implicit

00001— Telex

00010— Group 3 telefax

00100— Voice telephone

00101— ERMES

00110— Nation Paging system

10001— Any public information processing system based on X.400

10010— Internet Email

## 4.7 Data Coding Scheme

Bit No.	7	6	5	4	3	2	1	0	Description
Example	0	0	0	0	0	0	0	0	= 00&h 7 bit alphabet, default character set
	1	1	1	1	0	1	1	0	= F6&h 8 bit data coding Class 1
	0	0	0	0	1	0	0	0	= 08&h USC2 (16 bit) alphabet

### 4.7.1 Bit No.7 and Bit No.6

Set to 00.

### 4.7.2 Bit No.5

0: Text is not compressed.

1: Text is compressed in accordance with the algorithm of the GSM standards.

### 4.7.3 Bit No.4

0: Indicates that the bit 1 and bit 0 are reserved and contains not message information.

1: Indicates that bit 1 and bit 0 contain message information.

### 4.7.4 Bit No.3 and Bit No.2

00: default alphabet. Each character occupies 7 bits and one SMS message can contain 160 characters at most.

01: Each character occupies 8 bits and one SMS message can contain 140 characters at most.

10: Each character occupies 16 bits and one SMS message can contain 70 characters at most.

11: Reserved

### 4.7.5 Bit No.1 and Bit No.0

00: Class0 The message is displayed on the screen immediately.

01: Class1 ME-specific message

10: Class2 SIM-specific message

11: Class3 TE-specific message

DSC	Character Set	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 (Class 3 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)
08	16-bit	No Class
18	16-bit	Class 0 (immediate display)

## 4.8 Validity Period

The VP is present if MR in the PDU Type is set to be present.

### 4.8.1 Relative

VPF = 10 The VP comprises 1 octet in integer representation in relative format giving the length of the VP, counted from when the SMS-SUBMIT is received by the SC.

VP	Period
00-8F	(VF+1) X 5 minutes (i.e. 5 minutes intervals up to 12 hours)
90-A7	12 hours + (VF-143) X 30 minutes
A8-C4	(VP-166) X 1 day
C5-FF	(VP-192) X 1 week

### 4.8.2 Absolute

VPF = 11 In another case, the Validity Period comprises 7 octets in semi octet representation giving the absolute time of the VP termination. The representation of time is identical to the representation of the Service Center Time Stamp (SCTS).

Year	Month	Day	Hour	Minute	Second	Time Zone
30	80	02	90	54	33	20

## 4.9 User Data Length

The UDL field gives an integer representation of the message length (before formatting).

### 4.10 UD

User Data is the message data coded depending on the Data Coding Scheme (DCS) being set.

## 5 PDU SMS Message Receiving

Modify the indication mode (AT+CNMI=2,1,0,0,0 or AT+CNMI=2,2,0,0,0) before SMS receiving.



**0>:+CMT: ,48** 48 indicates the length of the SMS message TPDU.

**1>:08** The SCA length. 08 indicates that 91683108705505F0 is 8 bytes.

**2>:91** The type of the SCA segment. 91 means international format of the phone number.

**3>:683108705505F0** SCMC number. The 8613800755500 is odd, so a trailing F is added. The SMSC number can be obtained from the SIM card by executing the AT+CSCA? command.

**4>:04** PDU Type 04 indicates that this is the last SMS message stored in SC.

**5>:0D** The length of the OA segment. 0D indicates the 13 bytes of 683108881051F4 excluding F.

**6>:91** OA number type. 91 indicates that 683108881051F4 is an international number.

**7>:683108881051F4** The number of the sender.

**8>:00** Set PID to 00.

**9>:08** DSC coding format. 08 indicates that the message is encoded in UNICODE format.

**10>:31804171701523** SCTS field. **31804171701523** indicates 17:07:51, August 8<sup>th</sup>, 2013, DST-23.

**11>:1C** UDL. 1C indicates that the message length is 28 bytes, 14 Chinese characters.

12>:8FD98FB9662F6DF157335E02670965B979D1628067099650516C53F8      The content of the message.

## 6 PDU SMS Message Receiving Format

### 6.1 SMS-DELIVER-PDU

SCA	PDU Type	OA	PID	DCS	SCTS	UDL	UD
1-12	1	2-12	1	1	7	1	0-140

### 6.2 Service Center Address

The format of SCA is same as that in the SMS sending.

### 6.3 PDU Type

PDU type is the first octet in SMS-SUBMIT.

Bit No	7	6	5	4	3	2	1	0
Value	RP	UDHI	SRI			MMS	MTI	
	0	0	0	0	0	1	0	0

#### 6.3.1 RP

Reply path

0: Not set

1: Set

#### 6.3.2 UDHI

User Data Header Indicator

0: UD does not contain a header.

1: UD contains a header.

#### 6.3.3 SRI

Status Report Indicator, set by SCSM.

0: A status report will not be returned to SME.

1: A status report will be returned to SME.

#### 6.3.4 MMS

More Message to Send, set by SMSC only

0: More messages are waiting for the MS in the SMSC.

1: No more message is waiting for the MS in the SMSC.



### 6.3.5 MTI

Message Type Indicator

**00: SMS-DELIVER (in the direction SMSC to MS)**

**00: SMS-DELIVER REPORT (in the direction MS to SMSC)**

**01: SMS-SUBMIT (in the direction MS to SMSC)**

00: SMS-SUBMIT REPORT (in the direction SMSC to MS)

**10: SMS-COMMAND REPORT (in the direction MS to SMSC)**

11: Reserved

Note: The parameter values in bold are supported by phones not necessary supported by SC.

## 6.4 Originating Address

The length of OA is 2 to 12 octets and same as DA in SMS sending.

## 6.5 Protocol Identifier

The PID field serves the purpose which the Transport Layer either refers to the higher layer protocol being used, or indicates interworking with a certain type of telematic device. Although there are a lot of PID definitions (refer to GSM 03.40 section), 0x00 is used. This informed SC that the PDU message must be treated as short message.

Bit No.	7	6	5	4	3	2	1	0
---------	---	---	---	---	---	---	---	---

### 6.5.1 Bit No.7 and Bit No.6

00: Allocate bit 0 to bit 5 following the below definition.

01: Refer to the definition in GSM03.40.

10: Reserved

11: Allocate bit 0 to bit 5 for special purpose of SC

### 6.5.2 Bit No.5

0: Use only the protocol between the devices.

1: Use the remote network.

### 6.5.3 Bit No.0 to Bit No.4

00000— Implicit

00001— Telex

00010— Group 3 telefax

00100— Voice telephone

00101— ERMES

00110— Nation Paging system

10001— Any public information processing system based on X.400

10010— Internet Email

## 6.6 Data Coding Scheme

The DCS format is same as that in PDU SMS message sending.

## 6.7 Service Center Time Stamp

The SCTS occupies 7 octets. 01306181451523 indicates 18:47:51, March 16<sup>th</sup>, 2010, DST-23.

## 6.8 User Data Length

The UDL field gives an integer representation of the message length (before formatting).

## 6.9 User Data

User Data is the message data coded depending on the DCS being set.

# 7 Long SMS Message

One SMS message can contain only 140 ASCII characters or 70 Chinese characters. Sometime you might need to send long SMS messages. A long message goes out as multiple physical SMS messages that are logically reassembled into a single long text message by the recipient handset.

In PDU Type, TP-UDHI field:

0: indicates that the TP-UD does not contain protocol a header.

1: indicates that the TP-UD contains a protocol header.

When you set the TP-UDHI field to **1**, you need to fill corresponding information in accordance with the protocol. There are the following two protocol headers of long SMS messages:

### 1. 6-bit protocol header: 05 00 03 XX MM NN

1>: The length of the protocol header, fixed to 0x05

2>: Protocol header type, fixed to 0x00, indicating long SMS message

3>: Sub-package length, fixed to 0x03, indicating the length of the following three bits

4>: MR of the long SMS message, The MR is automatically incremented from 0 to 255 for each SMS-SUBMIT by the application. After each SMS-SUBMIT has been submitted to the network, the Last-Used-MR value in the SIM is updated with the MR that was used in the SMS-SUBMIT operation. The value in the MR assigned by the MS is the same value which is received at the SC.

5>: The number of packets after the SMS is coded, ranging from 1 to 255

6>: The location or No. of the physical message in the long SMS, ranging from 1 to 255

### 2. 7-bit protocol header format: 06 08 04 XX YY MM NN

06: indicates the length of the remaining protocol header

08: indicates that the identifier field length of the following long SMS is 2 bytes (XX YY in the format). The value is defined in GSM 03.40 Standard 9.2.3.24.1.

04: indicates the length of the remaining SMS identifier

XX YY: indicates the unique identifier of the SMS messages.

MM: indicates the quantity of the SMS messages. If the long SMS message contains 5 physical SMS messages, the value here is 5.

NN: indicates the location or No. of the physical messages in the long SMS.

## 7.2 Example of Sending Long SMS

The coding format of long SMS is same as that of PDU SMS coding and occupies 6 bit (or 7 bit) protocol header.



### 7.2.1 First Part of Long SMS

0891683108705505F051000D91683108881051F40008FF8C0500039102016DF157335E02670965B979D1628067099650516C53F8662F4E005BB64E136CE84E8E004D0032004D726980547F5165E07EBF901A4FE14EA754C1548C670D52A1768456FD5BB67EA79AD865B06280672F4F014E1A3002670965B9603B90E84F4D4E8E4E2D56FD4E4381F35168740375355B50901A8BAF4EA754C1781453D1300152369020548C

## 7.2.2 Second Part of Long SMS

0891683108705505F051000D91683108881051F40008FF160500039102029500552E91CD95476  
DF157335E023002

1>: 51—PDU Type bit. The UDHI field is 1, indicating that the UDHI contains user header.

2>: 08—Indicates the Unicode coding format

3>: 050003910201/050003910202—6-bit protocol header. 050003 is fixed value; 91 is the unique identifier of these two messages; 02 indicates that the long SMS is split into two pieces; 01 indicates the first piece while 02 indicates the second piece.

**8C and 16 in green in the packets indicates the length of the sent data.**

The first piece of physical SMS message contains 140 bytes (8C&h) data and in fact 134 bytes after excluding 6-bit protocol header, that is, 67 Chinese characters. The message content is: 深圳市有方科技有限公司是一家专注于M2M物联网无线通信产品和服务的国家级高新技术企业。有方总部位于中国乃至全球电子通讯产品研发、制造和;

Similarly, the second piece contains 8 Chinese characters: 销售重镇深圳市。

The two pieces are combined into one long SMS messages based on the receiving sequence.

## 8 SMS Sending Outside of China

Note the phone number format when you use Neoway module to send SMS messages, for example, 07063470156:

- Format 1: AT+CMGS="07063470156"
- Format 2: AT+CMGS="+2347063470156"

In format 2, 0 is replaced with +234, which is the code of some country