FORUM NOKIA

SMART MESSAGING FAQ
Version 2.0
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Change history

5 Sept 01	Version 1.0	Document added into Forum Nokia as an HTML document.
24 Sept 02	Version 2.0	Questions 21 – 26 added. Questions and answers throughout the document updated.

1. MORE INFORMATION ABOUT SMART MESSAGING

The following Short Messaging FAQ and the Forum Nokia Knowledge Network will help you with detailed questions about Smart Messaging. For general information, go to the http://www.forum.nokia.com Web site and look under Smart Messaging. Smart Messaging Specification 3.0.0 as well as other documents in that section will provide a good starting point. Fee-based personal support is also available.

2. GETTING NEW RINGING TONES, GRAPHICAL LOGOS, AND PICTURES TO A MOBILE PHONE

To get ringing tones and logos to your mobile phone, please contact the Club Nokia Careline in Europe. Club Nokia Careline supports and gives information to Club Nokia members. Visit http://www.club.nokia.com for more information. Your network service provider may also have services where you can get ringing tones and logos.

3. NOKIA PHONES THAT SUPPORT SMART MESSAGING

Most Nokia mobile phones are capable of receiving smart messages. These messages can contain ringing tones, operator logos, group graphics (caller line identification icons), picture messages, business cards (vCard), calendar bookings (vCal), Downloadable Profiles, and WAP settings. The Tagged Text Markup Language (TTML) and Dynamic Menu Control Protocol (DMCP) are supported in some phone models. A table documenting phone details can be found at http://www.forum.nokia.com/documents in the Nokia Phone Messaging Characteristics document.

4. BUSINESS CARD AND CALENDAR EVENT MESSAGE SPECIFICATIONS

Most Nokia phones support vCard and vCal smart messages. The specifications are determined by the Versit Consortium. The Electronic Calendaring and Scheduling Exchange Format Specification and The Electronic Business Card Specification can be found at http://www.imc.org.

5. SENDING A SHORT MESSAGE FROM A PC USING A MOBILE PHONE IN TEXT MODE

Short messages containing 7-bit textual information can be sent from a PC program to a mobile phone. The mobile phone must be installed as a modem to the PC's operating system, and the phone must be connected to the PC using cable, infrared, or Bluetooth.

To send a short message using AT commands in Text mode:

AT Command	Description
AT+CMGF=1<enter/carriage return>	Set SMS Text mode on.
AT+CMGS="+4441793181022"<enter/carriage return> <text entered><ctrl–Z>	The message is sent to the entered number +4441793181022. Replace this number with your own number.
+CMGS: 211 OK	Message reference is shown after successful sending of the message to the SC.

For more information and for an explanation of error responses from the phone or from the network, see "AT Command Set for Nokia GSM Products" in the Smart Messaging documents section.

6. SENDING A SHORT MESSAGE FROM A PC USING A MOBILE PHONE IN PDU MODE

A short message can be sent from a PC program using AT commands. The mobile phone must be installed as a modem to the PC's operating system and the phone must be connected to the PC using cable, infrared, or Bluetooth.

To send a short message using AT-commands in PDU mode:

AT Command	Description
AT+CMGF=0<enter/carriage return>	Set SMS PDU mode on.
AT+CMGS=**<length>**<enter/carriage return> **<pdu>**<ctrl-Z>	Sends a message from the DTE to the network (SMS-SUBMIT). **<length>** is the length of the actual TPDU in octets. The RP layer SC (short message center) address octets are not counted in the length. **<pdu>** is the RP SC address Address-Value field followed by a TPDU in hexadecimal format.
+CMGS: 212 OK	Message reference is shown after successful sending of the message to the SC.

For more information and an explanation of error responses from the phone or from the network see "AT Command Set for Nokia GSM Products" in the Smart Messaging documents section.

7. ENCODING A SHORT MESSAGE TPDU WITH 7-BIT DATA

SMS-SUBMIT and SMS-DELIVER are Transfer Protocol Data Units (TPDUs). The structure of these PDUs is explained in more detail in the GSM Specification 03.04. SMS-SUBMIT type messages can be sent from phone to SC, and SMS-DELIVER type messages are delivered from the SC to phone. Below is an example of a typical plain text message and its encoding.

Sending a short message using AT commands in PDU mode:

AT Commands and Responses	Description
AT+CMGF=0 OK	Set SMS PDU mode on
AT+CMGS=29 07915348500202091100 0C91534887042014000 0A71154747A0E4ACF41F4F29C9E769F4121<ctrl-Z>	Length of the SMS PDU (decimal 29). The RP layer SC address octets are not counted in the length. Rest of the message is explained in Table 1.
+CMGS: 212 OK	Message reference is shown after successful sending of message to the SC

Table 1: SC Address-Value field followed by a PDU in hexadecimal format

Octet Number	Value	Description	Status
0	07	SC address length	Length of the SC address is 7 including the type of numbering plan indication
1	91	Type of address	International address using ISDN telephone numbering plan
2-7	53 48 50 02 02 09	Short message service centre address	The short message service center number. F.ex +35 84 05 20 20 90 is encoded as 53 48 50 02 02 09. In this case the address takes 6 octets.
SMS-SUBMIT PDU starts...			
1	11	First octet of SMS-SUBMIT	Description below
bit 7	0	TP-Reply-Path	Reply path not set
bit 6	0	TP-User-Data-Header-Indicator	Indication that user data doesn't contain additional header
bit 5	0	TP-Status-Report-Request	Not requested
bit 4,3	10	TP-Validity-Period-Format	Relative format
bit 2	0	TP-Reject-Duplicates	Do not reject duplicates in SC
bit 1,0	01	TP-Message-Type-Indicator	SMS-SUBMIT type
2	00	TP-Message-Reference	Given by the phone, application/user does not need to fill this octet.

3	0C	Address length in semi-octets	Length of the address is 12 in semi-octets
4	91	Type of address	International address using ISDN telephone numbering plan
5 – 10	53 48 87 04 20 14	TP-Destination-Address	The destination telephone number +35 84 78 40 02 41 is encoded as 53 48 87 04 20 14. In this case the address takes 6 octets. The address can be from 2 to 12 octets long.
11	00	TP-Protocol-Identifier, for details see GSM spec 03.40	Parameter identifying the above layer protocol, if any. Note that for the straightforward case of simple MS-to-SC short message transfer, the TP-Protocol-Identifier is set to the value 00.
12	00	TP-Data-Coding-Scheme used in TP-User-Data, GSM spec 3.38	Description below
bits 7,6	00	Coding Group	Functionality related to usage of bits 4-0
bit 5	0		Indicates that text is uncompressed
bit 4	0		Indicates that bits 1 and 0 have no message class meaning
bits 3,2	00	Message coding	7-bit message
bits 1,0	00	Reserved	No meaning, indicated by bit 4
13	A7	TP-Validity-Period (Relative format), for details see GSM 03.40	A7 -> 24 hours.
14	11	TP-User-Data-Length	Amount of septets in TP-User-Data: 11 hex -> 17 septets. This is because of 7-bit user data coding.
15 – 29	54 74 7A 0E 4A CF 41 F4 F2 9C 9E 76 9F 41 21	TP-User-Data	Format of the user data depends on what kind of message is sent. This example includes a text string, "This is testing !". 17 septets + fill bits = 15 octets.

8. ENCODING A SHORT MESSAGE TPDU WITH 8-BIT DATA AND USER DATA HEADER.

SMS-SUBMIT and SMS-DELIVER are Transfer Protocol Data Units (TPDUs). The structure of these PDUs is explained in more detail in GSM Specification 03.04. The SMS-SUBMIT message goes from phone to network and the SMS-DELIVER message comes from network to phone. Below is an example of sending an 8-bit short message with SMS PDU mode. User data header is needed in all smart messages and concatenated messages.

Sending a short message using AT-commands in PDU mode:

AT Commands and Responses	Description
AT+CMGF=0 OK	Set SMS PDU mode on
AT+CMGS=50 0051000C912148700463320F5A7240605041581158102 4A3A51D195CDD008001B2055059061056055855054854 0 8208499000<ctrl-Z>	Length of the SMS PDU (decimal 29). The RP layer SC address octets are not counted in the length. Rest of the message is explained in Table 2.
+CMGS: 213 OK	Message reference is shown after successful sending of message to the SC

Table 2: SC Address-Value field followed by a PDU in hexadecimal format

Octet Number	Value	Description	Status
0	00	SC address length	Length of the SC address is 0, because the SC address is not included in this message
SMS-SUBMIT PDU starts...			
1	51	First octet of SMS-SUBMIT	Description below
bit 7	0	TP-Reply-Path	Reply path not set
bit 6	1	TP-User-Data-Header-Indicator	Indication that user data contains an additional header
bit 5	0	TP-Status-Report-Request	Not requested
bits 4,3	10	TP-Validity-Period-Format	Relative format
bit 2	0	TP-Reject-Duplicates	Do not reject duplicates in SC
bits 1,0	01	TP-Message-Type-Indicator	SMS-SUBMIT type
2	00	TP-Message-Reference	Given by the phone, application/user does not need to fill this octet
3	0C	Address length in semi-octets.	Length of the address is 12 in semi-octets
4	91	Type of address	International address using ISDN telephone numbering plan
5 – 10	21 48 70 04 63 32	TP-Destination-Address	The destination telephone number. F.ex +12 84 07 40 36 23 is encoded as 21 48 70 04 63 32. In this case the address takes 6

			octets. The address can be 2 to 12 octets long.
11	00	TP-Protocol-Identifier, for details see GSM spec 03.40	Parameter identifying the above layer protocol, if any. Note that for the straightforward case of simple MS-to-SC short message transfer, the TP-Protocol-Identifier is set to the value 00.
12	F5	TP-Data-Coding-Scheme used in TP-User-Data, consist one octet. See GSM 3.38	Description below
bits 7-4	1111	Coding Group	Functionality related to usage of bits 3 – 0
bits 3,2	01	Message coding	8-bit data
bits 1,0	01	Message class (bits 1 and 0)	Class 1, default meaning: ME-specific
13	A7	TP-Validity-Period (Relative format)., see GSM spec 03.40	A7 -> 24 hours.
14	24	TP-User-Data-Length	Amount of octets in TP-User-Data field to follow. 24 hex -> 36 octets. Length includes the user data header and data itself.
15 – 50	06 05 04 15 81 15 81 02 4A 3A 51 D1 95 CD D0 08 00 1B 20 55 05 90 61 05 60 55 85 50 54 85 40 82 08 49 90 00	TP-User-Data	Format of the user data depends on what kind of message is sent. This message includes a user data header and a ringing tone.

9. ENCODING AN OPERATOR LOGO MESSAGE

The following example shows how to encode the operator logo message user data. The length of the user data is so long that the message must be sent as a concatenated message (two parts). The examples do not include the whole SMS-SUBMIT PDU, which has to be added in front of both of these messages in order to send them. Remember to update the user data length when using the examples.

Here is the hex encoded user data. Details of the data are explained in Tables 3a and 3b.

First part:

0B05041582000000030102013021F3540A00480E01FFFFFFFFFFFFFFFFFF000000000000000000FFFFFFFFFFFFFFF
FFF00000000000000000010F00000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000

Second part:

0B050415820000000301020200000000000001

Table 3a: First part of the Operator logo message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 - 5	15 82	Information Element Data (octets 4 & 5 --> 1582 – destination port)
6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL; 3 octets)
10	01	Information Element Data (concatenated short message reference number)
11	02	Information Element Data (total number of concatenated messages (0-255))
12	01	Information Element Data (sequence number of current short message)
13	30	Operator logo version number. ISO-8859-1 character "0"
14 - 15	21 F3	Mobile Country Code (MCC), octets 14 and15, little-endian BCD, filled

		with F_{16}', 123 -> 21 F3 Notice: To see the logo on the phone's screen, octets 14 and 15 must be defined with the settings of the current operator.
16	54	Mobile Network Code (MNC) coding, little-endian BCD, filled with F_{16}', 45 -> 54
17	0A	ISO-8859-1 "Line feed" character
18	00	InfoField; see Smart Messaging Specification 3.0.0 for details.
19	48	The width of the bitmap. Hex 48 -> 72 decimal
20	0E	The height of the bitmap. Hex 0E -> 14 decimal
21	01	The depth of the bitmap (number of gray scales)
22-140	FF FF FF FF FF FF FF FF FF 00 00 00 00 00 00 00 00 00 FF FF FF FF FF FF FF FF FF 00 00 00 00 00 00 00 00 00 10 F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	OTA bitmap data

Table 3b: Second part of the Operator logo message user data (length 19 octets -> hex 13)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 - 5	15 82	Information Element Data (octets 4 & 5 --> 1582 – destination port)
6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	02	Information Element Data (total number of concatenated messages (0-255))
12	02	Information Element Data (sequence number of current short message)
13 – 19	00 00 00 00 00 00 01	The rest of the OTA bitmap data

10. ENCODING THE CALLER LINE IDENTIFICATION ICON MESSAGE

The following example shows how to encode the Caller Line Identification icon (Caller group graphic) message user data.

Here is the hex encoded user data. Details of the data are explained in Table 4.

0605041583000030004 80E0100000000000000000000000000000000000000000079041000000000000085041000000000000081041000000000000081041038F3800000008104104514400000008104104514400000008104104514400000008504104514400000079F41F38F380000000000000001000000000000000001E000000000000000000000000

Table 4: CLI icon message user data (length 138 octets -> hex 8A)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	06	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 – 5	15 83	Information Element Data (octets 4 & 5 --> 1583 – destination port)
6 – 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	30	CLI Icon version number. ISO-8859-1 character "0"
9	00	InfoField; see Smart Messaging Specification 3.0.0 for details
10	48	The width of the bitmap. Hex 48 -> 72 decimal
11	0E	The height of the bitmap. Hex 0E -> 14 decimal
12	01	The depth of the bitmap (number gray scales)
13-137	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 79 04 10 00 00 00 00 00 00 85 04 10 00 00 00 00 00 00 81 04 10 00 00 00 00 00 00 81 04 10 38 F3 80 00 00 00 81 04 10 45 14 40 00 00 00 81 04 10 45 14 40 00 00 00 81 04 10 45 14 40 00 00 00 85 04 10 45 14 40 00 00 00 00 79 F4 1F 38 F3 80 00 00 00 00 00 00 00 10 00 00 00 00 00 00 00 01 E0 00 00 00 00 00 00 00 00 00 00 00	OTA bitmap data

11. ENCODING AN OTA BITMAP

An OTA bitmap is used as part of the following Smart Messaging formats: Operator logo, CLI icon, Picture Message, and Downloadable Profile. In today's Nokia phones the maximum size of the operator logo and the CLI icon is 72 x 14 pixels, while the maximum size of the picture message and the screen saver is 72 x 28 pixels.

An OTA bitmap consists of a bitmap header and bitmap data. The size of the bitmap is specified in the header. Other information is defined there as well, but it handles issues that are not supported in today's Nokia phones. These values are similar in all OTA bitmap headers.

A typical OTA bitmap (72 x 14 pixels) header is: *00480E01*

00	Infofield
48	Width of the bitmap is 72 pixels
0E	Height of the bitmap is 14 pixels
00	Number of colors or grey shades (only one color)

The image data is located after the header information and is encoded as follows. Each semi-octet in the OTA bitmap presents 4 pixels in the original bitmap. Because one row takes 18 semi-octets, the whole 72 x 14 (operator logo and CLI icon) bitmap takes 18 x 14 = 252 semi-octets = 126 octets. With picture message and screen saver, the entire 72 x 28 size bitmap takes 18 x 28 = 504 semi-octets = 252 octets.

For example, if the first four pixels of the image are 1010 (1 - black, 0 - white), the first semi-octet of the OTA bitmap data is hex A.

Here is an example of a simple OTA bitmap (72 x 14 pixels). In the picture, there are two black lines and several black dots:

```
FFFFFFFFFFFFFFFFFF      <- First line black
000000000000000000      <- Second line white
FFFFFFFFFFFFFFFFFF
000000000000000000
10F000000000000000      <- Fourth pixel of this line is black and 9-12
000000000000000000         pixels are also black
000000000000000000
000000000000000000
000000000000000000
000000000000000000
000000000000000000
000000000000000000
000000000000000000
000000000000000001      <- Last pixel of this row/bitmap is black
```

For more information, please refer to the Smart Messaging Specification 3.0.0.

12. ENCODING A RINGING TONE MESSAGE

The following example shows how to encode a ringing tone message user data. Here is the hex encoded user data. Details of the data are explained in Tables 5 and 6.

0605041581000024A3A51D195CDD004001B2055059061056055855054854082084990000 0

Table 5: Ringing tone message user data (length 36 octets -> hex 24)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	06	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4	15	Information Element Data (octets 4 & 5 --> 1581 – destination port)
5	81	Information Element Data
6	00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
7	00	Information Element Data

The rest of the user data (024A3A51D195CDD004001B2055059061056055855054854082084990000 0) has been encoded from the bit string, which is explained in Table 6. The entire bit string must be divided to octets and then transferred to hex code. For more information, please see the Smart Messaging Specification 3.0.0 .

Table 6: Ringing tone bit string

Bit String	Description	Value
00000010	<command-length>	Number of command parts present
01001010	<ringing-tone-programming>	Command part 1 (with filler bit)
0011101	<sound>	Command part 2
001	<basic song type>	
0100	<song title length>	4 characters (ISO-8859-1)
01110100	the first character	T
01100101	the second character	E
01110011	the third character	S
01110100	the fourth character	T
00000001	<song sequence length>	1 song pattern

000	<pattern header>	pattern header ID
00	<pattern id>	A-part
0000	<loop value>	no loop
00001101	<pattern specifier>	<length of the new pattern> 13 pattern instructions
100	<tempo instruction id>	
10000	<beats per minute>	160 (i.e., length of 1/4 note = 0,38 sec.)
001	<note instruction id>	
0101	<note value>	note E
010	<note duration>	¼ note
00	<note duration specifier>	no special duration
001	<note instruction id>	
0110	<note value>	note F
010	<note duration>	¼ note
00	<note duration specifier>	no special duration
001	<note instruction id>	
1000	<note instruction>	note G
010	<note duration>	¼ note
00	<note duration specifier>	no special duration
001	<note instruction id>	
0101	<note value>	note E
100	<note duration>	1/16 note
00	<note duration specifier>	no special duration
001	<note instruction id>	
0101	<note value>	note E
011	<note duration>	1/8 note
00	<note duration specifier>	no special duration
001	<note instruction id>	
0101	<note value>	note E
010	<note duration>	¼ note
00	<note duration specifier>	no special duration
001	<note instruction id>	
0101	<note value>	note E
001	<note duration>	½ note

00	<note duration specifier>	no special duration
001	<note instruction id>	
0101	<note value>	note E
000	<note duration>	full note
00	<note duration specifier>	no special duration
010	<scale instruction id>	
00	<note scale>	Scale-1 (i.e., note A is 440 Hz)
001	<note instruction id>	
0000	<note value>	pause
010	<note duration>	¼ note
00	<note duration specifier>	no special duration
010	<scale instruction id>	
01	<note scale>	Scale-2 (i.e., note A is 880 Hz), default
001	<note instruction id>	
1001	<note value>	Gis ' i.e. As '
000	<note duration>	full note
00	<note duration specifier>	no special duration
0000000		filler bits
00000000	<command end>	end of the ringing tone data

13. ENCODING A VCARD MESSAGE

The following example shows how to encode the vCard message user data.

The vCard message content is:

```
BEGIN:VCARD
VERSION:2.1
N:Smith;Mike
TEL;PREF:+55512345
END:VCARD
```

Here is the hex encoded user data of the example above. Details of the data are explained in Table 7.

06050423F40000424547494E3A56434152440D0A56455253494F4E3A322E310D0A4E3A536D6974683B4D696
B650D0A54454C3B505245463A2B3535353131323334350D0A454E443A56434152440D0A

Table 7: vCard message user data (length 78 octets -> hex 4E)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header, similar to Table 2.
1	06	Length of User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 – 5	23 F4	Information Element Data (octets 4 & 5 --> 23F4 – destination port)
6 – 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8 - 20	42 45 47 49 4E 3A 56 43 41 52 44 0D 0A	BEGIN:VCARD<CR><LF>
21 - 33	56 45 52 53 49 4F 4E 3A 32 2E 31 0D 0A	VERSION:2.1<CR><LF>
34 - 47	4E 3A 53 6D 69 74 68 3B 4D 69 6B 65 0D 0A	N:Smith;Mike<CR><LF>
48 - 67	54 45 4C 3B 50 52 45 46 3A 2B 35 35 35 31 32 33 34 35 0D 0A	TEL;PREF:+55512345<CR><LF>
68 - 78	45 4E 44 3A 56 43 41 52 44 0D 0A	END:VCARD<CR><LF>

14. ENCODING A VCALENDAR MESSAGE

The following example shows how to encode vCalendar message user data.

The vCalendar message content is:

```
BEGIN:VCALENDAR
VERSION:1.0
BEGIN:VEVENT
DESCRIPTION:Steering Group meeting in Portal
DTSTART:20000906T100000
DTEND:20000906T120000
END:VEVENT
END:VCALENDAR
```

Here is the hex encoded user data. Details of the data are explained in Tables 8a and 8b. The length of the user data is so long that the message must be sent as a concatenated message (two parts).

First part:
0B050423F5000000030202014245474 94E3A5643414C454E4441520D0A56455253494F4E3A312E300D0A424547494E3A564556454E540D0A4445534352495054494F4E3A5374656572696E672047726F7570206D656574696E6720696E20506F7274616C0D0A445453544152543A32303030303039303654313030303030300D0A4454454E443A32303031303930

Second part:
0B050423F5000000030202023654313230303030300D0A454E443A564556454E540D0A454E443A5643414C454E4441520D0A

Table 8a: First part of the vCalendar message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, using 8-bit data coding scheme and user data header, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 – 5	23 F5	Information Element Data (octets 4 & 5 --> 23F5 – destination port)
6 – 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	02	Information Element Data (concatenated short message reference number)
11	02	Information Element Data (total number of concatenated messages (0-255))

12	01	Information Element Data (sequence number of current short message)
13 - 29	42 45 47 49 4E 3A 56 43 41 4C 45 4E 44 41 52 0D 0A	BEGIN:VCALENDAR<CR><LF>
30 - 42	56 45 52 53 49 4F 4E 3A 31 2E 30 0D 0A	VERSION:1.0<CR><LF>
43 - 56	42 45 47 49 4E 3A 56 45 56 45 4E 54 0D 0A	BEGIN:VEVENT<CR><LF>
57 - 102	44 45 53 43 52 49 50 54 49 4F 4E 3A 53 74 65 65 72 69 6E 67 20 47 72 6F 75 70 20 6D 65 65 74 69 6E 67 20 69 6E 20 50 6F 72 74 61 6C 0D 0A	DESCRIPTION:Steering GROUP Meeting in Portal<CR><LF>
103 - 127	44 54 53 54 41 52 54 3A 32 30 30 30 30 39 30 36 54 31 30 30 30 30 30 0D 0A	DTSTART:20000906T100000<CR><LF>
128 - 140	44 54 45 4E 44 3A 32 30 30 30 30 39 30	DTEND: 2000090

Table 8b: Second part of the vCalendar message user data (length 49 octets -> hex 31)

Octet number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4	23 F5	Information Element Data (octets 4 & 5 --> 23F5 – destination port).
6	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)

9	03	Information Element Data Length (IEDL)
10	02	Information Element Data (concatenated short message reference number)
11	02	Information Element Data (total number of concatenated messages (0-255))
12	02	Information Element Data (sequence number of current short message)
13 - 22	36 54 31 32 30 30 30 30 0D 0A	6T120000<CR><LF>
23 - 34	45 4E 44 3A 56 45 56 45 4E 54 0D 0A	END:VEVENT<CR><LF>
35 - 49	45 4E 44 3A 56 43 41 4C 45 4E 44 41 52 0D 0A	END:VCALENDAR<CR><LF>

15. RESTORING THE ORIGINAL OPERATOR LOGO

The easiest way to remove a previously downloaded operator logo and restore the original one is to send an almost normal operator logo message to the phone. The difference from the normal operator logo message is the value of the octets—9, 10 and 11—which determines values of the MCC and MNC. The octets must have different values than the current operator's values. For example, the values of the octets 9 -11 could be 000000. The content of the OTA bitmap has no relevance in the message, therefore the OTA bitmap data can be missing (header information is mandatory). When receiving this kind of operator logo message the logo must be saved and after that the original operator logo appears on the screen.

For example, here is the user data of the message that removes an old operator logo:

0605041582000030000000A00000001

A detailed description of the user data octets can be found in FAQ Section 9 (Table 3a).

16. ENCODING A PICTURE MESSAGE

The following example shows how to encode a picture message user data. The example includes a picture and a text "Test".

The length of the Picture message user data is so long that the message must be sent as a concatenated message (three parts). Here is the hex encoded user data; the details of the data are explained in Tables 9a, 9b, and 9c.

First part:

0B0504158A0000000301030130000004546573740201000048 1C0166666666666666666699999999999999999980000000000000000014000000060 00E000024000000E90031000028000003108 0CF3B80180000040041104440140000 0FFFE2F8B1202400000000005 38CAA028000000000628 9C40180000000000414140014000000000014280024000200000

Second part:

0B0504158A0000000301030201428002800 1F0000000A28001800FFE000000A500015FFFFFFFFFFEA57FFA400AAAA000000550002820150044001 5D08A188102480004 0FF020140410001000 3ABE00244000008200D5558828010144000 1AAAAC018000000000355556014001000080 6AAAAB024000000000555555028000000000000000000199999999999999

Third part:

0B0504158A000000030103039999666666666666666666

For more information, please refer to the Smart Messaging Specification 3.0.0.

Table 9a: First part of the Picture message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 - 5	15 8A	Information Element Data (octets 4 & 5 --> 158A – destination port).
6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	03	Information Element Data (total number of concatenated messages (0-

		255))
12	01	Information Element Data (sequence number of current short message)
13	30	Identifier for version, current version is (ASCII) zero "0". If it is not "0", stop processing of the message.
14	00	"00" <Item-length> <ISO-8859-1-char>*
15	00	Text length (octets 15 & 16)
16	04	Text length (octets 15 & 16)
17 - 20	54 65 73 74	Test
21	02	"02" = <Item length><OTA bitmap>
22 - 23	01 00	<Item-length> (octets 22 & 23) value 0100(hex) = 256(dec) = 4 octets for header and the rest for OTA bitmap data
24	00	The first byte of the bitmap must be 00 (hex); i.e., OTA bitmap header field 'number of animated icons' must hold 0, indicating that there is no animation, just a single static image.
25	48	Width = 48(hex) = 72(dec)
26	1C	Height = 1C(hex) = 28(dec)
27	01	The depth of the bitmap (number of grey scales)
28 – 140	66 66 66 66 66 66 66 66 99 99 99 99 99 99 99 99 80 00 00 00 00 00 00 00 01 40 00 00 00 60 00 E0 00 02 40 00 00 0E 90 03 10 00 02 80 00 00 31 08 0C F3 B8 01 80 00 00 40 04 11 04 44 01 40 00 00 FF FE 2F 8B 12 02 40 00 00 00 00 53 8C AA 02 80 00 00 00 00 62 89 C4 01 80 00 00 00 00 41 41 40 01 40 00 00 00 00 01 42 80 02 40 00 20 00 00	OTA bitmap visible data

Table 9b: Second part of the Picture message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 – 5	15 8A	Information Element Data (octets 4 & 5 --> 158A – destination port)
6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	03	Information Element Data (total number of (concatenated) messages (0-255))
12	02	Information Element Data (sequence number of current short message)
13 – 140	01 42 80 02 80 01 F0 00 00 00 A2 80 01 80 0F FE 00 00 00 A5 00 01 5F FF FF FF FF FE A5 7F FA 40 0A AA 00 00 00 55 00 02 82 01 50 04 40 01 5D 08 A1 88 10 24 80 00 40 FF 02 01 40 41 00 01 00 03 AB E0 02 44 00 00 08 20 0D 55 58 82 80 10 14 40 00 1A AA AC 01 80 00 00 00 00 35 55 56 01 40 01 00 00 80 6A AA AB 02 40 00 00 00 00 55 55 55 02 80 00 00 00 00 00 00 00 01 99 99 99 99 99 99 99	OTA bitmap visible data continues

Table 9c: Third part of the Picture message user data (length 23 octets -> hex 17)

Octet number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 - 5	15 8A	Information Element Data (octets 4 & 5 --> 158A – destination port)
6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	03	Information Element Data (total number of concatenated messages (0-255))
12	03	Information Element Data (sequence number of current short message)
13 – 23	99 99 66 66 66 66 66 66 66 66 66	Rest of the OTA bitmap visible data

17. ENCODING A DOWNLOADABLE PROFILE MESSAGE

The following example shows how to encode Downloadable Profile message user data. The Downloadable Profile message example includes three parts: profile name, ringing tone, and screen saver.

The length of the Downloadable Profile message user data is so long that the message must be sent as a concatenated message (four parts). Here is the hex encoded user data; the details of the data are explained in Tables 10a, 10b, 10c, and 10d.

First part:

0B0504158A00000003010401300400100053004D00530020005400650073007403009002 4A3A6589C9A585B989BDC9D40400C920A2AC22D49C81A61A428AB08B52720698690A26C49C69A8186184289B1271A6A0618610A2AC22D49C81A61A428AB08B52720698692698A22C26C2A826C22C49A2106186186288B09B0AA09B0AA09B0AB49C12718618718A22

Second part:

0B0504158A00000003010402C26849C6289A12718A26849C61A6288B09B0AA09B0AA08B0AA52698A22C26C2A826C22C49A200006010000481C0180000BFFFFFFD0000141001200000048008221002 2FFFFFF44008411FC42800001423F88090082BFFFFD410090050102A000054080A0000002AFFFF5400000000002A800154000000098 02ABFFD5403F8001

Third part:

0B0504158A00000003010403240 2AA005540248011240 2AAFF55402480392402AA815540208054C802AABD5 5402080100002AAA555400000100002AAA555400000110402AABD55401300110402AA8155402480112402AA FF55402480012402AA005540248001FC02ABFFD5401900000002A8001540000000002AFFFF5400000050102A 000054080A0090082

Fourth part:

0B0504158A00000003010404BFFFFD41009011FC42800001423F88210022FFFFFF4400844100120000004800 8280000BFFFFFFD00001

For more information, please refer to the Smart Messaging Specification 3.0.0.

Table 10a: First part of the Downloadable Profile message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 – 5	15 8A	Information Element Data (octets 4 & 5 --> 158A – destination port) .

6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	04	Information Element Data (total number of concatenated messages (0-255))
12	01	Information Element Data (sequence number of current short message)
13	30	Identifier for version, current version is (ASCII) zero "0". If it is not "0", stop the processing the message.
14	04	Item type 04 (Item length & Profile Name). The profile name must be encoded to unicode characters.
15 - 16	00 10	Item length (octets 15 & 16)
17 - 32	00 53 00 4D 00 53 00 20 00 54 00 65 00 73 00 74	SMS TEST
33	03	Item type 03 (ringing tone)
34 - 35	00 90	Item length (octets 34 & 35)
36-140	02 4A 3A 65 89 C9 A5 85 B9 89 BD C9 D4 04 00 C9 20 A2 AC 22 D4 9C 81 A6 1A 42 8A B0 8B 52 72 06 98 69 0A 26 C4 9C 69 A8 18 61 84 28 9B 12 71 A6 A0 61 86 10 A2 AC 22 D4 9C 81 A6 1A 42 8A B0 8B 52 72 06 98 69 26 98 A2 2C 26 C2 A8 26 C2 2C 49 A2 10 61 86 18 62 88 B0 9B 0A A0 9B 0A A0 9B 0A B4 9C 12 71 86 18 71 8A 22	Ringing tone data. For more information on encoding a ringing tone format, please refer to the FAQ Section 12 (Encoding Ringing Tone User Data (8-bit)) and the Smart Messaging specification.

Table 10b: Second part of the Downloadable Profile message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 - 5	15 8A	Information Element Data (octets 4 & 5 --> 158A – destination port)
6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	04	Information Element Data (total number of concatenated messages (0-255))
12	02	Information Element Data (sequence number of current short message)
13 – 51	C2 68 49 C6 28 9A 12 71 8A 26 84 9C 61 A6 28 8B 09 B0 AA 09 B0 AA 08 B0 AA 52 69 8A 22 C2 6C 2A 82 6C 22 C4 9A 20 00	Ringing tone data continues
52	06	Item type 06 (screen saver)
53 – 54	01 00	Item length (octets 56 & 57). Length is 256 bytes
55 - 140	00 48 1C 01 80 00 0B FF FF FF D0 00 01 41 00 12 00 00 00 48 00 82 21 00 22 FF FF FF 44 00 84 11 FC 42 80 00 01 42 3F 88 09 00 82 BF FF FD 41 00 90 05 01 02 A0 00 05 40 80 A0 00 00 02 AF FF F5 40 00 00 00 00 02 A8 00 15 40 00 00 00 98 02 AB FF D5 40 3F 80 01	OTA bitmap format, 72x28 bitmap. For more information, please refer to the FAQ Section 11 (Encoding an OTA Bitmap) and the Smart Messaging specification.

Table 10c: Third part of the Downloadable Profile message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16 bit port address)
3	04	Information Element Data Length (IEDL)
4 - 5	15 8A	Information Element Data (octets 4 & 5 --> 158A – destination port)
6 - 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	04	Information Element Data (total number of concatenated messages (0-255))
12	03	Information Element Data (sequence number of current short message)
13 – 140	24 02 AA 00 55 40 24 80 11 24 02 AA FF 55 40 24 80 39 24 02 AA 81 55 40 20 80 54 C8 02 AA BD 55 40 20 80 10 00 02 AA A5 55 40 00 00 10 00 02 AA A5 55 40 00 00 11 04 02 AA BD 55 40 13 00 11 04 02 AA 81 55 40 24 80 11 24 02 AA FF 55 40 24 80 01 24 02 AA 00 55 40 24 80 01 FC 02 AB FF D5 40 19 00 00 00 02 A8 00 15 40 00 00 00 00 02 AF FF F5 40 00 00 05 01 02 A0 00 05 40 80 A0 09 00 82	The OTA bitmap data continues

Table 10d: Fourth part of the Downloadable Profile message user data (length 54 octets -> hex 36)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	0B	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 – 5	15 8A	Information Element Data (octets 4 & 5 --> 158A – destination port)
6 – 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
9	03	Information Element Data Length (IEDL)
10	01	Information Element Data (concatenated short message reference number)
11	04	Information Element Data (total number of concatenated messages (0-255))
12	04	Information Element Data (sequence number of current short message)
13 – 54	BF FF FD 41 00 90 11 FC 42 80 00 01 42 3F 88 21 00 22 FF FF FF 44 00 84 41 00 12 00 00 00 48 00 82 80 00 0B FF FF FF D0 00 01	Rest of the OTA bitmap data

18. ENCODING A CONCATENATED SHORT MESSAGE

The User Data part of an SMS is limited to 140 octets. With some Smart Messaging formats there are more than 140 octets of User Data, so these must be sent using a series of messages. The User Data parts of these messages are then concatenated (after stripping off the User Data Headers) to form a full message.

The octets that specify the concatenation are defined in the User Data Header of each SMS in the series. There are five (5) octets required as follows:

Table 11: Description of extra octets needed for concatenated messages

Octet Number	Value	Description
1	00	Information Element Identifier (IEI; concatenated short message, 8-bit reference number)
2	03	Information Element Data Length (IEDL)
3	01	Information Element Data (concatenated short message reference number)
4	05	Information Element Data (total number of concatenated messages (0-255))
5	01	Information Element Data (sequence number of current short message)

The reference number can be anything, as long as it is unique for each series of messages sent. As an example, in a five-part series with the reference number=10 decimal (A hex) these octets would be:

Table 12: Example of "Concatenation octets" for a five-message series (reference number 10 -> hex A)

SMS Number	"Concatenation octets"
1	00 03 0A 05 01
2	00 03 0A 05 02
3	00 03 0A 05 03
4	00 03 0A 05 04
5	00 03 0A 05 05

Note that this set of octets is only one **part** of the User Data Header. For a full example, please see Section 8.

19. ENCODING A 72 X 14 OPERATOR LOGO AS A SINGLE MESSAGE, EVEN WHEN IT DOESN'T SEEM TO FOLLOW THE SPECIFICATIONS

The User Data part of an SMS is limited to 140 octets. The User Data Header takes 7 octets (1 length of user data header, 1 information element identifier, 1 information element data length, 4 port addresses). The actual bitmap part of a 72x14 OTA bitmap takes 9x14 = 126 octets. The OTA bitmap headers, when constructed according to specifications, take 9 more octets (1 OTA bitmap-version-number, 3 MCC+MNC, 1 Linefeed, 1 InfoField, 1 width, 1 height, 1 depth); see Table 3a in Section 9. This makes a total of 142 octets — too long by an annoying two octets! This means that according to the specifications, any operator logo would require two SMS messages.

There is a solution that allows these logos to be sent using only one SMS. This solution currently works with Nokia phones, but no support for single-message logos can be promised, nor should it be assumed by developers. It must be stressed that functioning of single-message logos in future Nokia terminals or terminals provided by other vendors supporting Smart Messaging cannot be guaranteed. (Note that a 72x13 OTA bitmap will fit into a single SMS message and still comply with specifications! These types of bitmaps **will** be guaranteed to be compatible, whereas a 72x14 logo sent using the method described below will **not**.)

In any case, the solution for a 72x14 logo is such that the two octets on either side of the MCC+MNC octets are left out completely. These octets are the OTA bitmap-version-number and the linefeed character. Thus, the single-SMS version of sending the logo from Section 9 is shown below.

Here is the hex encoded user data. Details of the data are explained in Table 13:

0605041582000042F45000480E01FFFFFFFFFFFFFFFF0000000000000000FFFFFFFFFFFFFFFF000000000000
00000010F0000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000001

Table 13: Single-message operator logo message user data (length 140 octets -> hex 8C)

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	06	Length of the User Data Header
2	05	Information Element Identifier (IEI; application port addressing scheme, 16-bit port address)
3	04	Information Element Data Length (IEDL)
4 – 5	15 82	Information Element Data (octets 4 & 5 --> 1582 – destination port)
6 – 7	00 00	Information Element Data (octets 6 & 7 --> 0000 – originator port)
8 – 9	21 F3	MCC (Mobile Country Code), octets 8 and 9, little-endian BCD, filled with F_{16}', 123 -> 21 F3 Notice: To see the logo on the phone's screen, octets 8 and 9 must be defined with the settings of the current operator.
10	54	MNC (Mobile Network Code) coding, little-endian BCD, filled with F_{16}',

		54 -> 45
11	00	InfoField; see Smart Messaging Specification 3.0.0 for details
12	48	The width of the bitmap. Hex 48 -> 72 decimal
13	0E	The height of the bitmap. Hex 0E -> 14 decimal
14	01	The depth of the bitmap (number of gray scales)
15-140	FF FF FF FF FF FF FF FF 00 00 00 00 00 00 00 00 00 FF FF FF FF FF FF FF FF 00 00 00 00 00 00 00 00 00 10 F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01	OTA bitmap data

20. OPERATOR LOGO AND ENCODING MCC AND MNC IN OPERATOR LOGO

Often after receiving or saving an operator logo, the logo does not appear on the screen. This is caused by wrong encoding of MNC or MCC. Please see Section 9, Table 3a, for an example of how MCC=123, MNC=45 has been encoded. (MCC=123, MNC=45 -> 21 F3 54).

21. ENCODING A RINGING TONE WITH UNICODE CHARACTERS IN SONG TITLE

This user data containing ringing tone with Unicode song title can be added to a text message, using an 8-bit data coding scheme and user data header, similar to Table 2.

Table 14. Ringing tone with Unicode characters in song title

Octet Number	Value	Description
		SMS-SUBMIT pdu without user data, having 8-bit data coding scheme and user data header indication, similar to Table 2.
1	06	Length of user data header is 06 (hex) = 6 (dec)
2	05	Information Element identifier; Meaning: Application port addressing scheme, 16-bit address
3	04	Length of IE
4 - 5	15 81	Destination port
6 - 7	00 00	Source port
8	03	Number of command parts present
9	4A	Ringing-tone-programming (command part 1)
10	44	Unicode (command part 2)
Bit stream...	0011101	Sound (command part 3)
	0 01	Basic-song-type
	0100	Song-title-length
	00 00000001 110100	T, notice that these are not octet aligned
	00 00000001 100101	E
	00 00000001 110011	S
	00 00000001 110100	T
	...	Continues as normal ringing tone

22. ENCODING A SHORT MESSAGE WITH UNICODE CHARACTERS

The following is an example of a short message with Unicoded data part in Table 15.

Table 15: Short message with Unicode characters

Octet Number	Value	Description
1	01	SMS-SUBMIT, do not reject duplicates in SC, validity period not present, no status report request, no header in user data, reply path not set
2	00	TP message reference, given by the phone
3	0A	Destination address length = 10 (dec)
4	A1	Type of address is national using ISDN telephone numbering plan
5 - 9	50 10 32 54 76	Destination address: 0501234567
10	00	Protocol identifier: straightforward
11	08	Data coding scheme: UCS2 16-bit message, no class meaning
12	08	Length of user data in octets
13 - 20	00 74 00 65 00 73 00 74	Test

23. ENCODING A VCARD WITH UNICODE CHARACTERS

The following is an example of a vCard with Unicode characters in Tables 16a and 16b.

Table 16a: vCard with Unicode characters, first message

Octet Number	Value	Description
1	41	SMS-SUBMIT, do not reject duplicates in SC, validity period not present, no status report request, header in user data, reply path not set
2	00	TP message reference, given by the phone
3 - 9	0A A1 50 10 32 54 76	Destination address length = 10 (dec), Type of address is national using ISDN telephone numbering plan; Destination address: 0501234567
10	00	Protocol identifier: straightforward
11	F5	Data coding scheme: 8-bit message
12	8C	Length of user data in octets
13	0B	Length of user data header is 11
14 – 19	05 04 23 F4 00 00	Information Element Identifier, length of IE, destination port, and Source port
20 – 24	00 03 03 02 01	Information Element Identifier, length of IE, reference number, amount of concatenation parts, and sequence number of the current short message
25 – 37	42 45 47 49 4E 3A 56 43 41 52 44 0D 0A	BEGIN:VCARD<CR><LF>
38 – 50	56 45 52 53 49 4F 4E 3A 32 2E 31 0D 0A	VERSION:2.1\r\n
51 – 80	4E 3B 43 48 41 52 53 45 54 3D 55 54 46 2D 38 3A C2 A0 E4 BB 96 E4 BB AC 3B 3B 3B 3B 0D 0A	N;CHARSET=UTF-8:<00 A0><4E D6><4E EC><CR><LF>
81 – 109	54 45 4C 3B 50 52 45 46 3B 56 4F 49 43 45 3A 38 34 35 36 35 36 39 36 35 36 36 36 0D 0A	TEL;PREF;VOICE:845656965666<CR><LF>
110 - 125	45 4D 41 49 4C 3A 61 64 40 74 2E 63 6F 6D 0D 0A	EMAIL:ad@t.com<CR><LF>
126 - 138	55 52 4C 3A 68 74 74 70 3A 2F 2F 0D 0A	URL:http:// <CR><LF>
139 - 152	4C 41 42 45 4C 3B 43 48 41 52 53 45 54 3D	LABEL;CHARSET=

Table 16b: Vcard with Unicode characters, second Message

Octet Number	Value	Description
1	41	SMS-SUBMIT, do not reject duplicates in SC, validity period not present, no status report request, header in user data, reply path not set
2	00	TP message reference, given by the phone
3 - 9	0A A1 50 10 32 54 76	Destination address length = 10 (dec); Type of address is national using ISDN telephone numbering plan, Destination address: 0501234567
10	00	Protocol identifier: straightforward,
11	F5	Data coding scheme: 8-bit message
12	25	Length of user data in octets
13	0B	Length of user data header is 11
14 - 19	05 04 23 F4 00 00	Information Element Identifier, length of IE, destination port, and Source port
20 - 24	00 03 03 02 02	Information Element Identifier, length of IE, reference number, amount of concatenation parts, and Sequence number of the current short message
25 - 38	55 54 46 2D 38 3A E4 BB 96 E4 BB AC 0D 0A	UTF-8:<4E D6><4E EC><CR><LF>
39 - 49	45 4E 44 3A 56 43 41 52 44 0D 0A	END:VCARD<CR><LF>

24. CONVERTING BITS, HEX AND DECIMAL

The following is an example of converting between bits, hex and decimal: 1010 0101 = A5h = 165.

Octet of Bits	Calculating Hexadecimal Number	Calculating Decimal Number
$\mathbf{1_7 0_6 1_5 0_4\ 0_3 1_2 0_1 1_0}$	$8 * \mathbf{1_7} + 4 * \mathbf{0_6} + 2 * \mathbf{1_5} + 1 * \mathbf{0_4} = 8 + 2 = A$ $8 * \mathbf{0_3} + 4 * \mathbf{1_2} + 2 * \mathbf{0_1} + 1 * \mathbf{1_0} = 4 + 1 = 5$ 10 * 16 + 5 = A5h	10 * 16 + 5 = 165 or 128 * **1** + 64 * **0** + 32 * **1** + 16 * **0** + 8 * **0** + 4 * **1** + 2 * **0** + 1 * **1** = 165
$2^0 = 1$ $2^4 = 16$ $2^1 = 2$ $2^5 = 32$ $2^2 = 4$ $2^6 = 64$ $2^3 = 8$ $2^7 = 128$	How to present 16 different numbers with one character: 0 1 2 3 4 5 6 7 8 9 A B C D E F A=10 B=11 C=12 D=13 E=14 F=15	1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 = 255 256 combinations: 0 - 255

25. HOW TO MAKE BLINKING OR FLASH SHORT MESSAGES

Blinking messages can be encoded using UCS2 encoding. Use 00 01 (hex bytes) as a toggle for blinking. This is an additional feature that only works on some older phones.

Flash messages show up on the user interface of the phone just after receiving. Messages that are sent with class 0 data coding scheme are treated as flash messages by the phone. These messages are not automatically stored to the phone.