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## ***Short Message Service***

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## PREFACE

These technical requirements form a standard for a Short Message Service (SMS), providing delivery of text and numeric information for paging, messaging, and voice mail notification. This standard includes Service Option 6 and Service Option 14 (as assigned in TSB58-A), which support delivery of short messages on CDMA Traffic Channels. Service Option 6 and Service Option 14 conform to the general requirements for service options specified in TIA/EIA-95-B, *Mobile Station-Base Station Compatibility Standard for Dual-Mode Spread Spectrum Systems*, TSB74, *Support for 14.4 kbps Data Rate and PCS Interaction for Spread Spectrum Cellular Systems*, and ANSI J-STD-008, *Personal Station-Base Station Compatibility Requirements for 1.8 to 2.0 GHz Code Division Multiple Access (CDMA) Personal Communications Systems*.

A mobile station can obtain Short Message Service operating in either the analog or the spread spectrum (CDMA) mode when it conforms to this standard and any of the following standards:

- TIA/EIA-95-B.
- TIA/EIA/IS-95-A (inclusive of text adopted by TSB74).
- ANSI J-STD-008.

This standard does not address the quality or reliability of Short Message Service, nor does it cover equipment performance or measurement procedures.

## SECTION SUMMARY

1. **Introduction.** This section defines the terms, references, protocols and network reference model used in this document.
2. **SMS Relay Layer.** This section defines the requirements for the lower layer of the SMS bearer service protocols. The SMS Relay Layer provides the interface between the Transport Layer and the Link Layer used for message transmission.
3. **SMS Transport Layer.** This section defines the requirements for the upper layer of the SMS bearer service protocols. The SMS Transport Layer manages the end-to-end delivery of messages.
4. **SMS Teleservice Layer.** This section defines the requirements for the SMS Teleservice Layer, which provides application-level data formats and procedures.

## NOTES

1. The following verbal forms are used: “Shall” and “shall not” identify requirements to be followed strictly to conform to the standard and from which no deviation is permitted. “Should” and “should not” indicate that one of several possibilities is recommended as particularly suitable, without mentioning or excluding others; that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is discouraged but not prohibited. “May” and “need not” indicate a course of action permissible within

- 1           the limits of the standard. “Can” and “cannot” are used for statements of  
2           possibility and capability, whether material, physical, or causal.
- 3           2. Footnotes appear at various points in this specification to elaborate and to further  
4           clarify items discussed in the body of the specification.
- 5           3. Unless indicated otherwise, this document presents numbers in decimal form.
- 6           Binary numbers are distinguished in the text by the use of single quotation marks.  
7           In some tables, binary values may appear without single quotation marks if table  
8           notation clearly specifies that values are binary. The character ‘x’ is used to  
9           represent a bit of unspecified value. For example ‘xxx00010’ represents any 8-bit  
10          binary value such that the least significant five bits equal ‘00010’.
- 11          Hexadecimal numbers (base 16) are distinguished in the text by use of the form  
12          0xh...h where h...h represents a string of hexadecimal digits. For example, 0x2fa1  
13          represents a number whose binary value is ‘0010111110100001’ and whose  
14          decimal value is 12193. Note that the exact number of bits in the binary  
15          representation of a hexadecimal number strictly depends upon the implementation  
16          requirements for the variable being represented.
- 17          4. “Base station” refers to the functions performed on the land side, which are  
18          typically distributed among a cell, a sector of a cell, and a mobile communications  
19          switching center.

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TIA/EIA-637-A

No text.

## 1 INTRODUCTION

### 1.1 General Description

The Short Message Service (SMS) allows the exchange of short messages between a mobile station and the wireless system, and between the wireless system and an external device capable of transmitting and optionally receiving short messages. The external device may be a voice telephone, a data terminal or a short message entry system.

The Short Message Service consists of message entry features, administration features, and message transmission capabilities. These features are distributed between a wireless system and the SMS message center (MC) that together make up the SMS system. The MC may be either separate from or physically integrated into the wireless system.

Short message entry features are provided through interfaces to the MC and the mobile station. Senders use these interfaces to enter short messages, intended destination addresses, and various delivery options.

MC interfaces may include features such as audio response prompts and DTMF reception for dial-in access from voice telephones, as well as appropriate menus and message entry protocols for dial-in or dedicated data terminal access. Mobile station interfaces may include keyboard and display features to support message entry. Additionally, a wireless voice service subscriber can use normal voice or data features of the mobile station to call an SMS system to enter a message.

An SMS Teleservice can provide the option of specifying priority level, future delivery time, message expiration interval, or one or more of a series of short, pre-defined messages.

If supported by the Teleservice, the sender can request acknowledgment that the message was received by the mobile station. An SMS recipient, after receiving a short message, can manually acknowledge the message. Optionally, the recipient can specify one of a number of pre-defined messages to be returned with the acknowledgment to the sender.

SMS administration features include message storage, profile editing, verification of receipt, and status inquiry capabilities. SMS administration is not within the scope of this standard.

The SMS transmission capabilities provide for the transmission of short messages to or from an intended mobile station, and the return of acknowledgments and error messages. These messages and acknowledgments are transmitted to or from the mobile station whether it is idle or engaged in a voice or data call.

The wireless service provider may offer SMS transmission to its wireless voice and data customers only, or may provide an SMS-only service without additional voice or data transmission capabilities.

This standard also provides for the broadcast of messages. All available mobile stations on a CDMA Paging Channel can receive a broadcast message. A broadcast message is not acknowledged by the mobile station. Broadcast Messaging Services may be made available to mobile stations on a CDMA Paging Channel as well as mobile stations in a call on a CDMA Traffic Channel.

1 **1.2 Terms**

2 **Base Station.** A fixed station that is used for communicating with mobile stations.  
3 Depending upon the context, the term base station may refer to a cell, a sector, an MSC, or  
4 another part of the wireless system. See also MSC.

5 **Bearer Service.** The portion of the SMS system responsible for delivery of messages  
6 between the MC and mobile user equipment. In this standard, the bearer service protocol  
7 is divided into a Transport Layer and a Relay Layer.

8 **Broadcast.** The bearer layer mechanism that is used to deliver SMS messages on the  
9 CDMA Paging Channel or on the CDMA Forward Traffic Channel to all available mobile  
10 stations.

11 **Broadcast Messaging Service.** A teleservice that allows an SMS message to be sent to all  
12 mobile stations.

13 **CMT.** Cellular Messaging Teleservice. See also Wireless Messaging Teleservice.

14 **CPT.** Cellular Paging Teleservice. See also Wireless Paging Teleservice.

15 **End Point.** An element of the SMS delivery system that can originate or terminate SMS  
16 messages.

17 **IWF.** An interworking function provides information conversion. A data service IWF  
18 provides functions needed for a mobile station to communicate with data terminal  
19 equipment connected to the network.

20 **MC.** SMS Message Center.

21 **Mobile Switching Center (MSC).** A configuration of equipment that provides wireless  
22 radio telephone service. Also called Mobile Telephone Switching Office (MTSO).

23 **Mobile-Originated.** Submitted to an SMS service provider by a mobile station.

24 **Mobile Station.** A station, fixed or mobile, which serves as the end user's wireless  
25 communication link with the base station. Mobile stations include portable units (e.g.,  
26 hand-held mobile units) and units installed in vehicles.

27 **Mobile-Terminated.** Delivered to a mobile station by an SMS service provider.

28 **Relay Layer.** The layer of the bearer service protocol responsible for the interface between  
29 the Transport Layer and the Link Layer used for message transmission.

30 **Relay Point.** An element of the SMS delivery system that forwards SMS messages.

31 **SMS.** Short Message Service.

32 **STX.** One of several allowable character sets allowed in IS-91 for CHAR. An STX ('111100')  
33 may be placed in the message to link this message to the previous message sent. All  
34 values other than STX in the 15th character position indicate end of message and are not  
35 displayed. The STX character is only valid for Short Messages.

36 **TE.** Terminal Equipment.

37 **Teleservice Layer.** The protocol layer providing the end-to-end SMS application.

1 **Transport Layer.** The layer of the bearer service protocol responsible for the end-to-end  
2 delivery of messages.

3 **Universal Coordinated Time (UTC).** An internationally agreed-upon time scale  
4 maintained by the Bureau International de l'Heure (BIH) used as the time reference by  
5 nearly all commonly available time and frequency distribution systems (i.e., WWV, WWVH,  
6 LORAN-C, Transit, Omega, and GPS).

7 **VMN.** Voice Mail Notification. VMN is a teleservice supported by TIA/EIA-41-D. This  
8 teleservice is an extension of the TIA/EIA/IS-91 Voice Mail Status capability. For details  
9 see 4.3.5.

10 **WAP.** Wireless Application Protocol.

11 **WMT.** Wireless Messaging Teleservice. This teleservice is further described in 6.3 of  
12 TIA/EIA-664. WMT is a point-to-point service only. See also 4.3.4.

13 **WPT.** Wireless Paging Teleservice. This teleservice is further described in 6.2 of TIA/EIA-  
14 664. WPT is a point-to-point service only. See also 4.3.3.

1 **1.3 References**

2 The following standards are referenced in this text. At the time of publication, the editions  
3 indicated were valid. All standards are subject to revision, and parties to agreements  
4 based on this standard are encouraged to investigate the possibility of applying the most  
5 recent editions of the standards indicated below. ANSI and TIA maintain registers of  
6 currently valid national standards published by them.

7 **ISO 646:1983** *Information Processing - Seven Byte Character Set for*  
8 *Information Processing Character Interchange*

9 **ISO 8348:1987 AD2** *Information Processing Systems - Data Communications -*  
10 *Network Service Definition, Addendum 2: Network Layer*  
11 *Addressing*

12 **CCITT Recommendation T.50** *International Alphabet No. 5*

13 **CCITT Recommendation X.213** *Network Service Definition for Open Systems*  
14 *Interconnection (OSI) for CCITT Applications*

15 **CCITT Recommendation X.25** *Interface Between Data Terminal Equipment (DTE) and*  
16 *Data Circuit-Terminating Equipment (DCE) for Terminals*  
17 *Operating in the Packet-Mode and Connected to Public*  
18 *Data Networks by Dedicated Circuit*

19  
20 **ANSI T1.607-1990** *Integrated Services Digital Network (ISDN) - Layer 3*  
21 *Signaling Specification for Circuit Switched Bearer*  
22 *Service for Digital Subscriber Signaling System Number 1*  
23 *(DSS1)*

24 **ANSI X3.4-1986** *Code for Information Interchange*

25 **ANSI/TIA/EIA-41-D** *Cellular Radio-Telecommunications Intersystem*  
26 *Operations, December 1997.*

27 **TIA/EIA-95-B** *Mobile Station-Base Station Compatibility Standard for*  
28 *Dual-Mode Spread Spectrum Systems*

29 **ANSI/TIA/EIA-664** *Cellular Features Description. ANSI version of IS-53-A*

30 **ANSI/TIA/EIA-691** *ANSI Enhanced Analog IS-691*

31 **TIA/EIA-553-A** *Core Analog Standard 800 MHz Mobile Station - Land*  
32 *Station Compatibility Specification with Authentication*

33 **TIA/EIA/IS-91** *Mobile Station - Base Station Compatibility Standard for*  
34 *800 MHz Analog Cellular, Auxiliary and Residential*  
35 *Services. November, 1995.*

36 **TSB58-A** *Administration of Parameter Value Assignments for*  
37 *TIA/EIA Spread Spectrum Standards*

38 **RFC 791** *Internet Protocol*

1 **RFC 822**

*Standard for the Format of ARPA Internet Text Messages*

2 **WAP Arch**

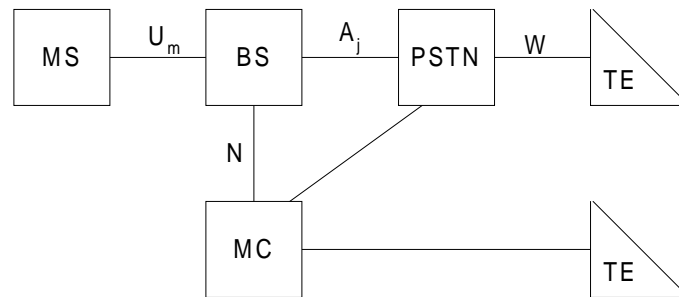
*Wireless Application Protocol Architecture Specification;*

3

*Wireless Application Protocol Forum, April 30, 1998*

#### 1.4 Network Reference Model

Figure 1.4-1 contains the network reference model for SMS. This model presents functional entities and associated interface reference points that may logically comprise a wireless network. Interface reference points  $U_m$ ,  $A_j$ ,  $W$ ,  $N$  are defined in Section 5.2 of TIA/EIA-41.1-D. The model is intended to provide a level of abstraction that facilitates the specification of messages within TIA/EIA-637-A. As such, implementations may vary with respect to how the functional entities are distributed among physical units.



**Figure 1.4-1. Simplified SMS Reference Model**

The base station (BS) in this model contains the transceiver equipment, Mobile Switching Center (MSC) and any Inter-Working Function (IWF) required for network connection. These elements are grouped together because there is no need to distinguish them in this standard.

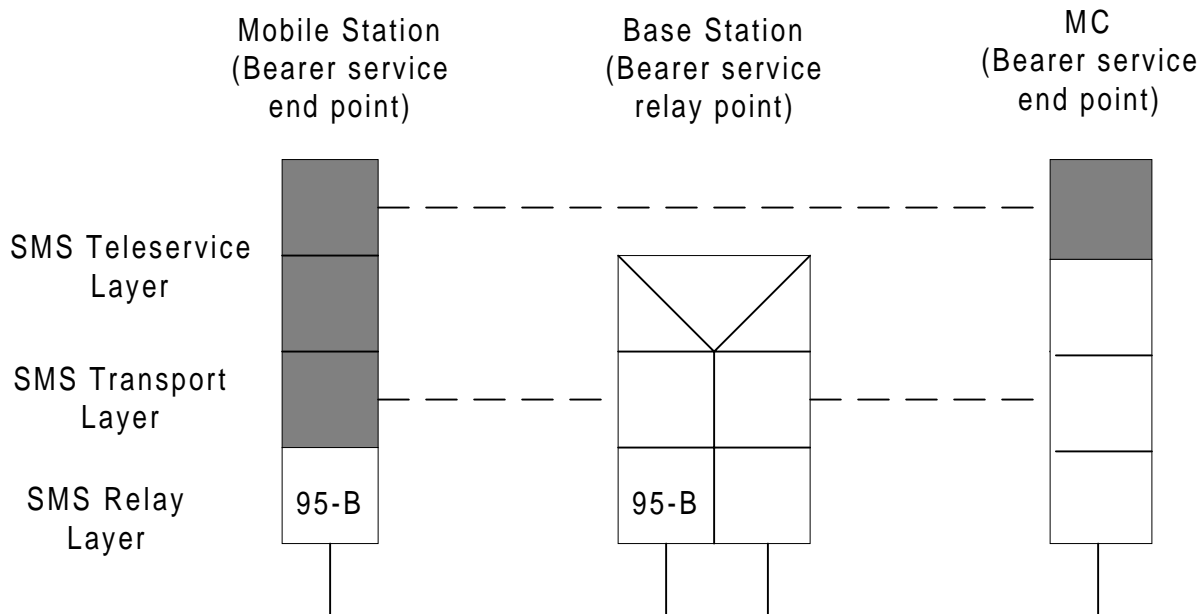
The MC element in this model represents a generic SMS Message Center function. The  $N$  reference point represents one or more standardized interfaces between an SMS message center and a BS. The Terminal Equipment (TE) is voice or data equipment connected either directly or indirectly to the MC.

It is possible for the MC to be included in, or co-located with, a base station. In this case, the  $N$  Interface is internal to the base station. For purposes of this standard, the procedures defined for the  $N$  Interface should be followed for such internal interfaces.

## 1.5 SMS Protocols

The SMS protocol stack for the CDMA mode of operation is illustrated in Figure 1.5-1. Shaded areas indicate the protocol elements covered in this standard.

In the analog mode of operation, only the Teleservice Layer portion of this standard applies (see 4.3.1.4).



**Figure 1.5-1. SMS Protocol Stack**

Figure 1.5-1 shows a simplified view of the network carrying SMS, including only a single SMS message relay point. In principle any number of relay points could be included, each containing an SMS protocol stack similar to that shown for the base station. For example, during a call that has undergone an intersystem handoff, SMS messages arriving at the mobile station's anchor base station must be forwarded to the current serving base station for delivery.

The SMS bearer service is the portion of the SMS system responsible for delivery of messages between the MC and mobile user equipment. The bearer service is provided by the SMS Transport Layer and the SMS Relay Layer.

The SMS Transport Layer is the highest layer of the bearer service protocol. The Transport Layer manages the end-to-end delivery of messages. In an entity serving as a relay point, the Transport Layer is responsible for receiving SMS Transport Layer messages from an underlying SMS Relay Layer, interpreting the destination address and other routing information, and forwarding the message via an underlying SMS Relay Layer. In entities serving as end points, the Transport Layer provides the interface between the SMS Bearer Service and the SMS Teleservice.

1 The SMS Relay Layer provides the interface between the Transport Layer and the Link  
2 Layer used for message transmission.

3

## 2 SMS RELAY LAYER

### 2.1 Introduction

The SMS Relay Layer provides the interface between the SMS Transport Layer and the Link Layer used to carry short message traffic. This standard addresses the SMS Relay Layer in mobile stations and base stations and their interfaces to the Link Layers for the  $U_m$  and N reference points.

On the  $U_m$  Interface, the SMS Relay Layer supports the SMS Transport Layer by providing the interface to the TIA/EIA-95-B transmission protocols needed to carry SMS data between CDMA mobile stations and base stations.

On the N Interface, the SMS Relay Layer supports the SMS Transport Layer by providing the interface to the network protocols needed to carry SMS data between the MC and TIA/EIA-95-B base stations. For the general N Interface, the SMS Relay Layer requirements in this standard are limited to the requirements for the Relay Layer interface to the Transport Layer. Specific requirements are given for operation with an N Interface that is a TIA/EIA-41-D network.

### 2.2 Overview

#### 2.2.1 Model of Operation

##### 2.2.1.1 $U_m$ Interface

In this standard, the  $U_m$  reference point is the CDMA wireless system as described in TIA/EIA-95-B. The dual-mode CDMA wireless system provides analog and digital mobile telephone service using the wireless mobile telephone frequency bands. Requirements for SMS message delivery in the analog mode are found in TIA/EIA-95-B.

The CDMA system provides the functions necessary for a mobile station to acquire CDMA system timing and the overhead information needed for access to system functions. A CDMA mobile station that is fully initialized and is capable of providing access to system functions can operate in any of the following three states that are defined in TIA/EIA-95-B:

- In the *Mobile Station Idle State*, the mobile station has limited access to system functions. In this state the mobile station monitors a Paging Channel on which overhead information, paging messages, and SMS messages can be sent to the mobile station. The mobile station can also send SMS messages by means of an Access Channel, though the message size and rate are limited. The Access Channel can also be used to gain access to CDMA Traffic Channels, which offer greater data bandwidth.
- In the *System Access State*, the mobile station attempts to send a TIA/EIA-95-B message on the CDMA Access Channel. While in this state, the mobile station can receive SMS messages but does not send SMS acknowledgments or new SMS messages until the access attempt is complete.
- In the *Mobile Station Control on the Traffic Channel State*, a mobile station has full access to system functions. In this state a mobile station has an assigned Traffic

1 Channel, which can be used for voice, data or other services. The data flow is full-  
2 duplex, and in that regard may be compared to a 4-wire telephone connection.

3 The SMS Relay Layer can deliver messages to mobile stations in any of these states. The  
4 Relay Layer is also capable of using TIA/EIA-95-B call control signaling to direct mobile  
5 stations to change states as necessary in order to deliver SMS messages.

#### 6 2.2.1.2 N (Intersystem) Interface

7 In this standard, the N reference point is assumed to be an intersystem network link with  
8 connectivity to the MC. Intersystem links can use a variety of public and private protocols,  
9 one example of which is defined in TIA/EIA-41-D.

10 SMS protocols and message formats on intersystem links may differ from those used on  
11 the CDMA air interface. The N Interface Relay Layer is responsible for formatting and  
12 parsing SMS messages as necessary when transmitting and receiving messages on the  
13 intersystem links.

#### 14 2.2.2 Relay Layer Functions

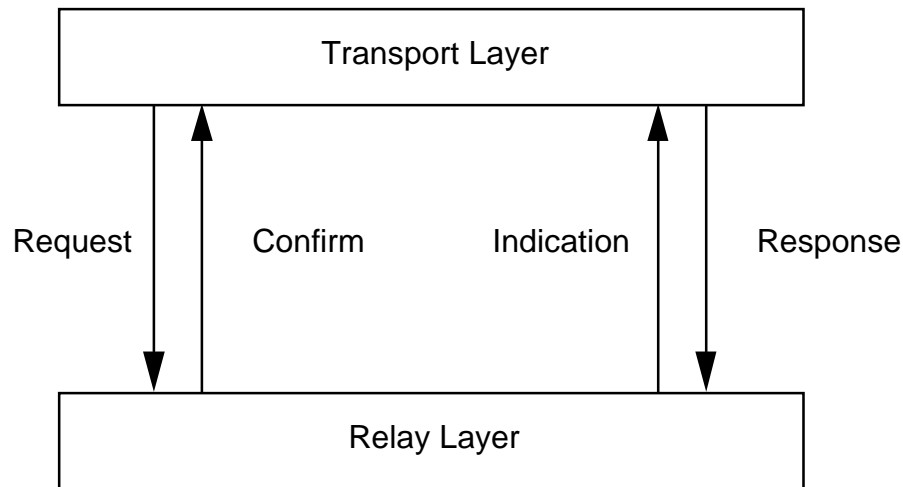
15 The Relay Layer performs the following functions:

- 16 • Accepting Transport Layer messages and delivering them to the next indicated relay  
17 point or end point.
- 18 • Providing error indications to the Transport Layer when messages cannot be  
19 delivered to the next relay point or end point.
- 20 • Receiving messages and forwarding them to the Transport Layer.
- 21 • Interfacing to and controlling the Link Layer used for message relay.
- 22 • Formatting messages according to the SMS standards and/or other message  
23 standards, as required by the Link Layer and/or peer SMS layers.

1 2.2.3 Service Description

2 2.2.3.1 Service Primitives

3 Service primitives represent a logical exchange of information between layers. The types of  
 4 primitives used in the Relay Layer are shown in Figure 2.2.3.1-1.



6  
 7 **Figure 2.2.3.1-1. Primitive Types**

8  
 9 The Request primitive type is used by the Transport Layer to request a service from the  
 10 Relay Layer.

11 The Confirm primitive type is used by the Relay Layer to report a consequence of the  
 12 Request primitive type.

13 The Indication primitive type is used by the Relay Layer to provide information to the  
 14 Transport Layer.

15 The Response primitive type is used by the Transport Layer to request a service from the  
 16 Relay Layer as a consequence of the Indication primitive type.

17 The following tables contain some examples of the primitive definitions. The conventions  
 18 used for service interface primitives are shown in Table 2.2.3.1-1.

**Table 2.2.3.1-1. U<sub>m</sub> Interface Primitive Types**

| <b>Primitive Type</b> | <b>Source</b>    | <b>Destination</b> | <b>Purpose</b>   |
|-----------------------|------------------|--------------------|--|
| <i>Request</i>        | service user     | service provider   | Request a service, resource, etc.                                  |
| <i>Confirm</i>        | service provider | service user       | Response (positive or negative) to a Request primitive.            |
| <i>Indication</i>     | service provider | service user       | Indicates that data or an event for the service user has occurred. |
| <i>Response</i>       | service user     | service provider   | Acknowledgment of an Indication.                                   |

Note that every Request primitive has a corresponding Confirm primitive, and every Indication has a corresponding Response primitive. The invocation of service primitives is noted as follows:

***RX.Primitive\_Type(parameters)***

where RX, Primitive\_Type and parameters are defined in Table 2.2.3.1-2.

**Table 2.2.3.1-2. U<sub>m</sub> Interface Primitives**

|                              |   |
|------------------------------|---|
| <b><i>RX</i></b>             | An abbreviation for the service provider entity (e.g., RL-BCDATA for Relay Layer Broadcast Data). |
| <b><i>Primitive_Type</i></b> | The specific Primitive Type as defined in Table 2.2.3.1-1 (e.g., Request)                         |
| <b><i>parameters</i></b>     | An (optional) list of parameters for the primitive (e.g., Address)                                |

For example, a request to transfer broadcast SMS messages between the Transport Layer and the Relay Layer uses the RL-BCDATA primitive. The Relay Layer passes the Transport Layer Message text, and the destination broadcast address parameters as follows:

***RL-BCDATA.Request(Transport Layer Message, Broadcast Address)***

Primitives and parameters for the U<sub>m</sub> Interface Relay Layer are summarized in Table 2.2.3.1-2.

1 2.2.3.1.1  $U_m$  Interface Primitives

2 Table 2.2.3.1.1-1 summarizes the primitives supported by the Relay Layer for the  $U_m$   
3 Interface.

4  
5 **Table 2.2.3.1.1-1. Relay Layer Service Primitives,  $U_m$  Interface**

| Name       | Type    |         |            |          | Parameters  |
|------------|---------|---------|------------|----------|---|
|            | Request | Confirm | Indication | Response |   |
| RL-DATA    | X       | X       | X          |          | Transport Layer Message, Address, Authentication, Confirm Request |
| RL-BCDATA  | X       |         | X          |          | Transport Layer Message, Broadcast Address                        |
| RL-ERROR   |         |         | X          |          | Error Type  |
| RL-CONTROL | X       |         |            |          |   |

6  
7 The RL-DATA primitive is used to transfer point-to-point SMS messages between the  
8 Transport Layer and the Relay Layer. The parameters of the RL-DATA primitive are the  
9 Transport Layer message text, authentication data, confirmation request and the mobile  
10 station identifier, which may be a source or destination address, according to the direction  
11 of transmission. For the mobile station and base station  $U_m$  Interface Relay Layer, the  
12 parameters of the RL-DATA primitive are summarized in Table 2.2.3.1.1-2.

13  
14 **Table 2.2.3.1.1-2. RL-DATA Primitive Parameters,  $U_m$  Interface**

| SMS Entity | Primitive Type | Address                               | Auth | Conf Req | Text |
|------------|----------------|---------------------------------------|------|----------|------|
| Mobile     | Request        | Originating mobile station identifier | X    | X        | X    |
|            | Indication     | None                                  |      |          | X    |
| Base       | Request        | Destination mobile station identifier |      | X        | X    |
|            | Indication     | Originating mobile station identifier | X    |          | X    |

15  
16 In the mobile station, the Authentication parameter of the RL-DATA.Request primitive  
17 contains the authentication digits used in forming the AUTHR field that is sent in all *Data  
18 Burst Messages* carrying SMS messages, as required in 3.3.3 and section 6.3.12.1.8 of  
19 TIA/EIA-95-B. In the base station, the Authentication parameter of the RL-DATA.Request  
20 primitive contains the authentication fields of the received *Data Burst Message*.

1 The RL-BCDATA primitive is used to transfer broadcast SMS messages between the  
 2 Transport Layer and the Relay Layer. For the U<sub>m</sub> Interface Relay Layer, the parameters of  
 3 the RL-BCDATA.Request and RL-BCDATA.Indication primitives are the Transport Layer  
 4 message text and the destination broadcast address.

5 The RL-ERROR primitive is used to report Relay Layer errors to the Transport Layer.

6 The RL-CONTROL primitive is used by the Transport Layer to indicate to the Relay Layer  
 7 that a TIA/EIA-95-B Traffic Channel, established solely for carrying SMS data, may be  
 8 released.

### 9 2.2.3.1.2 N Interface Primitives

10 Table 2.2.3.1.2-1 summarizes the primitives supported by the Relay Layer for the N  
 11 Interface.

12  
 13 **Table 2.2.3.1.2-1. Relay Layer Service Primitives, N Interface**

| Name      | Type    |         |            |          | Parameters   |
|-----------|---------|---------|------------|----------|--|
|           | Request | Confirm | Indication | Response |  |
| RL-DATA   | X       | X       | X          | X        | Transport Layer Message, Address, Confirm Request, Result  |
| RL-BCDATA |         |         | X          |          | Transport Layer Message, Service Category, Priority Indicator, Zone Indicator, Language Indicator. |
| RL-ERROR  |         |         | X          |          | Error Type   |

14  
 15 The RL-DATA primitive is used to transfer point-to-point SMS messages between the  
 16 Transport Layer and the Relay Layer. The parameters of the RL-DATA primitive are the  
 17 Transport Layer message text, the destination address, confirmation request and result.

18 The RL-BCDATA primitive is used to transfer broadcast SMS messages from the Relay  
 19 Layer to the Transport Layer. The parameters of the RL-BCDATA primitive are the  
 20 Transport Layer message text, the Service Category, the Priority Indicator, the Zone  
 21 Indicator, and the Language Indicator.

22 The RL-ERROR primitive is used to report Relay Layer errors to the Transport Layer. See  
 23 2.4.3.

### 2.2.3.2 Services Provided by the Relay Layer

The  $U_m$  Interface Relay Layer provides Transport Layer message delivery between mobile station and base station. The service is provided as a point-to-point service and as a broadcast service.

The N Interface Relay Layer provides message delivery between the base station and the MC. This service is provided as a point-to-point service only.

#### 2.2.3.2.1 Point-to-Point

The point-to-point Relay Layer service provides for the transmission and reception of Transport Layer messages destined for or received from individual mobile stations. When requested, this service provides a confirmation to the Transport Layer that a message sent on the  $U_m$  or N Interface was received, based on Link Layer acknowledgment procedures. The primitives used for this service are RL-DATA, RL-ERROR and RL-CONTROL.

For mobile-terminated SMS messages received from the N Interface Link Layer, the base station Relay Layer determines the destination mobile station address and passes the address to the Transport Layer. The Relay Layer may request confirmation of delivery to the mobile station as required by the N Interface Link Layer. For mobile-originated SMS messages received from the Transport Layer, the base station N Interface Relay Layer formats the originating mobile station address, the destination MC address and other information as required by the N Interface Link Layer and passes the message to the N Interface Link Layer.

For mobile-terminated SMS messages received from the Transport Layer, the base station  $U_m$  Interface Relay Layer formats the mobile station address and other information as required by the  $U_m$  Interface Link Layer and passes the message to the  $U_m$  Interface Link Layer. For mobile-originated SMS messages received from the  $U_m$  Interface Link Layer, the base station Relay Layer determines the originating mobile station address and passes the address to the Transport Layer.

#### 2.2.3.2.2 Broadcast

The broadcast Relay Layer service provides for the broadcast of Transport Layer messages. For the  $U_m$  and N Interfaces, the primitive used for this service is RL-BCDATA.

#### 2.2.3.3 Services Required from TIA/EIA-95-B Protocol Layers

The Relay Layer for the  $U_m$  Interface requires the following services from the TIA/EIA-95-B protocol layers:

- Transmission of *Data Burst Messages* containing SMS data on the Access, Paging and Traffic Channels to/from specific mobile stations.<sup>1</sup> This service includes provision of the location function necessary to deliver messages to a mobile station not on a Traffic Channel.

---

<sup>1</sup>This includes sending a broadcast SMS message to a mobile station on the Traffic Channel.

- 1 • Transmission of *Data Burst Messages* containing SMS data on the Paging Channels
- 2 to a broadcast address.
- 3 • Reception of *Data Burst Messages* containing SMS data on the Access, Paging and
- 4 Traffic Channels.
- 5 • Notification to mobile stations operating in the slotted mode that broadcast messages
- 6 will be transmitted.
- 7 • Determination of the current call state of mobile stations.
- 8 • Selection of the type of TIA/EIA-95-B channel to be used for message delivery.
- 9 • Determination of the maximum message size permitted on the Access, Paging and
- 10 Traffic channels.
- 11 • Selection of the TIA/EIA-95-B layer 2 acknowledgment option for message delivery.
- 12 • Report of the success/failure of TIA/EIA-95-B layer 2 acknowledgment.
- 13 • Report of the success/failure of mobile station paging.
- 14 • Generation of authentication information elements included in the *Data Burst*
- 15 *Message* according to the requirements of 6.3.12.1.8 and 7.3.1 of TIA/EIA-95-B.

#### 16 2.2.3.4 Services Required from Intersystem Links

17 The Relay Layer for the N Interface requires the following services from the intersystem  
18 link:

- 19 • Delivery of SMS messages to an MC.
- 20 • Reception of SMS messages from an MC.
- 21 • Report of the success/failure of message delivery.

### 22 **2.3 Elements of Procedures**

#### 23 2.3.1 Formats of Fields

24 The formats of the parameters passed in Relay Layer service primitives are  
25 implementation-dependent.

#### 26 2.3.2 Error Codes

27 The error codes used in the RL-ERROR primitive shall be SMS\_CauseCode values as  
28 defined in the SMS\_CauseCode Table in TIA/EIA-41-D.

### 29 **2.4 Definition of Procedures**

#### 30 2.4.1 Mobile Station Procedures

##### 31 2.4.1.1 Point-to-point Procedures

32 This section defines the procedures for processing of mobile-terminated SMS messages  
33 that are addressed to individual mobile stations, and processing of all mobile-originated

1 SMS messages. For mobile-originated SMS messages, the  $U_m$  Interface Relay Layer  
 2 considers all messages to be addressed to the current serving base station. The Transport  
 3 Layer in the base station is responsible for providing the N Interface address for routing of  
 4 a mobile-originated message to its final destination.

#### 5 2.4.1.1.1 Paging Channel Procedures

##### 6 2.4.1.1.1.1 Mobile SMS Message Termination

7 A mobile station supporting SMS shall accept and process *Data Burst Messages* received  
 8 while the mobile station is monitoring the CDMA Paging Channel (see 7.7.2.3.2.9 of  
 9 TIA/EIA-95-B) that are addressed to the mobile station. Processing of TIA/EIA-95-B layer  
 10 2 fields shall be in accordance with TIA/EIA-95-B.

11 The SMS Relay Layer shall process all *Data Burst Messages* addressed to the mobile  
 12 station on the Paging Channel and having the BURST\_TYPE field set to '000011' (as  
 13 assigned in TSB58-A). The SMS Relay Layer shall discard the message without further  
 14 processing if any of the following is true:

- 15 • MSG\_NUMBER field is set to a value other than 1.
- 16 • NUM\_MSGS field is set to a value other than 1.
- 17 • NUM\_FIELDS field is set to zero.

18 Otherwise, the SMS Relay Layer shall send the Transport Layer an RL-DATA.Indication  
 19 containing the CHARi fields of the received *Data Burst Message*.

##### 20 2.4.1.1.1.2 Mobile SMS Message Origination

21 Mobile-originated SMS messages are received by the mobile station SMS Relay Layer as  
 22 RL-DATA.Request primitives from the Transport Layer. The requirements of this section  
 23 apply when an RL-DATA.Request primitive is received from the Transport Layer and the  
 24 mobile station is in the TIA/EIA-95-B *Mobile Station Idle State* or *System Access State*.

25 Mobile stations supporting SMS shall support the *Mobile Station Message Transmission*  
 26 *Operation*, as defined in TIA/EIA-95-B section 6.6.2.6. Mobile stations may allow the user  
 27 to restrict SMS message origination to Traffic Channels for enhanced message privacy.

28 When the Relay Layer receives an RL-DATA.Request primitive from the Transport Layer,  
 29 and the mobile station is in the TIA/EIA-95-B *Mobile Station Idle State*, the Relay Layer  
 30 shall determine whether the SMS message can be sent on the Access Channel. As part of  
 31 this determination, the mobile station should determine whether the SMS message length  
 32 is such that the message can be sent on the Access Channel.<sup>2</sup> If the SMS message can be  
 33 sent on the Access Channel, the mobile station may form a *Data Burst Message* (see  
 34 6.7.1.3.2.3 of TIA/EIA-95-B), setting BURST\_TYPE to '000011', and transmit it on the  
 35 Access Channel, following the procedures specified in 6.6.2.6 and 6.6.3 of TIA/EIA-95-B.

---

<sup>2</sup>The maximum size depends on the current Access Channel capsule size, as determined from the *Access Parameters Message* broadcast by the base station, and on the mobile station identifier type that would be used in forming the *Data Burst Message* carrying the SMS message.

1 The mobile station shall set the MSG\_NUMBER and NUM\_MSGS fields to 1, and shall set  
2 the NUM\_FIELDS field to the number of octets in the SMS Transport Layer message. The  
3 mobile station address fields shall be set using the address parameter supplied by the  
4 Transport Layer in the RL-DATA.Request. The authentication fields shall be set as  
5 described in 3.3.3.1 using the authentication parameter supplied by the Transport Layer  
6 in the RL-DATA.Request.

7 When the Relay Layer receives an RL-DATA.Request primitive from the Transport Layer,  
8 and the mobile station is in the TIA/EIA-95-B *System Access State*, the Relay Layer should  
9 store the RL-DATA.Request until the mobile station exits the *System Access State*. If the  
10 mobile station enters the *Mobile Station Idle State*, the Relay Layer should process the  
11 RL-DATA.Request as if it had been received while in the *Mobile Station Idle State* (see  
12 above). If the mobile station enters the *Mobile Station Control on the Traffic Channel State*,  
13 the Relay Layer should process the RL-DATA.Request in accordance with the procedures  
14 defined in 2.4.1.1.2.4. If the mobile station enters any other state the Relay Layer may  
15 discard the RL-DATA.Request. If the mobile station enters an analog mode task, the  
16 mobile station shall return an RL-ERROR.Indication to the Transport Layer. The error  
17 code value shall be as defined by the implementation.

18 If an SMS message cannot be sent on the Access Channel because it is too long (see  
19 above), or because of other implementation-dependent criteria,<sup>3</sup> the mobile station shall  
20 transmit the SMS messages on the CDMA Traffic Channel, following the procedures  
21 defined in 2.4.1.1.2.3.

22 Messages transmitted on the Access Channel always require a TIA/EIA-95-B layer 2  
23 acknowledgment. If the access attempt is acknowledged (see 6.6.3.1.2 of TIA/EIA-95-B),  
24 the Relay Layer shall send an RL-DATA.Confirm primitive to the Transport Layer. If the  
25 access attempt fails (see 6.6.3.1.1.2 of TIA/EIA-95-B), the Relay Layer should send an  
26 RL-ERROR.Indication to the Transport Layer. The error code value shall be as defined by  
27 the implementation.

#### 28 2.4.1.1.2 Mobile Station Traffic Channel Procedures

##### 29 2.4.1.1.2.1 Negotiation for the SMS Service Option

30 Negotiation for the SMS Service Option is only required when no other service option is  
31 connected.

32 The SMS Service Option described by this standard shall use service option number 6 and  
33 is called Service Option 6 when using Multiplex Option 1. The SMS Service Option shall  
34 use service option number 14 and is called Service Option 14 when using Multiplex  
35 Option 2.

36 The mobile station shall negotiate for Service Option 6 using either service option  
37 negotiation (see 2.4.1.1.2.1.1) or service negotiation (see 2.4.1.1.2.1.2).

---

<sup>3</sup>For example, the choice to use the Access Channel or a Reverse Traffic Channel when multiple SMS messages are waiting to be transmitted is implementation-dependent.

1 The mobile station shall negotiate for Service Option 14 using service negotiation (see  
2 2.4.1.1.2.1.2).

#### 3 2.4.1.1.2.1.1 Procedures Using Service Option Negotiation

4 In the context of this section, a service option is active when the service option is agreed  
5 upon by both mobile station and base station (see 6.6.4.1.2 and 7.6.4.1.2 of TIA/EIA-95-  
6 B). A service option is connected when primary traffic data are being processed in  
7 accordance with the requirements of the service option. It is possible for a service option  
8 to be active without having been connected, but a service option that is not active cannot  
9 be connected.

10 The mobile station shall connect Service Option 6 as follows:

- 11 • If Service Option 6 is active when the mobile station enters the *Waiting for Mobile*  
12 *Station Answer Substate*, or if Service Option 6 becomes active when the mobile  
13 station is already in the *Waiting for Mobile Station Answer Substate*, then the  
14 mobile station shall send a *Connect Order* to the base station as a message  
15 requiring acknowledgment without waiting for the user to explicitly command the  
16 call to be answered. The mobile station shall enter the *Conversation Substate*.
- 17 • If Service Option 6 becomes active when the mobile station is not in the  
18 *Conversation Substate*, then it shall connect Service Option 6 immediately upon  
19 entering the *Conversation Substate*. Otherwise, the mobile station shall connect  
20 Service Option 6 at the time it becomes active. The mobile station shall complete  
21 connection of Service Option 6 within 200 ms of starting connection.

22 When Service Option 6 is connected, the Service Option shall discard all primary traffic  
23 data bits received from the multiplex sublayer, and the mobile station shall transmit null  
24 traffic channel data (see 6.1.3.3.2.4 of TIA/EIA-95-B).

25 The mobile station shall disconnect Service Option 6 if it exits the *Mobile Station Control on*  
26 *the Traffic Channel State* or if any other service option is connected as primary traffic.

#### 27 2.4.1.1.2.1.2 Procedures Using Service Negotiation

28 The mobile station shall perform service negotiation for Service Option 6 or Service Option  
29 14 as described in TIA/EIA-95-B. The negotiated service configuration shall include only  
30 valid attributes for the negotiated service option consistent with those specified in Tables  
31 2.4.1.1.2.1.2-1 and 2.4.1.1.2.1.2-2.

**Table 2.4.1.1.2.1.2-1. Valid Service Configuration Attributes for Service Option 6**

| <b>Service Configuration Attribute</b> | <b>Valid Selections</b>                                    |
|--|--|
| Forward Multiplex Option               | Multiplex Option 1   |
| Reverse Multiplex Option               | Multiplex Option 1   |
| Forward Transmission Rates             | Rate Set 1 with all four rates enabled                     |
| Reverse Transmission Rates             | Rate Set 1 with all four rates enabled                     |
| Forward Traffic Type                   | '0000' or '0001', see Table 7.7.5.7-1 of ANSI TIA/EIA-95-B |
| Reverse Traffic Type                   | '0000' or '0001', see Table 7.7.5.7-2 of ANSI TIA/EIA-95-B |

**Table 2.4.1.1.2.1.2-2. Valid Service Configuration Attributes for Service Option 14**

| <b>Service Configuration Attribute</b> | <b>Valid Selections</b>                                    |
|--|--|
| Forward Multiplex Option               | Multiplex Option 2   |
| Reverse Multiplex Option               | Multiplex Option 2   |
| Forward Transmission Rates             | Rate Set 2 with all four rates enabled                     |
| Reverse Transmission Rates             | Rate Set 2 with all four rates enabled                     |
| Forward Traffic Type                   | '0000' or '0001', see Table 7.7.5.7-1 of ANSI TIA/EIA-95-B |
| Reverse Traffic Type                   | '0000' or '0001', see Table 7.7.5.7-2 of ANSI TIA/EIA-95-B |

If the mobile station accepts a service configuration, as specified in a *Service Connect Message*, that includes a service option connection using Service Option 6 or Service Option 14, then the service option connection shall become part of the current service configuration at the action time associated with the *Service Connect Message*. Service Option 6 or Service Option 14 is considered to be connected when the current service configuration includes a service option connection for it.

If Service Option 6 or Service Option 14 is connected when the mobile station enters the *Waiting for Mobile Station Answer Substate*, or Service Option 6 or Service Option 14 becomes connected while the mobile station is in the *Waiting for Mobile Station Answer Substate*, the mobile station shall send a *Connect Order* to the base station as a message requiring acknowledgment without waiting for the user to explicitly command the call to be answered. The mobile station shall enter the *Conversation Substate*.

The mobile station shall not send a *Service Option Control Message* for Service Option 6 or Service Option 14.

#### 2.4.1.1.2.2 Mobile SMS Message Termination

A mobile station supporting SMS shall accept and process *Data Burst Messages* received on the CDMA Forward Traffic Channel (see 7.7.3.3.2.4 of TIA/EIA-95-B). Processing of

1 TIA/EIA-95-B layer 2 fields shall be in accordance with TIA/EIA-95-B. If requested in the  
2 ACK\_REQ field, TIA/EIA-95-B layer 2 acknowledgments shall be returned whether or not  
3 message errors are detected by the SMS Relay Layer.

4 The SMS Relay Layer shall process all *Data Burst Messages* addressed to the mobile  
5 station on the Forward Traffic Channel and having the BURST\_TYPE field set to '000011'.  
6 The SMS Relay Layer shall discard the message without further processing if any of the  
7 following is true:

- 8 • MSG\_NUMBER field is set to a value other than 1.
- 9 • NUM\_MSGS field is set to a value other than 1.
- 10 • NUM\_FIELDS field is set to zero.

11 Otherwise, the SMS Relay Layer shall send the Transport Layer an RL-DATA.Indication  
12 containing the CHARi fields of the received *Data Burst Message*.

#### 13 2.4.1.1.2.3 Traffic Channel Setup

14 When a mobile station in the TIA/EIA-95-B *Mobile Station Idle State* sends SMS data on a  
15 Traffic Channel, the following procedures apply:

16 The mobile station shall send an *Origination Message* (see 6.7.1.3.2.4 of TIA/EIA-95-B)  
17 containing no dialed digits and requesting Service Option 6 or Service Option 14.  
18 Authentication of the *Origination Message* shall be conducted according to the procedure  
19 described in 6.3.12.1.6 of TIA/EIA-95-B. The mobile station address fields shall be set  
20 using the originating address parameter supplied by the Transport Layer in the  
21 RL-DATA.Request.

22 Call processing following the transmission of the *Origination Message* shall follow the  
23 procedures defined in 6.6 of TIA/EIA-95-B. When the mobile station enters the  
24 *Conversation Substate*, the mobile station may transmit the SMS messages in accordance  
25 with the procedures defined in 2.4.1.1.2.4.

#### 26 2.4.1.1.2.4 Mobile Station Message Origination in the Conversation Substate

27 Mobile-originated SMS messages are received by the mobile station SMS Relay Layer as  
28 RL-DATA.Request primitives from the Transport Layer. The requirements of this section  
29 apply when an RL-DATA.Request primitive is received from the Transport Layer and the  
30 mobile station is in the TIA/EIA-95-B *Conversation Substate* of the *Mobile Station Control*  
31 *on the Traffic Channel State*.

32 The mobile station shall compare the originating address parameter, supplied by the  
33 Transport Layer in the RL-DATA.Request, to the mobile station address used to establish  
34 the Traffic Channel. If the addresses are not the same, the mobile station shall not  
35 transmit the SMS message and shall return an RL-ERROR.Indication to the Transport  
36 Layer. The error code value shall be as defined by the implementation. If the addresses  
37 are the same, the mobile station shall send the message using the following procedures:

38 The mobile station shall form a *Data Burst Message* (see 6.7.2.3.2.4 of TIA/EIA-95-B),  
39 setting BURST\_TYPE to '000011' and transmit it on the Reverse Traffic Channel. The

1 mobile station shall set the MSG\_NUMBER and NUM\_MSGS fields to '1', and shall set the  
2 NUM\_FIELDS field to the number of octets in the SMS Transport Layer message.

3 If the RL-DATA.Request contains the confirmation request parameter, the mobile station  
4 shall set the ACK\_REQ layer 2 field to '1'. If the message is acknowledged (see 6.6.4.1.3 of  
5 TIA/EIA-95-B), the Relay Layer shall send an RL-DATA.Confirm primitive to the Transport  
6 Layer. If the mobile station declares acknowledgment failure (see 6.6.4.1.3.1.1 of TIA/EIA-  
7 95-B), the Relay Layer shall send an RL-ERROR.Indication to the Transport Layer. The  
8 error code value shall be as defined by the implementation.

9 If the RL-DATA.Request does not contain the confirmation request parameter, the mobile  
10 station may send the *Data Burst Message* either with or without layer 2 acknowledgment.  
11 The Relay Layer should not return the RL-DATA.Confirm nor the RL-ERROR.Indication for  
12 layer 2 acknowledgment failure.

13 If the only connected service option is Service Option 6 or Service Option 14, the mobile  
14 station shall enter the *Release Substate* with a mobile station release indication (see  
15 6.6.4.5 of TIA/EIA-95-B) if the Relay Layer receives an RL-CONTROL.Request primitive  
16 from the Transport Layer.<sup>4</sup>

17 If any service option other than Service Option 6 or Service Option 14 is connected, the  
18 mobile station shall remain in the *Conversation Substate* after acknowledgment of the *Data*  
19 *Burst Message*.

#### 20 2.4.1.2 Broadcast Procedures

21 This section defines the procedures for the processing of mobile-terminated SMS messages  
22 that are addressed to broadcast addresses. SMS messages that are addressed to broadcast  
23 addresses can be sent on the Paging Channel, and these messages can also be sent to  
24 individual mobile stations on the Forward Traffic Channel.

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<sup>4</sup>The RL-CONTROL primitive is used by the Transport Layer to inform the Relay Layer that all anticipated replies from the peer Transport Layer have been received, and the Traffic Channel may therefore be released.

#### 2.4.1.2.1 Paging Channel Procedures for Broadcast SMS

A mobile station supporting broadcast SMS shall accept and process *Data Burst Messages* received on the CDMA Paging Channel (see 7.7.2.3.2.9 of TIA/EIA-95-B) addressed to any broadcast address that the mobile station is configured to receive.

Broadcast addresses are contained in the BC\_ADDR field of the broadcast address or page record. Broadcast addresses and page records for burst type '000011' are formatted as specified in 3.3.1. The mobile station may be configured to selectively receive broadcast addresses according to the following rules:

- If the PRIORITY field is set to '11', the mobile station shall receive and process the broadcast message or page; otherwise, the mobile station should receive and process the broadcast message or page if configured to receive broadcast messages and pages of the priority level given by the PRIORITY field.
- The mobile station should receive and process the broadcast message or page if the SERVICE field contains a service category that the mobile station has been configured to receive, and if the LANGUAGE field contains a language indicator that the mobile station has been configured to receive; otherwise, the mobile station may discard the broadcast message or page record.

The SMS Relay Layer shall process all *Data Burst Messages* on the Paging Channel that are addressed to a broadcast address that the mobile station is configured to receive and that have the BURST\_TYPE field set to '000011'. The SMS Relay Layer shall discard the message without further processing if any of the following is true:

- MSG\_NUMBER field is set to a value other than 1.
- NUM\_MSGS field is set to a value other than 1.
- NUM\_FIELDS field is set to zero.

Otherwise, the SMS Relay Layer shall send the Transport Layer an RL-BCDATA.Indication containing the CHARi fields of the received *Data Burst Message*.

#### 2.4.1.2.2 Traffic Channel Procedures

Since there is no address field in messages sent on the Forward Traffic Channel, broadcast SMS messages are indistinguishable from other SMS messages at the SMS Relay Layer. Mobile station processing of all SMS messages received on the Forward Traffic Channel is as defined in 2.4.1.1.2.2.<sup>5</sup>

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<sup>5</sup>The Transport Layer and the Teleservice Layer determine the broadcast nature of the message from the Transport Layer message type (*SMS Broadcast Message*).

## 2.4.2 Base Station Procedures, U<sub>m</sub> Interface

### 2.4.2.1 Point-to-point Procedures

This section defines the procedures for the processing of mobile-terminated SMS messages that are addressed to individual mobile stations, and processing of all mobile-originated SMS messages. For mobile-originated SMS messages, the Relay Layer considers all messages to be addressed to the base station. The Transport Layer in the base station is responsible for providing the N Interface address for the routing of a mobile-originated message to its final destination.

#### 2.4.2.1.1 Paging Channel Procedures

##### 2.4.2.1.1.1 Mobile SMS Message Origination

A base station supporting SMS shall accept and process *Data Burst Messages* received on the CDMA Access Channel (see 6.7.1.3.2.3 of TIA/EIA-95-B). The processing of TIA/EIA-95-B layer 2 fields shall be in accordance with TIA/EIA-95-B. TIA/EIA-95-B layer 2 acknowledgments shall be returned whether or not message errors are detected by the SMS Relay Layer.

The SMS Relay Layer shall process all *Data Burst Messages* received on the Access Channel and having the BURST\_TYPE field set to '000011'. The SMS Relay Layer shall discard the message without further processing if any of the following is true:

- MSG\_NUMBER field is set to a value other than 1.
- NUM\_MSGS field is set to a value other than 1.
- NUM\_FIELDS field is set to zero.

Otherwise, the SMS Relay Layer shall send the Transport Layer an RL-DATA.Indication containing the CHARI fields of the received *Data Burst Message* and the address of the mobile station from which the *Data Burst Message* was received. The mobile station address shall be determined from the MSID field of the *Data Burst Message*. If the AUTH\_MODE field of the *Data Burst Message* is not zero, the RL-DATA.Indication shall also contain the authentication parameter, which shall include the authentication fields of the message.

##### 2.4.2.1.1.2 Mobile SMS Message Termination

SMS messages addressed to individual mobile stations are received by the base station SMS Relay Layer as RL-DATA.Request primitives from the Transport Layer. The requirements of this section apply when an RL-DATA.Request primitive is received from the Transport Layer and the destination mobile station is not on a Traffic Channel.

When the base station Relay Layer receives an RL-DATA.Request primitive from the Transport Layer, and the addressed mobile station is not on a Traffic Channel, the Relay Layer shall determine whether the SMS message data length is such that the message can

1 be sent on the Paging Channel.<sup>6</sup> If the SMS message length is suitable, the base station  
2 may form a Paging Channel *Data Burst Message* (see 7.7.2.3.2.9 of TIA/EIA-95-B), setting  
3 BURST\_TYPE to '000011'. The base station shall set the MSG\_NUMBER and NUM\_MSGS  
4 fields to 1, and shall set the NUM\_FIELDS field to the number of characters in the SMS  
5 Transport Layer message. The mobile station address fields shall be set using the address  
6 parameter supplied by the Transport Layer in the RL-DATA.Request.

7 When an SMS message is to be transmitted on the Paging Channel, the base station shall  
8 transmit the message following the procedures specified in 7.6.2 of TIA/EIA-95-B. The  
9 base station may transmit the SMS message throughout the area where the mobile is  
10 registered. Alternatively, the base station may page the mobile station to determine its  
11 location, send the message on the Paging Channel corresponding to the Access Channel  
12 on which the mobile responds, and then send a *Release Order* to the mobile station. The  
13 latter procedure may be more efficient for messages sent to mobile stations operating in  
14 the slotted mode.

15 If the SMS message length is unsuitable for transmission on the Paging Channel because  
16 it is too long, or because of other implementation-dependent criteria,<sup>7</sup> the base station  
17 shall transmit the SMS messages on the CDMA Traffic Channel, following the procedures  
18 defined in 2.4.2.1.2.3.

19 If the RL-DATA.Request contains the confirmation request parameter, the base station  
20 should set the ACK\_REQ layer 2 field to '1'. If the message is acknowledged (see 7.6.2.1.4  
21 of TIA/EIA-95-B), the Relay Layer shall send an RL-DATA.Confirm primitive to the  
22 Transport Layer. If the ACK\_REQ field is set to '1' and the message is not acknowledged,  
23 or cannot be transmitted, the Relay Layer shall send an RL-ERROR.Indication to the  
24 Transport Layer with the error code set to the appropriate SMS\_CauseCode value as  
25 defined in the SMS\_CauseCode Table of TIA/EIA-41-D.

26 If the RL-DATA.Request does not contain the confirmation request parameter, the base  
27 station may send the *Data Burst Message* either with or without layer 2 acknowledgment.  
28 The Relay Layer should not return the RL-DATA.Confirm nor the RL-ERROR.Indication for  
29 layer 2 acknowledgment failure.

#### 30 2.4.2.1.2 Base Station Traffic Channel Procedures

##### 31 2.4.2.1.2.1 Negotiation for the SMS Service Option

32 Negotiation for the SMS Service Option is only required when no other service option is  
33 connected.

34 The SMS Service Option described by this standard shall use service option number 6 and  
35 is called Service Option 6 when using Multiplex Option 1. The SMS Service Option shall  
36 use service option number 14 and is called Service Option 14 when using Multiplex  
37 Option 2.

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<sup>6</sup>The maximum size is implementation-dependent.

<sup>7</sup>For example, the choice to use the Paging Channel or a Forward Traffic Channel when multiple SMS messages are waiting to be transmitted is implementation-dependent.

1 The base station shall negotiate for Service Option 6 using either service option  
2 negotiation (see 2.4.2.1.2.1.1) or service negotiation (see 2.4.2.1.2.1.2).

3 The base station shall negotiate for Service Option 14 using service negotiation (see  
4 2.4.2.1.2.1.2).

#### 5 2.4.2.1.2.1.1 Procedures Using Service Option Negotiation

6 The base station should wait until the action time associated with the most recently  
7 transmitted *Service Option Response Order* or *Service Option Request Order* before  
8 initializing and connecting Service Option 6.

9 When Service Option 6 is connected, the Service Option shall discard all primary traffic  
10 data bits received from the multiplex sublayer, and the base station should transmit null  
11 traffic channel data (see 7.1.3.5.2.4 of TIA/EIA-95-B).

12 The base station should disconnect Service Option 6 when it enters the *Release Substate*,  
13 when it connects any other service option as primary traffic, or when it performs a handoff  
14 to analog.

#### 15 2.4.2.1.2.1.2 Procedures Using Service Negotiation

16 The base station shall perform service negotiation for Service Option 6 or Service Option  
17 14 as described in TIA/EIA-95-B. The negotiated service configuration shall include only  
18 valid attributes for the negotiated service option consistent with those specified in Tables  
19 2.4.1.1.2.1.2-1 and 2.4.1.1.2.1.2-2.

20 If the base station establishes a service configuration, as specified in a *Service Connect*  
21 *Message*, that includes a service option connection using Service Option 6 or Service  
22 Option 14, then the service option connection shall become part of the current service  
23 configuration at the action time associated with the *Service Connect Message*. Service  
24 Option 6 or Service Option 14 is considered to be connected when the current service  
25 configuration includes a service option connection for it.

26 The base station shall not send a *Service Option Control Message* for Service Option 6 or  
27 Service Option 14.

#### 28 2.4.2.1.2.2 Mobile SMS Message Origination

29 For mobile-originated calls with no dialed digits in the *Origination Message*, the base  
30 station should complete an authentication Unique Challenge-Response Procedure (see  
31 6.3.12.1.5 of TIA/EIA-95-B) immediately after assigning the traffic channel. The Unique  
32 Challenge-Response Procedure should be completed successfully before SMS messages are  
33 sent to the mobile station and before any mobile-originated SMS messages are forwarded  
34 to the MC.

35 A base station supporting SMS shall accept and process *Data Burst Messages* received on  
36 the CDMA Reverse Traffic Channel (see 6.7.2.3.2.4 of TIA/EIA-95-B). Processing of  
37 TIA/EIA-95-B layer 2 fields shall be in accordance with TIA/EIA-95-B. If requested in the  
38 ACK\_REQ field, TIA/EIA-95-B layer 2 acknowledgments shall be returned whether or not  
39 message errors are detected by the SMS Relay Layer.

1 The SMS Relay Layer shall process all *Data Burst Messages* received on the Reverse Traffic  
2 Channel and having the BURST\_TYPE field set to '000011'. The SMS Relay Layer shall  
3 discard the message without further processing if any of the following is true:

- 4 • MSG\_NUMBER field is set to a value other than 1.
- 5 • NUM\_MSGS field is set to a value other than 1.
- 6 • NUM\_FIELDS field is set to zero.

7 Otherwise, the SMS Relay Layer shall send the Transport Layer an RL-DATA.Indication  
8 containing the CHAR<sub>i</sub> fields of the received *Data Burst Message*, the authentication  
9 parameter and the address of the mobile station that sent the message. The mobile station  
10 address shall be the address used to establish the Traffic Channel.

11 If the only connected service option is Service Option 6 or Service Option 14, the base  
12 station should release the traffic channel when no SMS messages have been received or  
13 sent during a period of time which is implementation-dependent.

#### 14 2.4.2.1.2.3 Traffic Channel Setup

15 When a base station is to send SMS data on a Traffic Channel, and the addressed mobile  
16 station is not on a Traffic Channel, the following procedures apply:

17 The mobile station address for paging shall be determined using the address parameter  
18 supplied by the Transport Layer in the RL-DATA.Request. If the mobile station cannot be  
19 paged, the Relay Layer shall send an RL-ERROR.Indication primitive to the Transport  
20 Layer with error code set to the appropriate SMS\_CauseCode value as defined in the  
21 SMS\_CauseCode Table of TIA/EIA-41-D.

22 Otherwise, the base station shall page the mobile station and establish a Traffic Channel  
23 using the procedures defined in 7.6 of TIA/EIA-95-B. The base station shall request  
24 Service Option 6 or Service Option 14. If the mobile station does not respond to paging,  
25 the Relay Layer shall send an RL-ERROR.Indication primitive to the Transport Layer with  
26 error code set to the appropriate SMS\_CauseCode value as defined in the SMS\_CauseCode  
27 Table of TIA/EIA-41-D.

28 When the base station enters the *Conversation Substate*, the base station may transmit the  
29 SMS messages in accordance with the procedures defined in 2.4.2.1.2.4.

#### 30 2.4.2.1.2.4 Mobile Station Message Termination in the *Conversation Substate*

31 SMS messages addressed to individual mobile stations are received by the base station  
32 SMS Relay Layer as RL-DATA.Request primitives from the Transport Layer. The  
33 requirements of this section shall be followed when an RL-DATA.Request primitive is  
34 received from the Transport Layer and the addressed mobile station is in the TIA/EIA-95-B  
35 *Conversation Substate* of the *Mobile Station Control on the Traffic Channel State*. The  
36 mobile station addressed shall be determined using the address parameter supplied by the  
37 Transport Layer in the RL-DATA.Request.

38 The base station shall form a *Data Burst Message* (see 7.7.3.3.2.4 of TIA/EIA-95-B), setting  
39 BURST\_TYPE to '000011' and transmit it on the Forward Traffic Channel. The base station

1 shall set the MSG\_NUMBER and NUM\_MSGS fields to 1 and shall set the NUM\_FIELDS  
2 field to the number of characters in the SMS Transport Layer message.

3 If the RL-DATA.Request contains the confirmation request parameter, the base station  
4 should set the ACK\_REQ layer 2 field to '1'. If the message is acknowledged (see 7.6.4.1.3  
5 of TIA/EIA-95-B), the Relay Layer shall send an RL-DATA.Confirm primitive to the  
6 Transport Layer. If the ACK\_REQ field is set to '1' and the base station declares  
7 acknowledgment failure (see 7.6.4.1.3.1.1 of TIA/EIA-95-B), the Relay Layer shall send an  
8 RL-ERROR.Indication to the Transport Layer with error code set to the appropriate  
9 SMS\_CauseCode value as defined in the SMS\_CauseCode Table of TIA/EIA-41-D.

10 If the RL-DATA.Request does not contain the confirmation request parameter, the base  
11 station may send the *Data Burst Message* either with or without layer 2 acknowledgment.  
12 The Relay Layer should not return the RL-DATA.Confirm nor the RL-ERROR.Indication for  
13 layer 2 acknowledgment failure.

14 If the only connected service option is Service Option 6 or Service Option 14, the base  
15 station should release the traffic channel when no SMS messages have been received or  
16 sent during a period of time which is implementation-dependent. After transmitting an  
17 SMS message, the base station should delay the traffic channel release for a period of time  
18 sufficient to allow the mobile station to return any requested acknowledgments.

#### 19 2.4.2.2 Broadcast Procedures

20 This section defines the procedures for processing of mobile-terminated SMS messages  
21 that are to be addressed to broadcast addresses. Broadcast SMS messages can be sent on  
22 the Paging Channel and these messages can also be sent to individual mobile stations on  
23 the Forward Traffic Channel.

24 SMS messages addressed to broadcast addresses are received by the base station SMS  
25 Relay Layer as RL-BCDATA.Request primitives from the Transport Layer.

26 When the base station Relay Layer receives an RL-BCDATA.Request primitive from the  
27 Transport Layer, the Relay Layer should form a *Data Burst Message* (see 7.7.2.3.2.9 of  
28 TIA/EIA-95-B). If a *Data Burst Message* is formed, the Relay Layer shall set BURST\_TYPE  
29 to '000011' and shall set the BC\_ADDR field of the *Data Burst Message* to the value of the  
30 address parameter of the RL-BCDATA.Request. The base station transmits the message on  
31 selected Paging Channels of selected CDMA channels in the selected broadcast area.  
32 Procedures for selection of broadcast areas are outside the scope of this standard.  
33 Procedures for selection of Paging Channels and CDMA channels over which the *Data*  
34 *Burst Message* is to be transmitted are outside the scope of this standard. The base  
35 station should follow the procedures defined in 7.6.2.4.1 of TIA/EIA-95-B to deliver  
36 broadcast messages to mobile stations operating in the slotted mode.

37 The base station shall set the MSG\_NUMBER and NUM\_MSGS fields to 1 and shall set the  
38 NUM\_FIELDS field to the number of octets in the SMS Transport Layer message. When  
39 broadcast SMS messages are sent on a Paging Channel, the base station shall set the  
40 ACK\_REQ layer 2 field to '0'.

41 When a broadcast SMS message is to be transmitted on the Paging Channel, the base  
42 station shall transmit the message following the procedures specified in 7.6.2 of TIA/EIA-

1 95-B, except that the base station shall not send any broadcast SMS message which is not  
2 completely contained within three consecutive Paging Channel slots.

3 When the base station Relay Layer receives an RL-BCDATA.Request primitive from the  
4 Transport Layer, the base station may also transmit the message to individual mobile  
5 stations on the Forward Traffic Channel. When sending such messages on the Forward  
6 Traffic Channel, the Relay Layer should form a *Data Burst Message* (see 7.7.2.3.2.9 of  
7 TIA/EIA-95-B) with BURST\_TYPE set to '000011' and should send the *Data Burst Message*  
8 on the Forward Traffic Channel using the procedures defined in 2.4.2.1.2.4, except that  
9 the base station should set the ACK\_REQ layer 2 field to '0'. The base station should not  
10 page a mobile station and assign it a Traffic Channel for the sole purpose of transmitting  
11 messages contained in RL-BCDATA.Request primitives.

### 12 2.4.3 Base Station Procedures, N Interface

13 When an SMS message is received from the N Interface Link Layer, and the destination  
14 address is an individual mobile station, the Relay Layer shall pass the SMS message and  
15 the destination address to the Transport Layer using the RL-DATA.Indication primitive.  
16 The Relay Layer shall determine the parameters for the RL-DATA.Indication primitive as  
17 follows:

- 18 • The Relay Layer may include the confirmation request parameter in the  
19 RL-DATA.Indication primitive.
- 20 • If the N Interface is a TIA/EIA-41-D network, the Relay Layer shall include the  
21 confirmation request parameter in the RL-DATA.Indication primitive.
- 22 • The Relay Layer shall include the destination address parameter in the  
23 RL-DATA.Indication primitive.
- 24 • If the N Interface is a TIA/EIA-41-D network, the destination address, if present,  
25 shall be as indicated in the Original Destination Address information element;  
26 otherwise, the destination address shall be indicated in the Destination Address  
27 information element.

28 When an SMS message is received from the N Interface Link Layer, and the destination  
29 address is a broadcast address, the Relay Layer shall pass the SMS message and the  
30 following parameters: Service Category, Priority Indicator, Zone Indicator, and Language  
31 Indicator to the Transport Layer using the RL-BCDATA.Indication primitive.

32 When an RL-DATA.Request is received from the Transport Layer, the Relay Layer shall use  
33 the MC destination address provided in the RL-DATA.Request to form a Link Layer  
34 message containing the SMS message and shall send the message to the MC via the Link  
35 Layer. The Relay Layer should return an RL-DATA.Confirm to the Transport Layer if the  
36 Link Layer transmission is successful and should send an RL-ERROR.Indication to the  
37 Transport Layer if the Link Layer transmission is unsuccessful. If the N Interface is a  
38 TIA/EIA-41-D network, the Relay Layer shall place the address from the Destination  
39 Address parameter of the SMS message in the Original Destination Address information  
40 element and shall place the MC address in the Destination Address information element.

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- 1 When an RL-DATA.Response is received from the Transport Layer, the Relay Layer should
- 2 use the result parameter to send a positive or negative acknowledgment of message
- 3 delivery on the N Interface Link Layer.

### 3 SMS TRANSPORT LAYER

#### 3.1 Introduction

The SMS Transport Layer resides in SMS bearer service end points and relay points (see 1.5). In a bearer service end point, the SMS Transport Layer provides the means of access to the SMS system for Teleservices that generate or receive SMS messages. In a bearer service relay point, the Transport Layer provides an interface between Relay Layers.

#### 3.2 Overview

##### 3.2.1 Model of Operation

The SMS Transport Layers use Relay Layer services to originate, forward, and terminate SMS messages sent between mobile stations and MCs. It is assumed that the Link Layers used by the Relay Layers support message addressing, so that certain address parameters can be inferred by the Relay Layer from Link Layer headers and are therefore not necessary in Transport Layer messages.

In particular, it is assumed that the *SMS Point-to-Point Message* does not require certain address parameters because the Link Layers will provide this address. On the CDMA Paging Channel, for example, it can be assumed that the Relay Layer can extract the address from the ADDRESS field of the TIA/EIA-95-B *Data Burst Message*. Requirements for the presence of address parameters are given with the message processing requirements in the following sections.

SMS Transport Layers have different functions in SMS bearer service end points and relay points, as discussed in 3.2.2.

##### 3.2.2 Transport Layer Functions

###### 3.2.2.1 Bearer Service End Points

In an SMS bearer service end point, the Transport Layer provides the following functions:

- Receiving message parameters from SMS Teleservices, formatting SMS Transport Layer messages, and passing the message to the Relay Layer using the appropriate Relay Layer service primitives.
- Informing the Relay Layer when all expected acknowledgments of submitted messages have been received.
- Informing the Teleservices when Relay Layer errors are reported.
- Receiving SMS messages from the Relay Layer and passing the messages to the SMS Teleservice.
- In mobile stations, performing authentication calculations, as described in 3.3.3.1.

###### 3.2.2.2 Bearer Service Relay Points

In an SMS bearer service relay point, the Transport Layer provides the following functions:

- 1 • Receiving SMS messages from a Relay Layer, reformatting the SMS Transport Layer  
2 messages if necessary, and passing the message to another Relay Layer using the  
3 appropriate Relay Layer service primitives.
- 4 • Passing confirmations or error reports between the Relay Layers if requested.
- 5 • In TIA/EIA-95-B base stations, performing authentication calculations, as described in  
6 3.3.3.2, or interfacing to the entities performing authentication calculations.

### 7 3.2.3 Service Description

#### 8 3.2.3.1 Teleservice Interface

9 This standard does not formally define the interface between the Transport Layer and the SMS  
10 Teleservice. This interface may be Teleservice-specific, and is to be defined by the implementers.

#### 11 3.2.3.2 Services Required from the Relay Layer

12 The Transport Layer requires the following services from the Relay Layer:

- 13 • Accepting Transport Layer messages and delivering them to the next indicated relay  
14 point or end point.
- 15 • Returning confirmations or error reports for messages sent.
- 16 • Receiving messages and forwarding them to the Transport Layer with the appropriate  
17 parameters.

## 18 3.3 Definition of Procedures

### 19 3.3.1 Relay Point Procedures, Base Station

20 In an SMS bearer service relay point, the Transport Layer serves as a connection between SMS  
21 Relay Layers. The requirements of this section apply to the Transport Layer in the base station.

22 When the base station Transport Layer receives an RL-DATA.Indication from the  $U_m$  Interface  
23 Relay Layer, and the message is an *SMS Point-to-Point Message*, it shall perform the following:

- 24 • If authentication is enabled in the serving system, the Transport Layer should perform  
25 authentication procedures as described in 3.3.3.2.
- 26 • If the message does not include the Originating Address parameter, the Transport Layer  
27 shall add the Originating Address parameter to the message. The contents of the  
28 Originating Address parameter shall be determined from the address parameter of the  
29 RL-DATA.Indication.
- 30 • If necessary, the Transport Layer shall reformat the message text for compatibility with  
31 the corresponding N Interface protocols.
- 32 • The Transport Layer shall then send an RL-DATA.Request to the N Interface Relay Layer.  
33 The address parameter of the RL-DATA.Request shall contain the address of the MC that  
34 processes SMS messages for the mobile station.
- 35 • If the *SMS Point-to-Point Message* includes the Bearer Reply Option parameter, the base  
36 station should form an *SMS Acknowledge Message*. If an error occurs, the base station

1 should include the Cause Codes parameter with the appropriate SMS\_CauseCode value  
2 as defined in the SMS\_CauseCode Table of TIA/EIA-41-D. The base station should send  
3 the *SMS Acknowledge Message* to the U<sub>m</sub> Interface Relay Layer in an RL-DATA.Request  
4 within 18 seconds. The base station may wait for confirmation from the N Interface  
5 Relay Layer before returning the *SMS Acknowledge Message*.

6 When the base station Transport Layer receives an RL-DATA.Indication from the U<sub>m</sub> Interface  
7 Relay Layer, and the message is an *SMS Acknowledge Message*, it shall perform the following:

- 8 • If authentication is enabled in the serving system, the Transport Layer should perform  
9 authentication procedures as described in 3.3.3.2.
- 10 • The Transport Layer should then send an RL-DATA.Response to the N Interface Relay  
11 Layer. The result parameter of the RL-DATA.Response shall contain the Cause Codes  
12 value from the *SMS Acknowledge Message*. The base station should use the REPLY\_SEQ  
13 field of the Cause Codes parameter from the *SMS Acknowledge Message* to identify the  
14 RL-DATA.Indication to which the RL-DATA.Response pertains.

15 When the base station Transport Layer receives an RL-DATA.Indication from the N Interface  
16 Relay Layer, the Transport Layer shall perform the following:

- 17 • The Transport Layer shall form an *SMS Point-to-Point Message*. If necessary, the  
18 Transport Layer shall reformat the message text for compatibility with this standard and  
19 TIA/EIA-95-B.
- 20 • The Transport Layer shall use the address parameter in the RL-DATA.Indication to  
21 determine the destination mobile station.
- 22 • If the N Interface is a TIA/EIA-41-D network, the Transport Layer shall include the  
23 Originating Address parameter in the *SMS Point-to-Point Message*. The Transport Layer  
24 shall set the Originating Address to the address contained in the Original Originating  
25 Address information element, if present, otherwise to the address contained in the  
26 Originating Address information element.
- 27 • If the RL-DATA.Indication from the N Interface contained the confirmation request  
28 parameter, the Transport Layer shall include the Bearer Reply Option parameter in the  
29 *SMS Point-to-Point Message*.
- 30 • The Transport Layer shall then send an RL-DATA.Request to the U<sub>m</sub> Interface Relay  
31 Layer. The RL-DATA.Request shall contain the processed message text from the  
32 RL-DATA.Indication, and the address parameter of the RL-DATA.Request shall contain  
33 the address of the destination mobile station. If the RL-DATA.Indication from the N  
34 Interface contained the confirmation request parameter, the Transport Layer shall  
35 include the confirmation request parameter in the RL-DATA.Request.
- 36 • If the Transport Layer receives an RL-ERROR.Indication from the U<sub>m</sub> Interface Relay  
37 Layer, it shall send an RL-DATA.Response to the N Interface Relay Layer with the result  
38 parameter containing a cause code indicating the reason for failure.

39 When the base station Transport Layer receives an RL-BCDATA.Indication from the N Interface  
40 Relay Layer, the Transport Layer shall perform the following:

- 1 • The Transport Layer shall form an *SMS Broadcast Message*. If necessary, the Transport  
2 Layer shall reformat the message text for compatibility with this standard and TIA/EIA-  
3 95-B.
- 4 • The Transport Layer shall include the Service Category parameter in the *SMS Broadcast*  
5 *Message* and shall set the CATEGORY field to the value of the Service Category  
6 parameter of the RL-BCDATA.Indication.
- 7 • The Transport Layer shall provide the address parameter in the RL-BCDATA.Request  
8 sent to the U<sub>m</sub> Relay Layer.

9 For the RL-BCDATA.Request the address parameter is 5 octets in length, and consists of the  
10 following fields:

| Field      | Length (bits) |
|------------|---------------|
| PRIORITY   | 2             |
| MESSAGE_ID | 6             |
| ZONE_ID    | 8             |
| SERVICE    | 16            |
| LANGUAGE   | 8             |

11  
12  
13 The base station SMS Transport Layer sets the broadcast address fields for the message  
14 according to the following rules:

- 15 • The base station may set the PRIORITY field to the value of the Priority Indicator  
16 parameter contained in the RL-BCDATA.Indication.
- 17 • The base station may use the MESSAGE\_ID field to distinguish different messages from  
18 the same broadcast service transmitted within the time period established for broadcast  
19 duplicate detection in the mobile station (see 6.6.2.1.1.3.4 of TIA/EIA-95-B).
- 20 • The base station may set the ZONE\_ID field to the value of the Zone Indicator parameter  
21 contained in the RL-BCDATA.Indication. The base station may use the ZONE\_ID field to  
22 distinguish messages from the same broadcast service transmitted in different  
23 geographic areas.
- 24 • The base station should set the SERVICE field to the value of the Service Category  
25 parameter contained in the RL-BCDATA.Indication.
- 26 • The base station should set the LANGUAGE field to the value of the Language Indicator  
27 parameter contained in the RL-BCDATA.Indication.

28 The Transport Layer shall then send the RL-BCDATA.Request to the U<sub>m</sub> Interface Relay Layer.

### 29 3.3.2 End Point Procedures, Mobile Station

30 In an SMS bearer service end point, the Transport Layer serves as a connection between the  
31 SMS Teleservice and the Relay Layer. The requirements of this section apply to the Transport  
32 Layer in the mobile station.

1 When the mobile station Transport Layer receives an RL-DATA.Indication from the Relay Layer,  
 2 and the message is not an *SMS Acknowledge Message*, the Transport Layer shall perform the  
 3 following:

- 4 • The Transport Layer shall pass the SMS message to the appropriate Teleservice  
 5 application. The Teleservice shall be determined from the Teleservice Identifier  
 6 parameter in the message.
- 7 • If the SMS message includes the Bearer Reply Option Parameter, the Transport Layer  
 8 shall form an *SMS Acknowledge Message*. If an error occurs, the Transport Layer should  
 9 include the Cause Codes parameter with the appropriate SMS\_CauseCode value as  
 10 defined in the SMS\_CauseCode Table of TIA/EIA-41-D. The Transport Layer shall set  
 11 the Destination Address parameter to the value of the Originating Address parameter of  
 12 the SMS message being acknowledged. The Transport Layer shall send the *SMS*  
 13 *Acknowledge Message* to the Relay Layer in an RL-DATA.Request within 2 seconds.  
 14 Provided that this timing requirement is met, the Transport Layer may wait for  
 15 confirmation from the Teleservice before returning the *SMS Acknowledge Message*.

16 When the mobile station Transport Layer receives an RL-DATA.Indication from the Relay Layer,  
 17 and the message is an *SMS Acknowledge Message*, the Transport Layer should inform the  
 18 Teleservice. The mobile station should use REPLY\_SEQ field of the Cause Codes parameter  
 19 from the *SMS Acknowledge Message* to identify the RL-DATA.Request to which the *SMS*  
 20 *Acknowledge Message* pertains.

21 When the mobile station SMS Transport Layer receives an RL-BCDATA.Indication from the  
 22 Relay Layer, the Transport Layer shall pass the message to the broadcast message application.

23 When a mobile station Teleservice submits a message to an SMS service, it shall supply all  
 24 message parameters to the Transport Layer. The Transport Layer shall perform the following:

- 25 • The Transport Layer shall form an *SMS Point-to-Point Message* containing the parameters  
 26 supplied by the Teleservice.
- 27 • The Transport Layer shall then send an RL-DATA.Request to the Relay Layer, including  
 28 the mobile station's address. The RL-DATA.Request may include the confirmation  
 29 request parameter. If the Teleservice included the Bearer Reply Option with the  
 30 parameters passed to the Transport Layer, the RL-DATA.Request should include the  
 31 confirmation request parameter.
- 32 • If the RL-DATA.Request includes the confirmation request parameter, the Transport  
 33 Layer should perform the following:
  - 34 - The Transport Layer may send multiple RL-DATA.Requests.
  - 35 - If the Transport Layer receives an RL-DATA.Confirm or an RL-ERROR.Indication from  
 36 the Relay Layer, the Transport Layer should record the result.
  - 37 - When a confirmation or error result has been received for all outstanding requests,  
 38 the Transport Layer should send an RL-CONTROL.Request to the Relay Layer.
- 39 • If the Transport Layer receives an RL-ERROR.Indication from the Relay Layer, the  
 40 Transport Layer should inform the Teleservice that the message submission was  
 41 unsuccessful.

1 3.3.3 Authentication Procedures

2 3.3.3.1 Mobile Station Procedures

3 If AUTH<sub>S</sub> is equal to '1' in the mobile station, then the mobile station SMS Transport Layer shall  
4 include the authentication parameter, as described below, in every RL-DATA.Request to the  
5 Relay Layer.

6 The authentication parameter shall consist of zero to six 4-bit digits, encoded according to  
7 TIA/EIA-95-B Table 6.7.1.3.2.4-4. The digits shall be generated from the Destination Address  
8 as follows:

- 9 • If the CHAR<sub>i</sub> fields (see 3.4.3.3) of the Destination Address represent decimal digits, then the  
10 Transport Layer shall include the least significant<sup>8</sup> six digits of the address in the  
11 authentication parameter. If there are fewer than six digits, then the Transport Layer shall  
12 include all of the digits in the authentication parameter with an indication of how many  
13 digits have been included.
- 14 • If the CHAR<sub>i</sub> fields (see 3.4.3.3) of the Destination Address represent a binary value, the  
15 Transport Layer shall convert the address to its decimal equivalent, including leading zeros  
16 if necessary, and shall include the least significant six digits of the result in the  
17 authentication parameter.

18 The sequence of digits in the authentication parameter shall be used to compute the  
19 authentication fields of the *Data Burst Message* in accordance with 6.3.12.1.8 of TIA/EIA-95-B.

20 3.3.3.2 Base Station Procedures

21 If authentication is enabled in the serving system, the base station SMS Transport Layer should  
22 form the authentication digits, as described in 3.3.3.1, from the message contents in each  
23 RL-DATA.Indication received from the U<sub>m</sub> Interface Relay Layer. The base station should use  
24 the sequence of digits to compute the authentication signature in accordance with 6.3.12.1.8 of  
25 TIA/EIA-95-B and should compare the computed signature with the authentication parameter  
26 of the RL-DATA.Indication, as discussed in 6.3.12.1.8 of TIA/EIA-95-B.

---

<sup>8</sup>For addresses consisting of a sequence of digits, the last digits in the sequence are considered least significant.

### 3.4 Transport Layer Messages

The SMS Transport Layer messages are summarized in Table 3.4-1.

**Table 3.4-1. SMS Transport Layer Messages**

| Message Type                   | base station -><br>mobile station | mobile station -><br>base station | SMS_MSG_TYPE |
|--------------------------------|-----------------------------------|-----------------------------------|--------------|
| SMS Point-to-Point             | X                                 | X                                 | '00000000'   |
| SMS Broadcast                  | X                                 |                                   | '00000001'   |
| SMS Acknowledge                | X                                 | X                                 | '00000010'   |
| All other values are reserved. |                                   |                                   |              |

#### 3.4.1 Message Format

All SMS Transport Layer messages shall use the following variable-length format:

| Field        | Length (bits) |
|--------------|---------------|
| SMS_MSG_TYPE | 8             |

One or more occurrences of the following parameter record:

|                |                 |
|----------------|-----------------|
| PARAMETER_ID   | 8               |
| PARAMETER_LEN  | 8               |
| Parameter Data | 8×PARAMETER_LEN |

SMS\_MSG\_TYPE - SMS message type.

See Table 3.4-1.

PARAMETER\_ID - SMS message parameter identifier.

See Table 3.4.3-1.

PARAMETER\_LEN - SMS message parameter length.

This field shall be set to the number of octets in the SMS message parameter, not including the PARAMETER\_ID and PARAMETER\_LEN fields.

Parameter Data - Parameter data fields.

See 3.4.3.

1 3.4.2 Message Definitions

2 The following sections define the contents of the SMS Transport Layer Messages. Message  
 3 parameters can be in any order within a message.

4 3.4.2.1 SMS Point-to-Point Message

5 The *SMS Point-to-Point Message* includes the following parameters:

6  
7

**Table 3.4.2.1-1. SMS Point-to-Point Message Parameters**

| Parameter  | Reference | Type          |
|--|-----------|---------------|
| Teleservice Identifier   | 3.4.3.1   | Mandatory     |
| Service Category   | 3.4.3.2   | Optional      |
| Originating Address  | 3.4.3.3   | Mandatory [1] |
| Originating Subaddress   | 3.4.3.4   | Optional [1]  |
| Destination Address  | 3.4.3.3   | Mandatory [2] |
| Destination Subaddress   | 3.4.3.4   | Optional [2]  |
| Bearer Reply Option  | 3.4.3.5   | Optional      |
| Bearer Data  | 3.4.3.7   | Optional      |
| [1] For mobile-terminated messages (not present in mobile-originated messages)<br>[2] For mobile-originated messages (not present in mobile-terminated messages) |           |               |

8 3.4.2.2 SMS Broadcast Message

9 The *SMS Broadcast Message* includes the following parameters:

10  
11

**Table 3.4.2.2-1. SMS Broadcast Message Parameters**

| Parameter        | Reference | Type      |
|------------------|-----------|-----------|
| Service Category | 3.4.3.2   | Mandatory |
| Bearer Data      | 3.4.3.7   | Optional  |

12

1 3.4.2.3 SMS Acknowledge Message

2 The *SMS Acknowledge Message* includes the following parameters:

3  
4 **Table 3.4.2.3-1. SMS Acknowledge Message Parameters**

| Parameter  | Reference | Type          |
|--|-----------|---------------|
| Destination Address  | 3.4.3.3   | Mandatory [1] |
| Destination Subaddress   | 3.4.3.4   | Optional      |
| Cause Codes  | 3.4.3.6   | Mandatory     |
| [1] For mobile-originated messages (not present in mobile-terminated messages) |           |               |

5  
6 3.4.3 Parameter Definitions

7 Table 3.4.3-1 lists the parameters used in Transport Layer messages.

8  
9 **Table 3.4.3-1. Parameter Identifiers**

| Parameter                      | PARAMETER_ID Value |
|--------------------------------|--------------------|
| Teleservice Identifier         | '00000000'         |
| Service Category               | '00000001'         |
| Originating Address            | '00000010'         |
| Originating Subaddress         | '00000011'         |
| Destination Address            | '00000100'         |
| Destination Subaddress         | '00000101'         |
| Bearer Reply Option            | '00000110'         |
| Cause Codes                    | '00000111'         |
| Bearer Data                    | '00001000'         |
| All other values are reserved. |                    |

10

1 **3.4.3.1 Teleservice Identifier**

2 The Teleservice Identifier parameter identifies which upper layer service access point is sending  
 3 or should receive this message.

4 The Teleservice Identifier parameter has the following fixed-length format:

5

| <b>Field</b>  | <b>Length (bits)</b> |
|---------------|----------------------|
| PARAMETER_ID  | 8                    |
| PARAMETER_LEN | 8                    |
| IDENTIFIER    | 16                   |

6

7       PARAMETER\_ID       -       SMS parameter identifier.

8                                       This field shall be set to '00000000'.

9       PARAMETER\_LEN     -       SMS message parameter length.

10                                   This field shall be set to '00000010'.

11       IDENTIFIER        -       Teleservice identifier.

12                                   This field shall be set to the value corresponding to the  
 13 Teleservice, as defined in the SMS\_TELESERVICE Identifier  
 14 Values Table in TIA/EIA-41-D (See Table 175 in Section  
 15 6.5.2). The Teleservices supported in this standard are  
 16 listed in Table 3.4.3.1-1.

17

18                                   **Table 3.4.3.1-1. TIA/EIA-41-D Supported Teleservices**

| <b>TIA/EIA-637-A Teleservice</b>          | <b>TIA/EIA-41 Teleservice</b> |
|---|-------------------------------|
| IS-91 Extended Protocol Enhanced Services | CMT-91                        |
| Wireless Paging Teleservice               | CPT-95                        |
| Wireless Messaging Teleservice            | CMT-95                        |
| Voice Mail Notification                   | VMN-95                        |
| Wireless Application Protocol             | WAP                           |

19

1 **3.4.3.2 Service Category**

2 The Service Category parameter identifies the type of service supported by the SMS message.

3 The Service Category parameter has the following fixed-length format:

4

| <b>Field</b>  | <b>Length (bits)</b> |
|---------------|----------------------|
| PARAMETER_ID  | 8                    |
| PARAMETER_LEN | 8                    |
| CATEGORY      | 16                   |

5

6 **PARAMETER\_ID** - SMS parameter identifier.

7 This field shall be set to '00000001'.

8 **PARAMETER\_LEN** - SMS message parameter length.

9 This field shall be set to '00000010'.

10 **CATEGORY** - Service category.

11 This field shall be set according to Table 3.4.3.2-1.

1

**Table 3.4.3.2-1 Service Categories (Part 1 of 2)**

| <b>Category</b> | <b>Description</b>                      |
|-----------------|---|
| 0x0000          | Unknown or unspecified                  |
| 0x0001          | Emergency Broadcasts                    |
| 0x0002          | Administrative                          |
| 0x0003          | Maintenance                             |
| 0x0004          | General News - Local                    |
| 0x0005          | General News - Regional                 |
| 0x0006          | General News - National                 |
| 0x0007          | General News - International            |
| 0x0008          | Business/Financial News - Local         |
| 0x0009          | Business/Financial News - Regional      |
| 0x000A          | Business/Financial News - National      |
| 0x000B          | Business/Financial News - International |
| 0x000C          | Sports News - Local                     |
| 0x000D          | Sports News - Regional                  |
| 0x000E          | Sports News - National                  |
| 0x000F          | Sports News - International             |
| 0x0010          | Entertainment News - Local              |
| 0x0011          | Entertainment News - Regional           |
| 0x0012          | Entertainment News - National           |
| 0x0013          | Entertainment News - International      |
| 0x0014          | Local Weather                           |
| 0x0015          | Area Traffic Reports                    |
| 0x0016          | Local Airport Flight Schedules          |
| 0x0017          | Restaurants                             |
| 0x0018          | Lodgings                                |
| 0x0019          | Retail Directory                        |
| 0x001A          | Advertisements                          |
| 0x001B          | Stock Quotes                            |
| 0x001C          | Employment Opportunities                |
| 0x001D          | Medical/Health/Hospitals                |

2

1

**Table 3.4.3.2-1 Service Categories (Part 2 of 2)**

| <b>Category</b>    | <b>Description</b> |
|--------------------|--------------------|
| 0x001E             | Technology News    |
| 0x001F             | Multi-category     |
| 0x0020 -<br>0xFFFF | Reserved           |

2

1 3.4.3.3 Address Parameters

2 The address parameters have the following variable-length format:

3

| Field         | Length (bits) |
|---------------|---------------|
| PARAMETER_ID  | 8             |
| PARAMETER_LEN | 8             |
| DIGIT_MODE    | 1             |
| NUMBER_MODE   | 1             |
| NUMBER_TYPE   | 0 or 3        |
| NUMBER_PLAN   | 0 or 4        |
| NUM_FIELDS    | 8             |

NUM\_FIELDS occurrences of the following field:

|                   |        |
|-------------------|--------|
| CHAR <sub>i</sub> | 4 or 8 |
|-------------------|--------|

The parameter ends with the following field:

|          |     |
|----------|-----|
| RESERVED | 0-7 |
|----------|-----|

4

5       PARAMETER\_ID       -       SMS parameter identifier.  
6  
7                               For the Originating Address parameter, this field shall be  
8                               set to '00000010'.

8                               For the Destination Address parameter, this field shall be  
9                               set to '00000100'.

10       PARAMETER\_LEN   -       SMS message parameter length.  
11  
12                               This field shall be set to the number of octets in the  
13                               parameter, not including the PARAMETER\_ID and  
14                               PARAMETER\_LEN fields.

14       DIGIT\_MODE       -       Digit mode indicator.  
15  
16                               This field indicates whether the address digits are 4-bit  
17                               DTMF codes using the Unknown numbering plan, or 8-bit  
18                               codes using a specified numbering plan.

18                               To specify an address using the binary representation of  
19                               DTMF digits, this field shall be set to '0'. To specify an  
20                               address using 8-bit characters, this field shall be set to '1'.

21       NUMBER\_MODE      -       Number mode indicator.  
22  
23                               This field indicates whether the address type is as defined  
                              in ANSI T1.607 or is a data network address.

To specify an address using the definitions in ANSI T1.607, this field shall be set to '0'. To specify an address using data network address formats, this field shall be set to '1'. With the exception of email addresses, data network addresses shall be encoded as binary numbers, with the most significant octet of the address first. Email addresses shall be encoded as 8-bit ASCII characters.

NUMBER\_TYPE - Type of number.

If the DIGIT\_MODE field is set to '1', and the NUMBER\_MODE field is set to '0', this field shall be set to the NUMBER\_TYPE value shown in TIA/EIA-95-B Table 6.7.1.3.2.4-2 corresponding to the type of the number as defined in ANSI T1.607 §4.5.9.

If the DIGIT\_MODE field is set to '1', and the NUMBER\_MODE field is set to '1', this field shall be set to the NUMBER\_TYPE value shown in Table 3.4.3.3-1.

If the DIGIT\_MODE field is set to '0', this field shall be omitted.

**Table 3.4.3.3-1. Data Network Address Number Types**

| Number Type                      | NUMBER_TYPE value |
|----------------------------------|-------------------|
| Unknown                          | '000'             |
| Internet Protocol (RFC 791)      | '001'             |
| Internet Email Address (RFC 822) | '010'             |
| All other values are reserved.   |                   |

NUMBER\_PLAN - Numbering plan.

If the DIGIT\_MODE field is set to '1' and the NUMBER\_MODE field is set to '0', this field shall be set to the NUMBER\_PLAN value shown in TIA/EIA-95-B Table 6.7.1.3.2.4-3 corresponding to the requested numbering plan. If the DIGIT\_MODE field is set to '0', or if the NUMBER\_MODE field is set to '1', this field shall be omitted.

NUM\_FIELDS - Number of digits in this parameter.

This field shall be set to the number of address digits or characters included in this parameter.

When the address parameter indicates the home Message Center for a mobile station identified in another address

1 parameter, the Message Center address digits may be  
2 omitted, in which case NUM\_FIELDS shall be set to  
3 '00000000'.

4 **CHARi** - An address digit or character.

5 This parameter shall include NUM\_FIELDS occurrences of  
6 this field.

7 If the DIGIT\_MODE field is set to '0', each occurrence of this  
8 field shall be set to the code value shown in TIA/EIA-95-B  
9 Table 6.7.1.3.2.4-4 corresponding to the address digit.

10 If the DIGIT\_MODE field is set to '1' and the  
11 NUMBER\_MODE field is set to '0', each occurrence of this  
12 field shall be set to the ASCII representation corresponding  
13 to the address digit or character, as specified in ANSI X3.4,  
14 with the most significant bit set to '0'.

15 If the DIGIT\_MODE field is set to '1', the NUMBER\_MODE  
16 field is set to '1', and the NUMBER\_TYPE field is set to '010',  
17 each occurrence of this field shall be set to an 8-bit ASCII  
18 character of the Internet email address. The CHARi fields  
19 may include more than one email address, with a comma  
20 separating each address. For example, the CHARi fields can  
21 be set to "x@y.com,a@b.com".

22 If the DIGIT\_MODE field is set to '1', the NUMBER\_MODE  
23 field is set to '1', and the NUMBER\_TYPE field is not set to  
24 '010', each occurrence of this field shall be set to the binary  
25 value of an octet of the data network address, with the most  
26 significant octet first.

27 **RESERVED** - Reserved bits.

28 This field shall contain the number of bits required to make  
29 the entire parameter an integer number of octets in length.  
30 This field shall be set to all zeros.

1 **3.4.3.4 Subaddress**

2 The Originating Subaddress identifies the subaddress of the originator of the SMS message.

3 The Destination Subaddress identifies the subaddress of the destination of the SMS message.

4 The Originating Subaddress and Destination Subaddress parameters have the following  
5 variable-length format:

| Field         | Length (bits) |
|---------------|---------------|
| PARAMETER_ID  | 8             |
| PARAMETER_LEN | 8             |
| TYPE          | 3             |
| ODD           | 1             |
| NUM_FIELDS    | 8             |

NUM\_FIELDS instances of the following field:

|                   |   |
|-------------------|---|
| CHAR <sub>i</sub> | 8 |
|-------------------|---|

The parameter ends with the following field:

|          |   |
|----------|---|
| RESERVED | 4 |
|----------|---|

- 7
- 8 **PARAMETER\_ID** - SMS parameter identifier.
- 9 For Originating Subaddress, this field shall be set to  
10 '00000011'.
- 11 For Destination Subaddress, this field shall be set to  
12 '00000101'.
- 13 **PARAMETER\_LEN** - SMS message parameter length.
- 14 This field shall be set to the number of octets in the  
15 parameter, not including the PARAMETER\_ID and  
16 PARAMETER\_LEN fields.
- 17 **TYPE** - Subaddress type.
- 18 This field shall be set to the subaddress coding type, as  
19 given in Table 3.4.3.4-1.
- 20

**Table 3.4.3.4-1. Subaddress Type Values**

| <b>TYPE</b>                    | <b>Subaddress type</b>                            |
|--------------------------------|---|
| '000'                          | NSAP (CCITT Recommendation X.213 or ISO 8348 AD2) |
| '001'                          | User-specified                                    |
| All other values are reserved. |   |

1  
2  
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28

- ODD** - Odd/even indicator.
- If the last CHAR<sub>i</sub> field contains information only in the 4 most significant bits, the ODD field shall be set to '1'. Otherwise, the ODD field shall be set to '0'.
- NUM\_FIELDS** - Number of CHAR<sub>i</sub> fields in this parameter.
- This field shall be set to the number of CHAR<sub>i</sub> fields included in this parameter.
- CHAR<sub>i</sub>** - A subaddress octet.
- The mobile station shall include NUM\_FIELDS occurrences of this field.
- When the TYPE field is set to '000', the NSAP shall be encoded in the CHAR<sub>i</sub> fields using the preferred binary encoding specified in CCITT Recommendation X.213 or ISO 8348 AD2. When the AFI is equal to 50 (encoded in BCD as 0101 0000), IA5 characters are encoded as specified in Table 11 of CCITT Recommendation T.50 or ISO 646, with the most significant bit set to '0'. When the AFI is equal to 51 (encoded in BCD as 0101 0001), ASCII characters are encoded as specified in ANSI X3.4, with the most significant bit set to '0'.
- When the TYPE field is set to '001', the subaddress encoding is according to user specifications. When interworking with a CCITT Recommendation X.25 network, BCD coding should be used.
- RESERVED** - Reserved bits.
- This field shall be set to '0000'.

1 **3.4.3.5 Bearer Reply Option**

2 The Bearer Reply Option parameter is used to request return of an *SMS Acknowledge Message*.

3 The Bearer Reply Option parameter has the following fixed-length format:

4

| <b>Field</b>  | <b>Length (bits)</b> |
|---------------|----------------------|
| PARAMETER_ID  | 8                    |
| PARAMETER_LEN | 8                    |
| REPLY_SEQ     | 6                    |
| RESERVED      | 2                    |

5

6 **PARAMETER\_ID** - SMS parameter identifier.

7 This field shall be set to '00000110'.

8 **PARAMETER\_LEN** - SMS message parameter length.

9 This field shall be set to '00000001'.

10 **REPLY\_SEQ** - Reply sequence number.

11 This field shall be set to a value identifying the SMS  
12 message for which acknowledgment is requested.

13 **RESERVED** - Reserved bits.

14 This field shall be set to '00'.

### 3.4.3.6 Cause Codes

The Cause Codes parameter is an indication whether an SMS error has occurred and if so, whether the condition is considered temporary or permanent.

The Cause Codes parameter has the following variable-length format:

| Field         | Length (bits) |
|---------------|---------------|
| PARAMETER_ID  | 8             |
| PARAMETER_LEN | 8             |
| REPLY_SEQ     | 6             |
| ERROR_CLASS   | 2             |
| CAUSE_CODE    | 0 or 8        |

- PARAMETER\_ID** - SMS parameter identifier.  
This field shall be set to '00000111'.
- PARAMETER\_LEN** - SMS message parameter length.  
This field shall be set to the number of octets in the parameter, not including the **PARAMETER\_ID** and **PARAMETER\_LEN** fields.
- REPLY\_SEQ** - Reply sequence number.  
This field shall be set to the reply sequence number in the Bearer Reply Option parameter of the message being acknowledged.
- ERROR\_CLASS** - Error report class.  
If there is no error, this field shall be set to '00'.  
If the error is caused by a temporary condition, this field shall be set to '10'. If the error is caused by a permanent condition, this field shall be set to '11'.  
The value '01' is reserved.
- CAUSE\_CODE** - Error cause identifier.  
If the **ERROR\_CLASS** field is set to '00', this field shall be omitted. Otherwise, this field shall be set to the appropriate **SMS\_CauseCode**, as defined in the **SMS\_CauseCode** Table of TIA/EIA-41-D.

1 3.4.3.7 Bearer Data

2 The Bearer Data parameter has the following variable-length format:

3

| Field         | Length (bits) |
|---------------|---------------|
| PARAMETER_ID  | 8             |
| PARAMETER_LEN | 8             |

One or more occurrences of the following subparameter record:

|                   |                |
|-------------------|----------------|
| SUBPARAMETER_ID   | 8              |
| SUBPARAM_LEN      | 8              |
| Subparameter Data | 8×SUBPARAM_LEN |

- 4
- 5       PARAMETER\_ID     -     SMS parameter identifier.
- 6                                 This field shall be set to '00001000'.
- 7       PARAMETER\_LEN   -     SMS message parameter length.
- 8                                 This field shall be set to the number of octets in the
- 9                                 parameter, not including the PARAMETER\_ID and
- 10                                PARAMETER\_LEN fields.
- 11       SUBPARAMETER\_ID -     Subparameter identifier.
- 12                                 See Table 4.5-1.
- 13       SUBPARAM\_LEN    -     Subparameter length.
- 14                                 This field shall be set to the number of octets in the
- 15                                 subparameter, not including the SUBPARAMETER\_ID and
- 16                                 SUBPARAM\_LEN fields.
- 17       Subparameter Data -     Subparameter data fields.
- 18                                 See 4.5.

1

2 No text.

3

## 4 SMS TELESERVICE LAYER

### 4.1 Introduction

The SMS Teleservice Layer resides in a Bearer Service end point (see 1.5). The Teleservice Layer supports basic SMS functions through a standard set of subparameters of the Transport Layer's Bearer Data parameter.

### 4.2 Overview

The Teleservice support defined in this standard is restricted to definition of the Teleservice messages and their contents, and definition of the minimum set of procedural requirements necessary to ensure compatibility.

The message type is indicated in the Message Identifier subparameter. Teleservice message types are summarized in Table 4.5.1-1.

### 4.3 Teleservice Procedures

#### 4.3.1 General

##### 4.3.1.1 Mobile Station Message Termination

When a mobile station receives an *SMS Deliver Message* it shall perform the following:

- If the mobile station and the teleservice supports unique message identification, then the mobile station shall perform the related procedures (see 4.3.1.6).
- If the mobile station supports the Validity Period subparameters, then the mobile station shall consider the received SMS Deliver as valid according to the Validity Period - Absolute or Validity Period - Relative subparameter.
- If an Alert on Message Delivery subparameter is included in the *SMS Deliver Message*, and the mobile station is configured to alert upon message delivery, the mobile station shall alert the user.
- If a Reply Option subparameter received in an *SMS Deliver Message* indicates that User Acknowledgment is requested the mobile station should indicate the request to the user. When the user acknowledges the message, the mobile station should send an *SMS User Acknowledgment Message* in response to the *SMS Deliver Message*.

When a mobile station sends an *SMS User Acknowledgment Message*, the Teleservice Layer shall perform the following:

- The Teleservice Layer shall supply the Destination Address parameter to the Transport Layer, and shall set the Destination Address parameter equal to the address contained in the Originating Address field of the SMS message being acknowledged.
- The MESSAGE\_ID field of the Message Identifier subparameter shall be set to the value of the MESSAGE\_ID field in the SMS message being acknowledged.

When a mobile station receives an *SMS User Acknowledgment Message* or an *SMS Delivery Acknowledgment Message*, the actions to be taken are implementation-dependent.

#### 4.3.1.2 Mobile Station Message Origination

The mobile station shall send the *SMS Submit Message* when originating a new SMS message. The mobile station shall set the MESSAGE\_ID field of the Message Identifier subparameter as described in Section 4.3.1.5.

#### 4.3.1.3 Broadcast Messaging Service

Broadcast Messaging Service Teleservice messages are sent using the *SMS Deliver Message*. Table 4.3.1.3-1 lists the subparameters used by the Broadcast Messaging Service in the *SMS Deliver Message*. The mobile station may ignore subparameters not listed in Table 4.3.1.3-1.

**Table 4.3.1.3-1. SMS Deliver Message Subparameters, Broadcast Messaging Service**

| Subparameter                | Reference | Type     |
|-----------------------------|-----------|----------|
| Message Identifier          | 4.5.1     | Optional |
| User Data                   | 4.5.2     | Optional |
| Message Center Time Stamp   | 4.5.4     | Optional |
| Validity Period - Absolute  | 4.5.5     | Optional |
| Validity Period - Relative  | 4.5.6     | Optional |
| Priority Indicator          | 4.5.9     | Optional |
| Alert on Message Delivery   | 4.5.13    | Optional |
| Language Indicator          | 4.5.14    | Optional |
| Call-Back Number            | 4.5.15    | Optional |
| Message Display Mode        | 4.5.16    | Optional |
| Multiple Encoding User Data | 4.5.17    | Optional |

If the Message Identifier subparameter is omitted, the message shall be treated as an *SMS Deliver Message*.

#### 4.3.1.4 Analog Mode SMS Services

TIA/EIA-95-B dual-mode mobile stations support limited short message delivery while operating in the analog mode. In the analog mode, mobile stations support message termination only. The Teleservices defined in this standard are supported by mobile stations in the analog mode, with the following restrictions and modifications.

##### 4.3.1.4.1 Extended Protocol SMS Services

TIA/EIA/IS-91 extended protocol enhanced services deliver mobile-terminated messages with the message type (MST) field set appropriately for each application. The mobile station shall process the contents of TIA/EIA/IS-91 extended protocol messages as Bearer

1 Data subparameters (see 4.5), using the mapping shown in Table 4.3.1.4.1-1 between MST  
 2 values and the Bearer Data subparameters. Refer to 3.7.1.1 of TIA/EIA/IS-91 for  
 3 definitions of fields of the extended protocol messages.

4  
 5 **Table 4.3.1.4.1-1. Bearer Data Subparameters for IS-91 Extended Protocol Messages**

| <b>MST</b>  | <b>Subparameters</b>   | <b>Message Fields</b>                                  |
|---|--|--|
| CLI Order   | Call-Back Number [1]<br>Alert on Message Delivery [2]  | DIGIT1 – DIGIT32<br>(Implicit)                         |
| Voice Mail  | Number of Messages [3]<br>Priority Indicator [5]<br>User Data [4]<br>Alert on Message Delivery [2] | CHAR1 – CHAR2<br>CHAR3<br>CHAR4 – CHAR14<br>(Implicit) |
| Short Message   | User Data [4]<br>Alert on Message Delivery [2]   | CHAR1 – CHAR14<br>(Implicit)                           |
| <p>[1] CHAR<sub>i</sub> fields of the Call-Back Number subparameter (see 4.5.15). DIGIT_MODE is assumed equal to '0'.</p> <p>[2] If the mobile station is configured to alert upon message delivery, the mobile station shall alert the user.</p> <p>[3] MESSAGE_CT field of the Number of Messages subparameter (see 4.5.12), but with CHAR1 and CHAR2 each containing a digit 0-9 formatted according to TIA/EIA/IS-91 Appendix B.</p> <p>[4] The indicated CHAR<sub>n</sub> fields of the TIA/EIA/IS-91 extended protocol message are the CHAR<sub>i</sub> fields of the User Data subparameter (see 4.5.2), with each character formatted according to TIA/EIA/IS-91 Appendix B. Characters are text information only.</p> <p>[5] If the Priority Indicator subparameter (see 4.5.9) is not included or if the PRIORITY field in the Priority Indicator subparameter is set to '00' (Normal) or '01' (Interactive), CHAR3 should be set to a space ('000000') which identifies the message as normal. If the PRIORITY field in the Priority Indicator subparameter is set to '10' (Urgent) or '11' (Emergency), CHAR3 should be set to an exclamation mark '!' ('000001') which identifies the message as urgent.</p> |  |  |

6

1 4.3.1.4.2 Alert With Info SMS Services

2 The TIA/EIA-95-B Alert With Info SMS message and the corresponding order confirmation  
 3 message on the analog channels replace the Transport Layer and Relay Layer services  
 4 defined in this standard. The Alert With Info SMS message carries a Teleservice message  
 5 functionally equivalent to the *SMS Deliver Message*. All Teleservices defined in this  
 6 standard may be supported by analog Alert With Info SMS messages. The INFO\_DATA  
 7 fields of the Alert With Info SMS message shall contain the SMS Teleservice message. The  
 8 first 16 bits of the SMS Teleservice message shall contain the Teleservice Identifier as  
 9 specified in Table 3.4.3.1-1 in the following format:

| Field      | Length (bits) |
|------------|---------------|
| IDENTIFIER | 16            |

11  
 12 **IDENTIFIER** - Teleservice identifier.  
 13 This field shall be set to the value corresponding to the  
 14 Teleservice, as defined in the SMS\_TELESERVICE Identifier  
 15 Values Table in TIA/EIA-41-D. The Teleservices supported in  
 16 this standard are listed in Table 3.4.3.1-1.

17 The remaining bits of the SMS Teleservice message shall contain one or more  
 18 subparameters in the following format:

| Field             | Length (bits)  |
|-------------------|----------------|
| SUBPARAMETER_ID   | 8              |
| SUBPARAM_LEN      | 8              |
| Subparameter Data | 8×SUBPARAM_LEN |

20  
 21 **SUBPARAMETER\_ID** - Subparameter identifier.  
 22 See Table 4.5-1.  
 23 **SUBPARAM\_LEN** - Subparameter length.  
 24 This field shall be set to the number of octets in the  
 25 subparameter, not including the SUBPARAMETER\_ID and  
 26 SUBPARAM\_LEN fields.  
 27 **Subparameter Data** - Subparameter data fields.  
 28 See 4.5.

29 The Message Identifier subparameter is optional in TIA/EIA-95-B analog Alert With Info  
 30 SMS messages. SMS messages carried as Alert With Info SMS messages are, by default,  
 31 *SMS Deliver Messages*. Other message types may be used in future implementations. If

1 the Message Identifier subparameter is present in an analog Alert With Info SMS message  
2 and the MESSAGE\_TYPE field is not equal to '0001' (*SMS Deliver Message*), the mobile  
3 station may ignore the message. If the Message Identifier subparameter is present in an  
4 analog Alert With Info SMS message, the mobile station should use the MESSAGE\_ID field  
5 to detect duplicate SMS Teleservice messages.

6 The Reply Option subparameter should not be included in analog Alert With Info SMS  
7 messages. If this subparameter is received by a mobile station while in analog mode, the  
8 mobile station shall ignore the subparameter.

#### 9 4.3.1.5 Setting of Message Identifier Field

10 The MESSAGE\_ID field of the Message Identifier Subparameter is a value used to identify  
11 sent SMS messages.

12 If the message is a WAP teleservice message, the mobile station shall set the MESSAGE\_ID  
13 field as specified in the WAP Arch.

14 Otherwise, the mobile station shall increment the MESSAGE\_ID field, modulo 65536, for  
15 each new message sent. Upon power-up, the mobile station should select a MESSAGE\_ID  
16 field value for the first such message sent using a procedure that minimizes the likelihood  
17 of reusing the same MESSAGE\_ID field value in consecutive *SMS Submit Messages*.<sup>9</sup>

#### 18 4.3.1.6 Unique Message Identification

19 Unique message identification enables mobile stations to identify repeated messages and  
20 to process them accordingly. Fields from the SMS message are used by the Teleservice  
21 Layer to uniquely identify a message.

22 Not all Teleservices support unique message identification. The WAP Teleservice does not  
23 support unique message identification.

24 The fields used to identify a message are:

- 25 • Message Identifier,
- 26 • Originating Address,
- 27 • Originating Subaddress, and
- 28 • Message Center Time Stamp.

29  
30 Since some of the fields are optional, the Teleservice Layer shall use as many of the fields  
31 as are present in the SMS message to determine message uniqueness. Mobile stations  
32 should discard repeated messages.

---

<sup>9</sup>An acceptable method is to select a random value in the range from 0 to 65535 for the MESSAGE\_ID field of the first SMS message submitted.

### 4.3.2 IS-91 Extended Protocol Enhanced Services

This Teleservice provides a means of delivering messages equivalent to those used in TIA/EIA/IS-91 Extended Protocol Enhanced Services. This Teleservice is a point-to-point service only, supporting only mobile-terminated messages.

For this Teleservice, SMS messages shall contain only the User Data subparameter. The MSG\_ENCODING field of the User Data subparameter shall be set to '00001'. The CHARi fields of the User Data subparameter shall contain the CHARn or DIGITn fields of the equivalent IS-91 extended protocol message (see 3.7.1.1 of TIA/EIA/IS-91), as determined by the value of the MST field of the User Data subparameter. The CHARi fields of the User Data subparameter shall be processed in the same manner as the corresponding Teleservice subparameters according to the mapping shown in Table 4.3.1.4.1-1 for the value of the MST field in the User Data subparameter.

TIA/EIA/IS-91 Short Messages should not be segmented when carried by this Teleservice. Mobile stations supporting this Teleservice are not required to concatenate messages containing STX characters.

Table 4.3.2-1 lists the subparameters used by TIA/EIA/IS-91 Extended Protocol Enhanced Services in the *SMS Deliver Message*. The mobile station may ignore subparameters not listed in Table 4.3.2-1.

**Table 4.3.2-1. SMS Deliver Message Subparameters, IS-91**

| Subparameter       | Reference | Type      |
|--------------------|-----------|-----------|
| Message Identifier | 4.5.1     | Mandatory |
| User Data          | 4.5.2     | Mandatory |

### 4.3.3 Wireless Paging Teleservice (WPT)

The Wireless Paging Teleservice (WPT) is described in 6.2 of TIA/EIA-664. This Teleservice uses the *SMS Deliver Message*, and optionally the *SMS Submit Message* and the *SMS Delivery Acknowledgment Message*. WPT does not support message cancellation. WPT is a point-to-point service only.

Table 4.3.3-1 lists the subparameters used by WPT in the *SMS Deliver Message*. The mobile station may ignore subparameters not listed in Table 4.3.3-1.

**Table 4.3.3-1. SMS Deliver Message Subparameters, WPT**

| <b>Subparameter</b>         | <b>Reference</b> | <b>Type</b> |
|-----------------------------|------------------|-------------|
| Message Identifier          | 4.5.1            | Mandatory   |
| User Data                   | 4.5.2            | Optional    |
| Message Center Time Stamp   | 4.5.4            | Optional    |
| Priority Indicator          | 4.5.9            | Optional    |
| Privacy Indicator           | 4.5.10           | Optional    |
| Reply Option                | 4.5.11           | Optional    |
| Number of Messages          | 4.5.12           | Optional    |
| Call-Back Number            | 4.5.15           | Optional    |
| Message Display Mode        | 4.5.16           | Optional    |
| Multiple Encoding User Data | 4.5.17           | Optional    |

When the mobile station receives a WPT *SMS Deliver Message* it shall perform alerting as configured by the mobile station user.

Table 4.3.3-2 lists the subparameters used by WPT in the *SMS Submit Message*. The MC may ignore subparameters not listed in Table 4.3.3-2.

**Table 4.3.3-2. SMS Submit Message Subparameters, WPT**

| <b>Subparameter</b>         | <b>Reference</b> | <b>Type</b> |
|-----------------------------|------------------|-------------|
| Message Identifier          | 4.5.1            | Mandatory   |
| User Data                   | 4.5.2            | Optional    |
| Priority Indicator          | 4.5.9            | Optional    |
| Privacy Indicator           | 4.5.10           | Optional    |
| Reply Option                | 4.5.11           | Optional    |
| Call-Back Number            | 4.5.15           | Optional    |
| Multiple Encoding User Data | 4.5.17           | Optional    |

When the MC receives a WPT *SMS Submit Message* whose destination is a mobile station, the MC should use the contents of the *SMS Submit Message* to form a WPT *SMS Deliver Message* and send it to the destination mobile station.

All subparameters of the *SMS User Acknowledgment Message*, listed in Table 4.4.4-1, may be used by WPT.

All subparameters of the *SMS Delivery Acknowledgment Message*, listed in Table 4.4.5-1, may be used by WPT. This message is originated by the MC in response to an *SMS Submit*

1 Message with the DAK\_REQ field set to '1'. The MC shall send this message to the  
 2 originating mobile station when the final destination confirms receipt of the submitted  
 3 message. If the final destination is a mobile station, the MC should send the *SMS Delivery*  
 4 *Acknowledgment Message* when informed that the destination mobile station has returned  
 5 a Transport Layer *SMS Acknowledgment Message*. If delivery is unsuccessful or an error is  
 6 reported, the MC may include the User Data subparameter containing an error message.  
 7 The Message Center Time Stamp subparameter should contain the time at which the *SMS*  
 8 *Delivery Acknowledgment Message* was sent.

#### 9 4.3.4 Wireless Messaging Teleservice (WMT)

10 The Wireless Messaging Teleservice (WMT) is described in 6.3 of TIA/EIA-664. This  
 11 Teleservice uses the *SMS Deliver Message*, and optionally the *SMS Submit Message*, the  
 12 *SMS Cancellation Message*, the *SMS User Acknowledgment Message* and the *SMS Delivery*  
 13 *Acknowledgment Message*. WMT is a point-to-point service only.

14 Table 4.3.4-1 lists the subparameters used by WMT in the *SMS Deliver Message*. The  
 15 mobile station may ignore subparameters not listed in Table 4.3.4-1.

16  
 17 **Table 4.3.4-1. SMS Deliver Message Subparameters, WMT**

| <b>Subparameter</b>         | <b>Reference</b> | <b>Type</b> |
|-----------------------------|------------------|-------------|
| Message Identifier          | 4.5.1            | Mandatory   |
| User Data                   | 4.5.2            | Optional    |
| Message Center Time Stamp   | 4.5.4            | Optional    |
| Validity Period – Absolute  | 4.5.5            | Optional    |
| Validity Period – Relative  | 4.5.6            | Optional    |
| Priority Indicator          | 4.5.9            | Optional    |
| Privacy Indicator           | 4.5.10           | Optional    |
| Reply Option                | 4.5.11           | Optional    |
| Number of Messages          | 4.5.12           | Optional    |
| Alert on Message Delivery   | 4.5.13           | Optional    |
| Language Indicator          | 4.5.14           | Optional    |
| Call-Back Number            | 4.5.15           | Optional    |
| Message Display Mode        | 4.5.16           | Optional    |
| Multiple Encoding User Data | 4.5.17           | Optional    |

18  
 19 All subparameters of the *SMS Submit Message*, listed in Table 4.4.2-1, may be used by  
 20 WMT. When the MC receives a WMT *SMS Submit Message* whose destination is a mobile  
 21 station, the MC should use the contents of the *SMS Submit Message* to form a WMT *SMS*  
 22 *Deliver Message* and send it to the destination mobile station.

1 When the MC receives an *SMS Cancellation Message* it should return an *SMS Delivery*  
2 *Acknowledgment Message* with the User Data subparameter containing a message  
3 indicating either cancellation of the submitted message or that the message has already  
4 been delivered.

5 All subparameters of the *SMS User Acknowledgment Message*, listed in Table 4.4.4-1, may  
6 be used by WMT.

7 All subparameters of the *SMS Delivery Acknowledgment Message*, listed in Table 4.4.5-1,  
8 may be used by WMT. This message is originated by the MC in response to an *SMS Submit*  
9 *Message* with the DAK\_REQ field set to '1'. The MC shall send this message to the  
10 originating mobile station when the final destination confirms receipt of the submitted  
11 message. If the final destination is a mobile station, the MC should send the *SMS Delivery*  
12 *Acknowledgment Message* when informed that the destination mobile station has returned  
13 a Transport Layer *SMS Acknowledgment Message*. If delivery is unsuccessful or an error is  
14 reported, the MC may include the User Data subparameter containing an error message.  
15 The Message Center Time Stamp subparameter should contain the time at which the *SMS*  
16 *Delivery Acknowledgment Message* was sent.

#### 17 4.3.5 Voice Mail Notification (VMN)

18 The Voice Mail Notification (VMN) Teleservice is an extension of the capability provided by  
19 the TIA/EIA/IS-91 Voice Mail Status extended protocol enhanced feature. This Teleservice  
20 uses the *SMS Deliver Message*. VMN is a point-to-point service only.

21 Table 4.3.5-1 lists the subparameters used by VMN in the *SMS Deliver Message*. The  
22 mobile station may ignore subparameters not listed in Table 4.3.5-1.

23

**Table 4.3.5-1. SMS Deliver Message Subparameters, VMN**

| <b>Subparameter</b>         | <b>Reference</b> | <b>Type</b> |
|-----------------------------|------------------|-------------|
| Message Identifier          | 4.5.1            | Mandatory   |
| User Data                   | 4.5.2            | Optional    |
| Message Center Time Stamp   | 4.5.4            | Optional    |
| Priority Indicator          | 4.5.9            | Optional    |
| Privacy Indicator           | 4.5.10           | Optional    |
| Number of Messages          | 4.5.12           | Mandatory   |
| Alert on Message Delivery   | 4.5.13           | Optional    |
| Call-Back Number            | 4.5.15           | Optional    |
| Multiple Encoding User Data | 4.5.17           | Optional    |

#### 4.3.6 Wireless Application Protocol (WAP)

The Wireless Application Protocol is described in “Wireless Application Protocol Architecture Specification” (see WAP Architecture.) This Teleservice uses the *SMS Deliver Message* and the *SMS Submit Message*. WAP is a point-to-point service only.

Table 4.3.6-1 and 4.3.6-2 list the subparameters used by WAP in the *SMS Deliver Message* and the *SMS Submit Message*. The MESSAGE\_ID field of the Message Identifier subparameter shall be set as described in the Wireless Application Protocol specification. The MSG\_ENCODING field of the User Data subparameter shall be set to ‘00000’. The mobile station and MC may ignore parameters not listed in Table 4.3.6-1 and in Table 4.3.6-2.

**Table 4.3.6-1. SMS Deliver Message Subparameters, WAP**

| <b>Subparameter</b> | <b>Reference</b> | <b>Type</b> |
|---------------------|------------------|-------------|
| Message Identifier  | 4.5.1            | Mandatory   |
| User Data           | 4.5.2            | Mandatory   |

**Table 4.3.6-2. SMS Submit Message Subparameters, WAP**

| <b>Subparameter</b> | <b>Reference</b> | <b>Type</b> |
|---------------------|------------------|-------------|
| Message Identifier  | 4.5.1            | Mandatory   |
| User Data           | 4.5.2            | Mandatory   |

Since WAP is normally used for interactive sessions, and has provisions that ensure reliable message delivery when required, the MC should not store WAP messages that cannot be delivered immediately.

## 4.4 Teleservice Message Contents

Teleservice messages are contained in the Bearer Data parameter of Transport Layer messages. The Teleservice message type is identified by the MESSAGE\_TYPE field of the Message Identifier subparameter. The following sections list the subparameters that may be included in the Bearer Data parameter for each Teleservice message type.

### 4.4.1 SMS Deliver Message

The *SMS Deliver Message* may include the following Bearer Data subparameters.

**Table 4.4.1-1. SMS Deliver Message Subparameters**

| Subparameter   | Reference | Type            |
|--|-----------|-----------------|
| Message Identifier   | 4.5.1     | Mandatory       |
| User Data  | 4.5.2     | Conditional [1] |
| Message Center Time Stamp  | 4.5.4     | Conditional [1] |
| Validity Period – Absolute   | 4.5.5     | Conditional [1] |
| Validity Period – Relative   | 4.5.6     | Conditional [1] |
| Deferred Delivery Time – Absolute  | 4.5.7     | Conditional [1] |
| Deferred Delivery Time – Relative  | 4.5.8     | Conditional [1] |
| Priority Indicator   | 4.5.9     | Conditional [1] |
| Privacy Indicator  | 4.5.10    | Conditional [1] |
| Reply Option   | 4.5.11    | Conditional [1] |
| Number of Messages   | 4.5.12    | Conditional [1] |
| Alert on Message Delivery  | 4.5.13    | Conditional [1] |
| Language Indicator   | 4.5.14    | Conditional [1] |
| Call-Back Number   | 4.5.15    | Conditional [1] |
| Message Display Mode   | 4.5.16    | Conditional [1] |
| Multiple Encoding User Data  | 4.5.17    | Conditional [1] |
| [1] Conditional means the field can be optional or mandatory depending on the teleservice (see 4.3). |           |                 |

1 4.4.2 SMS Submit Message

2 The *SMS Submit Message* may include the following Bearer Data subparameters.

3  
4 **Table 4.4.2-1. SMS Submit Message Subparameters**

| <b>Subparameter</b>  | <b>Reference</b> | <b>Type</b>     |
|--|------------------|-----------------|
| Message Identifier   | 4.5.1            | Mandatory       |
| User Data  | 4.5.2            | Conditional [1] |
| Validity Period – Absolute   | 4.5.5            | Conditional [1] |
| Validity Period – Relative   | 4.5.6            | Conditional [1] |
| Deferred Delivery Time - Absolute  | 4.5.7            | Conditional [1] |
| Deferred Delivery Time - Relative  | 4.5.8            | Conditional [1] |
| Priority Indicator   | 4.5.9            | Conditional [1] |
| Privacy Indicator  | 4.5.10           | Conditional [1] |
| Reply Option   | 4.5.11           | Conditional [1] |
| Alert on Message Delivery  | 4.5.13           | Conditional [1] |
| Language Indicator   | 4.5.14           | Conditional [1] |
| Call-Back Number   | 4.5.15           | Conditional [1] |
| Multiple Encoding User Data  | 4.5.17           | Conditional [1] |
| [1] Conditional means the field can be optional or mandatory depending on the teleservice (see 4.3). |                  |                 |

5

## 1 4.4.3 SMS Cancellation Message

2 The *SMS Cancellation Message* may include the following Bearer Data subparameter.  
3

3

4

**Table 4.4.3-1. SMS Cancellation Message Subparameters**

| <b>Subparameter</b> | <b>Reference</b> | <b>Type</b> |
|---------------------|------------------|-------------|
| Message Identifier  | 4.5.1            | Mandatory   |

5

## 1 4.4.4 SMS User Acknowledgment Message

2 The *SMS User Acknowledgment Message* may include the following Bearer Data  
3 subparameters.

4  
5 **Table 4.4.4-1. SMS User Acknowledgment Message Subparameters**

| <b>Subparameter</b>         | <b>Reference</b> | <b>Type</b> |
|-----------------------------|------------------|-------------|
| Message Identifier          | 4.5.1            | Mandatory   |
| User Data                   | 4.5.2            | Optional    |
| User Response Code          | 4.5.3            | Optional    |
| Message Center Time Stamp   | 4.5.4            | Optional    |
| Multiple Encoding User Data | 4.5.17           | Optional    |

6

## 1 4.4.5 SMS Delivery Acknowledgment Message

2 The *SMS Delivery Acknowledgment Message* may include the following Bearer Data  
3 subparameters.

4

5 **Table 4.4.5-1. SMS Delivery Acknowledgment Message Subparameters**

| <b>Subparameter</b>         | <b>Reference</b> | <b>Type</b> |
|-----------------------------|------------------|-------------|
| Message Identifier          | 4.5.1            | Mandatory   |
| User Data                   | 4.5.2            | Optional    |
| Message Center Time Stamp   | 4.5.4            | Optional    |
| Multiple Encoding User Data | 4.5.17           | Optional    |

#### 4.5 Bearer Data Subparameters

The Bearer Data parameter of the Transport Layer message contains one or more of the following Bearer Data subparameters.

**Table 4.5-1. Bearer Data Subparameter Identifiers**

| <b>Subparameter</b>               | <b>SUBPARAMETER_ID Value</b> |
|-----------------------------------|------------------------------|
| Message Identifier                | '00000000'                   |
| User Data                         | '00000001'                   |
| User Response Code                | '00000010'                   |
| Message Center Time Stamp         | '00000011'                   |
| Validity Period - Absolute        | '00000100'                   |
| Validity Period - Relative        | '00000101'                   |
| Deferred Delivery Time - Absolute | '00000110'                   |
| Deferred Delivery Time - Relative | '00000111'                   |
| Priority Indicator                | '00001000'                   |
| Privacy Indicator                 | '00001001'                   |
| Reply Option                      | '00001010'                   |
| Number of Messages                | '00001011'                   |
| Alert on Message Delivery         | '00001100'                   |
| Language Indicator                | '00001101'                   |
| Call-Back Number                  | '00001110'                   |
| Message Display Mode              | '00001111'                   |
| Multiple Encoding User Data       | '00010000'                   |
| All other values are reserved.    |                              |

#### 4.5.1 Message Identifier

The Message Identifier subparameter provides the message type and a message identification that can be used for acknowledgment. The Message Identifier subparameter has the following fixed-length format:

| Field           | Length (bits) |
|-----------------|---------------|
| SUBPARAMETER_ID | 8             |
| SUBPARAM_LEN    | 8             |
| MESSAGE_TYPE    | 4             |
| MESSAGE_ID      | 16            |
| RESERVED        | 4             |

SUBPARAMETER\_ID - Subparameter identifier.

This field shall be set to '00000000'.

SUBPARAM\_LEN - Subparameter length.

This field shall be set to '00000011'.

MESSAGE\_TYPE - Message type.

The mobile station or base station shall set this field to the value from Table 4.5.1-1 identifying the message type.

**Table 4.5.1-1. Message Types**

| MESSAGE_TYPE                   | Message Type                                     |
|--------------------------------|--|
| '0000'                         | Reserved   |
| '0001'                         | Deliver (mobile-terminated only)                 |
| '0010'                         | Submit (mobile-originated only)                  |
| '0011'                         | Cancellation (mobile-originated only)            |
| '0100'                         | Delivery Acknowledgment (mobile-terminated only) |
| '0101'                         | User Acknowledgment (either direction)           |
| All other values are reserved. |  |

MESSAGE\_ID - Message identifier.

The Teleservice end point shall set this field to the message identifier value for this message (see 4.3.1.5).

For Teleservices that do not require message identifiers this field should be set to 0x0000.



1 4.5.2 User Data

2 The User Data subparameter has the following variable-length format:

3

| Field           | Length (bits) |
|-----------------|---------------|
| SUBPARAMETER_ID | 8             |
| SUBPARAM_LEN    | 8             |
| MSG_ENCODING    | 5             |
| MESSAGE_TYPE    | 0 or 8        |
| NUM_FIELDS      | 8             |

NUM\_FIELDS occurrences of the following field:

|                   |                        |
|-------------------|------------------------|
| CHAR <sub>i</sub> | Variable - see TSB58-A |
|-------------------|------------------------|

The subparameter ends with the following field:

|          |     |
|----------|-----|
| RESERVED | 0-7 |
|----------|-----|

4

5 SUBPARAMETER\_ID - Subparameter identifier.

6 This field shall be set to '00000001'.

7 SUBPARAM\_LEN - Subparameter length.

8 This field shall be set to the number of octets in the  
9 subparameter, not including the SUBPARAMETER\_ID  
10 and SUBPARAM\_LEN fields.

11 MSG\_ENCODING - Message encoding.

12 See TSB58-A.

13 Support of an encoding method does not imply that  
14 the entire encodable character set must be supported.  
15 In general, once the supported character set is  
16 determined, various subsets of the character set can  
17 be supported. If a message is comprised entirely of  
18 characters from a supported subset of a character set,  
19 it can be displayed. If a message contains an  
20 unsupported character of a character set, it can be  
21 discarded.

22 MESSAGE\_TYPE - Message type.

23 If the MSG\_ENCODING field is set to '00001' (IS-91  
24 Extended Protocol Message), this field shall be set to  
25 the TIA/EIA/IS-91 Extended Protocol Message Type,  
26 as defined in TIA/EIA/IS-91 Table 9.

|    |            |   |   |
|----|------------|---|---|
| 1  |            |   | Otherwise, this field shall be omitted.                 |
| 2  | NUM_FIELDS | - | Number of occurrences of the CHARi field.               |
| 3  |            |   | This field shall be set to the number of characters     |
| 4  |            |   | included in this subparameter.                          |
| 5  | CHARi      | - | Character.  |
| 6  |            |   | This parameter shall include NUM_FIELDS                 |
| 7  |            |   | occurrences of this field.                              |
| 8  | RESERVED   | - | Reserved bits.  |
| 9  |            |   | This field shall contain the number of bits required to |
| 10 |            |   | make the entire subparameter an integer number of       |
| 11 |            |   | octets in length. This field shall be set to all zeros. |

### 4.5.3 User Response Code

The User Response Code subparameter is used in the *SMS User Acknowledgment Message* to respond to previously received short messages. This Message Center-specific element carries the identifier of a predefined response.

The User Response Code subparameter has the following fixed-length format:

| <b>Field</b>    | <b>Length (bits)</b> |
|-----------------|----------------------|
| SUBPARAMETER_ID | 8                    |
| SUBPARAM_LEN    | 8                    |
| RESPONSE_CODE   | 8                    |

**SUBPARAMETER\_ID** - Subparameter identifier.

This field shall be set to '00000010'.

**SUBPARAM\_LEN** - Subparameter length.

This field shall be set to '00000001'.

**RESPONSE\_CODE** - Response code.

This field shall be set to the value selected by the Teleservice. The meaning of this field is defined by the Teleservice and the SMS Message Center.

#### 4.5.4 Message Center Time Stamp

The Message Center Time Stamp subparameter may be included with SMS messages sent from a Message Center. The Message Center Time Stamp subparameter has the following fixed-length format:

| Field           | Length (bits) |
|-----------------|---------------|
| SUBPARAMETER_ID | 8             |
| SUBPARAM_LEN    | 8             |
| YEAR            | 8             |
| MONTH           | 8             |
| DAY             | 8             |
| HOURS           | 8             |
| MINUTES         | 8             |
| SECONDS         | 8             |

Note: all date and time fields contain two 4-bit BCD numbers giving the decimal value of the field. For example, if the year is 93, the YEAR field contains '10010011'.

**SUBPARAMETER\_ID**-Subparameter identifier.

This field shall be set to '00000011'.

**SUBPARAM\_LEN**- Subparameter length.

This field shall be set to '00000110'.

**YEAR** - Current year (UTC).

If the current year (UTC) is less than or equal to 1999, this field shall be set to the current year minus 1900. If the current year (UTC) is greater than or equal to 2000, this field shall be set to the current year minus 2000.<sup>10</sup>

**MONTH** - Current month (UTC).

This field shall be set to the current month (UTC), in the range 1-12.

**DAY** - Current day of month (UTC).

---

<sup>10</sup> When performing computations with the value of the field YEAR, the value should be converted to the full year in the range 1996-2095 by adding 1900 if the value is between 96 and 99 inclusive or by adding 2000 if the value is between 00 and 95 inclusive; e.g., 99 should be converted to 1999 and 00 to 2000.

|    |         |   |   |
|----|---------|---|---|
| 1  |         |   | This field shall be set to the current day of the month (UTC).  |
| 2  | HOURS   | - | Current hour (UTC).   |
| 3  |         |   | This field shall be set to the current hour (UTC), in the range |
| 4  |         |   | 0-23.   |
| 5  | MINUTES | - | Current minutes (UTC).  |
| 6  |         |   | This field shall be set to the current minutes (UTC), in the    |
| 7  |         |   | range 0-59.   |
| 8  | SECONDS | - | Current seconds (UTC).  |
| 9  |         |   | This field shall be set to the current seconds (UTC), in the    |
| 10 |         |   | range 0-59.   |

4.5.5 Validity Period - Absolute

The Validity Period - Absolute subparameter indicates to the Message Center the message expiration time, after which the message should be discarded if not delivered to the destination.

The Validity Period - Absolute subparameter has the following fixed-length format:

| Field   | Length (bits) |
|---|---------------|
| SUBPARAMETER_ID   | 8             |
| SUBPARAM_LEN  | 8             |
| YEAR  | 8             |
| MONTH   | 8             |
| DAY   | 8             |
| HOURS   | 8             |
| MINUTES   | 8             |
| SECONDS   | 8             |
| Note: all date and time fields contain two 4-bit BCD numbers giving the decimal value of the field. For example, if the year is 93, the YEAR field contains '10010011'. |               |

**SUBPARAMETER\_ID**-Subparameter identifier.

This field shall be set to '00000100'.

**SUBPARAM\_LEN**- Subparameter length.

This field shall be set to '00000110'.

**YEAR** - Current year (UTC).

If the expiration year (UTC) is less than or equal to 1999, this field shall be set to the expiration year minus 1900. If the expiration year (UTC) is greater than or equal to 2000, this field shall be set to the expiration year minus 2000.<sup>11</sup>

**MONTH** - Current month (UTC).

This field shall be set to the expiration month (UTC), in the range 1-12.

---

<sup>11</sup> When performing computations with the value of the field YEAR, the value should be converted to the full year in the range 1996-2095 by adding 1900 if the value is between 96 and 99 inclusive or by adding 2000 if the value is between 00 and 95 inclusive; e.g., 99 should be converted to 1999 and 00 to 2000.

|    |                |   |  |
|----|----------------|---|--|
| 1  | <b>DAY</b>     | - | <b>Current day of month (UTC).</b>                                     |
| 2  |                |   | <b>This field shall be set to the expiration day of the month</b>      |
| 3  |                |   | <b>(UTC).</b>  |
| 4  | <b>HOURS</b>   | - | <b>Current hour (UTC).</b>   |
| 5  |                |   | <b>This field shall be set to the expiration hour (UTC), in the</b>    |
| 6  |                |   | <b>range 0-23.</b>   |
| 7  | <b>MINUTES</b> | - | <b>Current minutes (UTC).</b>  |
| 8  |                |   | <b>This field shall be set to the expiration minutes (UTC), in the</b> |
| 9  |                |   | <b>range 0-59.</b>   |
| 10 | <b>SECONDS</b> | - | <b>Current seconds (UTC).</b>  |
| 11 |                |   | <b>This field shall be set to the expiration seconds (UTC), in the</b> |
| 12 |                |   | <b>range 0-59.</b>   |

1 4.5.6 Validity Period - Relative

2 The Validity Period - Relative subparameter indicates to the Message Center the time  
 3 period, beginning from the time the message is received by the Message Center, after  
 4 which the message should be discarded if not delivered to the destination. May also be  
 5 used to indicate the time period to retain a message sent to a mobile station.

6 The Validity Period - Relative subparameter has the following fixed-length format:

7

| <b>Field</b>    | <b>Length (bits)</b> |
|-----------------|----------------------|
| SUBPARAMETER_ID | 8                    |
| SUBPARAM_LEN    | 8                    |
| VALIDITY        | 8                    |

8

9 SUBPARAMETER\_ID-Subparameter identifier.

10 This field shall be set to '00000101'.

11 SUBPARAM\_LEN- Subparameter length.

12 This field shall be set to '00000001'.

13 VALIDITY - Validity period.

14 This field shall be set according to Table 4.5.6-1.

15

1

**Table 4.5.6-1. Coding of Relative Time Fields**

| <b>Field value<br/>(decimal)</b>  | <b>Relative Time Period</b>   | <b>Validity<br/>Period</b> | <b>Delivery<br/>Time</b> |
|---|---|----------------------------|--------------------------|
| 0 to 143  | $(\text{value} + 1) \times 5$ minutes   | X                          | X                        |
| 144 to 167  | 12 hours + $((\text{value} - 143) \times 30)$ minutes                           | X                          | X                        |
| 168 to 196  | $(\text{value} - 166)$ days   | X                          | X                        |
| 197 to 244  | $(\text{value} - 192)$ weeks  | X                          | X                        |
| 245   | Indefinite  | X                          |                          |
| 246   | Immediate [1]   | X                          |                          |
| 247   | Valid until mobile becomes inactive/<br>Deliver when mobile next becomes active | X                          | X                        |
| 248   | Valid until registration area changes,<br>discard if not registered             | X                          |                          |
| 249 to 255  | Reserved  |                            |                          |
| [1] Indicates that the message should be discarded if not immediately deliverable. If this value is present in a message received by a mobile station, the mobile station should discard the message after it has been displayed. |   |                            |                          |

4.5.7 Deferred Delivery Time - Absolute

The Deferred Delivery Time - Absolute subparameter indicates the absolute time of delivery desired by the originator.

The Deferred Delivery Time - Absolute subparameter has the following fixed-length format:

| Field   | Length (bits) |
|---|---------------|
| SUBPARAMETER_ID   | 8             |
| SUBPARAM_LEN  | 8             |
| YEAR  | 8             |
| MONTH   | 8             |
| DAY   | 8             |
| HOURS   | 8             |
| MINUTES   | 8             |
| SECONDS   | 8             |
| Note: all date and time fields contain two 4-bit BCD numbers giving the decimal value of the field. For example, if the year is 93, the YEAR field contains '10010011'. |               |

**SUBPARAMETER\_ID**-Subparameter identifier.

This field shall be set to '00000110'.

**SUBPARAM\_LEN**- Subparameter length.

This field shall be set to '00000110'.

**YEAR** - Current year (UTC).

If the expiration year (UTC) is less than or equal to 1999, this field shall be set to the expiration year minus 1900. If the expiration year (UTC) is greater than or equal to 2000, this field shall be set to the expiration year minus 2000.<sup>12</sup>

**MONTH** - Current month (UTC).

This field shall be set to the current month (UTC), in the range 1-12.

---

<sup>12</sup> When performing computations with the value of the field YEAR, the value should be converted to the full year in the range 1996-2095 by adding 1900 if the value is between 96 and 99 inclusive or by adding 2000 if the value is between 00 and 95 inclusive; e.g., 99 should be converted to 1999 and 00 to 2000.

|    |                |   |  |
|----|----------------|---|--|
| 1  | <b>DAY</b>     | - | <b>Current day of month (UTC).</b>                                     |
| 2  |                |   | <b>This field shall be set to the current day of the month (UTC).</b>  |
| 3  | <b>HOURS</b>   | - | <b>Current hour (UTC).</b>   |
| 4  |                |   | <b>This field shall be set to the current hour (UTC), in the range</b> |
| 5  |                |   | <b>0-23.</b>   |
| 6  | <b>MINUTES</b> | - | <b>Current minutes (UTC).</b>  |
| 7  |                |   | <b>This field shall be set to the current minutes (UTC), in the</b>    |
| 8  |                |   | <b>range 0-59.</b>   |
| 9  | <b>SECONDS</b> | - | <b>Current seconds (UTC).</b>  |
| 10 |                |   | <b>This field shall be set to the current seconds (UTC), in the</b>    |
| 11 |                |   | <b>range 0-59.</b>   |

1 **4.5.8 Deferred Delivery Time - Relative**

2 The Deferred Delivery Time - Relative subparameter indicates the relative time of delivery  
 3 desired by the sender. Indicates the time period, beginning from the time the message is  
 4 received by the Message Center, after which the message should be delivered.

5 The Deferred Delivery Time - Relative subparameter has the following fixed-length format:

6

| <b>Field</b>    | <b>Length (bits)</b> |
|-----------------|----------------------|
| SUBPARAMETER_ID | 8                    |
| SUBPARAM_LEN    | 8                    |
| DELIVERY_TIME   | 8                    |

7

8 **SUBPARAMETER\_ID**-Subparameter identifier.

9 This field shall be set to '00000111'.

10 **SUBPARAM\_LEN**- Subparameter length.

11 This field shall be set to '00000001'.

12 **DELIVERY\_TIME**- Deferred delivery time period.

13 This field shall be set according to Table 4.5.6-1.

1 **4.5.9 Priority Indicator**

2 The Priority Indicator subparameter indicates the priority level of the message.

3 The Priority Indicator subparameter has the following fixed-length format:

4

| <b>Field</b>    | <b>Length (bits)</b> |
|-----------------|----------------------|
| SUBPARAMETER_ID | 8                    |
| SUBPARAM_LEN    | 8                    |
| PRIORITY        | 2                    |
| RESERVED        | 6                    |

5  
6 **SUBPARAMETER\_ID**-Subparameter identifier.

7 This field shall be set to '00001000'.

8 **SUBPARAM\_LEN**- Subparameter length.

9 This field shall be set to '00000001'.

10 **PRIORITY** - Level of priority.

11 This field shall be set according to Table 4.5.9-1.

12  
13 **Table 4.5.9-1. Priority Indicator Values**

| <b>PRIORITY</b> | <b>Level of Priority</b> |
|-----------------|--------------------------|
| '00'            | Normal                   |
| '01'            | Interactive              |
| '10'            | Urgent                   |
| '11'            | Emergency                |

14  
15 **RESERVED** - Reserved bits.

16 This field shall be set to '000000'.

1 4.5.10 Privacy Indicator

2 The Privacy Indicator subparameter indicates the desired privacy level of the message.

3 The Privacy Indicator subparameter has the following fixed-length format:

4

| <b>Field</b>    | <b>Length (bits)</b> |
|-----------------|----------------------|
| SUBPARAMETER_ID | 8                    |
| SUBPARAM_LEN    | 8                    |
| PRIVACY         | 2                    |
| RESERVED        | 6                    |

5  
6 SUBPARAMETER\_ID-Subparameter identifier.

7 This field shall be set to '00001001'.

8 SUBPARAM\_LEN- Subparameter length.

9 This field shall be set to '00000001'.

10 PRIVACY - Privacy level.

11 This field shall be set according to Table 4.5.10-1.

12  
13 **Table 4.5.10-1. Privacy Indicator Values**

| <b>PRIVACY</b> | <b>Level of Privacy</b>          |
|----------------|----------------------------------|
| '00'           | Not restricted (privacy level 0) |
| '01'           | Restricted (privacy level 1)     |
| '10'           | Confidential (privacy level 2)   |
| '11'           | Secret (privacy level 3)         |

14  
15 RESERVED - Reserved bits.

16 This field shall be set to '000000'.

1 4.5.11 Reply Option

2 The Reply Option subparameter indicates whether SMS acknowledgment is requested or  
 3 not requested. This subparameter should not be included in the message with both  
 4 USER\_ACK\_REQ and DAK\_REQ set to '0'.

5 The Reply Option subparameter has the following fixed-length format:

6

| Field           | Length (bits) |
|-----------------|---------------|
| SUBPARAMETER_ID | 8             |
| SUBPARAM_LEN    | 8             |
| USER_ACK_REQ    | 1             |
| DAK_REQ         | 1             |
| RESERVED        | 6             |

7  
 8 SUBPARAMETER\_ID-Subparameter identifier.

9 This field shall be set to '00001010'.

10 SUBPARAM\_LEN- Subparameter length.

11 This field shall be set to '00000001'.

12 USER\_ACK\_REQ- Positive user (manual) acknowledgment requested.

13 When a user (manual) acknowledgment is requested as  
 14 acknowledgment of message delivery, this field shall be set to  
 15 '1'; otherwise, this field shall be set to '0'.

16 DAK\_REQ - Delivery acknowledgment request.

17 In a mobile-originated message, when delivery  
 18 acknowledgment is requested, this field shall be set to '1';  
 19 otherwise, this field shall be set to '0'.

20 This field shall be set to '0' in all mobile-terminated SMS  
 21 messages.

22 RESERVED - Reserved bits.

23 This field shall be set to '000000'.

1 **4.5.12 Number of Messages**

2 The Number of Messages element is a 0 to 99 decimal number representing the number of  
 3 messages stored at the Voice Mail System. This element is used by the Voice Mail  
 4 Notification service.

5 The Number of Messages subparameter has the following fixed-length format:

6

| <b>Field</b>    | <b>Length (bits)</b> |
|-----------------|----------------------|
| SUBPARAMETER_ID | 8                    |
| SUBPARAM_LEN    | 8                    |
| MESSAGE_CT      | 8                    |

7

8 **SUBPARAMETER\_ID**-Subparameter identifier.

9 This field shall be set to '00001011'.

10 **SUBPARAM\_LEN**- Subparameter length.

11 This field shall be set to '00000001'.

12 **MESSAGE\_CT**- Message count.

13 This field shall be set to the number of messages stored at the  
 14 Voice Mail System, in the range 0-99.

15 This field shall contain two 4-bit BCD numbers giving the  
 16 decimal value of the field. For example, if the number of  
 17 messages is 93, the MESSAGE\_CT field contains '10010011'.

1 4.5.13 Alert on Message Delivery

2 The Alert on Message Delivery subparameter indicates that alerting is requested. Such  
3 methods as vibrating or sound may be used. This option simulates pagers.

4 The Alert on Message Delivery subparameter has the following fixed-length format:

5

| Field           | Length (bits) |
|-----------------|---------------|
| SUBPARAMETER_ID | 8             |
| SUBPARAM_LEN    | 8             |
| ALERT_PRIORITY  | 2             |
| RESERVED        | 6             |

6  
7 SUBPARAMETER\_ID - Subparameter identifier.

8 This field shall be set to '00001100'.

9 SUBPARAM\_LEN - Subparameter length.

10 This field shall be set to '00000000'.

11 ALERT\_PRIORITY - The type of alerts used to distinguish different priorities of  
12 the message.

13 **Table 4.5.13-1. ALERT\_PRIORITY Values**

| ALERT_PRIORITY                                   | Function                      |
|--|-------------------------------|
| '00'   | Use Mobile default alert      |
| '01'   | Use Low-priority alert [1]    |
| '10'   | Use Medium-priority alert [1] |
| '11'   | Use High-priority alert [1]   |
| [1] This alert is defined by the mobile station. |                               |

14  
15 RESERVED - Reserved bits.

16 This field shall be set to '000000'.

1 4.5.14 Language Indicator

2 The Language Indicator subparameter indicates the language of the message so that the  
3 receiving mobile station can discard those messages that are not in the user's preferred  
4 language.

5 The Language Indicator subparameter has the following fixed-length format:

6

| <b>Field</b>    | <b>Length (bits)</b> |
|-----------------|----------------------|
| SUBPARAMETER_ID | 8                    |
| SUBPARAM_LEN    | 8                    |
| LANGUAGE        | 8                    |

7

8 SUBPARAMETER\_ID-Subparameter identifier.

9 This field shall be set to '00001101'.

10 SUBPARAM\_LEN- Subparameter length.

11 This field shall be set to '00000001'.

12 LANGUAGE - Language used for message text.

13 This field shall be set to the appropriate value as shown in  
14 TSB58-A.

#### 4.5.15 Call-Back Number

The Call-Back Number subparameter indicates the number to be dialed in reply to a received SMS message.

For teleservices such as digital paging and voice mail notification, this subparameter is typically set to the number of the originating party.

When used in the context of a Broadcast Messaging Service Teleservice, this subparameter indicates a third-party call-back number to be dialed in reply to a received *SMS Broadcast Message*.

The Call-Back Number subparameter has the following variable-length format:

| Field           | Length (bits) |
|-----------------|---------------|
| SUBPARAMETER_ID | 8             |
| SUBPARAM_LEN    | 8             |
| DIGIT_MODE      | 1             |
| NUMBER_TYPE     | 0 or 3        |
| NUMBER_PLAN     | 0 or 4        |
| NUM_FIELDS      | 8             |

NUM\_FIELDS occurrences of the following field:

|                   |        |
|-------------------|--------|
| CHAR <sub>i</sub> | 4 or 8 |
|-------------------|--------|

The subparameter ends with the following field:

|          |     |
|----------|-----|
| RESERVED | 0-7 |
|----------|-----|

**SUBPARAMETER\_ID**-Subparameter identifier.

This field shall be set to '00001110'.

**SUBPARAM\_LEN**- Subparameter length.

This field shall be set to the number of octets in the subparameter, not including the SUBPARAMETER\_ID and SUBPARAM\_LEN fields.

**DIGIT\_MODE** - Digit mode indicator.

This field indicates whether the call-back number digits are 4-bit DTMF codes using the Unknown numbering plan, or 8-bit ASCII codes using a specified numbering plan.

To specify the call-back number using the binary representation of DTMF digits, this field shall be set to '0'. To specify the call-back number using ASCII characters, this field shall be set to '1'.

|    |              |   |
|----|--------------|---|
| 1  | NUMBER_TYPE- | Type of number.   |
| 2  |              | If the DIGIT_MODE field is set to '1', this field shall be set to |
| 3  |              | the NUMBER_TYPE value shown in TIA/EIA-95-B Table                 |
| 4  |              | 6.7.1.3.2.4-2 corresponding to the type of the number as          |
| 5  |              | defined in ANSI T1.607 §4.5.9. If the DIGIT_MODE field is set     |
| 6  |              | to '0', this field shall be omitted.                              |
| 7  | NUMBER_PLAN- | Numbering plan.   |
| 8  |              | If the DIGIT_MODE field is set to '1', this field shall be set to |
| 9  |              | the NUMBER_PLAN value shown in TIA/EIA-95-B Table                 |
| 10 |              | 6.7.1.3.2.4-3 corresponding to the requested numbering plan.      |
| 11 |              | If the DIGIT_MODE field is set to '0', this field shall be        |
| 12 |              | omitted.  |
| 13 | NUM_FIELDS - | Number of call-back number digits in this subparameter.           |
| 14 |              | This field shall be set to the number of call-back number         |
| 15 |              | digits included in this subparameter.                             |
| 16 | CHARi -      | A call-back number digit or character.                            |
| 17 |              | This subparameter shall include NUM_FIELDS occurrences of         |
| 18 |              | this field. If the DIGIT_MODE field is set to '0', each           |
| 19 |              | occurrence of this field shall be set to the code value shown     |
| 20 |              | in TIA/EIA-95-B Table 6.7.1.3.2.4-4 corresponding to the          |
| 21 |              | call-back number digit. If the DIGIT_MODE field is set to '1',    |
| 22 |              | each occurrence of this field shall be set to the ASCII           |
| 23 |              | representation corresponding to the call-back number digit,       |
| 24 |              | as specified in ANSI X3.4, with the most significant bit set to   |
| 25 |              | '0'.  |
| 26 | RESERVED -   | Reserved bits.  |
| 27 |              | This field shall contain the number of bits required to make      |
| 28 |              | the entire subparameter an integer number of octets in            |
| 29 |              | length. This field shall be set to all zeros.                     |

1 4.5.16 Message Display Mode

2 The Message Display Mode subparameter is used to indicate to the mobile station when to  
 3 display the received message. The Message Display Mode subparameter has the following  
 4 fixed-length format:

5

| Field            | Length (bits) |
|------------------|---------------|
| SUBPARAMETER_ID  | 8             |
| SUBPARAM_LEN     | 8             |
| MSG_DISPLAY_MODE | 2             |
| RESERVED         | 6             |

6  
 7 SUBPARAMETER\_ID-Subparameter identifier.

8 This field shall be set to '00001111'.

9 SUBPARAM\_LEN- Subparameter length.

10 This field shall be set to '00000001'.

11 MSG\_DISPLAY

12 \_MODE- Message display mode.

13 This field shall be set according to Table 4.5.16-1.

14 **Table 4.5.16-1. Message Display Mode Indicator Values**

| MSG_DISPLAY_MODE | Function   |
|------------------|--|
| '00'             | Immediate Display: The mobile station is to display the received message as soon as possible.                                    |
| '01'             | Mobile default setting: The mobile station is to display the received message based on a pre-defined mode in the mobile station. |
| '10'             | User Invoke: The mobile station is to display the received message based on the mode selected by the user.                       |
| '11'             | Reserved   |

15  
 16 RESERVED - Reserved bits.

17 This field shall be set to '000000'.

1 4.5.17 Multiple Encoding User Data

2 The Multiple Encoding User Data subparameter has the following variable-length format:

| Field           | Length (bits) |
|-----------------|---------------|
| SUBPARAMETER_ID | 8             |
| SUBPARAM_LEN    | 8             |

3 One or more occurrences of the following encoding-specific fields

|                          |          |
|--------------------------|----------|
| Encoding-specific fields | Variable |
|--------------------------|----------|

The subparameter ends with the following field:

|          |     |
|----------|-----|
| RESERVED | 0-7 |
|----------|-----|

- 4
- 5 SUBPARAMETER\_ID - Subparameter identifier.
- 6 This field shall be set to '00010000'.
- 7 SUBPARAM\_LEN - Subparameter length.
- 8 This field shall be set to the number of octets in the
- 9 subparameter, not including the SUBPARAMETER\_ID
- 10 and SUBPARAM\_LEN fields.
- 11 Encoding-specific fields- Encoding-specific fields.
- 12 Encoding-specific fields shall include the following
- 13 sub-fields:

| Field        | Length (bits) |
|--------------|---------------|
| MSG_ENCODING | 5             |
| NUM_FIELDS   | 8             |

14 NUM\_FIELDS occurrences of the following field

|                   |                        |
|-------------------|------------------------|
| CHAR <sub>i</sub> | Variable - see TSB58-A |
|-------------------|------------------------|

- 15
- 16 MSG\_ENCODING - Message encoding.
- 17 See TSB58-A.
- 18 Support of an encoding method does not imply that
- 19 the entire encodable character set must be supported.
- 20 In general, once the supported character set is
- 21 determined, various subsets of the character set can
- 22 be supported. If a message is comprised entirely of

|    |                   |   |   |
|----|-------------------|---|---|
| 1  |                   |   | characters from a supported subset of a character set,  |
| 2  |                   |   | it can be displayed. If a message contains an           |
| 3  |                   |   | unsupported character of a character set, it can be     |
| 4  |                   |   | discarded.  |
| 5  | NUM_FIELDS        | - | Number of occurrences of the CHAR <sub>i</sub> field.   |
| 6  |                   |   | This field shall be set to the number of characters     |
| 7  |                   |   | included in this subparameter.                          |
| 8  | CHAR <sub>i</sub> | - | Character.  |
| 9  |                   |   | This parameter shall include NUM_FIELDS                 |
| 10 |                   |   | occurrences of this field.                              |
| 11 | RESERVED          | - | Reserved bits.  |
| 12 |                   |   | This field shall contain the number of bits required to |
| 13 |                   |   | make the entire subparameter an integer number of       |
| 14 |                   |   | octets in length. This field shall be set to all zeros. |
| 15 |                   |   |   |