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August 2009

3rd Generation Partnership Project 2
"3GPP2"

Interoperability Specification (IOS) for cdma2000 Access Network Interfaces — Part 4 (A1, A1p, A2, and A5 Interfaces)

(3G-IOS v5.1.1)

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1.0 Introduction

1.1 Overview

This document contains the message procedures, bitmaps, information elements, and timers used to define the A1 and A1p interfaces. In this document, "MSC" refers to either a circuit-switched MSC or a packet-based MSC emulator (MSCe). In situations where a statement applies to either the circuit-switched or packet-based MSC exclusively, the type of MSC will be specifically identified (i.e. "circuit-switched MSC" or "MSCe"). For signaling, the term MSC refers to either a circuit-switched MSC or an MSCe. For bearer path, the term MSC refers to either a circuit-switched MSC or a MGW. A1 messages are used by both the A1 and A1p interfaces except where indicated.

1.1.1 Purpose

The purpose of this document is to provide a standard for interfacing a Mobile Switching Center (MSC) with one or more Base Stations (BSs). In addition, this standard provides for interfacing a Mobile Switching Center Emulation (MSCe) and a Media Gateway (MGW) to one or more BSs. This document defines the functional capabilities, including services and features, of the specified interface. These services and features are the defining characteristics that are the basis for the overall system standard.

1.1.2 Scope

This standard provides the specification for the interface which coincides with the Reference Point "A" defined in the TR45 Network Reference Model shown in [I-4] and with Reference point 48 as defined in the Network Reference Model shown in [28]. The scope of this standard includes the following topics:

- Descriptions of the specified functional capabilities that provide wireless telecommunications services across the A1 interface as defined in the TR45 Network Reference Model;
- Descriptions of the division of responsibility of the functions provided between the BS and the MSC, without prescribing specific implementations;
- Descriptions of the A1 interface standard that support DS-41 [7] and cdma2000®[1] systems.
- Descriptions of the specified functional capabilities that provide circuit services across the packet transport based MSCe-BS (A1p) and MGW-BS (A2p) interfaces as defined in the Network Reference Model shown in [28]. It should be noted that, for a given call, the transcoder may or may not be in the MGW or BS. This protocol definition is not limited by the location or existence of the transcoder in the bearer path.

1 cdma2000® is the trademark for the technical nomenclature for certain specifications and standards of the Organizational Partners (OPs) of 3GPP2. Geographically (and as of the date of publication), cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United States.

- Descriptions of the division of responsibility of the functions provided between the BS and the MSCe and MGW without prescribing specific implementations.

1.2 References

References are either normative or informative. A normative reference is used to include another document as a mandatory part of a 3rd Generation Partnership Project 2 (3GPP2) specification. Documents that provide additional non-essential information are included in the informative references section.

1.2.1 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

[1] 3GPP2 C.S0001-E v1.0, *Introduction to cdma2000 Standards for Spread Spectrum Systems*, May 2009.

[2] 3GPP2 C.S0002-E v1.0, *Physical Layer Standard for cdma2000 Spread Spectrum Systems*, May 2009.

[3] 3GPP2 C.S0003-E v1.0, *Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems*, May 2009.

[4] 3GPP2 C.S0004-E v1.0, *Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems*, June 2009.

[5] 3GPP2 C.S0005-E v1.0, *Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems*, June 2009.

[6] 3GPP2 C.S0006-D v2.0, *Analog Signaling Standard for cdma2000 Spread Spectrum Systems*, September 2005.

[7] 3GPP2 C.S0007 v2.0, *Direct Spread Specification for Spread Spectrum Systems on ANSI-41 (DS-41) (Upper Layers Air Interface)*, June 2000.

[8] Reserved.

[9] 3GPP2 X.S0004-E v8.0, *Mobile Application Part (MAP)*, January 2009.

[10] TIA/EIA-95-B; *Mobile Station - Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems*, March 1999.

[11] 3GPP2 A.S0011-D v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 1 Overview*, August 2009.

[12] 3GPP2 A.S0012-D v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 2 Transport*, August 2009.

[13] 3GPP2 A.S0013-D v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 3 Features*, August 2009.

[14~16] Reserved.

[17] 3GPP2 A.S0017-D v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)*, August 2009.

[18] 3GPP2 A.S0019-A v2.0, *Interoperability Specification (IOS) for Broadcast Multicast Services (BCMCS)*, April 2008.

[19] TIA/EIA-553-A, *Mobile Station - Base Station Compatibility Specification*; November 1999.

[20] TIA/EIA-634-B, *M(S)C-BS Interface for Public Wireless Communications Systems*, April 1999.

[21] 3GPP2 C.S0014-D v1.0, *Enhanced Variable Rate Codec, Speech Service Options 3, 68, 70, and 73 for Wideband Spread Spectrum Digital Systems*, May 2009.

[22] 3GPP2 C.S0015-B v2.0, *Short Message Service (SMS) for Wideband Spread Spectrum Systems, Release B*, September 2005.
[23] 3GPP2 C.S0017-0-2, *Data Service Options for Spread Spectrum Systems Addendum 2*, August 2000.
[24] 3GPP2 C.S0022-A, *Position Determination Service for cdma2000 Spread Spectrum Systems*, March 2004.
[25] 3GPP2 A.S0004-B v2.0, *CDMA Tandem Free Operation*, August 2002.
[26] 3GPP2 N.S0010-0 v1.0, *Advanced Features in Wideband Spread Spectrum Systems*, January 1998.
[27] 3GPP2 X.S0001-A v1.0, *MAP Enhancements for CDMA Packet Data Service (C-PDS)*, April 2007.
[28] 3GPP2 X.S0012-0 v2.0, *Legacy MS Domain Step 1*, March 2004.
[29] 3GPP2 C.S0016-C v2.0, *Over the Air Service Provisioning of Mobile Systems in Spread Spectrum Standards*, October 2008.
[30] 3GPP2 C.S0057-C v1.0, *Band Class Specification for cdma2000 Spread Spectrum Systems*, July 2008.
[31] 3GPP2 X.S0006-0 v1.0, *MAP Support of Authentication and Key Agreement (AKA)*, October 2005.
[32] 3GPP2 C.S0076-0 V1.0, *Discontinuous Transmission (DTX) of Speech in cdma2000 System*, December 2005.
[33] T1.607, *Integrated Services Digital Network (ISDN) - Layer 3 Signaling Specification for Circuit Switched Bearer Service for Digital Subscriber Signaling Systems Number 1 (DSS1)*, August 2000, Revised 2009.
[34] T1.628, *Emergency Calling Service*, January 2001, Revised 2005.
[35] ITU-T Recommendation E.164, *The International Public Telecommunication Numbering Plan*, May 1997.
[36] ITU-T Recommendation F.69, *The International Telex Service - Service and Operational Provisions Of Telex Destination Codes and Telex Network Identification Codes*, June 1994.
[37] ITU-T Recommendation Q.931, *ISDN User-Network Interface Layer 3 Specification for Basic Call Control*, May 1998.
[38] ITU-T Recommendation X.121, *International Numbering Plan for Public Data Networks*, October 1996.
[39] ETSI TS 125.413 V3.3.0, *Technical Specification Universal Mobile Telecommunications System (UMTS); UTRAN Iu Interface RANAP Signalling*, November 2000. Refer also to 3GPP TS 25.413 V3.3.0.
[40] IETF, *RFC 2658 – RTP Payload Format for PureVoice ™ Audio*, www.ietf.org, August 1999.
[41] IETF, *RFC 2833 – RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals*, www.ietf.org, May 2000.
[42] IETF, *RFC 3232- Assigned Numbers: RFC 1700 is replaced by an On-line Database*, www.ietf.org, January 2002.
[43] IETF, *RFC 3551 – RTP Profile for Audio and Video Conferences with Minimal Control*, www.ietf.org, July 2003.
[44] IETF, *RFC 3558 – RTP Payload Format for Enhanced Variable Rate Codecs (EVRC) and Selectable Mode Vocoders (SMV)*, www.ietf.org, July 2003.
[45] IETF, *RFC 4788 – Enhancements to RTP Payload Formats for EVRC Family Codecs, www.ietf.org*, January 2007.
[46] RFC 5188, *RTP Payload Format for the Enhanced Variable Rate Wideband Codec (EVRC-WB) and the Media Subtype Updates for EVRC-B Codec*, February 2008.
[47] *draft-zfang-avt-rtp-evrc-nw*, July 2009.

Editor’s Note: The above document is a work in progress and should not be referenced unless and until it is approved and published. Until such time as this

Editor's Note is removed, the inclusion of the above document is for informational purposes only

1.2.2 Informative References

[I-1] 3GPP2 A.S0008-C v2.0, *Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network*, January 2009.

[I-2] 3GPP2 A.S0009-C v2.0, *Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Packet Control Function*, January 2009.

[I-3] 3GPP2 C.R1001-G v1.0, *Administration of Parameter Value Assignments for cdma2000 Spread Spectrum Standards*, Release D, June 2009.

[I-4] 3GPP2 S.R0005-B v2.0, *Network Reference Model for cdma2000 Spread Spectrum Systems*, May 2007.

1.3 Terminology

1.3.1 Acronyms

Acronym	Meaning
2G	Second Generation
3GPP2	Third Generation Partnership Project 2
AC	Authentication Center
ADDS	Application Data Delivery Service
AKA	Authentication and Key Agreement
AMPS	Advanced Mobile Phone System
ANID	Access Network Identifiers
ANSI	American National Standards Institute
ARFCN	Absolute Radio Frequency Channel Number
ASCII	American Standard Code for Information Interchange
AUTHBS	Authentication
AUTHR	Authentication Response
AUTHU	Unique Challenge Authentication Response
BCD	Binary Coded Decimal
BCMCS	Broadcast Multicast Services
BS	Base Station
BSAP	Base Station Application Part
BSMAP	Base Station Management Application Part
CANID	Current Access Network Identifier
CI	Cell Identity

Acronym	**Meaning**
CIC	Circuit Identity Code
CCPD	Common Channel Packet Data
CDG	CDMA Development Group
CDMA	Code Division Multiple Access
CIE	Content of Information Element
CM	Connection Management
COUNT	Call History Count
DCCH	Dedicated Control Channel
DLCI	Data Link Connection Identifier
DS	Direct Spread
DS-41	Direct Spread (ANSI)-41
DTAP	Direct Transfer Application Part
DTX	Discontinuous Transmission
EIA	Electronics Industry Association
ERAM	Enhanced Rate Adaptation Mode
ESN	Electronic Serial Number
ETSI	European Telecommunications Standards Institute
EVRC	Enhanced Variable Rate Codec
EVRC-NW	Enhanced Variable Rate Codec Narrowband-Wideband
FCH	Fundamental Channel
FPC	Forward Power Control
HLR	Home Location Register
HRPD	High Rate Packet Data
IANA	Internet Assigned Number Authority
IE	Information Element
IEI	Information Element Identifier
IMSI	International Mobile Subscriber Identity
IMSI_M	MIN based IMSI
IMSI_T	True IMSI
IMT	International Mobile Telecommunications
IOS	Interoperability Specification
IP	Internet Protocol
IS	Interim Standard
ISDN	Integrated Services Digital Network
ITU	International Telecommunications Union
IWF	Interworking Function
JTACS	Japanese Total Access Communications
kbps	kilobits per second
LAC	Location Area Code
LCM	Long Code Mask

Acronym	Meaning
LI	Length Indicator
LPM	logical to physical mapping
LSB	Least Significant Bit
MC-41	Multi-Carrier (ANSI)-41
MCC	Mobile Country Code
MEID	Mobile Equipment Identifier
MGW	Media Gateway
MIN	Mobile Identification Number
MIP	Mobile Internet Protocol
MNC	Mobile Network Code
MPC	Mobile Positioning Center
MS	Mobile Station
MSB	Most Significant Bit
MSC	Mobile Switching Center
MSCcs	Circuit-Switched Mobile Switching Center
MSCe	Mobile Switching Center Emulation
MSCID	Mobile Station Connection Identifier
MUX	Multiplexer
N-AMPS	Narrow band AMPS
NDSS	Network Directed System Selection
NID	Network ID
NMT	Nordic Mobile Telephone
OAM&P	Operations, Administration, Maintenance, and Provisioning
OTA	Over-the-Air
OTAPA	Over-the-Air Parameter Administration
OTASP	Over-the-Air Service Provisioning
OTD	Orthogonal Transmit Diversity
PACA	Priority Access and Channel Assignment
PANID	Previous Access Network Identifier
PBX	Private Branch Exchange
PCF	Packet Control Function
PCS	Personal Communications System
PCM	Pulse Code Modulation
PCMA	Pulse Code Modulation, A-law
PCMU	Pulse Code Modulation, Mu-law
PDCH	Packet Data Channel
PDE	Position Determining Equipment
PDS	Position Determination Services
PDSN	Packet Data Serving Node
PLCM	Public Long Code Mask

Acronym	Meaning
PLMN	Public Land Mobile Network
P-P	PDSN-PDSN
PSI	PACA Supported Indicator
PSMM	Pilot Strength Measurement Message
PZID	Packet Zone ID
QOF	Quasi-Orthogonal Function
QoS	Quality of Service
QPCH	Quick Paging Channel
RAND	Random Variable
RANDBS	Random Variable – BS Challenge
RANDC	Random Confirmation
RANDSSD	Random SSD
RANDU	Random Variable - Unique Challenge
RC	Radio Configuration, Radio Class
RF	Radio Frequency
RNC	Radio Network Controller (DS-41)
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
SCCP	Signaling Connection Control Part
SCM	Station Class Mark
SDB	Short Data Burst
SDU	Selection/Distribution Unit
SID	System Identification
SME	Signaling Message Encryption
SMS	Short Message Service
SMS-MO	SMS Mobile Originated
SMV	Selectable Mode Vocoder
SOCI	Service Option Connection Identifier
SR_ID	Service Reference Identifier
SRNC-ID	Source Radio Network Controller Identifier
S-RNTI	Source Radio Access Network Temporary Identifier
SSD	Shared Secret Data
TACS	Total Access Communications
TCH	traffic channel
TDSO	Test Data Service Option
TFO	Tandem Free Operation
TIA	Telecommunications Industry Association
TMSI	Temporary Mobile Station Identity
TSB	Telecommunications Systems Bulletin
UDP	User Datagram Protocol

Acronym	Meaning
UZID	User Zone ID
VLR	Visitor Location Register
VP	Voice Privacy
XC	Transcoder

1.3.2 Definitions

Refer to [11] for definitions.

1.4 Message Body, Coding, and Ordering of Elements

For each A1 or A1p interface message there are a number of information elements that are individually defined in section 4.2. Each information element in a given message is tagged with a reference in section 4.2, a direction indication (i.e., some elements within a message are bi-directional and others are not), and a mandatory/optional type (M/O) indicator. Information elements that are marked as optional carry an additional indication of being either required (R) or conditional (C). Some information elements are reused in multiple messages.

The DIRECTION indication associated with each message element pertains to the use of that particular message element when used with the particular message (i.e., use of the message element may be different in other messages). The format of the DIRECTION indication is as follows:

Table 1.4-1 Element Flow DIRECTION Indication

BS -> MSC	Element flows from the BS to the MSC
MSC -> BS	Element flows from the MSC to the BS
BS <-> MSC	Element flows both ways to/from the MSC and the BS
BS -> MSCcs	Element flows from the BS to the MSCcs
MSCcs -> BS	Element flows from the MSCcs to the BS
BS <-> MSCcs	Element flows both ways to/from the MSCcs and the BS
BS -> MSCe	Element flows from the BS to the MSCe
MSCe -> BS	Element flows from the MSCe to the BS
BS <-> MSCe	Element flows both ways to/from the MSCe and the BS

The inclusion of information elements in each message is specified as follows:

M information elements which are mandatory for the message.

O information elements which are optional for the message.

R Required in the message whenever the message is sent.

C Conditionally required. The conditions for inclusion of this element are defined in the operation(s) where the message is used (refer to [13]) and in footnotes associated with the table defining the order of information elements in the message.

Information elements which are mandatory for a given message shall be present, and appear in the order shown in the message definitions in this chapter. Mandatory and Optional/Required IEs differ predominantly in error processing, refer to section 1.6.

Information elements which are optional for a given message are included as needed for specific conditions. When included, they shall appear in the order shown in the message definition given in this chapter.

An information element can be mandatory for some messages and optional for other messages.

The bitmap tables in the message subsections of 3.0 are patterned after the format for the information elements of section 4.2 and use the following conventions:

⇒ **Element Name{<# instances>:**	
	= Name of information element.
	Different elements within a message are separated by double lines.
	Fields within elements are separated by single lines.
	Octets are renumbered at the beginning of every element.
[<values>]	= Set of allowed values.
} Element Name	The number of instances of an element is 1 by default. If the **Element Name{<# instances … }Element Name** notation is used, the <**# instances>** notation indicates: n = exactly n occurrences of the element n+ = n or more occurrences of the element 1..n = 1 to n inclusive occurrences of the element
label {<# instances>:	
<octet 1>	
<octet m>	
} label	= Number of instances of the bracketed set of fields where <**# instances>** notation indicates: n = exactly n occurrences of the field n+ = n or more occurrences of the field 1..n = 1 to n inclusive occurrences of the field
ssss ssss	
…	= Variable length field.
ssss ssss	

1.5 Forward Compatibility Guidelines

This standard is intended to evolve to accommodate new features and capabilities. To ensure that equipment implemented to one revision level interoperates with equipment implemented to later revision levels the following guidelines are defined for the processing of messages and for the development of messages in future revisions of this standard.

Unexpected signaling information may be received at an entity due to differing levels of signaling protocol at different entities within a network: an entity using a more enhanced version of the protocol may send (unless overridden by section 1.8) information to an entity implemented at a lower level of the protocol which is outside the protocol definition supported at that receiving entity.

It may happen that an entity receives unrecognized signaling information, i.e., messages, element types or element values. This can typically be caused by the upgrading of the protocol version used by other entities in the network. In these cases the following message processing guidelines are invoked (unless overridden by section 1.8) to ensure predictable network behavior.

If the receiving entity is implemented to IOS v4.0 or a later version of that standard, then the sending entity shall send messages that are correctly formatted for the version of the IOS declared to be implemented by the sending entity, unless overridden by section 1.8.

If the receiving entity is implemented to a CDG IOS version less than 3.1.0, then if the sending entity is at an equal or greater version than the receiver, the sending entity shall format messages according to the version of the protocol implemented at the receiving entity.

For example, a CDG IOS version 3.1.0 entity by using the following guidelines (unless overridden by section 1.8) may be capable of ignoring additional new elements or fields within elements sent by an entity implemented to an IOS version higher than 3.1.0.

1.6 Message Processing Guidelines

The following message processing guidelines apply unless overridden by explicit processing directions in other places within this standard.

In the guidelines in this section, "optional" includes both "optional – conditional" and "optional – required" information elements as indicated in the Type column of the individual message Information Element (IE) tables in section 3.0.

1. If a message is received containing a Message Type value which is not defined for the revision level implemented then the message shall be discarded and ignored. There shall be no change in state or in timers due to receipt of an unknown message.
2. If a message is received without an expected mandatory information element for the revision level implemented then the message shall be discarded and ignored. There shall be no change in state or in timers due to receipt of the message.
3. If a message is received that contains an information element which is defined for the revision level implemented but contains invalid values in some fields, these fields shall be ignored and the remainder of the information element processed to the extent possible. The message and all other information elements shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue. Also refer to message processing guidelines 9 and 10.
4. If a message is received that contains an IE Identifier which is not defined for the revision level implemented then that element shall be discarded and ignored. The message shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.
5. If a known but unexpected optional IE is received, that IE shall be ignored. The message and all other IEs shall be processed.
6. If a message is received without an expected optional IE the message shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.

7. If a field within a received IE contains a value that is specified as "reserved" or is otherwise not defined in the revision level implemented this field shall be ignored and the remainder of the IE processed to the extent possible. In this situation all other IEs in the message shall be processed to the extent possible.
8. Octets and bits designated as "Reserved" or which are undefined for the revision implemented shall be set to zero by a sending entity and ignored by a receiving entity.
9. If an element is received containing a field that is larger than expected, i.e., is indicated as having more bits/octets than expected, then the expected bits/octets of that field shall be processed to the extent possible and the additional bits/octets shall be ignored.
10. If an element is received containing a field that is smaller than expected, i.e., is indicated as having fewer bits/octets than expected, then the length field or other indicator shall be considered correct and the bits/octets actually present in the element shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.

1.7 Message Definition Guidelines

1. New messages shall have a Message Type that has never been previously used.
2. IE Identifiers may be reused in future revisions only when:
   - The old use of the element identifier is not used in the new revision, and
   - The new use of the element identifier is used only in new messages which were not defined in previous revisions.
   - The old use of the element identifier shall be supported within the context of the old messages in which it was used.
3. Defined valid values of IEs may be changed in future revisions. The new version shall define the error handling when previously valid values are received.
4. Octets and bits which are undefined or which are defined as reserved may be used in future revisions.
5. The Mandatory/Optional designation of IEs within a message shall not change.
6. Mandatory IEs shall be sent in the order specified in section 4.0.
7. New optional IEs in a message shall be defined after all previously defined optional IEs.
8. All new IEs shall be defined with a length field. Note that most existing Information Elements have 1 octet length fields but some existing Information Elements have 2 octet length fields. Information Element Identifier values in the range C0H-DFH inclusive shall be defined to have a 2 octet length field. All other new Information Element Identifier values shall be defined to have a 1 octet length field.
9. New information may be added to the end of an existing IE, provided that the IE is defined with a length field.

1.8 Message Sending Guidelines

This section applies only if the MSC, the BS or both entities are operating at a protocol that is less than IOS v5.1. For supporting backward compatibility on the A1 interface:

When an MSC and a BS communicate on the A1 interface, no IE shall be sent which is larger or smaller in length, or have values other than expected as per the protocol version of the node running on the lower protocol version. If an IE is sent in a manner that violates the above principle, or if an unexpected or unknown IE is sent in the middle of a message, or if an IE that was required to be sent for successful message processing as per the protocol revision of the node running at the lower version is not sent, then failure handling may be invoked by the receiving node. If the receiving node determines that failure handling does not need to be applied, then processing may continue with the receiving entity generating any OAM&P logs as required.

Any new IEs may be sent to the node running the lower protocol version if the position of those IEs is beyond the end of the IEs expected by the lower protocol revision. IEs that were defined at the lower protocol revision but identified as not included and that become used at the higher protocol revision and appear before the end of the IEs expected by the lower protocol revision shall not be sent to the node running the lower protocol revision.

If both the nodes are running the same protocol version then the above rules still apply.

1.9 MSC – BS Functional Partitioning

The functions provided by the network elements on either side of the A1 or A1p interface define the functions that the A1 or A1p interface supports. Figure 1.9-1 depicts a model of the A1 or A1p interface functional planes. The four functional planes embody all of the functions that the A1 or A1p interfaces support.

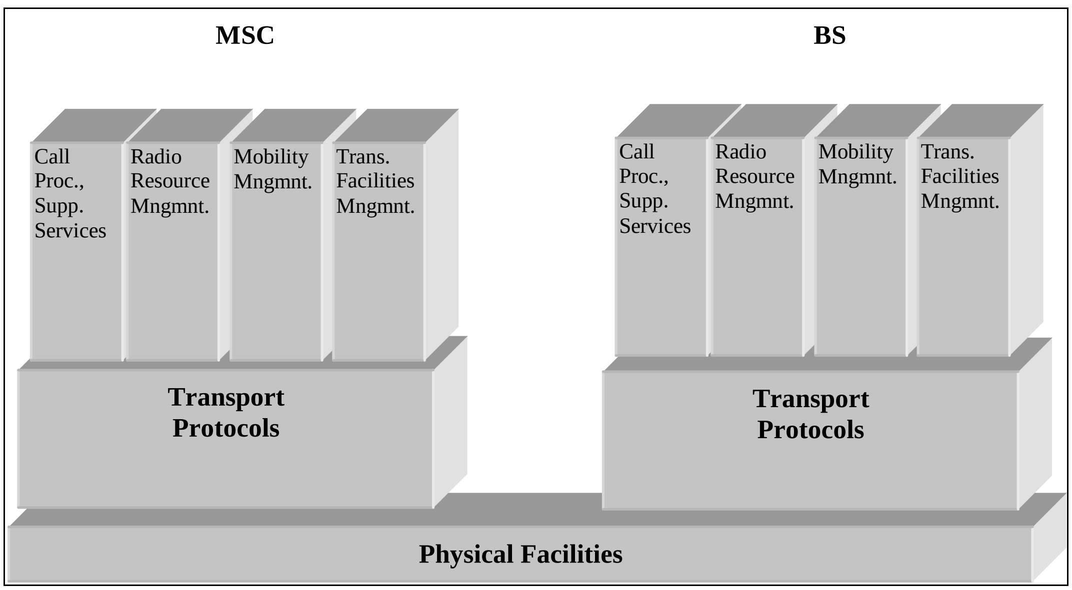

Figure 1.9-1 MSC-BS Interface Functional Planes

- The Call Processing plane manages call control and telecommunications services for the subscribers.
- The Radio Resource Management plane manages stable links between the MSs and the MSC and supports the movement of subscribers during calls (i.e., handoff control).
- The Mobility Management plane manages subscriber databases and subscriber location data.
- The Transmission Facilities Management plane is the basis for the A1 or A1p interface telecommunications services. It manages the transmission means for the

communication needs of the subscribers as well as the required information transfer between the BS and MSC.

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2.0 Message Procedures

2.1 Call Processing Message Procedures

2.1.1 Complete Layer 3 Information

The Complete Layer 3 Information message is a BSMAP message that contains the CM Service Request message, the Paging Response message, or the Location Updating Request message.

2.1.1.1 Successful Operation

Refer to section 2.1.2.1, Successful Operation, when this message is used in conjunction with the CM Service Request message. Refer to section 2.1.5.1 when this message is used in conjunction with the Paging Response message. Refer to section 2.3.7.1 when this message is used in conjunction with the Location Updating Request message.

2.1.1.2 Failure Operation

Refer to section 2.1.2.2, Failure Operation, when this message is used in conjunction with the CM Service Request message. Refer to section 2.1.5.2 when this message is used in conjunction with the Paging Response message. Refer to section 2.3.7.2 when this message is used in conjunction with the Location Updating Request message.

2.1.2 Connection Management (CM) Service Request

When the MS's originating access attempt is received by the BS, the BS constructs the CM Service Request DTAP message, places it in the Complete Layer 3 Information message, and sends the message to the MSC.

2.1.2.1 Successful Operation

In a mobile origination scenario, the BS transfers a CM Service Request message to the MSC in a Complete Layer 3 Information message. The BS starts timer T_{303}. The CM Service Request message and the subsequent MSC response are used for connection establishment.

If the Origination Message sent from the MS to the BS indicates that it is to be followed by an Origination Continuation Message, the BS shall include an Origination Continuation Indicator in the CM Service Request message. If the MSC receives a CM Service Request message where the Origination Continuation Indicator is present, it shall start timer T_{312} to wait for a CM Service Request Continuation message.

In the Access Probe Handoff scenario, the source BS (the BS on which the first access probe was sent), upon receiving an origination request for the same MS and the same call forwarded via an A7 connection from another BS, may choose to send a second CM Service Request to the MSC. In other scenarios (e.g. Silent Reorigination), the BS may receive multiple Originations from the same MS, and may choose to send a second CM Service Request message to the MSC. The MSC shall be able to handle a CM Service Request for an MS that is already engaged in an origination attempt by sending a Clear Command message to the BS containing a cause value of “Do not notify MS”. The MSC shall send this message on the underlying signaling connection associated with the second CM Service Request. The BS shall be able to handle Clear Command messages from the MSC for these duplicated CM Service Request messages.

The base station may select an available channel based on the MS’s capabilities, and assign the MS to that channel at any time following the receipt of the MS’s originating access.

2.1.2.2 Failure Operation

If the BS fails to receive an Assignment Request message, PACA Command message (e.g., if the call is eligible for PACA service), Service Redirection message, or Clear Command message in response to the CM Service Request message prior to expiration of timer T_{303}, then it may send a Reorder or Release message to the MS, and shall initiate call clearing by sending a Clear Request message to the MSC with the cause value set to “Timer expired” if an underlying transport connection exists.

If the MSC has started timer T_{312}, but fails to receive a CM Service Request Continuation message before the expiration of timer T_{312} and has not received sufficient information to process the call, then it shall initiate call clearing by sending a Clear Command message to the BS with the cause value set to “Timer expired”.

2.1.2.3 Abnormal Operation

The MSC may clear the call in response to the CM Service Request by refusing the connection request via the primitive appropriate to the underlying transport layer.

2.1.3 Connection Management (CM) Service Request Continuation

The CM Service Request Continuation message is sent from the BS to the MSC, when the BS receives an Origination Continuation Message from the MS containing information that needs to be conveyed to the MSC (e.g. dialed digits that did not fit in the Origination Message).

2.1.3.1 Successful Operation

Upon receiving an Origination Continuation Message from the MS, the BS sends a CM Service Request Continuation message to the MSC. No response is expected from the MSC to this message. The MSC stops timer T_{312} when it receives the CM Service Request Continuation message. Refer to section 2.1.2.1.

2.1.3.2 Failure Operation

None.

2.1.4 Paging Request

This BSMAP message is sent from the MSC to the BS to initiate a mobile terminated call setup scenario. This message may also be sent for location purposes.

2.1.4.1 Successful Operation

The MSC determines that an MS in its serving area needs to be paged and initiates the paging procedure. It starts timer T_{3113}, sends the Paging Request message to the BS, and waits for the Complete Layer 3 information containing a Paging Response message.

If the BS is not utilizing direct channel assignment, then when the BS receives the Paging Request message from the MSC, it determines from which cell(s) to broadcast the page request. The page messages are distributed to the appropriate cell(s), which broadcast the page message over their paging channels. Where necessary, the page message is inserted into the computed paging channel slot. If the A2p Bearer Format-Specific Parameters IE is included in the received Paging Request message and contains a list of bearer format parameters, then the BS is to attempt to page the MS using the service option associated with the first bearer format in the list that is supported by the BS.

If the BS and MS support direct channel assignment, when the BS receives a Paging Request from the MSC, it may page the MS as described above and simultaneously signal to the MS to prepare to receive an Extended Channel Assignment Message[2]. The BS then immediately assigns a traffic channel to the MS without waiting for a response to the Page Message. Alternatively, the BS sends an extended channel assignment message to the MS in place of the page message.

2.1.4.2 Failure Operation

If a Complete Layer 3 Information message containing a Paging Response message has not been received by the MSC before timer T_{3113} expires, the MSC may repeat the Paging Request message and restart timer T_{3113} a configurable number of times.

2.1.5 Paging Response

This DTAP message is sent from the BS to the MSC, after receipt of a Page Response Message from the MS, in response to a Paging Request message. This message is also sent when the BS utilizes direct channel assignment and the BS begins receiving traffic channel preamble frames from the MS on the reverse traffic channel. The Paging Response and the subsequent MSC response are used for connection establishment.

2.1.5.1 Successful Operation

When the MS recognizes a page message containing its identity, it sends a response message to the BS. The BS constructs the Paging Response message using the information received from the MS, encapsulates it in a Complete Layer 3 Information message (refer to section 2.1.1, Complete Layer 3 Information), and sends this message to the MSC. The BS may also send this message when the BS utilizes direct channel assignment and the BS begins receiving traffic channel preamble frames from the MS on the reverse traffic channel. The BS starts timer T_{303} to await reception of the Assignment

[2] This may be Channel Assignment Message or Extended Channel Assignment Message.

Request message. The MSC stops timer T_{3113} upon receiving the Paging Response message.

In the Access Probe Handoff scenario, the source BS (the BS on which the first access probe was sent), upon receiving a page response for the same MS and the same call forwarded via an A7 connection from another BS, may choose to send a second Paging Response to the MSC. The MSC shall be able to handle a Paging Response for an MS that is already engaged in a termination attempt by sending a Clear Command message to the BS containing a cause value of “Do not notify MS”. The MSC shall send this message on the underlying signaling connection associated with the second Paging Response. The BS shall be able to handle Clear Command messages from the MSC for duplicated Paging Response messages.

The BS may select an available channel based on the MS’s capabilities, and assign the MS to that channel at any time following the receipt of a Page Response Message from the MS.

2.1.5.2 Failure Operation

No action is taken at the BS on failure to receive a Paging Response from the MS.

If the BS fails to receive an Assignment Request message or Clear Command message in response to the Paging Response message prior to expiration of timer T_{303}, then it may send a Release message to the MS, and clear all associated resources.

2.1.5.3 Abnormal Operation

If a Paging Response is received by the MSC for a call that is no longer active, the MSC may clear the call.

2.1.6 Progress

This DTAP message may be sent by the MSC to trigger tone generation at the MS (e.g., via a Reorder Order or Intercept Order to the MS) prior to clearing a call request. Local tone generation allows the network to convey information to a user by means of tones.

2.1.6.1 Successful Operation

When the BS receives the Progress message from the MSC it takes the appropriate action to request the MS to generate the tone as indicated.

The MSC should delay sending any call clearing message after a Progress message to allow the local tone generation at the MS. In addition, the BS may need to be aware of the time needed by the MS to generate the local tone.

2.1.6.2 Failure Operation

None.

2.1.7 Assignment Request

This BSMAP message is sent from the MSC to the BS to request assignment of radio resources.

2.1.7.1 Successful Operation

After sending this message to the BS, the MSC starts timer T_{10} and waits for the Assignment Complete message from the BS.

The BS stops timer T_{303} or T_{20} upon receipt of the Assignment Request message, selects a traffic channel, sends the channel assignment message to the MS (unless the MS is already on a traffic channel), and waits for the confirmation from the MS that the MS reached the assigned traffic channel.

2.1.7.2 Failure Operation

If the MSC fails to receive an Assignment Complete message, or an Assignment Failure message before the expiration of timer T_{10}, then it shall initiate call clearing.

2.1.8 Assignment Complete

This BSMAP message indicates that the requested assignment has been completed correctly. The sending of the Assignment Complete message also indicates to the MSC that it is now responsible for providing in-band treatment of the call if required and if the bearer path has been successfully set up. If the BS has not received the bearer formats and address to be used, the BS sends this message to the MSCe to indicate that the MS and BS have successfully negotiated the traffic channel and service and waits for the bearer format and transport address to be sent from the MSCe.

2.1.8.1 Successful Operation

When the MS and BS have successfully negotiated the traffic channel and service, the BS sends this message to the MSC. If the BS sent the A2p bearer parameters in the CM Service Request or Paging Response message but has not received the bearer format and transport address to be used, the BS starts timer T_{xxp} and waits for the Bearer Update Request message. If the BS is communicating with an MSCe and did not send the A2p bearer parameters in the CM Service Request or Paging Response message, the BS shall include the A2p bearer parameters in this message, start timer T_{xxp} and wait for the Bearer Update Request message.

When the MSC receives this message, it stops timer T_{10} and starts timer T_{301} (unless the Assignment Complete message is received as part of a mobile originated call or a packet data call) and waits for the Connect or Flash With Information message from the BS.

Note that for mobile originated calls and network-initiated reactivation of packet data calls, the MSC considers the call to be stable and in the conversation state after receiving the Assignment Complete message and upon successful setup of the bearer path if needed. In all other cases the MSC considers the call to be stable and in the conversation state after receiving the Connect message.

2.1.8.2 Failure Operation

None.

2.1.9 Assignment Failure

This BSMAP message is sent from the BS to the MSC to indicate that the requested assignment procedure could not be successfully completed.

2.1.9.1 Successful Operation

Upon recognizing that the assignment can not be completed, the BS sends the Assignment Failure message, starts timer T_{20} and waits for the MSC to respond with an Assignment Request message, Service Release message, or a Clear Command message. An Assignment Request message is used if the MSC chooses to perform assignment retry and the call was not queued for PACA service. The MSC stops timer T_{10} upon receipt of the Assignment Failure message.

2.1.9.2 Failure Operation

If timer T_{20} expires, the BS shall send a Clear Request or Service Release message to the MSC.

2.1.10 Connect

This DTAP message informs the MSC that the called MS has entered the conversation state. The Connect message is not sent for network initiated packet data reactivation. It is sent for all other mobile terminated service options when a connect message is received from the MS.

2.1.10.1 Successful Operation

When the BS receives the connect indication from the MS, it sends the Connect message to the MSC.

Upon receiving the Connect message, the MSC connects both parties, and stops timer T_{301}.

2.1.10.2 Failure Operation

If the MSC fails to receive the Connect message prior to expiration of timer T_{301} then it performs exception handling (e.g., announcement, forwarding). The specific actions are the MSC manufacturer’s concern.

2.1.11 Service Release

2.1.11.1 Base Station Initiated

This DTAP message is sent from the BS to the MSC to release service instances associated with a single SOCI while other SOCIs are present.

2.1.11.1.1 Successful Operation

Upon receiving the Service Request Message, Resource Release Request Message or Resource Release Request Mini Message from the MS that results in the release of the last active packet data service instance associated with the packet data session or the release of the voice call, the BS shall send a Service Release message to the MSC. The BS starts timer T_{308} and waits for a Service Release Complete message from the MSC.

2.1.11.1.2 Failure Operation

If a Service Release Complete message is not received from the MSC while timer T_{308} is active, the BS may resend a Service Release message to the MSC and restart timer T_{308}. If the Service Release Complete message is not received from the MSC before timer T_{308} expires a second time or if the BS chooses not to resend the Service Release message, the BS shall cease further supervision of this service option connection, release all dedicated resources corresponding to this service, and shall release the service.

2.1.11.2 MSC Initiated

This DTAP message is sent from the MSC to the BS to release a single service that is not the only one connected from the concurrent service.

2.1.11.2.1 Successful Operation

Upon receiving a clear indication corresponding to a single service from the network, the MSC shall send a Service Release message to the BS. This message may also be sent by the MSC upon receipt of an Assignment Failure message associated with a concurrent service setup. The MSC starts timer T_{308} and waits for a Service Release Complete message from the BS. The BS stops timer T_{20} or timer T_{303} (if either is running) upon receipt of the Service Release message.

2.1.11.2.2 Failure Operation

If a Service Release Complete message is not received from the BS while timer T_{308} is active, the MSC may resend a Service Release message to the BS and restart timer T_{308}. If the Service Release Complete message is not received from the BS before timer T_{308} expires a second time or if the MSC chooses not to resend the Service Release message, the MSC shall cease further supervision of this service option connection, release all dedicated resources corresponding to this service, and shall release the service.

2.1.12 Service Release Complete

This message is sent by either the BS or the MSC.

2.1.12.1 MSC Initiated

This DTAP message is sent from the MSC to the BS as a response to the Service Release message.

2.1.12.1.1 Successful Operation

Upon receiving the Service Release message from the BS, the MSC sends a Service Release Complete message to the BS.

When the BS receives a Service Release Complete message, it stops timer T_{308} and performs the appropriate procedure to release the dedicated resources associated with the service.

2.1.12.1.2 Failure Operation

None.

2.1.12.2 BS Initiated

This DTAP message is sent from the BS to the MSC as a response to the Service Release message.

2.1.12.2.1 Successful Operation

Upon receiving the Service Release message from the MSC, the BS sends a Service Release Complete message to the MSC.

When the MSC receives a Service Release Complete message, it stops timer T_{308} and performs the appropriate procedure to release the dedicated resources associated with the service.

2.1.12.2.2 Failure Operation

None.

2.1.13 Clear Request

This BSMAP message is sent from the BS to the MSC upon failure of a radio channel or when the MS sends a Release Order to clear the call.

2.1.13.1 Successful Operation

The BS, after sending the Clear Request message, starts timer T_{300} and waits for a Clear Command message from the MSC. Upon receiving the Clear Request message from the BS, the MSC sends a Clear Command message to the BS and waits for a Clear Complete message.

2.1.13.2 Failure Operation

If a Clear Command message is not received from the MSC while timer T_{300} is active, the BS may resend the Clear Request message to the MSC and restart timer T_{300}. If the Clear Command message is not received from the MSC before timer T_{300} expires a second time or if the BS chooses to not resend the Clear Request message, the BS shall cease further supervision of this call connection, release all dedicated resources, and shall release the connection.

2.1.14 Clear Command

This BSMAP message is sent from the MSC to the BS. Upon receipt of the Clear Request message, the MSC sends a Clear Command message to the BS to instruct the BS to release the associated dedicated resources. Upon receipt of the Handoff Complete message from the target BS, the MSC sends a Clear Command message to the source BS if it has not already done so.

Additionally, upon the receipt of a Handoff Commenced message, the MSC may send a Clear Command message to the source BS to release the associated dedicated resources. Upon receipt of a Handoff Failure message from the source or the target BS, the MSC may send this message to the target BS; refer to section 2.4.8.1 for details. Upon receiving a clear indication from the network, the MSC shall send the Clear Command message to the BS to clear the call.

2.1.14.1 Successful Operation

After sending the Clear Command message to the BS, the MSC starts timer T_{315} and waits for the Clear Complete message from the BS. This operation is considered to be successful if the Clear Complete message is received by the MSC. The MSC stops timer T_{315} upon receipt of the Clear Complete message.

When the BS receives a Clear Command message, it stops timer T_{300}, $T_{303,}$ T_{306} or $T_{9,}$ if they are active, performs the appropriate procedure to release the MS and clears associated dedicated resources.

If the Clear Command message contains a cause value of “Do not notify MS”, the BS shall release terrestrial and radio resources and send no further messages to the MS.

If the Clear Command message contains a cause value of “Packet call going dormant”, the BS shall block the MS from originating for a specified duration (e.g., by using Service Option Control Message or Retry Order, refer to [5] and [23]), signal to the MS to transition all packet data service instances to the Dormant State and release associated terrestrial and radio resources.

2.1.14.2 Failure Operation

If the MSC fails to receive the Clear Complete message before the expiration of timer T_{315}, the MSC may send the Clear Command message a second tim**e** and restart timer T_{315}. If the MSC does not receive the Clear Complete message, the MSC shall release the underlying transport connection to clear the A1 or A1p signaling connection.

2.1.15 Clear Complete

This BSMAP message is sent from the BS to the MSC upon receipt of the Clear Command message.

2.1.15.1 Successful Operation

Upon receipt of the Clear Complete message from BS, the MSC stops timer T_{315} and releases the transport connection being used for the call.

2.1.15.2 Failure Operation

None.

2.1.16 Alert With Information

This DTAP message is sent from the MSC to the BS. Upon receipt of this message, the BS shall send an Alert With Information Message on the air interface.

2.1.16.1 Successful Operation

The MSC may send this message to the BS, after it has sent an Assignment Request to the BS, to request that the BS send an Alert With Information Message on the air interface. This message may be sent by the MSC for mobile control purposes. For example, this message may be used by the MSC to cause the MS to do audible alerting when it had been previously doing silent alerting during a mobile termination call setup.

2.1.16.2 Failure Operation

None.

2.1.17 BS Service Request

This BSMAP message is sent from the BS to the MSC to begin a BS initiated call setup. It is also used to initiate an ADDS Page or ADDS Deliver procedure to deliver a Short Data Burst (SDB) to an MS. For SDBs, the message is used to transport the data to the MSC for delivery to an MS.

2.1.17.1 Successful Operation

To initiate a call setup, the BS sends a BS Service Request message to the MSC containing the identity of the MS to be paged. When the BS/PCF receives data from the PDSN destined for an MS with a dormant packet data service instance, the BS may deliver the data as an SDB to the MSC, by sending a BS Service Request message including the application data to be sent to the MS. The BS starts timer T_{311} and awaits the reception of the BS Service Response message. The MSC delivers the SDB using the ADDS Page message if the MS is idle, or the ADDS Deliver message if the MS is on a traffic channel, e.g., the user is engaged in a voice call.

2.1.17.2 Failure Operation

If a BS Service Response message is not received at the BS before the expiration of timer T_{311} the BS may resend the BS Service Request message and restart timer T_{311} a configurable number of times. For SDB delivery to an MS, if the BS times out waiting for a BS Service Response message from the MSC, the BS shall not resend the BS Service Request message, and shall discard the data.

2.1.18 BS Service Response

This BSMAP message is sent from the MSC to the BS in response to a BS Service Request.

2.1.18.1 Successful Operation

The MSC shall send a BS Service Response message to the BS originating the BS Service Request message. Upon receiving a BS Service Response message the BS stops timer T_{311}.

2.1.18.2 Failure Operation

None.

2.1.19 Additional Service Notification

This BSMAP message is sent from the MSC to the BS to initiate additional service option connection establishment when the MS already has an active service.

2.1.19.1 Successful Operation

The MSC determines that an incoming call (either land or mobile originated) terminates to an MS that is already active within its serving region and initiates additional service option connection. The MSC starts timer T_{314}, sends the Additional Service Notification message to the BS, and waits for the Additional Service Request message.

2.1.19.2 Failure Operation

If an Additional Service Request message has not been received by the MSC before timer T_{314} expires, the MSC may repeat the Additional Service Notification message and restart timer T_{314}.

2.1.20 Additional Service Request

This DTAP message is sent from the BS to the MSC to request the establishment of an additional service option connection when the MS is already active with another service.

2.1.20.1 Successful Operation

If the BS receives an Enhanced Origination Message from an MS to request an additional packet data service option connection, and the packet data session is dormant or null, the BS shall send this message to the MSC. If the BS receives an Enhanced Origination Message from the MS to request a voice service option, the BS shall send this message to the MSC. The BS shall also send this message when it receives an A9-BS Service Request message to re-activate a dormant PDSI, and all the following conditions hold:

- The BS is supporting a voice call for the MS
- The BS is aware that the MS supports concurrent services
- The MS has a dormant packet data session.

The BS shall also send this message to the MSC in response to an Additional Notification message from the MSC requesting establishment of an additional service option connection. The BS starts timer T_{303} when it sends this message.

When the MSC receives this message in response to a Additional Service Notification message it shall stop timer T_{314}.

2.1.20.2 Failure Operation

If the BS fails to receive an Assignment Request, Service Release, or Clear Command message prior to the expiration of timer T_{303}, the BS may resend the Additional Service Request message and restart the timer. If the timer expires a second time, the BS may send a Retry Order or Call Assignment message to the MS and initiate service option connection release by sending a Service Release message to the MSC with cause value set to “Timer expired”.

2.1.21 Bearer Update Request

This BSMAP message may be sent from the MSCe to the BS and indicates A2p bearer format to be used for the call.

2.1.21.1 Successful Operation

The MSCe starts timer T_{yyp} and waits for the Beater Update Response message. Upon receipt of the Bearer Update Request message the BS stops timer T_{zzp}, if running, and updates the A2p bearer appropriately. The MSCe shall ignore Bearer Update Required messages from the BS while T_{yyp} is running.

2.1.21.2 Failure Operation

If the Bearer Update Response is not received before timer T_{yyp} expires, the MSCe may tear down the call.

2.1.22 Bearer Update Response

This BSMAP message is sent in response to the Bearer Update Request message.

2.1.22.1 Successful Operation

The BS shall send the Bearer update Response message to the MSCe upon receiving the Bearer Update Request message. Upon receipt of this message, the MSCe stops timer T_{yyp}.

2.1.22.2 Failure Operation

None.

2.1.23 Bearer Update Required

This BSMAP message is sent from the BS to the MSCe to initiate a bearer update.

2.1.23.1 Successful Operation

If the BS determines a need to change the A2p bearer format, it sends a Bearer Update Required message to the MSCe containing the new desired A2p bearer parameters for the call. The BS starts timer T_{zzp}.

Upon receipt of the Bearer Update Required message, if the MSCe can support the BS desired bearer format, it constructs A2p parameters based on the information in the Bearer Update Required message and sends a Bearer Update Request message to the BS. The MSC may choose not to accept the BS request by returning a Bearer Update Request message containing A2p parameters that the MSCe can support, e.g., the ones that are currently in use.

2.1.23.2 Failure Operation

If a Bearer Update Request message is not received prior to expiration of timer T_{zzp}, then the BS may resend the Bearer Update Required message and restart timer T_{zzp} a configurable number of times.

2.2 Supplementary Services Message Procedures

2.2.1 Flash with Information

This DTAP message may be sent from the MSC to the BS to convey supplementary services information which is to be sent to the MS. This message may also be sent from BS to the MSC to convey supplementary service information received from the MS.

2.2.1.1 Successful Operation

To send supplementary service information to the MS on a traffic channel, the MSC shall include the information in a Flash with Information message. If a Tag element is included in the Flash with Information message, the BS shall request that the MS acknowledge the corresponding air interface message. Upon receipt of this acknowledgment, the BS shall send a Flash with Information Ack message to the MSC.

If a Flash with Information Ack message is expected by the MSC, then it shall start timer T_{62}.

During call setup, the MSC shall queue any Flash with Information message until the Assignment Complete message is received for mobile originations or packet data service instance re-activations or until a Connect Message is received for mobile terminations (i.e., conversation sub-state). In the event that the call is cleared prior to reaching the conversation sub-state, a Feature Notification message may be sent by the MSC.

If the MSC receives a Flash with Information message from the BS during call setup (for a supplementary service that is authorized), and timer T_{301} is active, the MSC shall stop timer T_{301}.

2.2.1.2 Failure Operation

In the MSC to BS direction, if timer T_{62} expires before the receipt of a Flash with Information Ack message, the MSC may resend the Flash with Information message and restart timer T_{62} a configurable number of times.

2.2.2 Flash with Information Ack

This DTAP message is sent from the BS to the MSC to acknowledge the Flash with Information message.

2.2.2.1 Successful Operation

This message is sent from the BS to the MSC. If the MSC had included a Tag element in the Flash with Information message, then upon receiving a Layer 2 Ack for the Flash with Information message from the MS, the BS sends this message to the MSC. The MSC stops timer T_{62}.

2.2.2.2 Failure Operation

None.

2.2.3 Feature Notification

This BSMAP message is sent by the MSC to initiate sending of the feature indication information to the MS.

2.2.3.1 Successful Operation

If the MSC determines that it needs to deliver some feature indication information to the MS, it sends this BSMAP message to the BS and starts timer T_{63}. Then the MSC waits for the BS to send the Feature Notification Ack message back. When the BS receives the Feature Notification message, it sends an Order or Feature Notification message (depending upon the applicable air interface protocol) to the MS on a Paging channel. If the MSC requires an acknowledgment to the Feature Notification message, it indicates this by including a Tag element in the Feature Notification message. When the BS receives a Layer 2 Ack from the MS, it returns a Feature Notification Ack message, including this Tag element, to the MSC.

2.2.3.2 Failure Operation

If the timer T_{63} expires before the MSC receives the Feature Notification Ack message, the MSC may resend the Feature Notification message and restart timer T_{63} a configurable number of times.

2.2.4 Feature Notification Ack

This BSMAP message is sent by the BS to acknowledge the Feature Notification message.

2.2.4.1 Successful Operation

This BSMAP message is sent from the BS to the MSC. Upon receiving a Layer 2 Ack from the MS for the Feature Notification message, the BS sends this message to the MSC. Upon receipt of the Feature Notification Ack message the MSC stops timer $T_{63.}$

2.2.4.2 Failure Operation

None.

2.2.5 PACA Command

This BSMAP message is sent by the MSC to inform the BS that PACA service is to be applied to the call.

2.2.5.1 Successful Operation

Upon receipt of the CM Service Request message from the BS, if the MSC determines that it needs to queue the call for PACA service, it sends this message to the BS containing priority level and time stamp information for the call.

After sending the PACA Command message to the BS, the MSC starts timer T_{paca1} and waits for the PACA Command Ack message from the BS. When the BS receives the PACA Command message, it queues the call for PACA service, stops timer T_{303} and may send the air interface PACA Message to notify the MS that the call is queued and to provide the queue position. Refer to [13] for more explanation on this feature.

2.2.5.2 Failure Operation

If timer T_{paca1} expires before the MSC receives the PACA Command Ack message the MSC may resend the PACA Command to the BS and restart timer T_{pacal} a configurable number of times.

2.2.6 PACA Command Ack

This BSMAP message is sent by the BS to the MSC to acknowledge that the PACA request has been queued successfully.

2.2.6.1 Successful Operation

Upon receipt of the PACA Command message from the MSC, the BS queues the request and sends the PACA Command Ack message to notify the MSC that the call has been queued. Upon receipt of the PACA Command Ack message the MSC stops timer T_{paca1}.

2.2.6.2 Failure Operation

None.

2.2.7 PACA Update

This BSMAP message is sent, from either the BS or the MSC, to indicate that the sending entity intends to modify the queued call.

2.2.7.1 Successful Operation

The PACA Update message is sent by the MSC or the BS to indicate to the receiving entity (the BS or the MSC) that it shall take an appropriate action as specified by the

PACA Order IE in this message. After sending the PACA Update message, the sending entity starts timer T_{paca2} and waits to receive a PACA Update Ack message from the other entity. Refer to [13] for example scenarios.

The PACA Update message is used in the following cases:

- When idle handoff occurs the MSC sends this message to instruct the old BS to remove the request from its PACA queue.
- In the case of consecutive PACA calls the MSC may send this message to instruct the BS to remove the previous request (the call associated with the first called number) from its PACA queue.
- The MSC may send this message to request the BS to update its PACA queue. If the MSC doesn't receive any response from the BS within a certain period of time the MSC may clear all resources associated with the call.
- The MSC may send this message to indicate to the BS that the call has been canceled. The BS shall remove the request from its PACA queue and clear any resources allocated for the call. In this case, the BS shall notify the MS that the call has been canceled.
- The BS may send this message to the MSC either autonomously, if it wants to cancel the call, or upon the receipt of the PACA Cancel Message from the MS.

2.2.7.2 Failure Operation

If timer T_{paca2} expires before the sender (MSC or BS) receives the PACA Update Ack message, then the PACA Update message may be resent and timer T_{paca2} restarted a configurable number of times.

2.2.8 PACA Update Ack

This BSMAP message is sent by the BS or MSC to the MSC or BS to acknowledge that an appropriate action has been taken by the BS or MSC and that its PACA information has been updated. This message is sent in response to a PACA Update message.

2.2.8.1 Successful Operation

The MSC or BS sends the PACA Update Ack message to inform the BS or MSC of the result of the action taken in response to the PACA Update. The receiving entity stops timer T_{paca2}.

2.2.8.2 Failure Operation

None.

2.2.9 Radio Measurements for Position Request

This BSMAP message is sent by the MSC to the BS to request a set of radio measurements to be used for calculation of the MS's position.

2.2.9.1 Successful Operation

When the Mobile Positioning Center (MPC) [24] determines that position determination by means of software calculation is to take place for a given MS that is on a traffic channel, the MSC sends a Radio Measurements for Position Request message to the BS. This message indicates the MS to be measured, and the number of times to take measurements. The MSC starts timer $T_{softpos}$.

When the BS receives this message, it gathers the requested measurements and returns them in a Radio Measurements for Position Response message. If the BS is capable of determining the geographic location the BS may send the geographic location instead of the requested measurements to the MSC.

2.2.9.2 Failure Operation

If timer $T_{softpos}$ expires prior to the receipt of the Radio Measurements for Position Response message, the MSC may resend this message and restart timer $T_{softpos}$ a configurable number of times.

2.2.10 Radio Measurements for Position Response

This BSMAP message is sent by the BS in response to a Radio Measurements for Position Request message. It contains requested radio interface measurements with respect to the MS whose position is to be determined or it contains the requested geographic location of the MS.

2.2.10.1 Successful Operation

When a BS receives a Radio Measurements for Position Request message, it gathers the requested measurements and formats and sends them in a Radio Measurements for Position Response message to the MSC. If the BS is capable of determining the geographic location the BS may send the geographic location of the MS instead of the requested measurements to the MSC. When the MSC receives this message, it stops timer $T_{softpos}$.

2.2.10.2 Failure Operation

None.

2.3 Mobility Management Message Procedures

2.3.1 Authentication Request

The Authentication Request message is sent from the MSC to the BS. It is sent to initiate an authentication check on a specified MS, possibly triggered by the receipt of a BS Authentication Request Message. This is a DTAP message when used to perform authentication on a traffic channel and a BSMAP message otherwise.

2.3.1.1 Successful Operation

The MSC sends an Authentication Request message to the BS and starts timer T_{3260}. When the BS receives this message it forwards an Authentication Challenge message to the MS or initiates AKA authentication (refer to [5]) and stops timer T_{3273} if running.

When the MS receives the Authentication Challenge message, it uses the RANDU as input to the authentication algorithm to generate the response parameter (AUTHU). If AKA procedures are initiated, the MS uses RANDA and AUTN to perform AKA authentication and to generate the response parameter (RES).

2.3.1.2 Failure Operation

If timer T_{3260} expires, the MSC may resend the Authentication Request message to the BS and restart timer T_{3260} a configurable number of times, initiate call clearing, or invoke other failure processing as determined by the network operator.

2.3.2 Authentication Response

This message is sent from the BS to the MSC in response to the Authentication Request message. This is a DTAP message when used to perform authentication on a traffic channel and a BSMAP message otherwise.

2.3.2.1 Successful Operation

When a BS receives an Authentication Challenge Response message from the MS or performs an AKA procedure with the MS which does not indicate a synchronization failure, it sends the Authentication Response message to the MSC. If the AKA procedure results in the indication of a synchronization failure, the BS may attempt to resolve this problem first by sending an Authentication Report message to the MSC. Refer to section 2.3.26 and [13], Section 3.20.1.6.2. Otherwise the BS sends the Authentication Response message to the MSC, indicating that there was an unresolved synchronization failure. The MSC stops timer T_{3260}.

2.3.2.2 Failure Operation

None.

2.3.3 SSD Update Request

The SSD Update Request message is sent from the MSC to the BS to indicate that the MS should update its Shared Secret Data. This DTAP message is used to perform SSD update on a traffic channel.

2.3.3.1 Successful Operation

The MSC sends an SSD Update Request message to the BS and starts timer T_{3270}. When the BS receives this message it forwards an SSD Update Message to the MS.

When the MS receives the SSD Update Message, it uses the 56 bit RANDSSD as input to the algorithm to generate the new SSD. The MS selects a 32 bit random number (RANDBS) and sends it to the BS in a Base Station Challenge Order.

2.3.3.2 Failure Operation

If timer T_{3270} expires prior to receipt of a Base Station Challenge message, the MSC may resend the SSD Update Request message and restart timer T_{3270} a configurable number of times.

2.3.4 SSD Update Response

Upon the completion of Base Station Challenge/Response messaging, this message is sent from the BS to the MSC in response to an SSD Update Request message to indicate whether the MS has successfully updated its SSD. It is sent by the BS only upon receipt of the SSD Update Confirmation/Rejection Order from the MS. This DTAP message is used to perform SSD update on a traffic channel.

Refer to the SSD Update scenario in [13] for further explanation on the relationship between the SSD Update messaging and the Base Station Challenge messaging.

2.3.4.1 Successful Operation

When the MS receives the Base Station Challenge Confirmation Order from the BS, it checks the validity of the response and returns an SSD Update Confirmation/Rejection Order to the BS to indicate whether the procedure was successfully performed. The BS uses the SSD Update Confirmation/Rejection Order to create the SSD Update Response message which it sends to the MSC. The MSC stops timer T_{3271}.

The MS does not update the SSD if the AUTHBS value is not considered valid. Further error handling at the Home Location Register/Authentication Center (HLR/AC) is an HLR/AC matter and is not detailed in this specification.

2.3.4.2 Failure Operation

None.

2.3.5 Base Station Challenge

The Base Station Challenge message is sent from the BS to the MSC to verify the new SSD that was calculated at the MS. This DTAP message is used to perform SSD update on a traffic channel.

2.3.5.1 Successful Operation

The MS selects a 32 bit random number (RANDBS) and sends it to the BS in a Base Station Challenge Order. When a BS receives a Base Station Challenge Order, it forwards this MS generated RANDBS in the Base Station Challenge message to the MSC. The MSC stops timer T_{3270}.

When the Home Location Register/Authentication Center (HLR/AC) receives the Base Station Challenge message it uses the MS generated RANDBS and the new SSD as input to the algorithm to generate the response.

2.3.5.2 Failure Operation

None.

2.3.6 Base Station Challenge Response

This message is sent from the MSC to the BS in response to the Base Station Challenge message. This DTAP message is used to perform SSD update on a traffic channel.

2.3.6.1 Successful Operation

The MSC sends a Base Station Challenge Response message to the BS and starts timer T_{3271}. When the BS receives the Base Station Challenge Response message from the MSC it sends the Base Station Challenge Confirmation Order to the MS. The MS checks the validity of the response and sends an SSD Update Confirmation/Rejection Order to the BS.

2.3.6.2 Failure Operation

If timer T_{3271} expires prior to receipt of a SSD Update Response message, the MSC may declare failure of the SSD Update procedure.

2.3.7 Location Updating Request

This DTAP message is sent by the BS to the MSC to request an update to the MS's location area (registration) when the MS moves to a new location or frequency from its previous location or frequency.

2.3.7.1 Successful Operation

When the MS's registration message is received by the BS, it constructs the Location Updating Request message, places it in the Complete Layer 3 Information message (refer to section 2.1.1), sends the message to the MSC, and starts timer T_{3210}.

When the BS receives a BCMCS Registration message (refer to [18]) indicating that the MS is to tune to a frequency (i.e., designated frequency) other than the hash-to-frequency, the BS shall send a Location Updating Request message with frequency information to the MSC and start timer T_{3210}.

If the MSC had started timer T_{ordreg}, the MSC shall stop this timer upon receipt of the Location Updating Request message.

2.3.7.2 Failure Operation

If timer T_{3210} expires before the receipt of a Location Updating Accept message, a Location Updating Reject message, or a Service Redirection message, the BS may re-send the Location Updating Request message and restart timer T_{3210} a configurable number of times.

2.3.8 Location Updating Accept

This DTAP message is sent from the MSC to the BS to indicate that the Location Updating Request has been successfully processed.

2.3.8.1 Successful Operation

The MSC sends a Location Updating Accept message to the BS when a location registration procedure has been successfully completed at the MSC. Upon receipt of this message, the BS stops timer T_{3210} and may send the appropriate response (a Registration Accepted order) to the MS over the control channel in use.

2.3.8.2 Failure Operation

None.

2.3.9 Location Updating Reject

This DTAP message is sent from the MSC to the BS to indicate that the Location Updating Request message was rejected.

2.3.9.1 Successful Operation

The MSC may send a Location Updating Reject message to the BS when a registration procedure yields a rejection. The Location Updating Reject message contains a mandatory cause element containing the reason for rejection. Upon receipt of this message, the BS stops timer T_{3210} and may send the appropriate response to the MS (a Registration Reject Order) over the control channel in use.

2.3.9.2 Failure Operation

None.

2.3.10 Parameter Update Request

This DTAP message is sent from the MSC to the BS to increment the call history count in the MS.

2.3.10.1 Successful Operation

When the MSC sends a Parameter Update Request message to the BS it starts timer T_{3220}. When the BS receives this message, it shall send the Parameter Update Order to the MS.

2.3.10.2 Failure Operation

If timer T_{3220} expires before the receipt of a Parameter Update Confirm message from the BS, the MSC shall not increment the call history count and may re-send this message and restart timer T_{3220} a configurable number of times.

2.3.11 Parameter Update Confirm

This DTAP message is sent from the BS to the MSC in response to a Parameter Update Request message. This message is sent when the BS receives a positive indication from the MS that it incremented its call history count.

2.3.11.1 Successful Operation

When the BS receives the Parameter Update Confirmation Order from the MS, it shall send the Parameter Update Confirm message to the MSC. The MSC shall increment the call history count and stop timer T_{3220}.

2.3.11.2 Failure Operation

None.

2.3.12 Privacy Mode Command

This optional BSMAP message may be sent by the MSC to the BS while the call is in conversation state. Its typical use is to specify the use of encryption/privacy parameters for the call. It may be sent to enable or disable the use of encryption/privacy during conversation.

The pre-loading of the BS with parameters allows initiation of Signaling Message Encryption (SME) during assignment to traffic channels when appropriate, and allows the BS to immediately initiate privacy upon request by the mobile user or immediately following assignment to a traffic channel.

The MSC may place the information in the Assignment Request message, if available. Refer to section 3.1.7, Assignment Request for details on inclusion of the Encryption IE in this message.

If signaling encryption is not available at the time the Assignment Request message is sent, the MSC shall wait until after the Assignment Complete message is received to send the Privacy Mode Command message.

The Privacy Mode procedure may be invoked by the MSC during conversation state to enable or disable the use of encryption/privacy. This may be initiated by the MSC, or sent in response to a request for privacy by the mobile user. Use in the latter case is only necessary where the privacy parameters are not pre-loaded by the MSC.

2.3.12.1 Successful Operation

The MSC starts timer T_{3280} upon sending this message. When the BS receives the Privacy Mode Command message it responds to the MSC with the Privacy Mode Complete message.

2.3.12.2 Failure Operation

In the case where the MSC initiated the Privacy Mode procedure, if timer T_{3280} expires before the receipt of the Privacy Mode Complete message, the MSC shall initiate call clearing.

2.3.13 Privacy Mode Complete

This optional BSMAP message is sent from the BS to the MSC autonomously, or in response to the Privacy Mode Command message. It is used in the following cases:

- During conversation, to acknowledge the Privacy Mode Command and indicate current encryption parameter settings.
- During conversation, to indicate a change in the privacy status, where the privacy mode was changed to on or off at the request of the mobile user.
- During conversation, to indicate that the mobile user has requested privacy but the BS is unable to provide it.

2.3.13.1 Successful Operation

When the MSC receives this message from the BS in response to the Privacy Mode Command message it stops timer T_{3280}.

When the MSC receives this message autonomously indicating that the MS has requested Privacy, it may respond with the Privacy Mode Command message containing the necessary Privacy parameters, or indicate that Privacy is not available.

2.3.13.2 Failure Operation

None.

2.3.14 Status Request

The Status Request message is sent from the MSC to the BS to request information from the MS such as call mode, terminal information, roaming information, security status, etc. This is a DTAP message when sent on a traffic channel and a BSMAP message otherwise.

2.3.14.1 Successful Operation

The MSC sends the Status Request message to the BS and starts timer T_{3272}. When the BS receives this message it shall transparently transfer this information to the MS in the Status Request Order or the Status Request Message.

2.3.14.2 Failure Operation

If the MSC does not receive a Status Response message upon the expiration of timer T_{3272}, the MSC may resend the Status Request message and restart timer T_{3272} a configurable number of times.

2.3.15 Status Response

This message is sent from the BS to the MSC when the BS receives a Status Message or a Status Response Message from the MS. This is a DTAP message when used to perform the status inquiry on the traffic channel and a BSMAP message otherwise.

2.3.15.1 Successful Operation

When the BS receives the Status Message or a Status Response Message from the MS, it shall send the Status Response message to the MSC. The MSC shall stop the timer T_{3272}.

2.3.15.2 Failure Operation

None.

2.3.16 User Zone Update Request

This DTAP message is sent from the BS to MSC when a request is received from an MS to change its User Zone.

2.3.16.1 Successful Operation

When the BS receives a request from the MS to change its User Zone, the BS constructs the User Zone Update Request message, and sends the message to the MSC.

2.3.16.2 Failure Operation

None.

2.3.17 User Zone Update

This DTAP message is sent from the MSC to the BS to change the User Zone of the MS.

2.3.17.1 Successful Operation

The MSC sends a User Zone Update message to the BS to change the User Zone of the MS. Upon receipt of the User Zone Update message, the BS sends the appropriate air interface message to inform the MS.

2.3.17.2 Failure Operation

None.

2.3.18 User Zone Reject

This message is sent from the MSC to the BS to indicate that a request for a change of User Zone was rejected. This is a DTAP message when sent on a traffic channel and a BSMAP message otherwise.

2.3.18.1 Successful Operation

Upon receiving a Location Updating Request, CM Service Request or Paging Response message indicating the MS's User Zone, or a User Zone Update Request message proposing a new User Zone for the MS, the MSC may send a User Zone Reject message to the BS to reject the User Zone. The MSC may propose an alternative User Zone in this message. Upon receipt of the User Zone Reject message, the BS sends the appropriate air interface message to inform the MS.

2.3.18.2 Failure Operation

None.

2.3.19 Registration Request

The Registration Request message is a BSMAP message sent from the MSC to request the BS to initiate an ordered registration.

2.3.19.1 Successful Operation

The MSC sends Registration Request message to the BS and starts timer T_{ordreg}. The BS shall respond by sending a Registration Request Order to the MS to initiate ordered registration.

2.3.19.2 Failure Operation

If timer T_{ordreg} expires before the MSC receives a Location Updating Request message from the BS, the MSC may repeat the Registration Request message and restart timer T_{ordreg} a configurable number of times.

2.3.20 Mobile Station Registered Notification

This BSMAP message may be sent by the MSC to the BS, after it autonomously registers an MS, to trigger the BS to send the Mobile Station Registered Message to the MS.

2.3.20.1 Successful Operation

When the BS receives the Mobile Station Registered Notification message from the MSC, it sends the Mobile Station Registered Message to the MS.

2.3.20.2 Failure Operation

None.

2.3.21 BS Authentication Request

This BSMAP message is sent from the BS to the MSC when the BS initiates an authentication check for the specified MS on the traffic channel.

2.3.21.1 Successful Operation

The BS sends a BS Authentication Request to the MSC to request authentication of the MS and starts timer T_{3273}.

2.3.21.2 Failure Operation

If the BS fails to receive an Authentication Request or BS Authentication Request Ack message prior to the expiration of timer T_{3273}, the BS may resend the BS Authentication Request message a configurable number of times. If the BS chooses not to resend the message or fails to receive an Authentication Request or BS Authentication Request Ack message, it may send a Reorder or Release message to the MS, and initiate call clearing by sending a Clear Request message to the MSC with the cause value set to “protocol error between BS and MSC” or invoke other failure processing as determined by the network operator.

2.3.22 BS Authentication Request Ack

The MSC may use this BSMAP message to acknowledge the receipt of a BS Authentication Request message to the BS.

2.3.22.1 Successful Operation

If the MSC does not acknowledge receipt of a BS Authentication Request message by sending an Authentication Request message, it shall send this message to the BS. Upon receipt of the BS Authentication Request Ack message, the BS stops timer T_{3273}.

2.3.22.1 Failure Operation

None.

2.3.23 BS Security Mode Request

This BSMAP message is sent from the BS to the MSC to initiate receipt of encryption and/or message integrity information for the MS.

2.3.23.1 Successful Operation

The BS sends a BS Security Mode Request message to the MSC and starts timer T_{bsm}.

2.3.23.2 Failure Operation

If a Security Mode Request message is not received from the MSC before timer T_{bsm} expires, the BS may resend the BS Security Mode Request message and restart timer T_{bsm} a configurable number of times.

2.3.24 Security Mode Request

This message is sent from the MSC to the BS to update encryption and/or integrity information with the MS. This is a DTAP message when the Security Mode Command is sent on a traffic channel and a BSMAP message otherwise.

2.3.24.1 Successful Operation

The MSC sends a Security Mode Request message to the BS and starts timer T_{sm}. The BS stops timer T_{bsm} if it is running.

2.3.24.2 Failure Operation

If a Security Mode Response message is not received from the BS before timer T_{sm} expires, the MSC may resend the Security Mode Request message and restart timer T_{sm} a configurable number of times.

2.3.25 Security Mode Response

This message is sent from the BS to the MSC to indicate the successful updating of encryption and/or integrity information with the MS. This is a DTAP message when the Security Mode Command is sent on a traffic channel and a BSMAP message otherwise.

2.3.25.1 Successful Operation

The BS updates the encryption and/or integrity information with the MS and responds back to the MSC with a Security Mode Response message. The MSC stops timer T_{sm}.

2.3.25.2 Failure Operation

None.

2.3.26 Authentication Report

This DTAP message is sent from the BS to the MSC to convey the results of the MS AKA response after receiving AKA vector information in a Location Updating Accept or an Assignment Request message. Results include Loss of radio contact or Synchronization failure (indicating that the sequence number received by the MS was outside the expected range).

2.3.26.1 Successful Operation

If the MSC sent authentication vector information to the BS in the Location Updating Accept or the Assignment Request message, and the BS performed AKA authentication with the MS, the BS sends the results of the MS AKA response to the MSC in the Authentication Report message and starts timer T_{ar}.

2.3.26.2 Failure Operation

If an Authentication Report Response message is not received from the MSC before timer T_{ar} expires, the BS may repeat the Authentication Report message and restart timer T_{ar} a configurable number of times.

2.3.27 Authentication Report Response

This DTAP message is sent by the MSC to the BS in response to an Authentication Report message. In the event of an MS synchronization failure, this message also conveys new authentication vector information.

2.3.27.1 Successful Operation

If the BS sent an Authentication Report message indicating success or loss of radio contact, the MSC returns an Authentication Report Response message to acknowledge the message. In this case, no new authentication vector information is sent. The BS stops timer T_{ar}.

If the BS sent an Authentication Report message indicating an MS synchronization failure, the MSC returns an Authentication Report Response message including new authentication vector information. The BS stops timer T_{ar}. Refer to [31] for MSC/HLR authentication and resynchronization.

2.3.27.2 Failure Operation

None.

2.3.28 Event Notification

This message may be sent from the MSC to the BS prior to SCCP link establishment to indicate a change in call processing.

2.3.28.1 Successful Operation

If the MSC determines that a change to call processing is required, and an SCCP link has not yet been established for the call, the MSC sends an Event Notification message to the BS that is currently processing the call. The MSC starts timer T_{event} when it sends this message. Upon receipt of the Event Notification message, the BS takes the appropriate steps to change the call processing, depending on the information received in the message.

2.3.28.2 Failure Operation

If an Event Notification Ack message is not received prior to expiration of timer T_{event}, then the MSC may resend the Event Notification message and restart timer T_{event} a configurable number of times.

2.3.29 Event Notification Ack

This message is sent from the BS to the MSC in response to receiving an Event Notification message.

2.3.29.1 Successful Operation

If the BS receives an Event Notification message from the MSC, it shall send an Event Notification Ack message to the MSC. Upon receipt of this message, the MSC stops timer T_{event}.

2.3.29.2 Failure Operation

None.

2.4 Handoff Message Procedures

2.4.1 Handoff Required

This BSMAP message allows the source BS to initiate a handoff. This message provides the MSC with a list of target candidate cells or optional measurement information for the MSC to use to determine a target with an available radio channel.

Upon receiving a Handoff Required message, the MSC may unilaterally determine a candidate target cell list, modify the existing one, or use the existing list as received. Once the MSC has established a candidate target cell list, the handoff processing continues with resource establishment. Refer to [13] for more details. The provisions of this paragraph do not apply when the source BS is operating in DS-41 mode.

2.4.1.1 Successful Operation

When a source BS has sufficient information to initiate a handoff, it shall determine if one or more target cells are outside the current BS domain. If one or more candidate targets are outside its domain, then the source BS shall generate a Handoff Required message requesting the MSC to find a target with available resources.

Absence of the *IS-95* Channel Identity or *IS-2000* Channel Identity element indicates that the type of handoff being requested is a CDMA to AMPS hard handoff. This condition does not apply when the target BS is operating in DS-41 mode where the type of handoff is contained within the transparent container element passed to the target BS.

If timer T_7 has not been started for this handoff attempt prior to this time, it shall now be started. This implies that the Handoff Required message shall be repeated by the BS with a periodicity no smaller than T_7 between messages.

2.4.1.2 Failure Operation

If a Handoff Command message is not received prior to expiration of timer T_7, then the source BS may resend the Handoff Required message and restart timer T_7 a configurable number of times.

The MSC shall always respond to the Handoff Required message. The BS may resend the Handoff Required message only after timer T_7 expires or a Handoff Required Reject message is received.

2.4.2 Handoff Request

This BSMAP message allows the MSC to make specific requests of potential targets to provide radio resources for a handoff of an existing mobile connection.

2.4.2.1 Successful Operation

This message is sent by the MSC to candidate target cell(s). Using the candidate target cell list generated per section 2.4.1 (Handoff Required), the MSC determines a target cell that has available resources which match the MS’s permitted channel type. More than one candidate target cell under the domain of the same BS may be specified for simultaneous inclusion in the handoff. To accomplish a handoff for any supported signaling type, a Handoff Request message is constructed and sent to the necessary BS(s). Information may be included in the request that instructs the BS on specific information on the type of radio channel required and other miscellaneous parameters. This information can be extracted from the Handoff Required message elements. Upon transmission of this message, the MSC starts timer T_{11}.

Refer to section 3.4.2, Handoff Request, for the use of:

- *IS-95* Channel Identity elements to indicate hard handoff for TIA/EIA-95-B systems and
- *IS-2000* Channel Identity elements to indicate handoff for TIA/EIA/IS-2000 systems.

Upon receipt of this message, the candidate target BS shall determine if suitable idle radio resources are available. The candidate target BS responds to the MSC with either a Handoff Request Acknowledge message containing the appropriate channel and other pertinent information to allow the MS to be instructed to tune to the new channel or with a Handoff Failure message indicating a failure to allocate the requested resources.

2.4.2.2 Failure Operation

Receipt of a Handoff Failure message at the MSC or expiration of timer T_{11} signals the failure of the target BS to allocate resources for a handoff request. On receipt of a Handoff Failure message or upon expiration of timer T_{11}, the MSC shall terminate the handoff procedure and release all references and resources associated with the target. The MSC may continue with additional target cell candidates or send a Handoff Required Reject message to the source BS with the appropriate cause value. Refer to section 2.4.7 Handoff Required Reject, and section 2.4.8, Handoff Failure, for more information.

2.4.3 Handoff Request Acknowledge

This BSMAP message allows the target BS to respond to the MSC concerning the Handoff Request message. When a Handoff Request message is received, the target BS selects appropriate cell(s) amongst the target cell(s) identified in the Handoff Request message to be set up for the requested handoff. This message is generated when the target BS determines that appropriate resources are allocated to service the needs of the incoming handoff. The first cell in the cell identifier list element of the message is treated as the designated cell by the MSC.

2.4.3.1 Successful Operation

This acknowledgment to the Handoff Request message indicates that at least one cell under this BS’s domain can qualify as the target for the handoff. The target BS indicates that the appropriate radio resources have been allocated and set up for the requested handoff. The MSC uses information provided in this message to create a Handoff Command message to be sent to the source BS to execute the handoff. The MSC stops timer T_{11}.

Concurrent with sending of the Handoff Request Acknowledge message, the target BS shall start timer T_9 and await the arrival of the MS.

2.4.3.2 Failure Operation

Refer to section 2.4.8, Handoff Failure, for actions to be taken upon the expiration of timer T_9.

2.4.4 Handoff Command

This BSMAP message allows the MSC to signal to the source BS that a target channel(s) has/have been allocated for handoff. This message is sent only after the bearer path between the MSC and the target BS has been established.

2.4.4.1 Successful Operation

Essentially, the Handoff Command message is used to convey information about the target BS to the source BS (and on to the MS) regarding layer 1 access information at the target. Upon receipt of the Handoff Command message the source BS stops timer T_7.

If the source BS does not accept the Handoff Command message, a Handoff Failure message with a cause value of 'Alternate signaling type reject' shall be sent to the MSC so that the reserved target resources are released.

The following three paragraphs do not apply when the source BS is operating in DS-41 mode.

The source BS transmits the handoff instructions to the MS to execute a handoff and starts timer T_8 if an acknowledgment is requested.

The source BS typically receives confirmation that the MS has received the command and is acting accordingly. Timer T_8, if running, is stopped when this confirmation is received. The source BS may optionally send the handoff direction message[3] to the MS using quick repeats and may not request an acknowledgement from the MS. In this case, the source BS shall not start timer T_8.

If the source BS indicates in a handoff direction message that the MS is allowed to return to the source BS if it cannot acquire the target BS, the source BS starts timer T_{waitho}.

Information contained in the elements of this message are identical to the information contained in the corresponding elements of the Handoff Request Acknowledge (refer to section 2.4.3).

2.4.4.2 Failure Operation

If the MS fails to acknowledge the handoff instruction (i.e., timer T_8 expires) and the MS remains on the old channel, then a Handoff Failure message is sent to the MSC with the cause field set to 'Reversion to old channel'. The procedure at the target BS is terminated by the MSC using a call clearing sequence. Refer to [13] for additional call clearing requirements.

[3] This may be an Analog Handoff Direction message, Handoff Direction message, a General Handoff Direction message, an Extended Handoff Direction message, or a Universal Direction message as appropriate.

The three paragraphs immediately following do not apply when the source BS is operating in DS-41 mode.

If timer T_8 expires and the source BS cannot detect the presence of the radio link to the MS, then the source BS sends a Clear Request message (refer to section 3.1.12, Clear Request) to the MSC regarding the source channel with the cause field set to ‘Radio interface failure’. The channel and terrestrial resource are released after a Clear Command message is received from the MSC.

If timer T_{waitho} expires, the source BS should consider this a normal event and send a Handoff Commenced message to the MSC. Refer to section 2.4.5, Handoff Commenced.

If the source BS has allowed an MS to return if it cannot acquire the target BS and the MS returns before timer T_{waitho} expires, the source BS shall stop timer T_{waitho} and resume servicing the MS and send a Handoff Failure to the MSC with cause value “Reversion to old channel”.

The following two paragraphs apply when the source BS is operating in DS-41 mode.

If the source BS determines that the MS is no longer present in the area of its control and cannot return to that area, the source BS shall send a Clear Request message to the MSC with the cause field set to ‘Radio interface failure’. The channel and terrestrial resources are released after a Clear Command message is received from the MSC.

If the source BS detects that an MS returns to its control while in a call, the source BS shall send a Handoff Failure message to the MSC with cause value ‘Reversion to old channel’.

2.4.5 Handoff Commenced

This BSMAP message is used for TIA/EIA-553, TIA/EIA-95, and TIA/EIA/*IS-2000* hard handoffs. It is sent by the source BS to the MSC to indicate that the Handoff Command message has been sent to the MS, and that the MS is not expected to return to the source BS.

The MSC may send a Clear Command message to the source BS upon receipt of the Handoff Commenced Message.

2.4.5.1 Successful Operation

If the source BS does not expect the MS to return, it starts timer T_{306} once the Handoff Commenced message is sent to the MSC. If the handoff direction message is sent using quick repeats, the source BS might not request an acknowledgment from the MS. In this case, the source BS sends the Handoff Commenced message after all the quick repeats have been transmitted to the MS unless the MS has been allowed to return if it cannot acquire the target BS. In the case that the MS has been allowed to return, timer T_{waitho} is started and the source BS is required to wait until timer T_{waitho} expires before sending the Handoff Commenced message to the MSC.

2.4.5.2 Failure Operation

If timer T_{306} expires, then the BS follows the call clearing procedures defined in section 2.1.13 (i.e., it sends a Clear Request message to the MSC).

2.4.6 Handoff Complete

This BSMAP message allows the target BS to signal to the MSC that an MS has successfully accessed the target cell and performed all connection procedures.

2.4.6.1 Successful Operation

In the case of handoff of a voice call delivered by the MSC or concurrent services call, the Handoff Complete message is sent from the target BS to the MSC when the target BS has acquired the MS.

In the case of handoff of a packet data only session, the Handoff Complete message is sent from the target BS to the MSC when the target BS has acquired the MS and has performed the connection procedures to the PCF, i.e. when the BS has received the A9-AL Connected Ack message.

When the MSC receives the Handoff Complete message from the target BS, the MSC shall send a Clear Command message (refer to section 2.1.14) to the source BS. If the Handoff Complete is the result of a hard handoff of a voice call delivered by the MSC or concurrent services call, then any bearer resources to the source BS shall also be cleared via an MSC initiated clearing sequence.

When the target BS is operating in DS-41 mode, then when the new SRNC-ID + S-RNTI are successfully exchanged with the MS by the radio protocols, the target BS shall send the Handoff Complete message to MSC.

2.4.6.2 Failure Operation

None.

2.4.7 Handoff Required Reject

This BSMAP message is sent from the MSC to the source BS to deny the request contained in a Handoff Required message.

2.4.7.1 Successful Operation

If the source BS requested a response by including the Response Request element in the Handoff Required message, and the handoff cannot be accomplished, a Handoff Required Reject message may be sent to the source BS indicating that the handoff cannot be accomplished at this time.

If a Handoff Required Reject message is received, then the source BS shall stop timer T_7 and a new handoff procedure may be initiated if the condition of the call connection warrants immediate action (e.g., emergency handoff). Such a procedure is implemented at the discretion of the manufacturer and system operator.

2.4.7.2 Failure Operation

None.

2.4.8 Handoff Failure

This BSMAP message is sent from either the target BS or the source BS to the MSC to indicate that there has been a failure in either the resource allocation process or the execution of an inter-BS handoff and that the handoff has been aborted.

2.4.8.1 Successful Operation

The target BS starts timer T_{306} when sending this message on an established underlying signaling connection. After receiving a Handoff Failure message the MSC stops timer T_{11} if it is running. If there is an underlying signaling connection between the MSC and the target BS, the MSC shall send a Clear Command message to the target BS, which shall then deallocate radio and terrestrial resources. Upon receipt of the Clear Command message, the BS stops timer T_{306} if it is running.

In the event that timer T_9 expires and the MS is not detected by the target BS, a Handoff Failure message shall be sent to the MSC with the appropriate cause field set.

If the source BS has indicated in a handoff direction message[4] that the MS is allowed to return if it cannot acquire the target BS, the possibility exists that the MS may return to the source BS. If this happens prior to the expiration of timer T_{waitho}, the source BS sends a Handoff Failure message to the MSC indicating the return of the MS.

2.4.8.2 Failure Operation

If timer T_{306} expires, the BS follows the call clearing procedures defined in section 2.1.13 (i.e., it sends a Clear Request message to the MSC).

2.4.9 Handoff Performed

This BSMAP message is sent from the BS to the MSC to inform the MSC of handoff operations.

2.4.9.1 Successful Operation

An intra-BS handoff is a handoff performed under the domain of one BS. As such, the MSC is not involved in the execution of the handoff. Once an intra-BS handoff is successfully completed, the BS may inform the MSC via a Handoff Performed message.

When the sector identified as the “designated cell” is removed from the call, the BS currently serving as the source BS for the call chooses a new “designated cell” from the set of sectors serving the call and shall provide the appropriate cell identifier to the MSC using this message.

2.4.9.2 Failure Operation

None.

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4 This may be an Analog Handoff Direction message, Handoff Direction message, a General Handoff Direction message, an Extended Handoff Direction message, or a Universal Direction message as appropriate.

2.5 Facility Management Message Procedures

These sections do not apply to the MSCe, with the exception of sections 2.5.7 and 2.5.8.

2.5.1 Block

This BSMAP message is sent from the BS to the circuit-switched MSC to indicate that one or more terrestrial circuits shall be blocked at the circuit-switched MSC and therefore cannot be used for traffic.

2.5.1.1 Successful Operation

The BS sends a Block message to the circuit-switched MSC and starts timer T_1. Timer T_1 shall be set to a value to allow sufficient time for the circuit-switched MSC to block all circuits indicated in this message. The message identifies at least one circuit (Circuit Identity Code) to be blocked and the reason (Cause) of the blocking. The only way a terrestrial circuit may become unblocked after it has been blocked is through a reset circuit procedure (from the BS), a global reset from either the circuit-switched MSC or BS, or an unblock procedure (from the BS). More than one circuit may be blocked using a single Block message. The circuit-switched MSC stops timer T_{12} if it is running and sends a Block Acknowledge message in response to the Block message after taking appropriate action. A call that is already in progress on the specified circuit is not affected by the Block message; the block becomes effective after the completion of the call in progress. The circuit-switched MSC does not delay sending the Block Acknowledge message if a call is in progress. If a circuit is already marked as blocked in the circuit-switched MSC, it remains blocked and the circuit-switched MSC sends the Block Acknowledge message.

2.5.1.2 Failure Operation

If the BS does not receive a Block Acknowledge message before the expiration of timer T_1, then the BS shall send the Block message a second and final time and shall mark the indicated circuit(s) as blocked.

If an Assignment Request message is received for a circuit which is marked at the BS as blocked then the BS shall send an Assignment Failure message with a cause value of “Terrestrial resource is not available” followed by a Block message with a cause value of “No radio resource available”.

2.5.2 Block Acknowledge

This BSMAP message is sent from the circuit-switched MSC to the BS to acknowledge receipt of the Block message and to indicate that appropriate action has been taken.

2.5.2.1 Successful Operation

After the circuit-switched MSC blocks all of the circuits specified in the Block message, the circuit-switched MSC sends a Block Acknowledge message to the BS. The BS stops timer T_1 upon receipt of the Block Acknowledge message. The Block Acknowledge message indicates to the BS that the necessary action has been taken. The circuits involved are assumed to be blocked by the circuit-switched MSC until a Reset message or an Unblock message relevant to the circuits is received from the BS. The Block

Acknowledge message returns the Circuit Identity Code of the corresponding Block message.

If multiple circuits were indicated in the Block message, the response applies to all of those circuits.

2.5.2.2 Failure Operation

None.

2.5.3 Unblock

This BSMAP message is used by the BS to notify the circuit-switched MSC that the specified circuits are available for use.

2.5.3.1 Successful Operation

If the BS chooses to unblock blocked circuits, an Unblock message is sent to the circuit-switched MSC. The BS starts timer T_1 when it sends this message. Timer T_1 shall be set to a large enough value to allow sufficient time for the circuit-switched MSC to unblock all circuits indicated in this message.

2.5.3.2 Failure Operation

If the BS does not receive the Unblock Acknowledge message before the expiration of timer T_1, then the BS shall send the Unblock message a second and final time. If timer T_1 expires on the second attempt, the BS shall mark the indicated circuit(s) as unblocked.

2.5.4 Unblock Acknowledge

This BSMAP message is sent from the circuit-switched MSC to the BS in response to a request to unblock circuits. The circuit-switched MSC marks such circuits as available at the BS before it sends the Unblock Acknowledge message to the BS.

2.5.4.1 Successful Operation

Upon receipt of the Unblock message from the BS, the circuit-switched MSC marks the circuits as available at the BS and sends an Unblock Acknowledge message to the BS. Upon receipt of the Unblock Acknowledge message, the BS marks all circuits included in the Unblock message as “unblocked”. The Unblock Acknowledge message returns the Circuit Identity Code of the corresponding Unblock message. If a circuit is already marked as unblocked in the circuit-switched MSC, it remains unblocked and the circuit-switched MSC sends the Unblock Acknowledge message.

If multiple circuits were indicated in the Unblock message, the response applies to all of those circuits.

2.5.4.2 Failure Operation

None.

2.5.5 Reset Circuit

This BSMAP message is sent by either the BS or the circuit-switched MSC to request that one or more circuits be idled (reset).

2.5.5.1 Reset Circuit (at the BS)

If the BS detects that one or more circuits have to be idled due to abnormal SCCP-connection release, it sends a Reset Circuit message to the circuit-switched MSC indicating the Circuit Identity Code(s) which the circuit-switched MSC is to idle and the reason (Cause) of the circuit reset.

2.5.5.1.1 Successful Operation

The BS starts timer T_{12} when it sends this message. Timer T_{12} shall be set to a large enough value to allow sufficient time for the circuit-switched MSC to reset all circuits indicated in this message. When the circuit-switched MSC receives the Reset Circuit message, it clears all calls that are utilizing the circuits to be reset, marks the indicated circuits as idle and available (i.e., unblocked), and returns a Reset Circuit Acknowledge message to the BS.

2.5.5.1.2 Failure Operation

If the BS does not receive or recognize the Reset Circuit Acknowledge message before the expiration of timer T_{12}, the Reset Circuit message is repeated. The Reset Circuit message shall be sent no more than three times.

If the Reset Circuit Acknowledge message is never received or recognized by the BS, then the situation (i.e., possibly incompatible device states between the BS and circuit-switched MSC) shall be resolved internally in the BS or by OAM&P procedures.

2.5.5.2 Reset Circuit (at the circuit-switched MSC)

If the circuit-switched MSC detects that one or more circuits have to be idled due to abnormal SCCP connection release or OAM&P intervention, it sends a Reset Circuit message to the BS indicating the circuits which the BS is to idle and the cause of the circuit reset.

2.5.5.2.1 Successful Operation

The circuit-switched MSC starts timer T_{12} when it sends this message. Timer T_{12} shall be set to a large enough value to allow sufficient time for the BS to reset all circuits indicated in this message. When the BS receives a Reset Circuit message, it shall respond with a Reset Circuit Acknowledge message in the case that all of the circuit(s) can be idled and none of the circuits are blocked. If all of the circuits are blocked at the BS at reception of the Reset Circuit message, one or more Block messages is returned to the circuit-switched MSC instead of the Reset Circuit Acknowledge message. If some of the circuits are blocked at the BS at reception of the Reset Circuit message, one or more Block messages is returned to the circuit-switched MSC indicating those blocked circuits. The circuit-switched MSC responds with a Block Acknowledge message to any Block message it receives if it successfully blocks all of the circuits specified in the Block message.

2.5.5.2.2 Failure Operation

If the circuit-switched MSC does not receive the Reset Circuit Acknowledge message or a Block message before the expiration of timer T_{12}, the Reset Circuit message is sent a second and final time.

If the Reset Circuit Acknowledge message is never received or recognized by the circuit-switched MSC, then the situation (i.e., possibly incompatible device states between the BS and circuit-switched MSC) shall be resolved internally in the circuit-switched MSC or by OAM&P procedures.

2.5.6 Reset Circuit Acknowledge

This BSMAP message is sent by either the circuit-switched MSC or the BS to acknowledge the request that one or more circuits be idled (reset).

2.5.6.1 Reset Circuit Acknowledge (from BS)

The Reset Circuit Acknowledge message is sent from the BS to the circuit-switched MSC to acknowledge that the BS has reset (idled and unblocked) the circuits indicated in the corresponding Reset Circuit message.

2.5.6.1.1 Successful Operation

Upon receipt of the Reset Circuit Acknowledge or Block message from the BS, the circuit-switched MSC stops timer T_{12}.

2.5.6.1.2 Failure Operation

None.

2.5.6.2 Reset Circuit Acknowledge (from circuit-switched MSC)

The Reset Circuit Acknowledge message is sent from the circuit-switched MSC to the BS to acknowledge that the circuit-switched MSC has reset (idled and unblocked) the circuits indicated in the corresponding Reset Circuit message.

2.5.6.2.1 Successful Operation

When the circuit-switched MSC receives a Reset Circuit message, it idles the circuits and sends a Reset Circuit Acknowledge message to the BS.

Upon receipt of the Reset Circuit Acknowledge message, the BS stops timer T_{12}.

2.5.6.2.2 Failure Operation

None.

2.5.7 Reset

This BSMAP message can be sent by either the BS or the MSC. In the event of a failure or initialization at the BS or MSC that has resulted in the loss of transaction reference information, a Reset message is sent on the A1/A1p interface to the counterpart of the equipment that is resetting to indicate the reason for the reset.

2.5.7.1 Successful Operation

If the BS sends the Reset message to the MSC, the BS starts timer T_4. Upon receipt of the Reset message from the BS, the MSC releases affected calls, erases all affected references, puts all circuits associated with the BS into the idle state and shall mark all circuits as unblocked. During reinitialization, the BS may use the blocking procedure to mark circuits as blocked. After a guard period of T_2 seconds a Reset Acknowledge message is returned to the BS indicating that all references have been cleared.

If timer T_{16} is running at the MSC when the Reset message is received from the BS, the MSC shall stop timer T_{16}, start timer T_2, complete initialization, and then return a Reset Acknowledge message to the BS after timer T_2 expires.

If the MSC sends the Reset message to the one or more affected BSs, the MSC starts an associated timer T_{16} for each message. Upon receipt of a Reset message from the MSC, and the BS shall release all affected calls and erase all affected references. The BS may use the blocking procedure to mark circuits as blocked as described in section 2.5.1 and shall idle all others. After a guard period of T_{13} seconds a Reset Acknowledge message is returned to the MSC, indicating that all MSs that were involved in a call are no longer transmitting and that all references at the BS have been cleared.

If timer T_4 is running at the BS when the Reset message is received from the MSC, the BS shall stop timer T_4, start timer T_{13}, complete initialization, and then return a Reset Acknowledge to the MSC after timer T_{13} expires.

2.5.7.2 Failure Operation

If the BS sends a Reset message to the MSC and does not receive a Reset Acknowledgement message before timer T_4 expires then it shall repeat the entire reset procedure.

If the MSC sends a Reset message to the BS and does not receive a Reset Acknowledgement message before timer T_{16} expires then it shall repeat the reset procedure with respect to that BS.

If a Reset message is received that contains a software version less than the protocol version of the receiver but unknown to the receiver, then the receiver may raise an OAM&P flag and choose not to respond to the sender.

2.5.8 Reset Acknowledge

This BSMAP message is sent in response to a Reset message.

2.5.8.1 Successful Operation

When the MSC has received a Reset message from a BS, the MSC, after a guard period of timer T_2 seconds, sends a Reset Acknowledge message to the BS to indicate that the

Reset message is received and that all references have been cleared. When the BS receives the Reset Acknowledge message, it stops timer T_4 and begins normal operation.

When the BS has received a Reset message from the MSC, the BS sends a Reset Acknowledge message after a guard period of timer T_{13} seconds to the MSC to indicate that the Reset message was received and that all references have been cleared. When the MSC receives the Reset Acknowledge message, it stops the associated timer T_{16} and begins normal operation.

2.5.8.2 Failure Operation

None.

2.5.9 Transcoder Control Request

The BSMAP Transcoder Control Request message is sent from the circuit-switched MSC to the BS to request a change in the current state of the inband signaling mechanism.

2.5.9.1 Successful Operation

The circuit-switched MSC starts timer T_{309} when it sends this message.

When the BS receives this message with an “attempt TFO” directive, the inband signaling mechanism at the SDU is enabled (or reset if already enabled and not in the Tandem Free Operation (TFO) state) and the BS responds with a Transcoder Control Acknowledge. Refer to [25] for TFO.

When the BS receives this message with a “tandem mode” directive, it disables the inband signaling mechanism and reverts to tandem vocoding mode. The Transcoder Control Acknowledge message is returned upon successful transition to tandem vocoding mode.

2.5.9.2 Failure Operation

If the Transcoder Control Acknowledge message is not received by the circuit-switched MSC before timer T_{309} expires, then the circuit-switched MSC invokes the appropriate follow-up processing. The circuit-switched MSC may peg the error counters associated with the TFO feature and the call.

2.5.10 Transcoder Control Acknowledge

This BSMAP message is sent from the BS to the circuit-switched MSC to indicate the success or failure of enabling or disabling tandem free operation.

2.5.10.1 Successful Operation

The BS sends this message to the circuit-switched MSC with an indication (success or failure) of the outcome of the enabling or disabling of the TFO function. When the circuit-switched MSC receives this message, it stops timer T_{309}.

2.5.10.2 Failure Operation

None.

2.6 Application Data Delivery Service (ADDS) Message Procedures

2.6.1 ADDS Page

This BSMAP message is sent from the MSC to the BS to transport an application data message to be delivered to the MS or request application data from the MS on the paging channel(s).

2.6.1.1 Successful Operation

When the MSC determines that it needs to deliver an SMS message to a specific idle MS, and a Layer 2 Ack notification is required from the MS, the MSC sends the ADDS Page message containing a Tag IE to the BS, starts timer T_{3113}, and waits for the ADDS Page Ack message.

When the MSC determines that it needs to deliver an SMS message to a specific idle MS, and the MSC does not require a Layer 2 Ack notification, the MSC sends the ADDS Page message, without a Tag IE, to the BS.

The Tag IE, when present, indicates to the BS that a Layer 2 Ack is required from the MS. It can be used by the MSC to uniquely identify the ADDS Page message. If the Tag IE is present in the ADDS Page message, then the BS shall save it and return the same value in the Tag IE of the ADDS Page Ack message.

When the MSC determines that it needs to deliver an SMS Broadcast message, and the MSC desires a response from the BS, the MSC starts timer T_{3113}, sends the ADDS Page message containing a Tag element to the BS, and waits for the ADDS Page Ack message. The Tag IE, when present indicates to the BS that an ADDS Page Ack response message is requested. However, the BS is not required to solicit Layer 2 Acks from the MS. If the Tag element is present, the BS shall save it and return the saved value in the Tag IE of the ADDS Page Ack message.

If the MSC needs to send position location data to an idle MS, the MSC sends an ADDS page message to the BS with the Data Burst Type field of ADDS User Part IE set to Position Determination Services (PDS). The MSC includes a Tag IE in the ADDS Page message to request the BS to wait for a Layer 2 Ack from the MS before the BS acknowledges the message. The BS saves the Tag value and returns it in the Tag IE of the ADDS Page Ack message. The MSC starts timer T_{3113} and waits for an ADDS Page Ack Message.

When the MSC determines that it needs to deliver a SDB to an idle MS, the MSC sends a ADDS Page message to the BS with the Data Burst Type field of the ADDS User Part IE set to ‘SDB’. The MSC may include a Tag IE in the ADDS Page message to request the BS to wait for a Layer 2 Ack from the MS before the BS acknowledges the message. If the Tag element is present, the BS saves the Tag value and returns it in the Tag IE of the ADDS Page Ack message. The MSC starts timer T_{3113} and waits for an ADDS Page Ack Message.

2.6.1.2 Failure Operation

If the Tag IE was included in the ADDS Page message, and the ADDS Page Ack message has not been received at the MSC before timer T_{3113} expires, the MSC may resend the ADDS Page message and restart timer T_{3113} a configurable number of times.

2.6.2 ADDS Page Ack

This BSMAP message is sent from the BS to the MSC when the BS receives a Layer 2 Ack from an MS for an ADDS Page message directed to a specific MS that contains a Tag element, or when the BS successfully processes an ADDS Page message containing both Mobile Identity set to “Broadcast Address” and a Tag element, or when the BS is indicating an error situation resulting from an ADDS Page message that contains a Tag element.

2.6.2.1 Successful Operation

For messages to a specific MS, if the MSC included the Tag element in the ADDS Page message, the BS sends this message to the MSC when it receives a Layer 2 Ack from the MS. The MSC shall stop timer T_{3113} when it receives the ADDS Page Ack.

For SMS Broadcast messages, if the MSC included the Tag element in the ADDS Page message, the BS sends this message to the MSC to indicate that it has processed the ADDS Page message. The BS is not required to solicit Layer 2 Acks from the MSs. The MSC shall stop timer T_{3113} when it receives the ADDS Page Ack.

2.6.2.2 Failure Operation

None.

2.6.3 ADDS Transfer

This BSMAP message is sent from the BS to the MSC to deliver an application data message.

The message can also be sent from the BS to the MSC to request authentication of an MS in case of SDB, an origination of CCPD mode or alternate dormant mode handoff.

2.6.3.1 Successful Operation

When the BS receives an application data message for SMS or PDS from the MS on the access channel, it sends it to the MSC in an ADDS Transfer message. The BS includes the SMS or PDS message in the Application Data Message field in the ADDS User Part element and sets the Data Burst Type field of the ADDS User Part element to ‘SMS’ or ‘PDS’.

If the BS sends the ADDS Transfer message to the MSC for authentication purposes in the case of SDB, an MS origination with CCPD mode or alternate dormant mode handoff, the BS sets the Data Burst Type field of the ADDS User Part element to ‘SDB’ (for SDBs or CCPD Mode) or ‘Asynchronous Data Services’ (for alternate dormant mode handoff) and includes a Tag IE. The BS starts timer T_{60}.

2.6.3.2 Failure Operation

If timer T_{60} expires before an ADDS Transfer Ack message is received from the MSC in the case of SDB, the BS shall discard the data.

If timer T_{60} expires before an ADDS Transfer Ack message is received from the MSC in the case of CCPD Mode, the BS may resend the ADDS Transfer message and restart timer T_{60} to retry the authentication a configurable number of times. If the BS chooses not to resend the message, or does not receive an ADDS Transfer Ack message upon resending the message, the BS shall not continue processing the call.

If timer T_{60} expires before an ADDS Transfer Ack message is received from MSC in the case of alternate dormant mode handoff, the BS may resend the ADDS Transfer message to retry the authentication a configurable number of times. If the BS chooses not to resend the message, or does not receive an ADDS Transfer Ack message upon resending the message, the authentication of the MS is considered failed.

2.6.4 ADDS Transfer Ack

This BSMAP message is sent from the MSC to the BS in response to an ADDS Transfer Message to indicate the result of the authentication for an MS originating a SDB or requesting CCPD Mode from the network, or requesting an alternate dormant mode handoff.

2.6.4.1 Successful Operation

If the MS is successfully authenticated or if the MSC chose not to perform authentication for a mobile originated SDB, the MSC sends a ADDS Transfer Ack message with the same Tag IE as in ADDS Transfer message to the BS. The BS sends the buffered SDB data to the PCF. If the MSC includes a cause value indicating authentication failure, the buffered data shall be discarded. The BS stops timer T_{60} upon receipt of the authentication results in the ADDS Transfer Ack message.

If an MS requesting common channel packet data service is successfully authenticated or if the MSC chose to not perform authentication, the MSC sends an ADDS Transfer Ack message with the same Tag IE as in ADDS Transfer message to the BS. The BS proceeds with the CCPD call setup. If the MSC includes a cause value indicating authentication failure for an MS requesting CCPD Mode the CCPD call setup fails.

If an MS requesting an alternate dormant mode packet handoff is successfully authenticated or if the MSC chose not to perform authentication, the MSC sends the ADDS Transfer Ack message with the same Tag IE as in ADDS Transfer message to the BS. The BS stops timer T_{60} upon receipt of the message, and the alternate dormant mode handoff is allowed to proceed.

Alternatively, the MSC may optionally allow the alternate dormant mode handoff to begin prior to completion of authentication procedures for the MS. In this case, the MSC sends an ADDS Transfer Ack message with the same Tag IE as in ADDS Transfer message and a cause value set to concurrent authentication to the BS. The MSC then sends a second ADDS Transfer message with the same Tag IE as in the ADDS Transfer message to the BS when the MSC has received the authentication results. The BS stops timer T_{60} upon receipt of the second ADDS Transfer Ack message. If the MSC includes a cause value indicating authentication failure in the ADDS Transfer Ack message, the BS shall stop the alternate dormant mode handoff.

Note: The second ADDS Transfer Ack message is not sent if an underlying signaling connection was requested by the BS when a traffic channel is required. In this case, the BS stops timer T_{60} upon sending the CM Service Request message.

2.6.4.2 Failure Operation

None.

2.6.5 ADDS Deliver

This DTAP message is sent from the MSC to the BS or from the BS to the MSC to transfer an application data message exchanged over the traffic channel.

2.6.5.1 Successful Operation

When the MSC or BS needs to deliver an application data message while a traffic channel exists, the sender includes that application data message (SMS, PDS, SDB or OTASP) in an ADDS Deliver message and sends it across the A1 or A1p interface.

In the MSC to BS direction, the Tag IE, when present, indicates to the BS that a Layer 2 Ack is required from the MS. It can be used by the MSC to uniquely identify the ADDS Deliver message. If the Tag IE is present in the ADDS Deliver message, then the BS shall save it and return the same value in the Tag IE of the ADDS Deliver Ack message.

2.6.5.2 Failure Operation

If a Layer 2 Ack is not received from the MS, the BS shall initiate call clearing.

2.6.6 ADDS Deliver Ack

This DTAP message is sent from the BS to the MSC when the BS receives a Layer 2 Ack from the MS for an ADDS Deliver message that contains a Tag IE. In the case of OTASP, PDS and SMS, this message is sent from the BS to the MSC to report that an acknowledgment or a rejection from the MS has been received for application data delivery.

2.6.6.1 Successful Operation

The BS sends this message when it receives a Layer 2 Ack from the MS and the corresponding ADDS Deliver message received from the MSC contained a Tag IE.

2.6.6.2 Failure Operation

None.

2.7 Error Handling Message Procedures

2.7.1 Rejection

The Rejection message is used by the BS to indicate to the MSC that the MS has indicated rejection of a command/message. This is coded as a BSMAP message when triggered by a Mobile Station Reject Order on the access channel and a DTAP message otherwise.

2.7.1.1 Successful Operation

When the BS receives a rejection indication (e.g., a Mobile Station Reject Order) it shall send the Rejection message to the MSC only in the cases listed below. No response is expected from the MSC.

The Rejection message shall only be used in conjunction with a Mobile Station Reject Order received as a response to an ADDS Page or ADDS Deliver operation (i.e., Data Burst).

2.7.1.2 Failure Operation

None.

2.8 Network Directed System Selection (NDSS) Message Procedures

2.8.1 Service Redirection

This DTAP message is sent by the MSC to the BS to cause the BS to redirect the MS to another system.

2.8.1.1 Successful Operation

The MSC sends a Service Redirection message to the BS when an MS is to be redirected to another system. Upon receipt of this message, the BS stops timer T_{3210} and/or timer T_{303} if they are running and sends the appropriate redirection message to the MS (refer to [5]).

2.8.1.2 Failure Operation

None.

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3.0 Message Formats

3.1 Call Processing Messages

3.1.1 Complete Layer 3 Information

This BSMAP message is sent from the BS to the MSC upon receipt of the first message from the MS. This message contains a CM Service Request message (refer to section 3.1.2), a Paging Response message (refer to section 3.1.5), or a Location Updating Request message (refer to section 3.3.7).

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	BS -> MSC	M
Cell Identifier	4.2.17	BS -> MSC	M[a]
Layer 3 Information	4.2.30	BS -> MSC	M

a. This element identifies the cell where the service request was received from the MS. Discriminator type ‘0000 0010’ (Cell ID) shall be used in the complete Layer 3 Information message.

The bitmap below is included for information only. It is already included (shaded in gray) in the bitmaps for the CM Service Request, Paging Response and Location Updating Request messages.

3.1.1 Complete Layer 3 Information

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [57H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Cell Identifier: A1 Element Identifier = [05H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [03H]</td><td>2</td></tr>
<tr><td colspan="8">Cell Identification Discriminator = [02H]</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">Cell = [001H-FFFH]</td><td>4</td></tr>
<tr><td colspan="4"></td><td colspan="3">Sector = [0H-FH](0H = Omni)</td><td>(LSB)</td><td>5</td></tr>
<tr><td colspan="8">⇒ Layer 3 Information: A1 Element Identifier = [17H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable> (# of bytes included in the following message)</td><td>2</td></tr>
<tr><td colspan="8">Contents of Layer 3 Message:
CM Service Request, Paging Response or Location Updating Request</td><td>1</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="8"></td><td>n</td></tr>
</table>

3.1.2 CM Service Request

This DTAP message is sent from the BS to the MSC to request a service for the connection management sub-layer entities, e.g., circuit switched and packet connection establishment and activation of supplementary services.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M[m]	
Reserved – Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
CM Service Type	4.2.39	BS -> MSC	M[m, u]	
Classmark Information Type 2	4.2.12	BS -> MSC	M[a, m, q, u]	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	M[m, u]	
Called Party BCD Number	4.2.40	BS -> MSC	O[b]	C
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[z]	C
Slot Cycle Index	4.2.14	BS -> MSC	O[c,r]	C
Authentication Response Parameter (AUTHR)	4.2.36	BS -> MSC	O[d]	C
Authentication Confirmation Parameter (RANDC)	4.2.33	BS -> MSC	O[e]	C
Authentication Parameter COUNT	4.2.37	BS -> MSC	O[x]	C
Authentication Challenge Parameter (RAND)	4.2.35	BS -> MSC	O[f]	C
Service Option	4.2.49	BS -> MSC	O[g, m]	R
Voice Privacy Request	4.2.11	BS -> MSC	O[x,ee]	C
Radio Environment and Resources	4.2.58	BS -> MSC	O[h]	R
Called Party ASCII Number	4.2.59	BS -> MSC	O[i]	C
Circuit Identity Code	4.2.19	BS -> MSCcs	O[j]	C
Authentication Event	4.2.61	BS -> MSC	O[k]	C
Authentication Data	4.2.62	BS -> MSC	O[l]	C
PACA Reorigination Indicator	4.2.69	BS -> MSC	O[n]	C
User Zone ID	4.2.26	BS -> MSC	O[x]	C
IS-2000 Mobile Capabilities	4.2.53	BS -> MSC	O[o, r, y]	C
CDMA Serving One Way Delay	4.2.57	BS -> MSC	O[p]	C
Special Service Call Indicator	4.2.21	BS -> MSC	O[s]	C
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	O[t]	C
Origination Continuation Indicator	4.2.81	BS -> MSC	O[v]	C
Return Cause	4.2.83	BS -> MSC	O[w]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[x]	C
A2p Bearer Session-Level Parameters	4.2.89	BS -> MSCe	O[aa, cc]	C
A2p Bearer Format-Specific Parameters	4.2.90	BS -> MSCe	O[bb, cc]	C
Mobile Subscription Information	4.2.91	BS -> MSC	O[dd]	C
Enhanced Voice Privacy Request	4.2.98	BS -> MSC	O[r,x,ee]	C

Information Element	Section Reference	Element Direction	Type	
Encryption and Integrity Info	4.2.99	BS -> MSC	$O^{r,x}$	C

a. If an MS is capable of multiple band classes, and this information is available at the BS, this shall be indicated in the band class entry field as shown in section 4.2.12.

b. This element is included when Digit_Mode=0, i.e. BCD digits are received by the BS from the MS.

If both the Special Service Call Indicator element and the Origination Continuation Indicator element are not present in this message, either the Called Party ASCII Number element or the Called Party BCD Number element shall be present (except for packet data calls (service option 0021H) or PDS calls (service options 0023H or 0024H)), but not both simultaneously. If both this element and the Called Party ASCII Number element are missing, or both are present, the MSC may initiate call failure handling (except for packet data calls (service option 0021H) or PDS calls (service options 0023H or 0024H)).

If the Special Service Call Indicator element is not present and the Origination Continuation Indicator element is present in this message, either the Called Party ASCII Number element or the Called Party BCD Number element may be present (except for packet data calls (service option 0021H) or PDS calls (service options 0023H or 0024H)), but not both simultaneously. If both this element and the Called Party ASCII Number element are present, the MSC may initiate call failure handling.

If the Special Service Call Indicator element is present in this message, the message is valid if either the Called Party ASCII Number element or the Called Party BCD Number element is present, or if both elements are absent from the message. If both elements are present, the MSC may initiate call failure handling.

c. This element applies only to MSs operating in slotted mode (discontinuous reception). It contains the sign and index value used in paging channel slot computation [1]. The Slot Cycle Index shall be stored by the MSC, and returned to the BS for call termination to the MS to ensure that the Paging Message is broadcast in the paging channel slots monitored by the MS.

d. This optional element contains the authentication response signature (AUTHR) received from an authentication capable MS when broadcast authentication is active.

e. This element contains the RANDC received from the MS. RANDC shall be included whenever it is received from the MS and authentication is enabled.

f. This element is included where broadcast authentication is performed, and contains the random number (RAND) value used when the BS is responsible for RAND assignment and can correlate this parameter with the RAND used by the MS in its authentication computation.

g. If no service option is received from the MS, the Service Option element is set to 0001H (8K speech). Note, this service option is not explicitly supported in this specification.

h. If the MS has been or is being placed on a radio traffic channel prior to the Assignment Request message, the BS shall set the Alloc field to “Resources are allocated” and the Avail field shall be set to “Resources are available”.

i. This element contains information on the called party number coded as an ASCII string. This element is included when Digit_Mode of value = 1, i.e. ASCII digit is received by the BS from the MS. If both the Special Service Call Indicator element and the Origination Continuation Indicator element are not present in this message, either the Called Party ASCII Number element or the Called Party BCD Number element shall be present (except for packet data calls (service option 0021H) or PDS calls (service options 0023H or 0024H)), but not both simultaneously. If both this element and the Called Party BCD Number element are missing, or both are present, the MSC may initiate call failure handling (except for packet data calls, service option 0021H) or PDS calls (service options 0023H or 0024H).

If the Special Service Call Indicator element is not present and the Origination Continuation Indicator element is present in this message, either the Called Party ASCII Number element or the Called Party BCD Number element may be present (except for packet data calls (service option 0021H) or PDS calls (service options 0023H or 0024H)), but not both simultaneously. If both this element and the Called Party ASCII Number element are present, the MSC may initiate call failure handling.

If the Special Service Call Indicator element is present in this message, the message is valid if either the Called Party ASCII Number element or the Called Party BCD Number element is present, or if both elements are absent from the message. If both elements are present, the MSC may initiate call failure handling

j. This element is included when the BS requests a preferred terrestrial circuit.

k. This element is present when an authentication enabled BS does not receive the authentication parameters (AUTHR, RANDC and COUNT) from the MS, or when a RAND/RANDC mismatch has occurred, or if authentication was recently requested and a new authentication is not required.

l. This element is required when the service option is Async Data, Group 3 Fax, or Circuit Switched Video Conferencing. It may be optionally included for other calls. If this element is absent and the Service Option element indicates an Async Data, Group 3 Fax, or Circuit Switched Video Conferencing call, then the MSC may initiate call failure handling.

m. If any of these elements are not correctly present, call failure handling may be initiated by the MSC.

n. This element is included if the air interface Origination message indicated PACA reorigination.

o. This element is only included when the MS operates at revision level 6 or greater as defined by [1]~[6].

p. This IE is included if applicable to the geo-location technology and if this technology is supported at the base station.

q. When the BS is operating in DS-41 mode, only the following fields in the Classmark Type 2 IE shall be considered valid by the MSC: MOB_P_REV, NAR_AN_CAP, Mobile Term, PSI (PACA Supported Indicator), SCM Length, Count of Band Class Entries, Band Class Entry Length, Band Class n, Band Class n Air Interfaces Supported, Band Class n MOB_P_REV.

r. These elements shall not be included by the BS when the BS and MS are operating in DS-41 mode.

s. This element is included if the air interface Origination message indicates that the user is attempting to initiate a Global Emergency Call.

t. This element is required if concurrent services are supported.

u. Because this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included.

v. This element is included if the air interface Origination Message indicates that an Origination Continuation Message is to follow.

w. This element is included if the MS re-sends the Origination message with Return Cause to the BS because it failed to be redirected to the desired system.

x. This IE is included if the necessary information was received from the MS.

y. If the BS does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

z. This IE is not required to be sent if the MEID is sent and the ESN is not received from the MS. It shall be sent in all other cases (i.e., this IE shall be sent if the ESN is received from the MS).

aa. If an A2p connection is required, the BS may send this element to indicate the session-level parameters to be used for this call. If the BS does not have the information required to correctly populate this IE, it shall omit this element.

bb. The BS may send this element to indicate the bearer format or formats that are supported for this call. If the BS does not have the information required to correctly populate this IE, it shall omit this element. The highest priority bearer format contained in this IE and the Service Option IE should be consistent. If they are not consistent, then the bearer format specified by this element shall take precedence.

cc If an A2p connection is required, the BS shall include both the A2p Bearer Session-Level Parameters IE and the A2p Bearer Format-Specific Parameters IE or neither one.

dd. If an MS is capable of multiple band classes and at least one band class has band subclasses defined, the BS shall include the MS's band class and/or band subclass capabilities in this element as shown in section 4.2.91 if this information is available at the BS. When included, the band class and band subclass information in this IE shall take precedence over any band class information included in the Classmark Information Type 2 IE.

Note that [5] introduced air interface signaling improvements that allows the BS to determine the MS's band class and band subclass capabilities prior to sending this message.

ee. Either the Voice Privacy Request IE or the Enhanced Voice Privacy Request IE may be sent. If both IEs are received, the Enhanced Voice Privacy shall take precedence.

The following message layout contains the Complete Layer 3 Info message (shaded in gray) encapsulating the CM Service Request message. Refer to section 3.1.1.

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [57H]								1
⇒ **Cell Identifier:** A1 Element Identifier = [05H]								1
Length = [03H]								2
Cell Identification Discriminator = [02H]								3
(MSB)	Cell = [001H-FFFH]							4
				Sector = [0H-FH] (0H = Omni)			(LSB)	5
⇒ **Layer 3 Information:** A1 Element Identifier = [17H]								1
Length = <variable> (# of bytes included in the following message)								2
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011] (Call Processing & Supplementary Services)				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [24H]								1
⇒ **CM Service Type:** A1 Element Identifier = [1001]				Service Type = [0001] (Mobile Originating Call)				1
⇒ **Classmark Information Type 2:** Length = <variable>								1
MOB_P_REV = [000 – 111]			Reserved = [0]	See List of Entries = [0,1]	RF Power Capability = [000-010]			2
Reserved = [00H]								3
NAR_ AN_ CAP = [0,1]	IS-95 = [1]	Slotted = [0,1]	Reserved = [00]		DTX = [0,1]	Mobile Term = [0,1]	TIA/ EIA-553 = [0,1]	4
Reserved = [00H]								5
Reserved = [000000]						Mobile Term = [0,1]	PSI = [0,1]	6
SCM Length = [01H]								7
Station Class Mark = [00H – FFH]								8
Count of Band Class Entries = [01H-20H]								9
Band Class Entry Length = [03H]								10

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
Mobile Band Class Capability Entry {1+:								
Reserved = [000]			Band Class n = [00000-11111]					k
Band Class n Air Interfaces Supported = [00H-FFH]								k+1
Band Class n MOB_P_REV = [00H-FFH]								k+2
} Mobile Band Class Capability Entry								
⇒ **Mobile Identity (IMSI):** Length = [06H-08H] (10-15 digits)								1
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			2
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				3
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Called Party BCD Number:** A1 Element Identifier = [5EH]								1
Length = [00H-11H]								2
= [1]	Type of Number = [000-111]			Number Plan Identification = [0000-1111]				3
Number Digit/End Mark 2 = [0000-1111]				Number Digit/End Mark 1 = [0000-1111]				4
Number Digit/End Mark 4 = [0000-1111]				Number Digit/End Mark 3 = [0000-1111]				5
…								…
Number Digit/End Mark m+1 = [0000-1111]				Number Digit/End Mark m = [0000-1111]				n
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
⇒ **Authentication Response Parameter (AUTHR):** A1 Element Identifier = [42H]								1
Length = [04H]								2
Reserved = [0000]				Auth Signature Type = [0001] (AUTHR)				3
[0]	[0]	[0]	[0]	[0]	[0]	(MSB)		4
Auth Signature = <any value>								5
							(LSB)	6
⇒ **Authentication Confirmation Parameter (RANDC):** A1 Element Identifier = [28H]								1
RANDC = [00H-FFH]								2
⇒ **Authentication Parameter COUNT:** A1 Element Identifier = [40H]								1
Reserved = [00]		Count = [000000-111111]						2
⇒ **Authentication Challenge Parameter (RAND):** A1 Element Identifier = [41H]								1
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)	RAND = <any value>							4
								5
								6
							(LSB)	7
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option = <any value>							2
							(LSB)	3
⇒ **Voice Privacy Request:** A1 Element Identifier = [A1H]								1
⇒ **Radio Environment and Resources:** A1 Element Identifier = [1DH]								1
Reserved = [0]	Include Priority = [0,1]	Forward = [00]		Reverse = [00]		Alloc = [0,1]	Avail = [0,1]	2
⇒ **Called Party ASCII Number:** A1 Element Identifier = [5BH]								1
Length = <variable>								2
ext = [1]	Type of Number = [000-111]			Numbering Plan Identification = [0000-1111]				3
ASCII character 1 = <any value>								4
ASCII character 2 = <any value>								5
…								**…**
ASCII character n = <any value>								n
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
		(LSB)	Timeslot = [00000-11111]					3
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1
Length = [01H]								2
Event = [01H, 02H, 03H] (Parameters not received, RANDC/RAND mismatch, Authentication Recently Requested)								3
⇒ **Authentication Data:** A1 Element Identifier = [59H]								1
Length = [03H]								2
(MSB)	Auth-Data = <any value>							3
								4
							(LSB)	5
⇒ **PACA Reorigination Indicator:** A1 Element Identifier = [60H]								1
Length = [01H]								2
Reserved = [0000 000]							PRI = [1]	3
⇒ **User Zone ID:** A1 Element Identifier = [02H]								1
Length = [02H]								2
(MSB)	UZID = <any value>							3
							(LSB)	4
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								4
Reserved = [0]	Geo Location Type = [000, 001, 010, 011]			Geo Location Included = [0,1]	FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			5
(MSB)								6
FCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
DCCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								k+1
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			k+2
(MSB)								k+3
DCCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	m
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								m+1
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			m+2
(MSB)								m+3
FOR_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000 to 0000 0010]								q+1
(MSB)	Additional Geo Location Type = <any value>							q+2
…								…
							(LSB)	r
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [08H, 0BH]								2
Cell Identification Discriminator = [02H, 07H]								3
IF (Discriminator = 02H), Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							j
			Sector = [0H-FH] (0H = Omni)				(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSC_ID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
			Sector = [0H-FH] (0H = Omni)				(LSB)	j+4
} Cell Identification								
(MSB)	CDMA Serving One Way Delay = [0000H-FFFFH]							k
							(LSB)	k+1
Reserved = [0000 00]						Resolution = [00, 01, 10]		k+2
(MSB)	CDMA Serving One Way Delay Time Stamp = [00 00H – FF FFH]							k+3
							(LSB)	k+4
⇒ **Special Service Call Indicator:** A1 Element Identifier = [5AH]								1
Length = [01H]								2
Reserved = [0000 00]						MOPD = [0,1]	GECI = [1]	3
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2

3.1.2 CM Service Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="5">Reserved = [0000 0]</td><td colspan="3">Service Option Connection Identifier = [001 - 110]</td><td>3</td></tr>
<tr><td colspan="8">⇒ Origination Continuation Indicator: A1 Element Identifier = [A0H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Return Cause: A1 Element Identifier = [68H]</td><td>1</td></tr>
<tr><td colspan="4">Reserved</td><td colspan="4">Return_Cause =
[0000 (Normal access),
0001 (System not found),
0010 (Protocol mismatch),
0011 (Registration rejection),
0100 (Wrong SID),
0101 (Wrong NID)]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (MEID): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [08H]</td><td>2</td></tr>
<tr><td colspan="4">MEID Hex Digit 1 = [0H-FH]</td><td>Odd/ Even Indicator = ‘0’</td><td colspan="3">Type of Identity = [001] (MEID)</td><td>3</td></tr>
<tr><td colspan="4">MEID Hex Digit 3 = [0H-FH]</td><td colspan="4">MEID Hex Digit 2 = [0H-FH]</td><td>4</td></tr>
<tr><td colspan="4">MEID Hex Digit 5 = [0H-FH]</td><td colspan="4">MEID Hex Digit 4 = [0H-FH]</td><td>5</td></tr>
<tr><td colspan="4">MEID Hex Digit 7 = [0H-FH]</td><td colspan="4">MEID Hex Digit 6 = [0H-FH]</td><td>6</td></tr>
<tr><td colspan="4">MEID Hex Digit 9 = [0H-FH]</td><td colspan="4">MEID Hex Digit 8 = [0H-FH]</td><td>7</td></tr>
<tr><td colspan="4">MEID Hex Digit 11 = [0H-FH]</td><td colspan="4">MEID Hex Digit 10 = [0H-FH]</td><td>8</td></tr>
<tr><td colspan="4">MEID Hex Digit 13 = [0H-FH]</td><td colspan="4">MEID Hex Digit 12 = [0H-FH]</td><td>9</td></tr>
<tr><td colspan="4">Fill = [FH]</td><td colspan="4">MEID Hex Digit 14 = [0H-FH]</td><td>10</td></tr>
<tr><td colspan="8">⇒ A2p Bearer Session-Level Parameters: A1p Element Identifier [45H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="3">Max Frames = [000 to 101]</td><td colspan="2">Session IP Address Type = [00 = IPv4]</td><td>Session Addr Flag = [0,1]</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">Session IP Address = <any value></td><td>i</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j</td></tr>
<tr><td>(MSB)</td><td colspan="7">Session UDP Port = <any value></td><td>j+1</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j+2</td></tr>
<tr><td colspan="8">⇒ A2p Bearer Format-Specific Parameters: A1p Element Identifier = [46H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="6">Number of Bearer Formats = <variable></td><td colspan="2">Bearer IP Address Type= [00 = IPv4]</td><td>3</td></tr>
</table>

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6

3.1.2 CM Service Request

7	6	5	4	3	2	1	0	Octet
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								
⇒ **Enhanced Voice Privacy Request:** A1 Element Identifier = [4CH]								1
Length = [02H]								2
VP Algorithm Requested <any value>								3
VP Algorithms Supported <any value>								4
⇒ **Encryption and Integrity Info:** A1 Element Identifier = [4DH]								1
Length = 07H								2
Reserved = 00 0000						KEY_ID		3
(MSB)	Crypto-Sync							4
…								5
…								6
							(LSB)	7
Encryption Algorithms Supported								8
Integrity Algorithms Supported								9

3.1.3 CM Service Request Continuation

This DTAP message is sent from the BS to the MSC when the BS receives an Origination Continuation Message from the MS.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Called Party BCD Number	4.2.40	BS -> MSC	O[a]	C
Called Party ASCII Number	4.2.59	BS -> MSC	O[b]	C
MS Information Records	4.2.55	BS -> MSC	O[c]	C

a. This element is included when Digit_Mode = 0, i.e. BCD digits are received by the BS from the MS. The digits are copied from the Origination Continuation Message.

b. This element contains information on the called party number coded as an ASCII string. It is included when Digit Mode of value = 1, i.e. ASCII digit is received by the BS from the MS. The digits are copied from the Origination Continuation Message.

c. This element is included if the Origination Continuation message included information records carrying other relevant information to be sent to the MSC.

The following table shows the bitmap layout for the CM Service Request Continuation message.

3.1.3 CM Service Request Continuation

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				**Protocol Discriminator** = [0011] (Call Processing & Supplementary Services)				1
⇒ **Reserved – Octet** = [00H]								1
⇒ **Message Type** = [25H]								1
⇒ **Called Party BCD Number:** A1 Element Identifier = [5EH]								1
Length = [00H-11H]								2
= [1]	Type of Number = [000-111]			Number Plan Identification = [0000-1111]				3
Number Digit/End Mark 2 = [0000-1111]				Number Digit/End Mark 1 = [0000-1111]				4
Number Digit/End Mark 4 = [0000-1111]				Number Digit/End Mark 3 = [0000-1111]				5
…								…
Number Digit/End Mark m+1 = [0000-1111]				Number Digit/End Mark m = [0000-1111]				n

3.1.3 CM Service Request Continuation

7	6	5	4	3	2	1	0	Octet
⇒ **Called Party ASCII Number:** A1 Element Identifier = [5BH]								1
Length = <variable>								2
ext = [1]	Type of Number = [000-111]			Numbering Plan Identification = [0000-1111]				3
ASCII character 1 = <any value>								4
ASCII character 2 = <any value>								5
…								…
ASCII character n = <any value>								n
⇒ **MS Information Records:** A1 Element Identifier = [15H]								1
Length = [01H-FFH]								2
Information Record: {1+:								
Information Record Type = [00H-FFH]								j
Information Record Length = <variable>								j+1
(MSB)	Information Record Content = <any value>							j+2
…								…
							(LSB)	k
} Information Record								

3.1.4 Paging Request

This BSMAP message is sent from MSC to BS and contains sufficient information to allow the paging to be transmitted by the correct cells, in the correct format at the correct time.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI/ESN)	4.2.13	MSC -> BS	M[a]	
Tag	4.2.46	MSC -> BS	O[h]	C
Cell Identifier List	4.2.18	MSC -> BS	O[b]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[c,f]	C
Service Option	4.2.49	MSC -> BS	O[d,k]	R
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[e,f,i]	C
Protocol Revision	4.2.79	MSC -> BS	O[g]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[f, e,n]	C
A2p Bearer Format-Specific Parameters	4.2.90	MSCe -> BS	O[j]	C
Mobile Identity (MEID)	4.2.13	MSC -> BS	O[l]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[m]	C

a. This element shall be set to ESN when the BS and MS are operating in DS-41 mode and IMSI otherwise[5].

b. This element is only required for a multi-cell BS. More than one cell identifier element may be included to allow the paging request of several cells within a BS on receipt of a single paging request message from the MSC. When absent, paging request at all cells controlled by the BS is assumed.

c. This element is included where slotted paging is performed on the paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. If this element is absent, then it is assumed that the MS is operating in non-slotted mode.

d. The MSC may decide to page the MS with the preferred service option selected from the subscribed service option record.

e. This element is only included when the MSC has previously been given this information by a BS.

f. These elements shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

g. This element contains the MS's MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

h. If this element is present in the message, the value shall be saved at the BS to be included in the corresponding Paging Response message.

i. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

5 In DS-41 mode, ESN is used because an IMSI may not be available, e.g., emergency calls to an MS without a subscriber identity module.

j. The MSCe may include this element to indicate the preferred service options for paging. The highest priority bearer format contained in this IE and the Service Option IE should be consistent. If they are not consistent, then the Service Option IE shall take precedence.

k. When sent from an MSCe, only service options with equivalent A2p bearer formats (refer to section 4.2.90) are allowed.

l. This IE is included if the MEID is available at the MSC.

m. If available at the MSC, the MSC shall include a Band Class/Band Subclass Record within this element to report the last known band class and band subclass (if applicable) as well as any other band classes and band subclasses supported by the MS.

n. For BCMCS, this IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.

The following table shows the bitmap layout for the Paging Request message.

3.1.4 Paging Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
Message Type = [52H]								1
⇒ **Mobile Identity (IMSI/ESN):** A1 Element Identifier = [0DH]								1
Length = [05H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [101 (ESN),110 (IMSI)]			3
IF(Type of Identity = 101), Identity {1:								
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
} OR IF (Type of Identity = 110), Identity {1:								
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
} Type of Identity								
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3

3.1.4 Paging Request

7	6	5	4	3	2	1	0	Octet
								4
							(LSB)	5
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2

3.1.4 Paging Request

7	6	5	4	3	2	1	0	Octet
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 801FH (13K Markov), 0009H (13K Loopback), 0004H (Async Data Rate Set 1), 000CH (Async Data Rate Set 2), 0005H (G3 Fax Rate Set 1), 000DH (G3 Fax Rate Set 2), 0006H (SMS Rate Set 1), 000EH (SMS Rate Set 2), 0021H (3G High Speed Packet Data), 0012H (OTAPA Rate Set 1), 0013H (OTAPA Rate Set 2), 0025H (ISDN Interworking Service), 0020H (TDSO), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback), 0023H (PDS Rate Set 1), 0024H (PDS Rate Set 2), 0038H (SMV), 0039H (32 kbps Circuit Switched Video Conferencing), 003AH (64 kbps Circuit Switched Video Conferencing)]							(LSB)	3
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								4

3.1.4 Paging Request

7	6	5	4	3	2	1	0	Octet
Reserved = [0]	Geo Location Type = <any value> (Ignored)			Geo Location Included = <any value> (Ignored)	FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			5
(MSB)								6
FCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
DCCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								k+1
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			k+2
(MSB)								k+3
DCCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	m
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								m+1
Reserved = [0000 0]						FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]		m+2
(MSB)								m+3
FOR_PDCH Information Content = <any value>								…

3.1.4 Paging Request

7	6	5	4	3	2	1	0	Octet
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>					Bearer IP Address Type= [00 = IPv4]			3

3.1.4 Paging Request

7	6	5	4	3	2	1	0	Octet
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8

3.1.4 Paging Request

7	6	5	4	3	2	1	0	Octet
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

3.1.5 Paging Response

This DTAP message is sent from the BS to the MSC when the BS receives a page response message from an MS or when the BS utilizes direct channel assignment and the BS begins receiving traffic channel preamble frames from the MS on the reverse traffic channel.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M^{j}	
Reserved – Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Classmark Information Type 2	4.2.12	BS -> MSC	$M^{a, j, l, p, y}$	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	$M^{j, p}$	
Tag	4.2.46	BS -> MSC	O^{q}	C
Mobile Identity (ESN)	4.2.13	BS -> MSC	O^{u}	C
Slot Cycle Index	4.2.14	BS -> MSC	$O^{b,m}$	C
Authentication Response Parameter (AUTHR)	4.2.36	BS -> MSC	O^{c}	C
Authentication Confirmation Parameter (RANDC)	4.2.33	BS -> MSC	O^{d}	C
Authentication Parameter COUNT	4.2.37	BS -> MSC	O^{r}	C
Authentication Challenge Parameter (RAND)	4.2.35	BS -> MSC	O^{e}	C
Service Option	4.2.49	BS -> MSC	$O^{f, j}$	R
Voice Privacy Request	4.2.11	BS -> MSC	$O^{r,z}$	C
Circuit Identity Code	4.2.19	BS -> MSCcs	O^{g}	C
Authentication Event	4.2.61	BS -> MSC	$O^{h, t}$	C
Radio Environment and Resources	4.2.58	BS -> MSC	O^{i}	R
User Zone ID	4.2.26	BS -> MSC	O^{r}	C
IS-2000 Mobile Capabilities	4.2.53	BS -> MSC	$O^{k, m, s}$	C
CDMA Serving One Way Delay	4.2.57	BS -> MSC	$O^{n, m}$	C
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	$O^{m, o}$	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O^{r}	C
A2p Bearer Session-Level Parameters	4.2.89	BS -> MSCe	$O^{v, x}$	C
A2p Bearer Format-Specific Parameters	4.2.90	BS -> MSCe	$O^{w, x}$	C
Enhanced Voice Privacy Request	4.2.98	BS -> MSC	$O^{r,m,z}$	C
Encryption and Integrity Info	4.2.99	BS -> MSC	$O^{r,m}$	C

a. If an MS is capable of supporting multiple band classes, and this information is available at the BS, it shall be indicated in the Band Class Entry field as shown in section 4.2.12.

b. This element applies only to MSs operating in slotted mode (discontinuous reception). It contains the sign and index value used in paging channel slot computation [1]. The Slot Cycle Index shall be stored by the MSC, and returned to the BS for call termination to the MS to ensure that the paging message is broadcast in the *cdma2000* paging channel slots monitored by the MS.

c. This element contains the authentication response signature (AUTHR) received from an authentication capable MS when broadcast authentication is active.

d. This element contains the RANDC received from the MS. RANDC shall be included whenever it is received from the MS and authentication is enabled.

e. This element is included when broadcast authentication is performed, and contains the random number (RAND) value used when the BS is responsible for RAND assignment and can correlate this parameter with the RAND used by the MS in its authentication computation.

f. If no service option is received from the MS, the Service Option element is set to 0001H (8K speech). Note, this service option is not explicitly supported in this specification.

g. This element is included when the BS requests a preferred terrestrial circuit.

h. This element is present when an authentication enabled BS does not receive the authentication parameters (AUTHR, RANDC and COUNT) from the MS, or when a RAND/RANDC mismatch has occurred.

i. If the MS has been or is being placed on a radio traffic channel prior to the Assignment Request message, the BS shall set the Alloc field to “Resources are allocated” and the Avail field shall be set to “Resources are available”.

j. If any of these elements are not correctly present, call failure handling may be initiated by the MSC.

k. This element is only included when the MS operates at revision level 6 or greater as defined by [1]~[6].

l. When the BS is operating in DS-41 mode, only the following fields in the Classmark Type 2 IE shall be considered valid by the MSC: MOB_P_REV, NAR_AN_CAP, Mobile Term, PSI (PACA Supported Indicator), SCM Length, Count of Band Class Entries, Band Class Entry Length, Band Class n, Band Class n Air Interfaces Supported, Band Class n MOB_P_REV.

m. These elements shall not be included by the BS when the BS and MS are operating in DS-41 mode.

n. This IE is included if applicable to the geo-location technology and if this technology is supported at the base station.

o. This element is required if concurrent services are supported.

p. Because this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included.

q. If the Tag IE was received from the MSC in the Paging Request message, the BS shall include the Tag IE. The Tag value used in this message shall be the same as the Tag value received from the MSC in the Paging Request message.

r. This IE is included if the necessary information was received from the MS.

s. If the BS does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

t. If the BS assigns a traffic channel as a part of the paging process, it shall return a value of ‘04H’ in the Authentication Event IE. In this case, the BS may not have the information required to populate the Classmark Info Type 2 and Mobile Identity (ESN) IEs, and these elements should be disregarded by the MSC.

u. This IE is not required to be sent if the MEID is sent and the ESN is not received from the MS. It shall be sent in all other cases (i.e., this IE shall be sent if the ESN is received from the MS).

v. If an A2p connection is required, the BS may send this element to indicate the session-level parameters to be used for this call. If the BS does not have the information required to correctly populate a field in this IE, it shall omit this element.

w. The BS may send this element to indicate the bearer format or formats that are supported for the call. If the BS does not have the information required to correctly populate a field in this IE, it shall omit this element. The highest priority bearer format contained in this IE and the Service Option IE should be consistent. If they are not consistent, then the bearer format specified by this element shall take precedence.

x. If an A2p connection is required, the BS shall include both the A2p Bearer Session-Level Parameters IE and the A2p Bearer Format-Specific Parameters IE or neither one.

y. If the Station Classmark value is not received from the MS, the Station Class Mark octet shall be set to all zeros.

z. Either the Voice Privacy Request IE or the Enhanced Voice Privacy Request IE may be sent. If both IEs are received, the Enhanced Voice Privacy shall take precedence.

The following message layout contains the Complete Layer 3 Info message (shaded in gray) encapsulating the Paging Response message. Refer to section 3.1.1.

3.1.5 Paging Response

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [57H]								1
⇒ **Cell Identifier:** A1 Element Identifier = [05H]								1
Length = [03H]								2
Cell Identification Discriminator = [02H]								3
(MSB)	Cell = [001H-FFFH]							4
				Sector = [0H-FH] (0H = Omni)			(LSB)	5
⇒ **Layer 3 Information:** A1 Element Identifier = [17H]								1
Length = <variable> (# of bytes included in the following message)								2
Reserved = [0000]				⇒ Protocol Discriminator = [0011] (Call Processing & Supplementary Services)				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [27H]								1
⇒ **Classmark Information Type 2:** Length = <variable>								1
MOB_P_REV = [000 – 111]			Reserved = [0]	See List of Entries = [0,1]	RF Power Capability = [000-010]			2

3.1.5 Paging Response

7	6	5	4	3	2	1	0	Octet
Reserved = [00H]								3
NAR_ AN_ CAP = [0,1]	IS-95 = [1]	Slotted = [0,1]	Reserved = [00]		DTX = [0,1]	Mobile Term = [0,1]	TIA/ EIA-553 = [0,1]	4
Reserved = [00H]								5
Reserved = [0000 00]						Mobile Term = [0,1]	PSI = [0,1]	6
SCM Length = [01H]								7
Station Class Mark = [00H – FFH]								8
Count of Band Class Entries = [01H-20H]								9
Band Class Entry Length = [03H]								10
Mobile Band Class Capability Entry {1+:								
Reserved = [000]			Band Class n = [00000-11111]					k
Band Class n Air Interfaces Supported = [00H-FFH]								k+1
Band Class n MOB_P_REV = [00H-FFH]								k+2
} Mobile Band Class Capability Entry								
⇒ **Mobile Identity (IMSI):** Length = [06H-08H] (10-15 digits)								1
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			2
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				3
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2

3.1.5 Paging Response

7	6	5	4	3	2	1	0	Octet
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒ **Authentication Response Parameter (AUTHR):** A1 Element Identifier = [42H]								1
Length = [04H]								2
Reserved = [0000]				Auth Signature Type = [0001] (AUTHR)				3
= [0]	= [0]	= [0]	= [0]	= [0]	= [0]	(MSB)		4
Auth Signature = <any value>								5
							(LSB)	6
⇒ **Authentication Confirmation Parameter (RANDC):** A1 Element Identifier = [28H]								1
RANDC = [00H-FFH]								2
⇒ **Authentication Parameter COUNT:** A1 Element Identifier = [40H]								1
Reserved = [00]		Count = [00 0000 - 11 1111]						2
⇒ **Authentication Challenge Parameter (RAND):** A1 Element Identifier = [41H]								1
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)	RAND Value = <any value>							4
								5
								6
							(LSB)	7
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option = <any value>							2
							(LSB)	3
⇒ **Voice Privacy Request:** A1 Element Identifier = [A1H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1

3.1.5 Paging Response

7	6	5	4	3	2	1	0	Octet
Length = [01H]								2
Event = [01H, 02H, 04H] (Parameters not received, RANDC/RAND mismatch, Direct channel assignment)								3
⇒ **Radio Environment and Resources:** A1 Element Identifier = [1DH]								1
Reserved = [0]	Include Priority = [0,1]	Forward = [00]		Reverse = [00]		Alloc = [0,1]	Avail = [0,1]	2
⇒ **User Zone ID:** A1 Element Identifier = [02H]								1
Length = [02H]								2
(MSB)	UZID = <any value>							3
							(LSB)	4
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								4
Reserved = [0]	Geo Location Type = [000] (Ignored)			Geo Location Included = [0] (Ignored)	FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			5
(MSB)								6
FCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
DCCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								k+1
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			k+2
(MSB)								k+3

3.1.5 Paging Response

7	6	5	4	3	2	1	0	Octet
DCCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	m
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								m+1
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			m+2
(MSB)								m+3
FOR_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1

3.1.5 Paging Response

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">Length = [08H, 0BH]</td><td>2</td></tr>
<tr><td colspan="8">Cell Identification Discriminator = [02H,07H]</td><td>3</td></tr>
<tr><td colspan="9">IF (Discriminator = 02H), Cell Identification {1:</td></tr>
<tr><td>(MSB)</td><td colspan="7">Cell = [001H-FFFH]</td><td>j</td></tr>
<tr><td colspan="4"></td><td colspan="3">Sector = [0H-FH] (0H = Omni)</td><td>(LSB)</td><td>j+1</td></tr>
<tr><td colspan="9">} OR IF (Discriminator = 07H), Cell Identification {1:</td></tr>
<tr><td>(MSB)</td><td colspan="7">MSCID = <any value></td><td>j</td></tr>
<tr><td colspan="8"></td><td>j+1</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j+2</td></tr>
<tr><td>(MSB)</td><td colspan="7">Cell = [001H-FFFH]</td><td>j+3</td></tr>
<tr><td colspan="3"></td><td>(LSB)</td><td colspan="4">Sector = [0H-FH] (0H = Omni)</td><td>j+4</td></tr>
<tr><td colspan="9">} Cell Identification</td></tr>
<tr><td>(MSB)</td><td colspan="7">CDMA Serving One Way Delay = [0000H-FFFFH]</td><td>k</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>k+1</td></tr>
<tr><td colspan="6">Reserved = [0000 00]</td><td colspan="2">Resolution = [00, 01, 10]</td><td>k+2</td></tr>
<tr><td>(MSB)</td><td colspan="7">CDMA Serving One Way Delay Time Stamp = [00 00H – FF FFH]</td><td>k+3</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>k+4</td></tr>
<tr><td colspan="8">⇒ Service Option Connection Identifier (SOCI): A1 Element Identifier = [1EH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="5">Reserved = [0000 0]</td><td colspan="3">Service Option Connection Identifier = [001 - 110]</td><td>3</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (MEID): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [08H]</td><td>2</td></tr>
<tr><td colspan="4">MEID Hex Digit 1 = [0H-FH]</td><td>Odd/Even Indicator = ‘0’</td><td colspan="3">Type of Identity = [001] (MEID)</td><td>3</td></tr>
<tr><td colspan="4">MEID Hex Digit 3 = [0H-FH]</td><td colspan="4">MEID Hex Digit 2 = [0H-FH]</td><td>4</td></tr>
<tr><td colspan="4">MEID Hex Digit 5 = [0H-FH]</td><td colspan="4">MEID Hex Digit 4 = [0H-FH]</td><td>5</td></tr>
<tr><td colspan="4">MEID Hex Digit 7 = [0H-FH]</td><td colspan="4">MEID Hex Digit 6 = [0H-FH]</td><td>6</td></tr>
<tr><td colspan="4">MEID Hex Digit 9 = [0H-FH]</td><td colspan="4">MEID Hex Digit 8 = [0H-FH]</td><td>7</td></tr>
<tr><td colspan="4">MEID Hex Digit 11 = [0H-FH]</td><td colspan="4">MEID Hex Digit 10 = [0H-FH]</td><td>8</td></tr>
<tr><td colspan="4">MEID Hex Digit 13 = [0H-FH]</td><td colspan="4">MEID Hex Digit 12 = [0H-FH]</td><td>9</td></tr>
<tr><td colspan="4">Fill = [FH]</td><td colspan="4">MEID Hex Digit 14 = [0H-FH]</td><td>10</td></tr>
<tr><td colspan="8">⇒ A2p Bearer Session-Level Parameters: A1p Element Identifier [45H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
</table>

3.1.5 Paging Response

7	6	5	4	3	2	1	0	Octet
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k

3.1.5 Paging Response

7	6	5	4	3	2	1	0	Octet
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								
⇒ **Enhanced Voice Privacy Request:** A1 Element Identifier = [4CH]								1
Length = [02H]								2
VP Algorithm Requested <any value>								3
VP Algorithms Supported <any value>								4
⇒ **Encryption and Integrity Info:** A1 Element Identifier = [4DH]								1
Length = 07H								2
Reserved = 00 0000						KEY_ID		3
(MSB)	Crypto-Sync							4
…								5
…								6
							(LSB)	7
Encryption Algorithms Supported								8
Integrity Algorithms Supported								9

3.1.6 Progress

This DTAP message is sent from the MSC to the BS to trigger tone generation at the MS (e.g., via a Reorder Order or Intercept Order message to the MS) prior to clearing a call request. Local tone generation allows the network to convey tone information to a user by means of signaling information.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M	
Reserved Octet	4.2.32	MSC -> BS	M	
Message Type	4.2.4	MSC -> BS	M	
Signal	4.2.38	MSC -> BS	O[a]	C
MS Information Records	4.2.55	MSC -> BS	O[a,b]	C
Service Option Connection Identifier (SOCI)	4.2.73	MSC -> BS	O[c]	C

a. Either the Signal element or the MS Information Records element shall be present in this message, but both shall not be present simultaneously.

b. This element carries the MS Information Records. This element shall carry only signal information.

c. This element is required if concurrent services are supported.

The following table shows the bitmap layout for the Progress message.

3.1.6 Progress

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [03H]								1
⇒ **Signal:** A1 Element Identifier = [34H]								1
Signal value = [63H (abbrev intercept), 65H (abbrev reorder), 02H (intercept), 03H (Network Congestion (reorder) tone on)]								2
Reserved = [000000]						Alert Pitch = [00,01,10] (med, high, low)		3
⇒ **MS Information Records:** A1 Element Identifier = [15H]								1
Length = [01H-FFH]								2
Information Record: {1+:								
Information Record Type = [00H-FFH]								j

3.1.6 Progress

7	6	5	4	3	2	1	0	Octet
Information Record Length = <variable>								j+1
(MSB)	Information Record Content							j+2
…								…
							(LSB)	k
} Information Record								
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

3.1.7 Assignment Request

This BSMAP message is sent from the MSC to the BS to request that the BS assign radio resource, the attributes of which are defined within the message. The message may include the terrestrial circuit to be used if one is needed for the call/activity. The message includes the necessary information for providing PACA service if the call is eligible for such service.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Channel Type	4.2.6	MSC -> BS	M[a]	
Circuit Identity Code	4.2.19	MSCcs -> BS	O[b]	C
Encryption Information	4.2.10	MSC -> BS	O[c]	C
Service Option	4.2.49	MSC -> BS	O[d]	R
Signal	4.2.38	MSCcs -> BS	O[e, f,]	C
MS Information Records	4.2.55	MSC -> BS	O[g]	C
Priority	4.2.15	MSC -> BS	O[j]	C
PACA Timestamp	4.2.67	MSC -> BS	O[h]	C
Quality of Service Parameters	4.2.41	MSC -> BS	O[i]	C
Service Option Connection Identifier (SOCI)	4.2.73	MSC -> BS	O[k]	C
Service Reference Identifier (SR_ID)	4.2.86	MSC -> BS	O[l]	C
A2p Bearer Session-Level Parameters	4.2.89	MSCe -> BS	O[m, o]	C
A2p Bearer Format-Specific Parameters	4.2.90	MSCe -> BS	O[n, o]	C
Mobile Identity (MEID)	4.2.13	MSC -> BS	O[p]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[q]	C
Authentication Challenge Parameter (RAND)	4.2.35	MSC -> BS	O[r]	C
Authentication Vector Info	4.2.96	MSC -> BS	O[s]	C

a. Channel Type is being included for historical reasons and is hard coded as shown. The BS should examine the Service Option element instead.

b. This element is not included when a terrestrial resource is not required. When the Service Option element indicates one of the following {Markov, loopback, packet data, OTAPA, SMS, Test Data, *IS-2000* Markov, *IS-2000* Loopback, PDS}, this element is not included in the message. This element contains the circuit identifier allocated by the circuit-switched MSC.

c. This element is present when encryption is requested and the MSC has the keys available at the time this message is sent.

d. The MSC shall send to the BS the same service option received on the CM Service Request, Paging Response, or Additional Service Request message.

e. This element carries instructions for the generation of audible tones or alerting patterns. For mobile terminated calls, it can be used to specify a distinctive alerting pattern. This element is not used for mobile originated calls. This element may be set to “Alerting Off” if included when used for setting up an SMS delivery on the traffic channel.

f. The Signal element is retained in this message for the purpose of backward compatibility. If this information is included in the MS Information Records IE, this element is not included.

g. This element carries the MS Information Records. It shall not redundantly carry information present in other elements such as Signal.

h. This element is present only when the call is eligible for PACA service.

i. This element is only used for packet data calls. In this version of this standard, this element carries the user's subscribed QoS for non-assured mode operation.

j. If the 'Include Priority' bit of the Radio Environment and Resources element was set to '1' in the CM Service Request message to indicate that no lower priority channels are available (e.g., when a PACA channel reservation scheme is used) the MSC shall include the actual call priority.

k. This element is required if concurrent services are supported.

l. This element is included if this message is sent upon receiving a BS Service Request message containing this element. This element contains the SR_ID value of the packet data service instance that is to be re-activated.

m. If an A2p connection is required, the MSCe may send this element to indicate the session parameters that the BS is to use for the call. This IE may contain the A2p bearer address and port to which the BS is to send information. If the MSCe does not have the information required to correctly populate a field in this IE, it shall omit this element.

n. If an A2p connection is required, the MSCe may send this element to indicate the bearer format or formats that the BS is to use for the call. This IE may contain the A2p bearer address and port to which the BS is to send information. The bearer format should be tagged with the same tag that was sent by the BS for this format. The highest priority bearer format contained in this IE and the Service Option IE should be consistent. If they are not consistent, then the bearer format specified by this element shall take precedence.

   If the MSCe does not have the information required to correctly populate a field in this IE, it shall omit this element. If these IEs are not included in this message, the MSCe shall send these IEs to the BS in a Bearer Update Request message.

o. If an A2p connection is required, the MSCe shall include both the A2p Bearer Session-Level Parameters IE and the A2p Bearer Format-Specific Parameters IE or neither one. If the A2p Bearer Format Specific Parameters IE contains the Bearer IP Address and UDP Port, they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters information element for the corresponding bearer format.

p. For mobile originated calls, if the MEID is not received in the CM Service Request message, this IE shall be included if the MEID is available at the MSC. For mobile terminated calls, if the MEID is not received in the Paging Response message and not sent in the Paging Request message, this IE shall be included if the MEID is available at the MSC.

q. The MSC includes a Band Class/Band Subclass Record within this element to report the band classes and band subclasses supported by the MS. This IE shall be omitted if the same information was received from the BS in the CM Service Request or when the information is not available at the MSC. This IE shall also be omitted for mobile terminated calls.

r. This IE is included for 2G mutual authentication.

s. This IE may be included if the MSC supports AKA.

The following table shows the bitmap layout for the Assignment Request message.

3.1.7 Assignment Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [01H]								1
⇒ **Channel Type:** A1 Element Identifier = [0BH]								1
Length = [03H]								2
Speech or Data Indicator =[01H] (speech)								3
Channel Rate and Type = [08H] (Full Rate)								4
Speech Encoding Algorithm/data rate + Transparency Indicator = [05H] (13 kbps vocoder - speech)								5
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = <variable>								2
Encryption Info {1..2: ***IF (Encryption Parameter Identifier = 00001, 00101, or 00110) {1:***								
ext = [1]	Encryption Parameter Identifier = [00001 (SME), 00101 (Datakey (ORYX)), 00110 (Initial RAND)]					Status = [0,1]	Available = [0]	j
Encryption Parameter Length = [04H, 08H]								j+1
(MSB)	Encryption Parameter value = <any value>							j+2
…								…
							(LSB)	k
} OR IF (Encryption Parameter Identifier = 00100) {1:								
ext = [1]	Encryption Parameter Identifier = [00100] (Private Longcode)					Status = [0,1]	Available = [0]	j
Encryption Parameter Length = [06H]								j+1
Reserved = [00 0000]						(MSB)		j+2
Encryption Parameter value (Private Long Code) = <any value>								j+3
								j+4
								j+5
								j+6
							(LSB)	j+7
} OR IF (Encryption Parameter Identifier = 00111) {1:								

3.1.7 Assignment Request

7	6	5	4	3	2	1	0	Octet
ext = [1]	Encryption Parameter Identifier = [00111] (Enhanced Encryption Parameters)					Status = [0,1]	Available = [0]	3
Encryption Parameter Length = [17H]								4
(MSB)	Encryption Key = <any value>							5
…								…
							(LSB)	20
Reserved = 00 0000						KEY_ID = <any value>		21
(MSB)	Crypto-Sync = <any value>							22
…								23
…								24
							(LSB)	25
Encryption Algorithm in Use = <any value>								26
Encryption Algorithms Supported = <any value>								27
} Encryption Parameter Identifier								
} Encryption Info								
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option =							2

3.1.7 Assignment Request

7	6	5	4	3	2	1	0	Octet
[0001H (8K Speech), 0003H (EVRC), 0004H (Async Data Rate Set 1), 0005H (G3 Fax Rate Set 1), 0006H (SMS Rate Set 1), 0009H (13K Loopback), 000CH (Async Data Rate Set 2), 000DH (G3 Fax Rate Set 2), 000EH (SMS Rate Set 2), 0011H (13K high rate voice service), 0012H (OTAPA Rate Set 1), 0013H (OTAPA Rate Set 2), 0020H (TDSO), 0021H (3G High Speed Packet Data), 0023H (PDS Rate Set 1), 0024H (PDS Rate Set 2), 0025H (ISDN Interworking Service), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback), 0038H (SMV), 0039H (32 kbps Circuit Switched Video Conferencing), 003AH (64 kbps Circuit Switched Video Conferencing)] 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 8000H (13K speech), 801FH (13K Markov)]							(LSB)	3
⇒ **Signal:** A1 Element Identifier = [34H]								1

3.1.7 Assignment Request

7	6	5	4	3	2	1	0	Octet
Signal value = [40H (normal), 41H (inter-group), 42H (special/priority), 44H (ping ring), 4FH (alerting off), 81H (long), 82H (short-short), 83H (short-short-long), 84H (short-short-2), 85H (short-long-short), 86H (short-short-short-short), 87H (PBX long), 88H (PBX short-short), 89H (PBX short-short-long), 8AH (PBX short-long-short), 8BH (PBX short-short-short-short)]								2
Reserved = [00 0000]						Alert Pitch = [00,01,10] (med, high, low)		3
⇒ **MS Information Records:** A1 Element Identifier = [15H]								1
Length = [01H-FFH]								2
Information Record: {1+:								
Information Record Type = [00H-FFH]								j
Information Record Length = <variable>								j+1
(MSB)	Information Record Content = <any value>							j+2
…								…
							(LSB)	k
} Information Record								
⇒ **Priority:** A1 Element Identifier = [06H]								1
Length = [01H]								2
Reserved = [00]		Call Priority = [0000 – 1111]				Queuing Allowed = [0,1]	Preemption Allowed = [0,1]	3
⇒ **PACA Timestamp:** A1 Element Identifier = [4EH]								1
Length = [04H]								2
(MSB)	PACA Queuing Time = <any value>							3
								4

3.1.7 Assignment Request

7	6	5	4	3	2	1	0	Octet
								5
							(LSB)	6
⇒ **Quality of Service Parameters:** A1 Element Identifier = [07H]								1
Length = [01H]								2
Reserved = [0000]				Non-Assured Mode Packet Priority = [0000 – 1101]				3
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3
⇒ **Service Reference Identifier (SR_ID):** A1 Element Identifier = [71H]								1
Length = [01H]								2
Reserved = [0000 0]					SR_ID = [001 – 110]			3
⇒ **A2p Bearer Session-Level Parameters:** A1p Element Identifier [45H]								1
Length = <variable>								2
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1

3.1.7 Assignment Request

7	6	5	4	3	2	1	0	Octet
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event) , 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2

3.1.7 Assignment Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="9">Record: {1:</td></tr>
<tr><td colspan="8">Record Identifier = [00H]</td><td>3</td></tr>
<tr><td colspan="8">Record Length = <variable></td><td>4</td></tr>
<tr><td>All Band Classes Included = [0,1]</td><td colspan="7">Current Band Subclass = <variable></td><td>5</td></tr>
<tr><td colspan="8">Band Class = <variable></td><td>6</td></tr>
<tr><td>All Band Subclasses Included = [0,1]</td><td colspan="3">Reserved = [000]</td><td colspan="4">Band Subclass Length = <variable></td><td>7</td></tr>
<tr><td>SC7 = [0,1]</td><td>SC6 = [0,1]</td><td>SC5 = [0,1]</td><td>SC4 = [0,1]</td><td>SC3 = [0,1]</td><td>SC2 = [0,1]</td><td>SC1 = [0,1]</td><td>SC0 = [0,1]</td><td>i</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td>SCn = [0,1]</td><td>SCn-1 = [0,1]</td><td>SCn-2 = [0,1]</td><td>SCn-3 = [0,1]</td><td>SCn-4 = [0,1]</td><td>SCn-5 = [0,1]</td><td>SCn-6 = [0,1]</td><td>SCn-7 = [0,1]</td><td>j</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="8">Band Class n = <variable></td><td>k</td></tr>
<tr><td>All Band Subclasses Included = [0,1]</td><td colspan="3">Reserved = [000]</td><td colspan="4">Band Subclass Length = <variable></td><td>k+1</td></tr>
<tr><td>SC7 = [0,1]</td><td>SC6 = [0,1]</td><td>SC5 = [0,1]</td><td>SC4 = [0,1]</td><td>SC3 = [0,1]</td><td>SC2 = [0,1]</td><td>SC1 = [0,1]</td><td>SC0 = [0,1]</td><td>k+2</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td>SCn = [0,1]</td><td>SCn-1 = [0,1]</td><td>SCn-2 = [0,1]</td><td>SCn-3 = [0,1]</td><td>SCn-4 = [0,1]</td><td>SCn-5 = [0,1]</td><td>SCn-6 = [0,1]</td><td>SCn-7 = [0,1]</td><td>m</td></tr>
<tr><td colspan="9">} Record</td></tr>
<tr><td colspan="8">⇒ Authentication Challenge Parameter (RAND): A1 Element Identifier = [41H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [05H]</td><td>2</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">Random Number Type = [0001] (RAND)</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">RAND = <any value></td><td>4</td></tr>
<tr><td colspan="8"></td><td>5</td></tr>
<tr><td colspan="8"></td><td>6</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>7</td></tr>
<tr><td colspan="8">⇒ Authentication Vector Info: A1 Element Identifier = [48H]</td><td>1</td></tr>
<tr><td colspan="8">Length =<variable></td><td>2</td></tr>
<tr><td colspan="8">AKA Authentication Type = [01H]</td><td>3</td></tr>
</table>

3.1.7 Assignment Request

7	6	5	4	3	2	1	0	Octet
(MSB)	RANDA = <any value>							4
…								…
							(LSB)	19
(MSB)	AUTN = <any value>							20
…								…
							(LSB)	35

3.1.8 Assignment Complete

This BSMAP message is sent from the BS to the MSC and indicates that the requested assignment has been completed.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Channel Number	4.2.5	BS -> MSC	M[c]	
Encryption Information	4.2.10	BS -> MSC	O[a]	C
Service Option	4.2.49	BS -> MSC	O[b]	R
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	O[d]	C
A2p Bearer Session-Level Parameters	4.2.89	BS -> MSCe	O[e, g]	C
A2p Bearer Format-Specific Parameters	4.2.90	BS -> MSCe	O[f, g]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[h]	C

a. This element is present when either Voice Privacy (VP) or Signaling Message Encryption (SME) parameters were provided by the MSC in the Privacy Mode Command or Assignment Request message. It contains the algorithm information which indicates the current settings of VP and SME. No keys (encryption parameters) are included in this message.

b. If the service option value included in the Assignment Request message was 8000H, 0011H, 0038H, 0003H, 0044H, 0046H, 0049H or 003EH (13K speech, 13K high rate speech, SMV, EVRC, EVRC-B, EVRC-WB, EVRC-NW or Wideband Speech Codec), then the only allowable values that may be sent on this message are those same five service options.

If the service option value included in the Assignment Request message indicated a fax call, then the only allowable values that may be sent on this message are fax service options.

If the service option value included in the Assignment Request message indicated a data call, then the only allowable values that may be sent on this message are data service options.

If the service option value included in the Assignment Request message indicated a Circuit Switched Video Conferencing data call, then the only allowable values that may be sent in this message are Circuit Switched Video Conferencing data service options.

If the service option value included in the Assignment Request message indicated an SMS call, then the only allowable values that may be sent on this message are SMS service options.

If the service option value included in the Assignment Request message indicated either Markov or loopback procedures, then the only allowable values that may be sent on this message are values that indicate Markov or loopback procedures.

If the service option value included in the Assignment Request message indicated an OTAPA call, then the only allowable values that may be sent on this message are OTAPA service options.

If the service option value included in the Assignment Request message indicated a PDS call, then the only allowable values that may be sent on this message are values that indicate PDS service options.

If any of the above rules are violated, the MSC may initiate failure handling.

c. If this element is not correctly present, call failure handling may be initiated by the MSC.

d. This element is required if concurrent services are supported.

e. If an A2p connection is required, the BS may send this element to indicate the session-level parameters to be used for this call.

If this IE was previously included in the CM Service Request message or the Paging Response message, then it shall not be included in the Assignment Complete message. If this IE was not previously included in the CM Service Request message, or in the Paging Response message, then it shall be included in the Assignment Complete message.

f. The BS may send this element to indicate the bearer format or formats that are supported for this call.

If this IE was previously included in the CM Service Request message or the Paging Response message, then it shall not be included in the Assignment Complete message. If this IE was not previously included in the CM Service Request message, or in the Paging Response message, then it shall be included in the Assignment Complete message. The highest priority bearer format contained in this IE and the Service Option IE should be consistent. If they are not consistent, then the bearer format specified by this element shall take precedence.

g. The BS shall include both the A2p Bearer Session-Level Parameters IE and the A2p Bearer Format-Specific Parameters IE or neither one.

h. If the MS is configured with an MEID and the MEID was not previously sent to or received from the MSC during the current call setup (i.e., in the CM Service Request, Paging Request, Paging Response, or Assignment Request message), this element is optionally included.

The following table shows the bitmap layout for the Assignment Complete message.

3.1.8 Assignment Complete

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [02H]								1
⇒ **Channel Number:** A1 Element Identifier = [23H]								1
(reserved)				ARFCN High Part (MSB)				2
ARFCN Low Part(LSB)								3
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = [02H,04H]								2
Encryption Info {1..2:								
ext = [1]	Encryption Parameter Identifier = [0 0001 (SME), 0 0100 (Private Longcode), 0 0101 (Datakey (ORYX)), 0 0110 (Initial RAND)]					Status = [0,1]	Available = [0,1]	j

3.1.8 Assignment Complete

7	6	5	4	3	2	1	0	Octet
Encryption Parameter Length = [00H]								j+1
} Encryption Info								
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 801FH (13K Markov), 0009H (13K Loopback), 0004H (Async Data Rate Set 1), 0005H (G3 Fax Rate Set 1), 000CH (Async Data Rate Set 2), 000DH (G3 Fax Rate Set 2), 0006H (SMS Rate Set 1), 000EH (SMS Rate Set 2), 0021H (3G High Speed Packet Data), 0012H (OTAPA Rate Set 1), 0013H (OTAPA Rate Set 2), 0025H (ISDN Interworking Service), 0020H (TDSO), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback), 0023H (PDS Rate Set 1), 0024H (PDS Rate Set 2), 0038H (SMV), 0039H (32 kbps Circuit Switched Video Conferencing), 003AH (64 kbps Circuit Switched Video Conferencing)]							(LSB)	3
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3
⇒ **A2p Bearer Session-Level Parameters:** A1p Element Identifier [45H]								1
Length = <variable>								2

3.1.8 Assignment Complete

7	6	5	4	3	2	1	0	Octet
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k

3.1.8 Assignment Complete

7	6	5	4	3	2	1	0	Octet
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10

3.1.9 Assignment Failure

This BSMAP message is sent from the BS to the MSC and indicates that the requested assignment could not be completed.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Cause	4.2.16	BS -> MSC	M[a]	
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	O[b]	C

a. If the MSC uses a CIC value that is unknown to the BS, the cause value used shall be 25H (BS not equipped). Cause value 50H (Terrestrial circuit already allocated) shall not be sent to an MSCe.

b. This element is required if concurrent services are supported.

The following table shows the bitmap layout for the Assignment Failure message.

3.1.9 Assignment Failure

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H, 07H]								2
⇒ **Message Type** = [03H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2

3.1.9 Assignment Failure

7	6	5	4	3	2	1	0	Octet
ext = [0]	Cause Value = [00H (Radio interface message failure), 01H (Radio interface failure), 07H (OAM&P intervention), 10H (Packet call going dormant), 20H (Equipment failure), 21H (No radio resource available), 22H (Requested terrestrial resource unavailable), 23H (A2p RTP Payload Type not available), 24H (A2p Bearer Format Address Type not available), 25H (BS not equipped), 26H (MS not equipped (or incapable)), 29H (PACA call queued), 2CH (A2p Resource not available), 30H (Requested transcoding/rate adaptation unavailable), 31H (Lower priority radio resources not available), 32H (PCF resources are not available), 50H (Terrestrial circuit already allocated), 60H (Protocol error between BS and MSC), 79H (PDSN resources are not available)]							3
⇒ **SOCI:** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved					Service Option Connection Identifier = [001 - 110]			3

3.1.10 Connect

This DTAP message is sent by the BS to the MSC for mobile terminated calls (except for network initiated packet data session reactivations) to indicate that the call has been accepted by the user.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	4.2.31	BS -> MSC	M	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	O[a]	C

a. This element is required if concurrent services are supported.

The following table shows the bitmap layout for the Connect message.

3.1.10 Connect

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ DTAP Header: Message Discrimination = [01H]</td><td>1</td></tr>
<tr><td colspan="8">Data Link Connection Identifier (DLCI) = [00H]</td><td>2</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [03H]</td><td>3</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">⇒ Protocol Discriminator = [0011]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Reserved Octet = [00H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Message Type = [07H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Service Option Connection Identifier (SOCI): A1 Element Identifier = [1EH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="5">Reserved = [0000 0]</td><td colspan="3">Service Option Connection Identifier = [001 - 110]</td><td>3</td></tr>
</table>

3.1.11 Service Release

This DTAP message is sent, from either the BS or the MSC, to indicate that the equipment sending the message intends to release a service that is not the only service connected to the MS, and that the receiving equipment should release the corresponding service option connection after sending a Service Release Complete message.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	4.2.31	BS <-> MSC	M	
Reserved - Octet	4.2.32	BS <-> MSC	M	
Message Type	4.2.4	BS <-> MSC	M	
Service Option Connection Identifier (SOCI)	4.2.73	BS <-> MSC	O	R
Cause	4.2.16	BS <-> MSC	O[a]	R
Cause Layer 3	4.2.42	BS <-> MSC	O[b]	C

a. When the MS or MSC initiates a single service option connection release, the cause value in this message shall be set to “call processing”, and the real reason for sending the Service Release message is specified in the Cause Layer 3 IE.

Since the purpose of this message is to release the call, call release should proceed even if the Cause element is missing from this message.

b. This element contains the reason for sending the Service Release message when the MS or MSC has initiated a single service option connection release.

The following table shows the bitmap layout for the Service Release message.

3.1.11 Service Release

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [09H, 0DH]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011] (Call Processing & Supplementary Services)				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [2EH]								1
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2

3.1.11 Service Release

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td>ext = [0]</td><td colspan="7">Cause Value =
[00H (radio interface message failure),
01H (radio interface failure),
07H (OAM&P intervention),
09H (call processing),
10H (packet call going dormant),
0DH (timer expired),
20H (equipment failure),
60H (protocol error between BS and MSC),
77H (PPP session closed by the MS)]</td><td>3</td></tr>
<tr><td colspan="8">⇒ Cause Layer 3: A1 Element Identifier = [08H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [02H]</td><td>2</td></tr>
<tr><td>ext = [1]</td><td colspan="2">Coding Standard = [00]</td><td>Reserved = [0]</td><td colspan="4">Location = [0100]
(Public network serving the remote user)</td><td>3</td></tr>
<tr><td>ext = [1]</td><td colspan="7">Cause Value =
[001 0000 (normal clearing),
001 0001(user busy),
001 0011(user alerting – no answer),
001 1111(normal unspecified)]</td><td>4</td></tr>
</table>

3.1.12 Service Release Complete

This DTAP message is sent by the BS or the MSC, to indicate that the equipment sending the message has released a service that is not the only service connected to MS, and that the receiving equipment shall release the corresponding service option connection.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS <-> MSC	M	
Reserved - Octet	4.2.32	BS <-> MSC	M	
Message Type	4.2.4	BS <-> MSC	M	
Service Option Connection Identifier (SOCI)	4.2.73	BS <-> MSC	O	R

The following table shows the bitmap layout for the Service Release Complete message.

3.1.12 Service Release Complete

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [06H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011] (Call Processing & Supplementary Services)				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [2FH]								1
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

3.1.13 Clear Request

The BS sends this BSMAP message to the MSC to indicate that the BS is releasing all service option connections to the MS and the associated dedicated resource. This message is sent via the BSMAP underlying signaling connection associated with the dedicated resource.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	BS -> MSC	M	
Cause	4.2.16	BS -> MSC	M[a]	
Cause Layer 3	4.2.42	BS -> MSC	O[b]	C

a. When the MS sends a Release Order to the BS to clear the call, the cause value in this message shall be set to “call processing”, and the real reason for sending the Clear Request message is specified in the Cause Layer 3 IE.

Since the purpose of this message is to release the call, call release should proceed even if the Cause element is missing from this message.

b. This element contains the reason for sending the Clear Request message from the BS to the MSC when the MS has sent a Release Order to the BS to clear the call.

The following table shows the bitmap layout for the Clear Request message.

3.1.13 Clear Request

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H,08H]								2
⇒ **Message Type** = [22H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [00H (radio interface message failure), 01H (radio interface failure), 07H (OAM&P intervention), 09H (call processing), 10H (packet call going dormant), 0DH (timer expired), 20H (equipment failure), 60H (protocol error between BS and MSC), 77H (PPP session closed by the MS)]							3
⇒ **Cause Layer 3:** A1 Element Identifier = [08H]								1
Length = [02H]								2
ext = [1]	Coding Standard = [00]		Reserved = [0]	Location = [0100] (Public network serving the remote user)				3

3.1.13 Clear Request

7	6	5	4	3	2	1	0	Octet
ext = [1]	Cause Value = [001 0000 (Normal clearing), 001 1111(Normal, unspecified)]							4

3.1.14 Clear Command

This BSMAP message is sent from MSC to BS to instruct the BS to release or transition to dormancy all service option connections to the MS and release the associated dedicated resource. This message is sent via the BSMAP underlying signaling connection associated with the dedicated resource.

<table>
<tr><th>Information Element</th><th>Section Reference</th><th>Element Direction</th><th colspan="2">Type</th></tr>
<tr><td>Message Type</td><td>4.2.4</td><td>MSC -> BS</td><td colspan="2">M</td></tr>
<tr><td>Cause</td><td>4.2.16</td><td>MSC -> BS</td><td colspan="2">M[a]</td></tr>
<tr><td>Cause Layer 3</td><td>4.2.42</td><td>MSC -> BS</td><td>O[b]</td><td>C</td></tr>
</table>

a. This mandatory element indicates the reason for sending the Clear Command message to the BS. If the Clear Command message is being sent in response to a Clear Request message that contained a cause value of “call processing”, then this element shall be set to “call processing”.

b. This element is only used when the MSC initiates call clearing. The Cause Layer 3 element shall be present only when the Cause element contains a value of “Call processing”.

The following table shows the bitmap layout for the Clear Command message.

3.1.14 Clear Command

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [04H,08H]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [20H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Cause: A1 Element Identifier = [04H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td>ext = [0]</td><td colspan="7">Cause Value =
[07H (OAM&P intervention),
09H (Call processing),
0AH (Reversion to old channel),
0BH (Handoff successful),
10H (Packet call going dormant),
1AH (Authentication Failure),
20H (Equipment failure),
60H (Protocol error between BS and MSC),
78H (Do not notify MS)]</td><td>3</td></tr>
<tr><td colspan="8">⇒ Cause Layer 3: A1 Element Identifier = [08H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [02H]</td><td>2</td></tr>
<tr><td>ext = [1]</td><td colspan="2">Coding Standard
= [00]</td><td>Reserved
= [0]</td><td colspan="4">Location = [0100]
(Public network serving the remote user)</td><td>3</td></tr>
</table>

3.1.14 Clear Command

7	6	5	4	3	2	1	0	Octet
ext = [1]	Cause Value = [001 0000 (Normal clearing), 001 0001 (User busy), 001 0011 (User alerting, no answer), 001 1111 (Normal, unspecified)]							4

3.1.15 Clear Complete

The BS sends this BSMAP message to the MSC to inform the MSC that all service option connections to the MS and the associated dedicated resource have been successfully cleared.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Power Down Indicator	4.2.44	BS -> MSC	O[a]	C
Mobile Subscription Information	4.2.91	BS -> MSC	O[b]	C
Integrity Info	4.2.95	BS -> MSC	O[c]	C

a. This element is used to indicate that the MS powered down at the end of the call.

b. The BS shall include the MS’s band class and/or band subclass capabilities in this element as shown in section 4.2.91 if this information is available at the BS and this same information was not received from the MSC or sent to the MSC in prior messaging. This element shall also be included by the BS if the MS’s band class/band subclass capabilities were updated at the BS since last sent to or received from the MSC.

c. This IE is included if available at the BS to update the MSC with the last crypto-sync of the MS.

The following table shows the bitmap layout for the Clear Complete message.

3.1.15 Clear Complete

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [01H,02H] (depending on the presence of the Power Down Indicator)								2
⇒ **Message Type** = [21H]								1
[1]	[0]	[1]	[0]	⇒ **Power Down Indicator:** A1 Element Identifier = [0010]				1
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6

3.1.15 Clear Complete

7	6	5	4	3	2	1	0	Octet
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								
⇒ **Integrity Info:** A1 Element Identifier = [47H]								1
Length = 17H								2
(MSB)	Integrity Key = <any value>							3
…								…
							(LSB)	18
Reserved = 00 0000						KEY_ID = <any value>		19
(MSB)	Crypto-Sync = <any value>							20
…								21
…								22
							(LSB)	23
Integrity Algorithm in Use = <any value>								24
Integrity Algorithms Supported = <any value>								25

3.1.16 Alert with Information

This DTAP message is sent from the MSC to the BS. It directs the BS to send an Alert with Information Message on the air interface to the MS.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M	
Reserved Octet	4.2.32	MSC -> BS	M	
Message Type	4.2.4	MSC -> BS	M	
MS Information Records	4.2.55	MSC -> BS	O[a]	C
Service Option Connection Identifier (SOCI)	4.2.73	MSC -> BS	O[b]	C

a. This element carries the MS Information Records.

b. This element is required if concurrent services are supported.

The following table shows the bitmap layout for the Alert with Information message.

3.1.16 Alert with Information

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011]				1
⇒ **Reserved Octet** = [00H]								2
⇒ **Message Type** = [26H]								1
⇒ **MS Information Records:** A1 Element Identifier = [15H]								1
Length = <variable>								2
Information Record: {1+:								
Information Record Type = [01H-FFH]								j
Information Record Length = <variable>								j+1
(MSB)	Information Record Content = <any value>							j+2
…								…
							(LSB)	k
} Information Record								
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

3.1.17 BS Service Request

This BSMAP message is sent from the BS to the MSC to request a BS initiated mobile terminated call setup. This message is also used for mobile terminated SDB delivery.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	M	
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[a]	C
Service Option	4.2.49	BS -> MSC	O[b]	R
Tag	4.2.46	BS -> MSC	O[c]	C
ADDS User Part	4.2.50	BS -> MSC	O[d]	C
Service Reference Identifier (SR_ID)	4.2.86	BS -> MSC	O[e]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[f]	C

a. This IE is included if the necessary information is available at the BS. This IE is included if the ESN is available at the BS. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

b. This element indicates the service option requested by the BS.

c. If this element is present in the message, the value shall be saved at the MSC to be included in a BS Service Response message.

d. This element is included if this message is used for mobile terminated SDB delivery. The Application Data Message field is included and contains the SDB received from the PCF.

e. This element is passed to the MSC when the network reactivates a packet data service instance and the SR_ID is available at the BS. The element identifies the reactivated service instance.

f. This IE is included if the MEID is available at the BS.

The following table shows the bitmap layout for the BS Service Request message.

3.1.17 BS Service Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [09H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (IMSI): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD)</td><td>Odd/even Indicator = [1,0]</td><td colspan="3">Type of Identity = [110] (IMSI)</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
</table>

3.1.17 BS Service Request

7	6	5	4	3	2	1	0	Octet
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option = [00 21H (3G High Speed Packet Data)]							2
							(LSB)	3
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **ADDS User Part:** A1 Element Identifier = [3DH]								1
Length = <variable>								2
Reserved		Data Burst Type = [000110] (SDB)						3
(MSB)	Application Data Message = <any value>							4
…								…
							(LSB)	n
⇒ **Service Reference Identifier (SR_ID):** A1 Element Identifier = [71H]								1
Length = [01H]								2
Reserved = [0000 0]					SR_ID = [001 – 110]			3
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2

3.1.17 BS Service Request

7	6	5	4	3	2	1	0	Octet
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10

3.1.18 BS Service Response

This BSMAP message is sent from the MSC to the originating BS to convey the outcome of processing the BS Service Request message.

<table>
<tr><th>Information Element</th><th>Section Reference</th><th>Element Direction</th><th colspan="2">Type</th></tr>
<tr><td>Message Type</td><td>4.2.4</td><td>MSC -> BS</td><td colspan="2">M</td></tr>
<tr><td>Mobile Identity (IMSI)</td><td>4.2.13</td><td>MSC -> BS</td><td colspan="2">M</td></tr>
<tr><td>Mobile Identity (ESN)</td><td>4.2.13</td><td>MSC -> BS</td><td>O[a]</td><td>C</td></tr>
<tr><td>Tag</td><td>4.2.46</td><td>MSC -> BS</td><td>O[b]</td><td>C</td></tr>
<tr><td>Cause</td><td>4.2.16</td><td>MSC -> BS</td><td>O[c]</td><td>C</td></tr>
<tr><td>Mobile Identity (MEID)</td><td>4.2.13</td><td>MSC -> BS</td><td>O[d]</td><td>C</td></tr>
</table>

a. This IE is included if the ESN is available at the MSC. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

b. If a Tag element was received from the BS in the BS Service Request message, the MSC shall include the Tag element in the BS Service Response message. The Tag value used in this message shall be the same as the Tag value received from the BS.

c. This element shall only be included if the MSC does not grant the BS service request.

d. This IE is included if the MEID is available at the BS.

The following table shows the bitmap layout for the BS Service Response message.

3.1.18 BS Service Response

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [0AH]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (IMSI): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD)</td><td>Odd/even Indicator = [1,0]</td><td colspan="3">Type of Identity = [110] (IMSI)</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit N = [0H-9H] (BCD)</td><td>n</td></tr>
<tr><td colspan="4">= [1111] (if even number of digits),
Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (ESN): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [05H]</td><td>2</td></tr>
</table>

3.1.18 BS Service Response

7	6	5	4	3	2	1	0	Octet
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [08H (MS busy), 11H (Service option not available)]							3
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10

3.1.19 Additional Service Notification

This BSMAP message is sent from MSC to BS to request additional service option connection establishment to the existing call.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	4.2.13	MSC -> BS	O	R
Service Option	4.2.49	MSC -> BS	O[a]	R
A2p Bearer Format-Specific Parameters	4.2.90	MSCe -> BS	O[b]	C

a. The MSC may propose the preferred service option selected from the subscribed service option record as an additional service option connection.

b. The MSCe may include one or more bearer formats in this IE to propose the preferred service options for an additional service option connection. The highest priority bearer format contained in this IE and the Service Option IE should be consistent. If they are not consistent, then the Service Option IE shall take precedence.

The following table shows the bitmap layout for the Additional Service Notification message.

3.1.19 Additional Service Notification

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [69H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (IMSI): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD)</td><td>Odd/even Indicator = [1,0]</td><td colspan="3">Type of Identity = [110] (IMSI)</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit N = [0H-9H] (BCD)</td><td>n</td></tr>
<tr><td colspan="4">= [1111] (if even number of digits),
Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="8">⇒ Service Option: A1 Element Identifier = [03H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="7">Service Option</td><td>2</td></tr>
</table>

3.1.19 Additional Service Notification

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="7">= [8000H (13K speech),
0003H (EVRC),
003EH (Wideband Speech Codec),
0044H (EVRC-B),
0046H (EVRC-WB),
0049H (EVRC-NW),
0011H (13K high rate voice service),
0001H (8K speech),
0038H (SMV),
0021H (3G High Speed Packet Data)]</td><td>(LSB)</td><td>3</td></tr>
<tr><td colspan="8">⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="6">Number of Bearer Formats = <variable></td><td colspan="2">Bearer IP Address Type= [00 = IPv4]</td><td>3</td></tr>
<tr><td colspan="9">***Bearer Format Parameters {1+:***</td></tr>
<tr><td colspan="8">Bearer Format Length = <variable></td><td>m</td></tr>
<tr><td>Ext = [0,1]</td><td colspan="3">Bearer Format Tag Type = [001-100]</td><td colspan="4">Bearer Format ID = [<any value>]</td><td>m+1</td></tr>
<tr><td colspan="7">RTP Payload Type =
[00H = (PCMU),
08H = (PCMA),
0CH = (13K Vocoder),
60H - 7FH (dynamically assigned = EVRC),
60H - 7FH (dynamically assigned = EVRC0),
60H - 7FH (dynamically assigned = SMV),
60H - 7FH (dynamically assigned = SMV0),
60H - 7FH (dynamically assigned = telephone-event),
60H - 7FH (dynamically assigned = EVRCB),
60H - 7FH (dynamically assigned = EVRCB0),
60H - 7FH (dynamically assigned = EVRCWB),
60H - 7FH (dynamically assigned = EVRCWB0)
60H - 7FH (dynamically assigned = EVRCNW)
60H - 7FH (dynamically assigned = EVRCNW0)]</td><td>Bearer Addr Flag= [0, 1]</td><td>m+2</td></tr>
<tr><td>(MSB)</td><td colspan="7">Bearer IP Address = <any value></td><td>i</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j</td></tr>
<tr><td>(MSB)</td><td colspan="7">Bearer UDP Port= <any value></td><td>j+1</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j+2</td></tr>
</table>

3.1.19 Additional Service Notification

7	6	5	4	3	2	1	0	Octet
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								

3.1.20 Additional Service Request

This DTAP message is sent from the BS to the MSC to request additional service option connection establishment to the existing call.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M[a]	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	O	R
Called Party BCD Number	4.2.40	BS -> MSC	O[b]	C
Service Option	4.2.49	BS -> MSC	O[c,a]	R
Voice Privacy Request	4.2.11	BS -> MSC	O[g]	C
Called Party ASCII Number	4.2.59	BS -> MSC	O[d]	C
Circuit Identity Code	4.2.19	BS -> MSCcs	O[e]	C
Special Service Call Indicator	4.2.21	BS -> MSC	O[f]	C
A2p Bearer Session-Level Parameters	4.2.89	BS -> MSCe	O[h, j]	C
A2p Bearer Format-Specific Parameters	4.2.90	BS -> MSCe	O[i, j]	C
Enhanced Voice Privacy Request	4.2.98	BS -> MSC	O[g,k]	C

a. If any of these elements are not correctly present, call failure handling may be initiated by the MSC.

b. This element is included when Digit_Mode=0, i.e. BCD digits are received by the BS from the MS.

If the Special Service Call Indicator element is not present in this message, either the Called Party ASCII Number element or the Called Party BCD Number element shall be present (except for packet data calls, service option 0021H), but not both simultaneously. If both this element and the Called Party ASCII Number element are missing, or both are present, the MSC may initiate call failure handling (except for packet data calls, service option 0021H).

If the Special Service Call Indicator element is present in this message, the message is valid if either the Called Party ASCII Number element or the Called Party BCD Number element is present, or if both elements are absent from the message. If both elements are present, the MSC may initiate call failure handling.

c. If no service option is received from the MS, the Service Option element is set to 0001H (8K speech). Note, this service option is not explicitly supported in this specification.

d. This element contains information on the called party number coded as an ASCII string. This element is included when Digit_Mode of value = 1, i.e. ASCII digit is received by the BS from the MS.

If the Special Service Call Indicator element is not present in this message, either the Called Party ASCII Number element or the Called Party BCD Number element shall be present, but not both simultaneously. If both this element and the Called Party BCD Number element are missing, or both are present, the MSC may initiate call failure handling (except for packet data calls, service option 0021H).

If the Special Service Call Indicator element is present in this message, the message is valid if either the Called Party ASCII Number element or the Called Party BCD Number element is present, or if both elements are absent from the message. If both elements are present, the MSC may initiate call failure handling.

e. This element is included when the BS requests a preferred terrestrial circuit.

f. This element is included if the air interface Enhanced Origination message indicates that the user is attempting to initiate a Global Emergency Call.

g. This information element is included if the necessary information was received from the MS.

h. The BS may send this element to indicate the session-level parameters to be used for this call.

i. The BS may send this element to indicate the bearer format or formats that are supported for this call. The highest priority bearer format contained in this IE and the Service Option IE should be consistent. If they are not consistent, then the bearer format specified by this element shall take precedence.

j. The BS shall include both the A2p Bearer Session-level Parameters IE and the A2p Bearer Format-level parameters IE or neither one. If the A2p Bearer Format Specific Parameters IE contains the Bearer IP Address and UDP Port, they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters information element for the corresponding bearer format.

k. Either the Voice Privacy Request IE or the Enhanced Voice Privacy Request IE may be sent. If both IEs are received, the Enhanced Voice Privacy shall take precedence.

The following table shows the bitmap layout for the Additional Service Request message.

3.1.20 Additional Service Request

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011] (Call Processing & Supplementary Services)				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [62H]								1
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3
⇒ **Called Party BCD Number:** A1 Element Identifier = [5EH]								1
Length = [00H-11H]								2
= [1]	Type of Number = [000-111]			Number Plan Identification = [0000-1111]				3
Number Digit/End Mark 2 = [0000-1111]				Number Digit/End Mark 1 = [0000-1111]				4

3.1.20 Additional Service Request

7	6	5	4	3	2	1	0	Octet
Number Digit/End Mark 4 = [0000-1111]				Number Digit/End Mark 3 = [0000-1111]				5
…								…
Number Digit/End Mark m+1 = [0000-1111]				Number Digit/End Mark m = [0000-1111]				n
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [8000H (13K speech), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 0011H (13K high rate voice service), 0001H (8K speech), 0021H (3G High Speed Packet Data), 0038H (SMV)]							(LSB)	3
⇒ **Voice Privacy Request:** A1 Element Identifier = [A1H]								1
⇒ **Called Party ASCII Number:** A1 Element Identifier = [5BH]								1
Length = <variable>								2
ext = [1]	Type of Number = [000-111]			Numbering Plan Identification = [0000-1111]				3
ASCII character 1 = <any value>								4
ASCII character 2 = <any value>								5
…								…
ASCII character n = <any value>								n
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3
⇒ **Special Service Call Indicator:** A1 Element Identifier = [5AH]								1
Length = [01H]								2
Reserved = [0000 00]						MOPD = [0,1]	GECI = [1]	3
⇒ **A2p Bearer Session-Level Parameters:** A1p Element Identifier [45H]								1
Length = <variable>								2
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3

3.1.20 Additional Service Request

7	6	5	4	3	2	1	0	Octet
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								
⇒ **Enhanced Voice Privacy Request:** A1 Element Identifier = [4CH]								1

3.1.20 Additional Service Request

7	6	5	4	3	2	1	0	Octet
Length = [02H]								2
VP Algorithm Requested <any value>								3
VP Algorithms Supported <any value>								4

3.1.21 Bearer Update Request

This BSMAP message is sent from MSCe to BS to specify or change the A2p bearer format.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSCe -> BS	M	
A2p Bearer Session-Level Parameters	4.2.89	MSCe -> BS	O[a]	C
A2p Bearer Format-Specific Parameters	4.2.90	MSCe -> BS	O[b]	C

a. The MSCe may send this element to indicate the session parameters that the BS is to use for the call. This IE may contain the A2p bearer address and port to which the BS is to send information.

b. The MSCe may send this element to indicate the bearer format or formats that the BS is to use for the call. At most one voice bearer format (e.g. EVRC, 13K, SMV, PCM) shall be included in this IE. If the A2p Bearer Format Specific Parameters IE contains the Bearer IP Address and UDP Port, they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters information element for the corresponding bearer format.

The following table shows the bitmap layout for the Bearer Update Request message.

3.1.21 Bearer Update Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [58H]								1
⇒ **A2p Bearer Session-Level Parameters:** A1p Element Identifier [45H]								1
Length = <variable>								2
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m

3.1.21 Bearer Update Request

7	6	5	4	3	2	1	0	Octet
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								

3.1.22 Bearer Update Response

This BSMAP message is sent from BS to MSCe to acknowledge a change in the A2p bearer format.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSCe	M	
Cause	4.2.16	BS -> MSCe	O[a]	C
A2p Bearer Session-Level Parameters	4.2.89	BS -> MSCe	O[b]	C
A2p Bearer Format-Specific Parameters	4.2.90	BS -> MSCe	O[c]	C

a. This element is included only in the case that the BS cannot perform the bearer update request from the MSCe.

b. The BS may send this element when the Cause IE is not included. This IE is included when the BS requires a different session address and port than was previously sent.

c. The BS may send this element when the Cause IE is not included. This IE is included when the BS bearer format requires a different address and port than was previously sent by the BS. If the A2p Bearer Format Specific Parameters IE contains the Bearer IP Address and UDP Port, they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters information element for the corresponding bearer format. If this IE is included, it only includes bearer formats that were indicated in the Bearer Update Request message.

The following table shows the bitmap layout for the Bearer Update Request message.

3.1.22 Bearer Update Response

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [59H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Cause: A1 Element Identifier = [04H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="8">Cause Value =
[23H (A2p RTP Payload Type not available),
24H (A2p Bearer Format Address Type not available),
2CH (A2p Resource not available)]</td><td>3</td></tr>
<tr><td colspan="8">⇒ A2p Bearer Session-Level Parameters: A1p Element Identifier [45H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="3">Max Frames = [000 to 101]</td><td colspan="2">Session IP Address Type = [00 = IPv4]</td><td>Session Addr Flag = [0,1]</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">Session IP Address = <any value></td><td>i</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j</td></tr>
</table>

3.1.22 Bearer Update Response

7	6	5	4	3	2	1	0	Octet
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								

3.1.23 Bearer Update Required

This BSMAP message may be sent from the BS to the MSCe to request a bearer format change for the reason given by the Cause IE.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSCe	M	
Cause	4.2.16	BS -> MSCe	O[a]	C
A2p Bearer Session-Level Parameters	4.2.89	BS -> MSCe	O[b]	C
A2p Bearer Format-Specific Parameters	4.2.90	BS -> MSCe	O[c]	C

a. This element is included to indicate why the BS needs a bearer format change.

b. This element is included to indicate what session-level parameters the BS is requesting.

c. This element is included to indicate what formats the BS is requesting. If the A2p Bearer Format Specific Parameters IE contains the Bearer IP Address and UDP Port, they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters information element for the corresponding bearer format.

The following table shows the bitmap layout for the Bearer Update Required message.

3.1.23 Bearer Update Required

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [5AH]								1
⇒ **Cause:** Element Identifier = [04H]								1
Length = [01H]								2
Cause Value = [23H (A2p RTP Payload Type not available), 24H (A2p Bearer Format Address Type not available), 2CH (A2p Resource not available)]								3
⇒ **A2p Bearer Session-Level Parameters:** A1p Element Identifier [45H]								1
Length = <variable>								2
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1

3.1.23 Bearer Update Required

7	6	5	4	3	2	1	0	Octet
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Number of Bearer Formats = <variable>					Bearer IP Address Type= [00 = IPv4]			3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								

3.2 Supplementary Services Message Formats

3.2.1 Flash with Information

This DTAP message is sent from the BS to the MSC to indicate that a “hook-flash” has been received from the MS. This message may be sent from the MSC to the BS for supplementary services.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS <-> MSC	M	
Reserved – Octet	4.2.32	BS <-> MSC	M	
Message Type	4.2.4	BS <-> MSC	M	
Called Party BCD Number	4.2.40	BS -> MSCcs	O[a]	C
Signal	4.2.38	MSCcs -> BS	O[b]	C
Tag	4.2.46	MSC -> BS	O[f]	C
MS Information Records	4.2.55	MSC <-> BS	O[c]	C
Special Service Call Indicator	4.2.21	BS -> MSCcs	O[d]	C
Service Option Connection Identifier (SOCI)	4.2.73	BS <-> MSC	O[e]	C

a. This element is only retained in this message in this version of the standard for the purpose of backward compatibility. It is not intended to be supported in future versions. This element shall only be sent to an MSC operating at IOS V4.0 or earlier.

b. The Signal IE is retained in this message for the purpose of backward compatibility.

c. This element carries the MS Information Records. It shall not redundantly carry information present in other elements such as Signal.

d. This element is only retained in this message in this version of the standard for the purpose of backward compatibility, in which case it shall be included if the air interface Flash With Information message indicates that the user is attempting to initiate an emergency call. It is not intended to be supported in future versions. This element shall only be sent to an MSC operating at IOS V4.2 or earlier.

e. This element is required if concurrent services are supported.

f. The MSC includes this element to request an acknowledgement from the BS that the corresponding air interface message was received by the MS.

The following table shows the bitmap layout for the Flash with Information message.

3.2.1 Flash with Information

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [10H]								1
⇒ **Called Party BCD Number:** A1 Element Identifier = [5EH]								1
Length = [00H-11H]								2
= [1]	Type of Number = [000-111]			Number Plan Identification = [0000-1111]				3
Number Digit/End Mark 2 = [0000-1111]				Number Digit/End Mark 1 = [0000-1111]				4
Number Digit/End Mark 4 = [0000-1111]				Number Digit/End Mark 3 = [0000-1111]				5
…								…
Number Digit/End Mark m+1 = [0000-1111]				Number Digit/End Mark m = [0000-1111]				n
⇒ **Signal:** A1 Element Identifier = [34H]								1
Signal value = [00H-FFH] (refer to section 4.2.38)								2
Reserved = [000000]						Alert Pitch = [00,01,10] (med, high, low)		3
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **MS Information Records:** A1 Element Identifier = [15H]								1
Length = [01H-FFH]								2
Information Record: {1+:								
Information Record Type = [00H-FFH]								j
Information Record Length = <variable>								j+1
(MSB)	Information Record Content = <any value>							j+2
…								…
							(LSB)	k
} Information Record								
⇒ **Special Service Call Indicator:** A1 Element Identifier = [5AH]								1

3.2.1 Flash with Information

7	6	5	4	3	2	1	0	Octet
Length = [01H]								2
Reserved = [0000 00]						MOPD = [0,1]	GECI = [1]	3
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

3.2.2 Flash with Information Ack

This DTAP message is sent from the BS to the MSC to indicate that a Layer 2 Ack to a Flash with Information message has been received from the MS.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Tag	4.2.46	BS -> MSC	O[a]	R
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	O[b]	C

a. This IE contains the Tag value received from the MSC in the Flash With Information message.

b. This element is required if concurrent services are supported.

The following table shows the bitmap layout for the Flash with Information Ack message.

3.2.2 Flash with Information Ack

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [08H, 0BH]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [50H]								1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

3.2.3 Feature Notification

This BSMAP message is sent from the MSC to the BS and currently is used for message waiting indication.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	4.2.13	MSC -> BS	M	
Tag	4.2.46	MSC -> BS	O[f]	C
Cell Identifier List	4.2.18	MSC -> BS	O[a]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[b, e]	C
Signal	4.2.38	MSCcs -> BS	O[c, e]	C
MS Information Records	4.2.55	MSC -> BS	O[d,]	C
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[e, h]	C
Protocol Revision	4.2.79	MSC -> BS	O[f]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[e, i]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[j]	C

a. This element uniquely identifies cells within a BS, therefore it is a variable length element dependent on the number of cells that need to be identified. This element is only useful for multi-cell BSs.

b. This element is included when slotted paging is performed on the paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel in the *cdma2000* system. If this element is absent, then it is assumed that the MS is operating in non-slotted mode.

c. The Signal IE is retained in this message for the purpose of backward compatibility.

d. This element carries MS Information Records. It shall not redundantly carry information present in other elements such as Signal.

e. This element shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

f. This element contains the MS's MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

g. The MSC includes this element to request an acknowledgement from the BS that the corresponding air interface message was received by the MS.

h. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

i. This element is included when the MSC has the information available. For BCMCS, this IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.

j. If available at the MSC, the MSC shall include a Band Class/Band Subclass Record within this element to report the last known band class and band subclass (if applicable) as well as any other band classes and band subclasses supported by the MS.

The following table shows the bitmap layout for the Feature Notification message.

3.2.3 Feature Notification

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [60H]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [00 01H-FF FFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒ **Signal:** A1 Element Identifier = [34H]								1
Signal value = [00H-FFH] (refer to section 4.2.38)								2

3.2.3 Feature Notification

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="6">Reserved = [000000]</td><td colspan="2">Alert Pitch = [00,01,10]
(med, high, low)</td><td>3</td></tr>
<tr><td colspan="8">⇒ MS Information Records: A1 Element Identifier = [15H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H-FFH]</td><td>2</td></tr>
<tr><td colspan="9">Information Record: {1+:</td></tr>
<tr><td colspan="8">Information Record Type = [00H-FFH]</td><td>j</td></tr>
<tr><td colspan="8">Information Record Length = <variable></td><td>j+1</td></tr>
<tr><td>(MSB)</td><td colspan="7">Information Record Content = <any value></td><td>j+2</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>k</td></tr>
<tr><td colspan="9">} Information Record</td></tr>
<tr><td colspan="8">⇒ IS-2000 Mobile Capabilities: A1 Element Identifier = [11H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td>REV_ PDCH Supported = [0, 1]</td><td>FOR_ PDCH Supported = [0,1]</td><td>ERAM Supported = [0,1]</td><td>DCCH Supported = [0,1]</td><td>FCH Supported = [0,1]</td><td>OTD Supported = [0,1]</td><td>Enhanced RC CFG Supported = [0,1]</td><td>QPCH Supported = [0,1]</td><td>3</td></tr>
<tr><td colspan="8">FCH Information: Bit-Exact Length – Octet Count
= [00H]</td><td>4</td></tr>
<tr><td>Reserved = [0]</td><td colspan="3">Geo Location Type = <any value>
(Ignored)</td><td>Geo Location Included = [0,1]
(Ignored)</td><td colspan="3">FCH Information:
Bit-Exact Length – Fill Bits
= [000]</td><td>5</td></tr>
<tr><td colspan="8">DCCH Information: Bit-Exact Length – Octet Count
= [00H]</td><td>6</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">DCCH Information:
Bit-Exact Length – Fill Bits
= [000]</td><td>7</td></tr>
<tr><td colspan="8">FOR_PDCH Information: Bit-Exact Length – Octet Count
= [00H]</td><td>8</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">FOR_PDCH Information:
Bit-Exact Length – Fill Bits
= [000]</td><td>9</td></tr>
<tr><td colspan="8">REV_PDCH Information: Bit-Exact Length – Octet Count
= [00H]</td><td>10</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">REV_PDCH Information:
Bit-Exact Length – Fill Bits
= [000]</td><td>11</td></tr>
</table>

3.2.3 Feature Notification

7	6	5	4	3	2	1	0	Octet
VP Algorithms Supported = <any value>								12
Additional Geo Location Type Length = [0000 0000]								13
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…

3.2.3 Feature Notification

7	6	5	4	3	2	1	0	Octet
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

3.2.4 Feature Notification Ack

This BSMAP message is sent from the BS to the MSC in response to Feature Notification message.

<table>
<tr><th>Information Element</th><th>Section Reference</th><th>Element Direction</th><th colspan="2">Type</th></tr>
<tr><td>Message Type</td><td>4.2.4</td><td>BS -> MSC</td><td colspan="2">M</td></tr>
<tr><td>Mobile Identity (IMSI)</td><td>4.2.13</td><td>BS -> MSC</td><td colspan="2">M</td></tr>
<tr><td>Tag</td><td>4.2.46</td><td>BS -> MSC</td><td>O[a]</td><td>R</td></tr>
</table>

The following table shows the bitmap layout for the Feature Notification Ack message.

a. This IE contains the Tag value received from the MSC in the Feature Notification message.

3.2.4 Feature Notification Ack

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [61H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (IMSI): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD)</td><td>Odd/even Indicator = [1,0]</td><td colspan="3">Type of Identity = [110] (IMSI)</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit N = [0H-9H] (BCD)</td><td>n</td></tr>
<tr><td colspan="4">= [1111] (if even number of digits),
Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="8">⇒ Tag: A1 Element Identifier = [33H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="7">Tag Value = <any value></td><td>2</td></tr>
<tr><td colspan="8"></td><td>3</td></tr>
<tr><td colspan="8"></td><td>4</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>5</td></tr>
</table>

3.2.5 PACA Command

This BSMAP message is sent from the MSC to the BS. This message is used to indicate that the BS is to apply PACA service to the call. The MSC sends this message to convey the PACA information (e.g., priority and PACA time stamp) to the BS.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Priority	4.2.15	MSC -> BS	O	R
PACA Timestamp	4.2.67	MSC -> BS	O	R

The following table shows the bitmap layout for the PACA Command message.

3.2.5 PACA Command

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [0AH]								2
⇒ **Message Type** = [6CH]								1
⇒ **Priority:** A1 Element Identifier = [06H]								1
Length = [01H]								2
Reserved = [00]		Call Priority = [0000 – 1111]				Queuing Allowed = [0,1]	Preemption Allowed = [0,1]	3
⇒ **PACA Timestamp:** A1 Element Identifier = [4EH]								1
Length = [04H]								2
(MSB)	PACA Queuing Time = <any value>							3
								4
								5
							(LSB)	6

3.2.6 PACA Command Ack

This BSMAP message is sent from the BS to the MSC to acknowledge that the PACA Command message was received and appropriate action was taken by the BS.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Cause	4.2.16	BS -> MSC	O[a]	C

a. This cause value is included if the BS was unable to queue the call.

The following table shows the bitmap layout for the PACA Command Ack message.

3.2.6 PACA Command Ack

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [01H]								2
⇒ **Message Type** = [6DH]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [2DH (PACA queue overflow)]							3

3.2.7 PACA Update

This BSMAP message is sent, from either the BS or the MSC, to indicate that the BS (MSC) intends to modify the queued call. The MSC sends this message to cancel the call, to remove the previous request (the request associated with the first called number when the MS makes consecutive PACA calls) or to instruct the source BS (cell) to remove the request from its PACA queue when an idle handoff has occurred. The BS sends this message to the MSC to cancel the call. The BS can either send this message autonomously or send it when it receives a PACA cancellation request from the MS.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	BS <-> MSC	M	
Mobile Identity (IMSI)	4.2.13	BS <-> MSC	O	R
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[a]	C
PACA Order	4.2.68	BS <-> MSC	O	R
Priority	4.2.15	BS <- MSC	O[b]	C
Authentication Response Parameter (AUTHR)	4.2.36	BS -> MSC	O[c]	C
Authentication Confirmation Parameter (RANDC)	4.2.33	BS -> MSC	O[c]	C
Authentication Parameter COUNT	4.2.37	BS -> MSC	O[c]	C
Authentication Challenge Parameter (RAND)	4.2.35	BS -> MSC	O[d]	C
Authentication Event	4.2.61	BS -> MSC	O[e]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[f]	C
MS Designated Frequency	4.2.88	BS <- MSC	O[g, h]	C

a. This IE is included if the ESN is available at the BS. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

b. This element is included in the message if the MSC is modifying the priority of a queued call.

c. This element is included in the message if it is received from the MS.

d. This element is included when broadcast authentication is performed, and contains the random number (RAND) value used when the BS is responsible for RAND assignment and can correlate this parameter with the RAND used by the MS in its authentication computation.

e. This element is present when an authentication enabled BS does not receive the authentication parameters (AUTHR, RANDC and COUNT) from the MS, or when a RAND/RANDC mismatch has occurred, or if authentication was recently requested and a new authentication is not required.

f. This IE is included if the MEID is available at the BS.

g. This element is included when the MSC has the information available.

h. These elements shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

The following table shows the bitmap layout for the PACA Update message.

3.2.7 PACA Update

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [6EH]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **PACA Order:** A1 Element Identifier = [5FH]								1
Length = [01H]								2
Reserved = [0000 0]					PACA Action Required = [000 – 101]			3
⇒ **Priority:** A1 Element Identifier = [06H]								1
Length = [01H]								2
Reserved = [00]		Call Priority = [0000 – 1111]				Queuing Allowed = [0,1]	Preemption Allowed = [0,1]	3
⇒ **Authentication Response Parameter (AUTHR):** A1 Element Identifier = [42H]								1
Length = [04H]								2
Reserved = [0000]				Auth Signature Type = [0001] (AUTHR)				3
= [0]	= [0]	= [0]	= [0]	= [0]	= [0]	(MSB)		4

3.2.7 PACA Update

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
Auth Signature = <any value>								5
							(LSB)	6
⇒ **Authentication Confirmation Parameter (RANDC):** A1 Element Identifier = [28H]								1
RANDC = [00H-FFH]								2
⇒ **Authentication Parameter COUNT:** A1 Element Identifier = [40H]								1
Reserved = [00]		Count = [00 0000-11 1111]						2
⇒ **Authentication Challenge Parameter (RAND):** A1 Element Identifier = [41H]								1
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)	RAND = <any value>							4
								5
								6
							(LSB)	7
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1
Length = [01H]								2
Event = [01H, 02H] (Parameters not received, RANDC/RAND mismatch)								3
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4

3.2.8 PACA Update Ack

This BSMAP message is sent in either direction between the BS and the MSC to acknowledge that the PACA Update message was received and processed.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS <-> MSC	M	
Mobile Identity (IMSI)	4.2.13	BS <-> MSC	O	R
Priority	4.2.15	BS <- MSC	O[a]	C
Cause	4.2.16	BS -> MSC	O[b]	C

a. Indicates the new priority to be applied to the queued call if the priority is to be changed.

b. This IE is included when the PACA update procedure fails.

The following table shows the bitmap layout for the PACA Update Ack message.

3.2.8 PACA Update Ack

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [6FH]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Priority:** A1 Element Identifier = [06H]								1
Length = [01H]								2
Reserved = [00]		Call Priority = [0000 – 1111]				Queuing Allowed = [0,1]	Preemption Allowed = [0,1]	3
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2

3.2.8 PACA Update Ack

7	6	5	4	3	2	1	0	Octet
ext = [0]	Cause Value = [0CH (No response from MS), 2DH (PACA queue overflow), 2EH (PACA cancel request rejected)]							3

3.2.9 Radio Measurements for Position Request

This BSMAP message is sent from the MSC to the BS to request that specific radio interface measurements be gathered or the geographic location determined with respect to a given MS that is on a traffic channel.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
PSMM Count	4.2.63	MSC -> BS	O[a]	R

a. If the value of the PSMM Count field is greater than zero, this is the number of Pilot Strength Measurement Messages (PSMMs) (refer to [5]) the PDE is requesting the BS to send. If the value is zero, the BS is requested to provide geographic location instead of the requested measurements to the MSC.

The following table shows the bitmap layout for the Radio Measurements for Position Request message.

3.2.9 Radio Measurements for Position Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [04H]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [23H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ PSMM Count A1 Element Identifier = [2DH]</td><td>1</td></tr>
<tr><td colspan="8">Length=[01H]</td><td>2</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">PSMM Count = [0000-1010]</td><td>3</td></tr>
</table>

3.2.10 Radio Measurements for Position Response

This BSMAP message is sent from the BS to the MSC to provide the geographic location or the specific radio interface measurements that have been gathered with respect to a given MS that is on a traffic channel. These measurements are input to position determination calculations.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
CDMA Serving One Way Delay	4.2.57	BS -> MSC	O[a]	C
Downlink Radio Environment List	4.2.65	BS -> MSC	O[b,f]	C
Cause	4.2.16	BS -> MSC	O[c]	C
Geographic Location	4.2.64	BS -> MSC	O[d,e]	C

a. If the PSMM count is zero in the Radio Measurements for Position Request message and the BS is not capable of determining the geographic location, then the BS shall return the CDMA Serving One Way Delay. The CDMA Serving One Way Delay is included at most once.

b. The Downlink Radio Environment List contains one entry for each PSMM received. Each entry contains pilots from the active and candidate list. All occurrences of the Downlink Radio Environment List entries are populated in the order in which the BS receives the related PSMMs from the MS.

c. When present, this element indicates some level of failure to provide one or more of the requested radio interface measurements. This element is not included when the Geographic Location IE is present.

d. If the BS is capable of determining the geographic location the BS may send the geographic location instead of the requested measurements to the MSC.

e. This element is not present if the Downlink Radio Environment List is present.

f. This element is not present if Geographic Location is present.

The following table shows the bitmap layout for the Radio Measurements for Position Response message.

3.2.10 Radio Measurements for Position Response

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [25H]								1
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [08H, 0BH]								2
Cell Identification Discriminator = [07H]								3
(MSB)	MSCID = <any value>							4
								5

3.2.10 Radio Measurements for Position Response

7	6	5	4	3	2	1	0	Octet
							(LSB)	6
(MSB)	Cell = [001H-FFFH]							7
				Sector = [0H-FH] (0H = Omni)			(LSB)	8
(MSB)	CDMA Serving One Way Delay = [0000H-FFFFH]							9
							(LSB)	10
Reserved = [0000 00]						Resolution = [00, 01, 10]		11
(MSB)	CDMA Serving One Way Delay Time Stamp = [00 00H – FF FFH]							12
							(LSB)	13
⇒ **Downlink Radio Environment List:** A1 Element Identifier = [2BH]								1
Length = <variable>								2
Downlink Radio Environment List entry {1+:								
Length = <variable>								i
Number of Cells = <variable>								i+1
Cell Identification Discriminator = [02H,07H]								i+2
Downlink Radio Environment entry{1+: ***IF (Discriminator = 02H), Cell Identification {1***								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
Reserved = [00]		Downlink Signal Strength Raw = [00 0000 - 11 1111]						k
(MSB)	CDMA Target One Way Delay = [00 00H - FF FFH] (x100ns)							k+1
							(LSB)	k+2
} Downlink Radio Environment entry								
} Downlink Radio Environment List entry								
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [34H (MS rejected order), 45H (PDS-related capability not available or not supported)]							3

3.2.10 Radio Measurements for Position Response

7	6	5	4	3	2	1	0	Octet
⇒ **Geographic Location:** A1 Element Identifier = [2CH]								1
Length = <variable>								2
(MSB)	Calling Geodetic Location (CGL) = <any value>							3
								…
							(LSB)	k

3.3 Mobility Management Message Formats

3.3.1 Authentication Request

This message is sent from the MSC to the BS and it is used to make an authentication check on the MS. This is a DTAP message when used to perform authentication on a voice/traffic channel and a BSMAP message otherwise. The RANDU IE of this message is used by the MS to generate the AUTHU.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M[a]	
Reserved Octet	4.2.32	MSC -> BS	M[a]	
Message Type	4.2.4	MSC -> BS	M	
Authentication Challenge Parameter (RANDU)	4.2.35	MSC -> BS	M[i]	
Mobile Identity (IMSI)	4.2.13	MSC -> BS	O[b,c]	C
Tag	4.2.46	MSC -> BS	O[c,d]	C
Cell Identifier List	4.2.18	MSC -> BS	O[c,e]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[c,f,g]	C
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[c,g,j]	C
Protocol Revision	4.2.79	MSC -> BS	O[h,c]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[c, g, k]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[l]	C
Authentication Vector Info	4.2.96	MSC -> BS	O[m]	C

a. This element is not used when the Authentication Request message is sent as a BSMAP message.

b. This element contains the identity of the MS to which the Authentication Challenge order is to be sent. It shall be included when the Authentication Challenge is to be sent on the paging channel(s).

c. This element is not used when the Authentication Request message is sent as a DTAP message.

d. If this element is present in this message, the value shall be saved at the BS to be included in an Authentication Response message if one is sent in response to this message.

e. This element uniquely identifies cells within a BS from which the Authentication Challenge is to be sent on paging channels. It is a variable length element dependent on the number of cells that need to be identified. This element is only included when the Authentication Challenge is to be sent on paging channel(s) and is only required when a subset of the BS's cells shall be identified.

f. This element is included when slotted paging is performed on *cdma2000* paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. In *cdma2000* systems, if this element is absent, then it is assumed that the MS is operating in non-slotted mode.

g. This element shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

h. This element contains the MS's MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

i. When this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included.

j. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

k. This element is included if the message is sent as a BSMAP message and the MSC has the information available. For BCMCS, this IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.

l. If this message is sent as a BSMAP message and the information is available at the MSC, the MSC shall include a Band Class/Band Subclass Record within this element to report the last known band class and band subclass (if applicable) as well as any other band classes and band subclasses supported by the MS.

m. This IE may be included if the MSC supports AKA.

When the Authentication Request message is sent as a BSMAP message, the following format applies.

3.3.1 Authentication Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [45H]								1
⇒ **Authentication Challenge Parameter (RANDU):** A1 Element Identifier = [41H]								1
Length = [04H]								2
Reserved = [0000]				Random Number Type = [0010] (RANDU)				3
(MSB)	RANDU Value = <any value>							4
								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1

3.3.1 Authentication Request

7	6	5	4	3	2	1	0	Octet
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H]								4
Reserved = [0]	Geo Location Type = [000, 001, 010, 011] (Ignored)			Geo Location Included = [0,1] (Ignored)	FCH Information: Bit-Exact Length – Fill Bits = [000]			5
DCCH Information: Bit-Exact Length – Octet Count = [00H]								6
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000]			7
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H]								8

3.3.1 Authentication Request

7	6	5	4	3	2	1	0	Octet
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000]			9
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H]								10
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000]			11
VP Algorithms Supported = <any value>								12
Additional Geo Location Type Length = [0000 0000]								13
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k

3.3.1 Authentication Request

7	6	5	4	3	2	1	0	Octet
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								
⇒ **Authentication Vector Info:** A1 Element Identifier = [48H]								1
Length =<variable>								2
AKA Authentication Type = [01H]								3
(MSB)	RANDA = <any value>							4
…								…
							(LSB)	19
(MSB)	AUTN = <any value>							20
…								…
							(LSB)	35

When the Authentication Request message is sent as a DTAP message, the following format applies.

3.3.1 Authentication Request

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [08H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [45H]								1
⇒ **Authentication Challenge Parameter (RANDU):** Length = [04H]								1
Reserved = [0000]				Random Number Type = [0010] (RANDU)				2
(MSB)	RANDU Value = <any value>							3
								4
							(LSB)	5

3.3.2 Authentication Response

This message is in response to the Authentication Request message and it is sent from the BS to the MSC. This is a DTAP message when used to perform authentication on a voice/traffic channel and a BSMAP message otherwise. The AUTHU is generated by the MS using an algorithm and the RANDU which was sent through the Authentication Request message.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M[a]	
Reserved Octet	4.2.32	BS -> MSC	M[a]	
Message Type	4.2.4	BS -> MSC	M	
Authentication Response Parameter (AUTHU)	4.2.36	BS -> MSC	M[d]	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	O[b,c]	C
Tag	4.2.46	BS -> MSC	O[c]	C
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[c, e]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[c,f]	C
AKA Report	4.2.97	BS -> MSC	O[g]	C

a. This element is not used when the Authentication Response message is sent as a BSMAP message.

b. This element contains the identity of the MS that sent the Authentication Challenge Response. It shall be included when the Authentication Challenge Response was received on an access channel.

c. This element is not used when the Authentication Response message is sent as a DTAP message.

d. When this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included.

e. This IE is included if the ESN is available at the BS. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

f. This IE is included if the MEID is available at the BS.

g. This IE may be included to provide the AKA results between the MS and the BS. If this IE is included, then AKA was performed instead of 2G authentication and the Authentication Response Parameter (AUTHU) IE is included by the BS and its fields set to zero.

When the Authentication Response message is sent as a BSMAP message, the following format applies.

3.3.2 Authentication Response

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [46H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Authentication Response Parameter (AUTHU): A1 Element Identifier = [42H]</td><td>1</td></tr>
</table>

3.3.2 Authentication Response

7	6	5	4	3	2	1	0	Octet
Length = [04H]								2
Reserved = [0000]				Auth Signature Type = [0010] (AUTHU)				3
[0]	[0]	[0]	[0]	[0]	[0]	(MSB)		4
Auth Signature = <any value>								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5

3.3.2 Authentication Response

7	6	5	4	3	2	1	0	Octet
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **AKA Report:** A1 Element Identifier = [49H]								1
Length <variable>								2
AKA Code = [01H (Success). 02H (Reject), 04H (Loss of radio contact), 06H (Unresolved synchronization failure)]								3
(MSB)	RES = <any value>							4
…								…
							(LSB)	19
(MSB)	AUTS = <any value>							20
…								…
							(LSB)	33

When the Authentication Response message is sent as a DTAP message, the following format applies.

3.3.2 Authentication Response

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [08H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [46H]								1
⇒ **Authentication Response Parameter (AUTHU):** Length = [04H]								1
Reserved = [0000]				Auth Signature Type = [0010] (AUTHU)				2
[0]	[0]	[0]	[0]	[0]	[0]	(MSB)		3
Auth Signature = <any value>								4
							(LSB)	5

3.3.3 SSD Update Request

This DTAP message is sent from the MSC to the BS and is used to initiate the Shared Secret Data update procedure at the MS. This message is used to perform the SSD Update on a voice/traffic channel. The Authentication Challenge Parameter (RANDSSD) IE of this message is used to generate the new SSD at the MS.

Information Element	Section Reference	Element Direction	Type
Protocol Discriminator	4.2.31	MSC -> BS	M
Reserved Octet	4.2.32	MSC -> BS	M
Message Type	4.2.4	MSC -> BS	M
Authentication Challenge Parameter (RANDSSD)	4.2.35	MSC -> BS	M[a]

a. Because this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included.

The following table shows the bitmap layout for the SSD Update Request message.

3.3.3 SSD Update Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ DTAP Header: Message Discrimination = [01H]</td><td>1</td></tr>
<tr><td colspan="8">Data Link Connection Identifier (DLCI) = [00H]</td><td>2</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [0CH]</td><td>3</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">⇒ Protocol Discriminator = [0101]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Reserved Octet = [00H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Message Type = [47H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Authentication Challenge Parameter (RANDSSD): Length = [08H]</td><td>1</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">Random Number Type = [0100] (RANDSSD)</td><td>2</td></tr>
<tr><td>(MSB)</td><td colspan="7">RANDSSD Value = <any value></td><td>3</td></tr>
<tr><td colspan="8"></td><td>4</td></tr>
<tr><td colspan="8"></td><td>5</td></tr>
<tr><td colspan="8"></td><td>6</td></tr>
<tr><td colspan="8"></td><td>7</td></tr>
<tr><td colspan="8"></td><td>8</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>9</td></tr>
</table>

3.3.4 SSD Update Response

This DTAP message is used to complete the SSD Update procedure and is sent in response to the Base Station Challenge Response message. This message is sent from the BS to the MSC. This message is used to perform the SSD Update on a voice/traffic channel.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	4.2.31	BS -> MSC	M	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Cause Layer 3	4.2.42	BS -> MSC	O[a]	C

a. This element indicates the failure of the SSD update operation at the MS. Absence of this element indicates success of the SSD update operation at the MS. If the BS receives an SSD update reject order from the MS, the BS shall set the Cause Layer 3 value to “SSD update rejected”.

The following table shows the bitmap layout for the SSD Update Response message.

3.3.4 SSD Update Response

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [03H,07H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [4AH]								1
⇒ **Cause Layer 3:** A1 Element Identifier = [08H]								1
Length = [02H]								2
ext = [1]	Coding Standard = [00]		Reserved = [0]	Location = [0100] (Public network serving the remote user)				3
ext = [1]	Cause Value = [000 1111 (Procedure failed), 011 1011 (SSD update rejected)]							4

3.3.5 Base Station Challenge

This DTAP message is in response to the SSD Update Request message and is sent from the BS to the MSC. This message is used to perform the SSD Update on a voice/traffic channel. The authentication parameter RANDBS IE of this message contains the RANDBS and is used by the HLR/AC as input to the authentication algorithm to verify the new Shared Secret Data.

Information Element	Section Reference	Element Direction	Type
Protocol Discriminator	4.2.31	BS -> MSC	M
Reserved Octet	4.2.32	BS -> MSC	M
Message Type	4.2.4	BS -> MSC	M
Authentication Challenge Parameter (RANDBS)	4.2.35	BS -> MSC	M[a]

a. Because this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included.

The following table shows the bitmap layout for the Base Station Challenge message.

3.3.5 Base Station Challenge

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ DTAP Header: Message Discrimination = [01H]</td><td>1</td></tr>
<tr><td colspan="8">Data Link Connection Identifier (DLCI) = [00H]</td><td>2</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [09H]</td><td>3</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">⇒ Protocol Discriminator = [0101]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Reserved Octet = [00H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Message Type = [48H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Authentication Challenge Parameter (RANDBS): Length = [05H]</td><td>1</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">Random Number Type = [1000] (RANDBS)</td><td>2</td></tr>
<tr><td>(MSB)</td><td colspan="7">RANDBS Value = <any value></td><td>3</td></tr>
<tr><td colspan="8"></td><td>…</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>6</td></tr>
</table>

3.3.6 Base Station Challenge Response

This DTAP message is in response to the Base Station Challenge message and is sent from the MSC to the BS. This message is used to perform the SSD Update on a voice/traffic channel. The AUTHBS is generated using an authentication algorithm, the new SSD, and RANDBS, which was sent in the Base Station Challenge message.

Information Element	**Section Reference**	**Element Direction**	**Type**
Protocol Discriminator	4.2.31	MSC -> BS	M
Reserved Octet	4.2.32	MSC -> BS	M
Message Type	4.2.4	MSC -> BS	M
Authentication Response Parameter (AUTHBS)	4.2.36	MSC -> BS	M[a]

a. Because this IE is sent as a mandatory IE in DTAP message, the IE identifier is not included

The following table shows the bitmap layout for the Base Station Challenge Response message.

3.3.6 Base Station Challenge Response

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [08H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [49H]								1
⇒ **Authentication Response Parameter (AUTHBS):** Length = [04H]								1
Reserved = [0000]				Auth Signature Type = [0100] (AUTHBS)				2
[0]	[0]	[0]	[0]	[0]	[0]	(MSB)		3
Auth Signature = <any value>								4
							(LSB)	5

3.3.7 Location Updating Request

This DTAP message is sent by the BS to the MSC to request an update to the MS's location area (registration) when the MS moves to a new location from its previous location.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M[i]	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	M[a, i, m]	
Classmark Information Type 2	4.2.12	BS -> MSC	O[b, i, k]	R
Registration Type	4.2.45	BS -> MSC	O[i]	R
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[c]	C
Slot Cycle Index	4.2.14	BS -> MSC	O[d, l]	C
Authentication Response Parameter (AUTHR)	4.2.36	BS -> MSC	O[e]	C
Authentication Confirmation Parameter (RANDC)	4.2.33	BS -> MSC	O[f]	C
Authentication Parameter COUNT	4.2.37	BS -> MSC	O[o]	C
Authentication Challenge Parameter (RAND)	4.2.35	BS -> MSC	O[g]	C
Authentication Event	4.2.61	BS -> MSC	O[h]	C
User Zone ID	4.2.26	BS -> MSC	O[o]	C
IS-2000 Mobile Capabilities	4.2.53	BS -> MSC	O[j, l, p]	C
Return Cause	4.2.83	BS -> MSC	O[n]	C
MS Designated Frequency	4.2.88	BS -> MSC	O[l, c,r]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[c]	C
Mobile Subscription Information	4.2.91	BS -> MSC	O[q]	C

a. This element contains an IMSI.

b. If an MS is capable of supporting multiple band classes, and this information is available at the BS, it shall be indicated in the Band Class Entry field as shown in section 4.2.12.

c. This IE is present if the information is received from the MS.

d. The slot cycle index is included when provided by the MS.

e. This element contains the authentication response signature (AUTHR) received from an authentication capable MS when broadcast authentication is active.

f. This element contains the RANDC received from the MS. RANDC shall be included whenever it is received from the MS and authentication is enabled.

g. This element is included when broadcast authentication is performed, and contains the random number (RAND) value used when the BS is responsible for RAND assignment and can correlate this parameter with the RAND used by the MS in its authentication computation.

h. This element is present when an authentication enabled BS does not receive the authentication parameters (AUTHR, RANDC and COUNT) from the MS, or when a RAND/RANDC mismatch has occurred.

i. If any of these elements are not correctly present, call failure handling may be initiated by the MSC.

j. This element is only included when the MS operates at revision level 6 or greater as defined by [1]~[6].

k. When the BS is operating in DS-41 mode, only the following fields in the Classmark Type 2 IE shall be considered valid by the MSC: MOB_P_REV, NAR_AN_CAP, Mobile Term, PSI (PACA Supported Indicator), SCM Length, Count of Band Class Entries, Band Class Entry Length, Band Class n, Band Class n Air Interfaces Supported, Band Class n MOB_P_REV.

l. These elements shall not be included by the BS when the BS and MS are operating in DS-41 mode.

m. Because this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included.

n. This element is included if the MS re-sends the Registration Message with Return Cause to the BS because it failed to be redirected to the desired system.

o. This IE is included if the necessary information was received from the MS.

p. If the BS does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

q. If an MS is capable of supporting multiple band classes and at least one band class has band subclasses defined, the BS shall include the MS's band class and band subclass capabilities in this element as shown in section 4.2.91 if this information is available at the BS. When included, the band class and band subclass information in this IE shall take precedence over any band class information included in the Classmark Information Type 2 IE.

r. For BCMCS, this IE shall not be included when the BS assumes that the MS is reachable on its hash-to frequency.

The following message layout contains the Complete Layer 3 Info message encapsulating the Location Updating Request message. Refer to section 3.1.1.

3.3.7 Location Updating Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [57H]								1
⇒ **Cell Identifier:** A1 Element Identifier = [05H]								1
Length = [03H]								2
Cell Identification Discriminator = [02H]								3
(MSB)	Cell = [001H-FFFH]							4
				Sector = [0H-FH] (0H = Omni)			(LSB)	5
⇒ **Layer 3 Information:** A1 Element Identifier = [17H]								1

3.3.7 Location Updating Request

7	6	5	4	3	2	1	0	Octet
Length = <variable> (# of bytes included in the following message)								2
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [08H]								1
⇒ **Mobile Identity (IMSI):** Length = [06H-08H] (10-15 digits)								1
Identity Digit 1 = [0H-9H] (BCD)			Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)				2
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				3
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Classmark Information Type 2:** A1 Element Identifier = [12H]								1
Length = <variable>								2
MOB_P_REV = [000 – 111]			Reserved = [0]	See List of Entries = [0, 1]	RF Power Capability = [000-010]			3
Reserved = [00H]								4
NAR_ AN_ CAP = [0,1]	IS-95 = [1]	Slotted = [0,1]	Reserved = [00]		DTX = [0,1] (ignored)	Mobile Term = [0,1]	TIA/ EIA-553 = [0,1]	5
Reserved = [00H]								6
Reserved = [0000 00]						Mobile Term = [0,1]	PSI = [0,1]	7
SCM Length = [01H]								8
Station Class Mark = [00H – FFH]								9
Count of Band Class Entries = [01H-20H]								10
Band Class Entry Length = [03H]								11
Mobile Band Class Capability Entry {1+:								
Reserved = [000]			Band Class n = [00000-11111]					k
Band Class n Air Interfaces Supported = [00H-FFH]								k+1
Band Class n MOB_P_REV = [00H-FFH]								k+2

3.3.7 Location Updating Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="9">} Mobile Band Class Capability Entry</td></tr>
<tr><td colspan="8">⇒ Registration Type: A1 Element Identifier = [1FH]</td><td>1</td></tr>
<tr><td colspan="8">Location Registration Type =
[00H (timer-based),
01H (power-up),
02H (zone-based),
03H (power-down),
04H (parameter change),
05H (ordered),
06H (distance-based),
07H (user zone based),
09H (BCMC Registration)]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (ESN): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [05H]</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0000]</td><td>Odd/even Indicator
= [0]</td><td colspan="3">Type of Identity
= [101] (ESN)</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">ESN = <any value></td><td>4</td></tr>
<tr><td colspan="8"></td><td>5</td></tr>
<tr><td colspan="8"></td><td>6</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>7</td></tr>
<tr><td colspan="8">⇒ Slot Cycle Index: A1 Element Identifier = [35H]</td><td>1</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td>SCI Sign = [0,1]</td><td colspan="3">Slot Cycle Index = [000-111]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Authentication Response Parameter (AUTHR): A1 Element Identifier = [42H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [04H]</td><td>2</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">Auth Signature Type = [0001] (AUTHR)</td><td>3</td></tr>
<tr><td>[0]</td><td>[0]</td><td>[0]</td><td>[0]</td><td>[0]</td><td>[0]</td><td>(MSB)</td><td></td><td>4</td></tr>
<tr><td colspan="8">Auth Signature = <any value></td><td>5</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>6</td></tr>
<tr><td colspan="8">⇒ Authentication Confirmation Parameter (RANDC):
A1 Element Identifier = [28H]</td><td>1</td></tr>
<tr><td colspan="8">RANDC = [00H-FFH]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Authentication Parameter COUNT: A1 Element Identifier = [40H]</td><td>1</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="6">Count = [000000-111111]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Authentication Challenge Parameter (RAND): A1 Element Identifier = [41H]</td><td>1</td></tr>
</table>

3.3.7 Location Updating Request

7	6	5	4	3	2	1	0	Octet
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)	RAND = <any value>							4
								5
								6
							(LSB)	7
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1
Length = [01H]								2
Event = [01H (Parameters not received), 02H (RANDC/RAND mismatch)]								3
⇒ **User Zone ID:** A1 Element Identifier = [02H]								1
Length = [02H]								2
(MSB)	UZID = <any value>							3
							(LSB)	4
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H]								4
Reserved = [0]	Geo Location Type = [000, 001, 010, 011]			Geo Location Included = [0,1]	FCH Information: Bit-Exact Length – Fill Bits = [000]			5
DCCH Information: Bit-Exact Length – Octet Count = [00H]								6
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000]			7
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H]								8
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000]			9
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H]								10

3.3.7 Location Updating Request

7	6	5	4	3	2	1	0	Octet
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000]			11
VP Algorithms Supported = <any value>								12
Additional Geo Location Type Length = [0000 0000 to 0000 0010]								13
(MSB)	Additional Geo Location Type = <any value>							14
…								…
							(LSB)	r
⇒ **Return Cause:** A1 Element Identifier = [68H]								1
Reserved = [0000]				Return_Cause = [0001 (Service redirection failed as a result of system not found), 0010 (Service redirection failed as a result of protocol mismatch), 0011 (Service redirection failed as a result of registration rejection), 0100 (Service redirection failed as a result of wrong SID), 0101 (Service redirection failed as a result of wrong NID)]				2
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1

3.3.7 Location Updating Request

7	6	5	4	3	2	1	0	Octet
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

3.3.8 Location Updating Accept

This DTAP message is sent from an MSC to a BS to acknowledge that the MSC received and accepted the Location Updating Request from the BS.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M	
Reserved Octet	4.2.32	MSC -> BS	M	
Message Type	4.2.4	MSC -> BS	M	
Cause	4.2.16	MSC -> BS	O[a]	C
Protocol Revision	4.2.79	MSC -> BS	O[b]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[c,d]	C
Authentication Challenge Parameter (RAND)	4.2.35	MSC -> BS	O[e]	C
Authentication Vector Info	4.2.96	MSC -> BS	O[f]	C

a. This element may be included if the MSC is aware that the MS has a dormant packet data session and that the MS is powering down.

b. This element contains the MS's MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

c. This element is included when the MSC has the information available.

d. These elements shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

e. This IE is included for 2G mutual authentication.

f. This IE is included if the MSC supports AKA.

The following table shows the bitmap layout for the Location Updating Accept message.

3.3.8 Location Updating Accept

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [02H]								1
⇒ **Cause:** A1 Element Identifier **=** [04H]								1
Length = [01H]								2
Ext= [0]	Cause Value = [19H] (Power down from dormant state)							3
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3

3.3.8 Location Updating Accept

7	6	5	4	3	2	1	0	Octet
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **Authentication Challenge Parameter (RAND):** A1 Element Identifier = [41H]								1
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)	RAND = <any value>							4
								5
								6
							(LSB)	7
⇒ **Authentication Vector Info:** A1 Element Identifier = [48H]								1
Length =<variable>								2
AKA Authentication Type = [01H]								3
(MSB)	RANDA = <any value>							4
…								…
							(LSB)	19
(MSB)	AUTN = <any value>							20
…								…
							(LSB)	35

3.3.9 Location Updating Reject

This DTAP message is optionally sent by the MSC to the BS to indicate that updating has failed.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M	
Reserved Octet	4.2.32	MSC -> BS	M	
Message Type	4.2.4	MSC -> BS	M	
Reject Cause	4.2.34	MSC -> BS	M[a]	
Protocol Revision	4.2.79	MSC -> BS	O[b]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[c,d]	C

a. Because this IE is sent as a mandatory IE in DTAP message, the IE identifier is not included.

b. This element contains the MS's MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

c. This element is included when the MSC has the information available.

d. These elements shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

The following table shows the bitmap layout for the Location Updating Reject message.

3.3.9 Location Updating Reject

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [04H, 07H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [04H]								1
⇒ **Reject Cause** = [03H (Illegal MS), 0BH (Roaming not allowed), 51H (Network failure), 56H (Congestion)]								1
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2

3.3.9 Location Updating Reject

7	6	5	4	3	2	1	0	Octet
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4

3.3.10 Parameter Update Request

This DTAP message is sent from the MSC to the BS to increment the call history count in the MS.

Information Element	Section Reference	Direction	Type
Protocol Discriminator	4.2.31	MSC -> BS	M
Reserved Octet	4.2.32	MSC -> BS	M
Message Type	4.2.4	MSC -> BS	M

The following table shows the bitmap layout for the Parameter Update Request message.

3.3.10 Parameter Update Request

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [03H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [2CH]								1

3.3.11 Parameter Update Confirm

This DTAP message is sent from the BS to the MSC in response to a Parameter Update Request message. This message is sent when the BS receives a positive indication from the MS that it incremented its call history count.

Information Element	**Section Reference**	**Direction**	**Type**
Protocol Discriminator	4.2.31	BS -> MSC	M
Reserved Octet	4.2.32	BS -> MSC	M
Message Type	4.2.4	BS -> MSC	M

The following table shows the bitmap layout for the Parameter Update Confirm message.

3.3.11 Parameter Update Confirm

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [03H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [2BH]								1

3.3.12 Privacy Mode Command

This BSMAP message is sent from the MSC to the BS to enable or disable signaling message encryption or Voice Privacy mode.

Information Element	**Section Reference**	**Element Direction**	**Type**
Message Type	4.2.4	MSC -> BS	M
Encryption Information	4.2.10	MSC -> BS	M

The following table shows the bitmap layout for the Privacy Mode Command message.

3.3.12 Privacy Mode Command

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [53H]								1
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = <variable>								2
Encryption Info {1..2: ***IF (Encryption Parameter Identifier = 00001, 00101, or 00110), Encryption Info {1:***								
ext = [1]	Encryption Parameter Identifier = [00001 (SME), 00101 (Datakey (ORYX)), 00110 (Initial RAND)]					Status = [0,1]	Available = [0]	j
Encryption Parameter Length = [04H, 08H]								j+1
(MSB)	Encryption Parameter value							j+2
…								…
							(LSB)	k
} OR IF (Encryption Parameter Identifier = 00100), Encryption Info {1:								
ext = [1]	Encryption Parameter Identifier = [00100] (Private Longcode)					Status = [0,1]	Available = [0]	j
Encryption Parameter Length = [06H]								j+1
Unused = [000000]						(MSB)		j+2
Encryption Parameter value								j+3
								j+4
								j+5
								j+6
							(LSB)	j+7
} Encryption Parameter Identifier ***} Encryption Info***								

3.3.13 Privacy Mode Complete

This BSMAP message is sent from the BS to the MSC to acknowledge the Privacy Mode Command, to indicate a change in the Voice Privacy mode setting, or to indicate that the MS has requested Voice Privacy.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Encryption Information	4.2.10	BS -> MSC	O[a]	C
Voice Privacy Request	4.2.11	BS -> MSC	O[b,d]	C
Enhanced Voice Privacy Request	4.2.98	BS -> MSC	O[c,d]	C

a. This element is used to indicate Voice Privacy mode changes when this message is sent autonomously by the BS.

b. This element is used to indicate that Voice Privacy was requested by the MS, but could not be provided by the BS.

c. This IE is used to indicate that the MS has requested a specific voice privacy algorithm or a change in voice privacy in addition to the voice privacy algorithms supported.

d. Either the Voice Privacy Request IE or the Enhanced Voice Privacy Request IE may be sent. If both IEs are received, the Enhanced Voice Privacy shall take precedence.

Note: Encryption Information and voice privacy elements are mutually exclusive. The Encryption IE is used to indicate a change in Encryption Information at the BS. The Voice Privacy Request or Enhanced Voice Privacy Requests elements are used by the BS to request the encryption keys.

The following table shows the bitmap layout for the Privacy Mode Complete message.

3.3.13 Privacy Mode Complete

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [55H]								1
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = [02H,04H]								2
Encryption Info {1..2:								
ext = [1]	Encryption Parameter Identifier = [00001,00100] (SME, Private Longcode)					Status = [0,1]	Available = [0,1]	j
Encryption Parameter Length = [00H]								j+1
} Encryption Info								
⇒ **Voice Privacy Request:** A1 Element Identifier = [A1H]								1
⇒ **Enhanced Voice Privacy Request:** A1 Element Identifier = [4CH]								1

3.3.13 Privacy Mode Complete

7	6	5	4	3	2	1	0	Octet
Length = [02H]								2
VP Algorithm Requested <any value>								3
VP Algorithms Supported <any value>								4

3.3.14 Status Request

This message is sent from the MSC to the BS to request that the MS report certain MS programmable and static parameters such as call mode, roaming and security setting, terminal information etc. This is a DTAP message when used to perform the Status Request on a traffic channel and a BSMAP message otherwise.

This message shall not be used for DS-41 operation.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M[a]	
Reserved Octet	4.2.32	MSC -> BS	M[a]	
Message Type	4.2.4	MSC -> BS	M	
Information Record Requested	4.2.77	MSC -> BS	M[e]	
Mobile Identity (IMSI)	4.2.13	MSC -> BS	O[b]	C
Mobile Identity (ESN)	4.2.13	MSC -> BS	O[b,g]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[b,c]	C
Cell Identifier List	4.2.18	MSC -> BS	O[b]	C
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[b, f]	C
Protocol Revision	4.2.79	MSC -> BS	O[b,d]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[b,i,l]	C
Mobile Identity (MEID)	4.2.13	MSC -> BS	O[b,h]	C
Tag	4.2.46	MSC -> BS	O[j]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[b,k]	C

a. This element is not used when the Status Request message is sent as a BSMAP message.

b. These elements are used only in BSMAP messages. For BSMAP messages, this IE is included if the necessary information is available at the MSC.

c. This element is included where slotted paging is performed on cdma2000 paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. If this element is absent, then it is assumed that the MS is operating in non-slotted mode.

d. This element contains the MS's MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

e. When this IE is sent as a mandatory IE in DTAP message, the IE identifier is not included. The Information Record Type field values and coding are specified in [5].

f. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

g. This IE is included if the ESN is available at the MSC. ESN containing a pseudo ESN is not required to be sent if the MEID is sent

h. This IE is included if the MEID is available at the MSC.

i. These elements shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

j. This element is included only if the message is sent as a BSMAP message. If this element is present in the message, the value shall be saved at the BS to be included in a Status Response message.

k. If this message is sent as a BSMAP message and the information is available at the MSC, the MSC shall include a Band Class/Band Subclass Record within this element to report the last known band class and band subclass (if applicable) as well as any other band classes and band subclasses supported by the MS.

l. For BCMCS, this IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.

When the Status Request message is sent as a BSMAP message, the following format applies.

3.3.14 Status Request

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [6AH]								1
⇒ **Information Record Requested:** A1 Element Identifier = [2EH]								1
Length = <variable>								2
Information Record requested: {1+:								
Information Record Type = <any value>								j
} information Record Requested								
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6

3.3.14 Status Request

7	6	5	4	3	2	1	0	Octet
							(LSB)	7
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)				j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **IS-2000 Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H]								4
Reserved = [0]	Geo Location Type = [000, 001, 010, 011]			Geo Location Included = [0,1]	FCH Information: Bit-Exact Length – Fill Bits = [000]			5
DCCH Information: Bit-Exact Length – Octet Count = [00H]								6
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000]			7
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H]								8
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000]			9
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H]								10

3.3.14 Status Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">REV_PDCH Information:
Bit-Exact Length – Fill Bits
= [000]</td><td>11</td></tr>
<tr><td colspan="8">VP Algorithms Supported = <any value></td><td>12</td></tr>
<tr><td colspan="8">Additional Geo Location Type Length = [0000 0000]</td><td>13</td></tr>
<tr><td colspan="8">⇒ Protocol Revision: A1 Element Identifier = [3BH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="8">MOB_P_REV = [07H-FFH]</td><td>3</td></tr>
<tr><td colspan="8">⇒ MS Designated Frequency: A1 Element Identifier = [73H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [02H]</td><td>2</td></tr>
<tr><td colspan="5">Band Class = [00000 – 11111]</td><td colspan="3">CDMA channel (high part) =
[000 – 111]</td><td>3</td></tr>
<tr><td colspan="8">CDMA channel (low part) = [00H – FFH]</td><td>4</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (MEID): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [08H]</td><td>2</td></tr>
<tr><td colspan="4">MEID Hex Digit 1 = [0H-FH]</td><td>Odd/Even Indicator = ‘0’</td><td colspan="3">Type of Identity
= [001] (MEID)</td><td>3</td></tr>
<tr><td colspan="4">MEID Hex Digit 3 = [0H-FH]</td><td colspan="4">MEID Hex Digit 2 = [0H-FH]</td><td>4</td></tr>
<tr><td colspan="4">MEID Hex Digit 5 = [0H-FH]</td><td colspan="4">MEID Hex Digit 4 = [0H-FH]</td><td>5</td></tr>
<tr><td colspan="4">MEID Hex Digit 7 = [0H-FH]</td><td colspan="4">MEID Hex Digit 6 = [0H-FH]</td><td>6</td></tr>
<tr><td colspan="4">MEID Hex Digit 9 = [0H-FH]</td><td colspan="4">MEID Hex Digit 8 = [0H-FH]</td><td>7</td></tr>
<tr><td colspan="4">MEID Hex Digit 11 = [0H-FH]</td><td colspan="4">MEID Hex Digit 10 = [0H-FH]</td><td>8</td></tr>
<tr><td colspan="4">MEID Hex Digit 13 = [0H-FH]</td><td colspan="4">MEID Hex Digit 12 = [0H-FH]</td><td>9</td></tr>
<tr><td colspan="4">Fill = [FH]</td><td colspan="4">MEID Hex Digit 14 = [0H-FH]</td><td>10</td></tr>
<tr><td colspan="8">⇒ Tag: A1 Element Identifier = [33H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="7">Tag Value = <any value></td><td>2</td></tr>
<tr><td colspan="8"></td><td>3</td></tr>
<tr><td colspan="8"></td><td>4</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>5</td></tr>
<tr><td colspan="8">⇒ Mobile Subscription Information: A1 Element Identifier = [7DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="9">Record: {1:</td></tr>
<tr><td colspan="8">Record Identifier = [00H]</td><td>3</td></tr>
<tr><td colspan="8">Record Length = <variable></td><td>4</td></tr>
</table>

3.3.14 Status Request

7	6	5	4	3	2	1	0	Octet
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

When the Status Request message is sent as a DTAP message, the following format applies.

3.3.14 Status Request

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [6AH]								1
⇒ **Information Record Requested:** Length = <variable>								1
Information Record Requested: {1+:								
Information Record Types = <any value>								j
} Information Record Requested								

3.3.15 Status Response

This message is sent from the BS to the MSC when the MS reports certain parameters to the network. This message is the response to the Status Request message. This is a DTAP message when the Status Response Message is received on a traffic channel and a BSMAP message otherwise.

This message shall not be used for DS-41 operation.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M[a]	
Reserved Octet	4.2.32	BS -> MSC	M[a]	
Message Type	4.2.4	BS -> MSC	M	
MS Information Records	4.2.55	BS -> MSC	M[b]	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	O[c]	C
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[c]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[c]	C
Tag	4.2.26	BS -> MSC	O[d]	C

a. This element is not used when the Status Request message is sent as a BSMAP message.

b. When this IE is sent as a mandatory IE in DTAP message, the IE identifier is not included.

c. These IEs are only used in BSMAP messages. For BSMAP messages, these IEs are present if the information is received from the MS.

d. If a Tag element was received from the MSC in the Status Request message, the BS shall include the Tag element in the Status Response message. The Tag value used in this message shall be the same as the Tag value received from the MSC.

When the Status Response message is sent as a BSMAP message, the following format applies.

3.3.15 Status Response

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [6BH]								1
⇒ **MS Information Records:** A1 Element Identifier = [15H]								1
Length = [01H-FFH]								2
Information Record: {1+:								
Information Record Type = [00H-FFH]								j
Information Record Length = <variable>								j+1
(MSB)	Information Record Content = <any value>							j+2
…								…

3.3.15 Status Response

7	6	5	4	3	2	1	0	Octet
							(LSB)	k
} Information Record								
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = '0'	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3

3.3.15 Status Response

7	6	5	4	3	2	1	0	Octet
								4
							(LSB)	5

When the Status Response message is sent as a DTAP message, the following format applies.

3.3.15 Status Response

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [6BH]								1
⇒ **MS Information Records:** Length = [01H-FFH]								1
Information Record: {1+:								
Information Record Type = [00H-FFH]								j
Information Record Length = <variable>								j+1
(MSB)	Information Record Content = <any value>							j+2
…								…
							(LSB)	k
} Information Record								

3.3.16 User Zone Update Request

This DTAP message is sent from the BS to the MSC to indicate that the MS has sent a User Zone Update Request message to change its User Zone.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	4.2.31	BS -> MSC	M	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
User Zone ID	4.2.26	BS -> MSC	O[a]	R

a. This element indicates the User Zone proposed by the MS.

The following table shows the bitmap layout for the User Zone Update Request message:

3.3.16 User Zone Update Request

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [06H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [0DH]								1
⇒ **User Zone ID:** A1 Element Identifier = [02H]								1
Length = [02H]								2
(MSB)	UZID = <any value>							3
							(LSB)	4

3.3.17 User Zone Update

This DTAP message is sent from the MSC to the BS when the MSC is updating the User Zone being used by the MS.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	4.2.31	MSC -> BS	M	
Reserved Octet	4.2.32	MSC -> BS	M	
Message Type	4.2.4	MSC -> BS	M	
User Zone ID	4.2.26	MSC -> BS	O[a]	R

a. This element indicates the User Zone proposed by the MSC.

The following table shows the bitmap layout for the User Zone Update message:

3.3.17 User Zone Update

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ DTAP Header: Message Discrimination = [01H]</td><td>1</td></tr>
<tr><td colspan="8">Data Link Connection Identifier (DLCI) = [00H]</td><td>2</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [06H]</td><td>3</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">⇒ Protocol Discriminator = [0101]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Reserved Octet = [00H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Message Type = [0CH]</td><td>1</td></tr>
<tr><td colspan="8">⇒ User Zone ID: A1 Element identifier = [02H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [02H]</td><td>2</td></tr>
<tr><td>(MSB)</td><td colspan="7">UZID = <any value></td><td>3</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>4</td></tr>
</table>

3.3.18 User Zone Reject

This message is sent from the MSC to the BS to indicate that the MSC has rejected the User Zone indicated by the MS. The MSC may choose to include an alternate User Zone in this message. This is a BSMAP message when sent on a Paging Channel and a DTAP message otherwise.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	4.2.31	MSC -> BS	M[a]	
Reserved Octet	4.2.32	MSC -> BS	M[a]	
Message Type	4.2.4	MSC -> BS	M	
User Zone ID	4.2.26	MSC -> BS	O[f]	C
Mobile Identity (IMSI)	4.2.13	MSC -> BS	O[b,c]	C
Cell Identifier List	4.2.18	MSC -> BS	O[c,d]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[c,e,g]	C
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[c,g,i]	C
Protocol Revision	4.2.79	MSC -> BS	O[h,c]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[g, j]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[j,k]	C

a. These elements are not used when the User Zone Reject message is sent as a BSMAP message.

b. This element contains the identity of the MS to which the User Zone Reject is to be sent. It shall be included when the User Zone Reject is to be sent on the paging channel(s).

c. These elements are not used when the User Zone Reject is sent as a DTAP message.

d. This element is only required for multi-cell BSs. Uniquely identifies cells within a BS.

e. This element is included when slotted paging is performed on paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. If this element is absent, then it is assumed that the MS is operating in non-slotted mode.

f. The MSC shall include this element if it is proposing an alternate User Zone to be used by the MS.

g. These elements shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

h. This element contains the MS's MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

i. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

j. This element is included if the message is sent as a BSMAP message and the MSC has the information available. For BCMCS, this IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.

k. If this message is sent as a BSMAP message and the information is available at the MSC, the MSC shall include a Band Class/Band Subclass Record within this element to report the last known band class and band subclass (if applicable) as well as any other band classes and band subclasses supported by the MS.

When the User Zone Reject message is sent as a BSMAP message, the following format applies.

3.3.18 User Zone Reject

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [0BH]								1
⇒ **User Zone ID:** A1 Element Identifier = [02H]								1
Length = [02H]								2
(MSB)	UZID = <any value>							3
							(LSB)	4
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2

3.3.18 User Zone Reject

7	6	5	4	3	2	1	0	Octet
⇒ **IS-2000 Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								4
Reserved = [0]	Geo Location Type = [000, 001, 010, 011]			Geo Location Included = [0,1]	FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			5
(MSB)								6
FCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
DCCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								k+1
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			k+2
(MSB)								k+3
DCCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	m
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								m+1
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			m+2
(MSB)								m+3
FOR_PDCH Information Content = <any value>								…

3.3.18 User Zone Reject

7	6	5	4	3	2	1	0	Octet
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6

3.3.18 User Zone Reject

7	6	5	4	3	2	1	0	Octet
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

When the User Zone Reject message is sent as a DTAP message, the following format applies.

3.3.18 User Zone Reject

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [07H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [0BH]								1
⇒ **User Zone ID:** A1 Element Identifier = [02H]								1
Length = [02H]								2
(MSB)	UZID = <any value>							3
							(LSB)	4

3.3.19 Registration Request

This BSMAP message is sent from the MSC to the BS to initiate ordered registration with the MS.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI/ESN)	4.2.13	MSC -> BS	M[a]	
Cell Identifier List	4.2.18	MSC -> BS	O[b]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[c,d]	C
Protocol Revision	4.2.79	MSC -> BS	O[e]	C
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[f]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[d, g]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[h]	C

a. This element shall be set to the ESN when the BS and MS are operating in DS-41 mode and IMSI otherwise.

b. One or more cell identifiers may be included to indicate which cells within the BS shall send the Registration Request Order upon receipt of a single Registration Request message from the MSC. If this element is not included in the message, all cells within the BS shall send the Registration Request order.

c. This element is included where slotted paging is performed on the paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. If this element is absent, then it is assumed that the MS is operating in non-slotted mode.

d. This element shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

e. This element contains the MS’s MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

f. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

g. This element is included when the MSC has the information available. For BCMCS, this IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.

h. If available at the MSC, the MSC shall include a Band Class/Band Subclass Record within this element to report the last known band class and band subclass (if applicable) as well as any other band classes and band subclasses supported by the MS.

The following table shows the bitmap layout for the Registration Request message.

3.3.19 Registration Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
Message Type = [05H]								1

3.3.19 Registration Request

7	6	5	4	3	2	1	0	Octet
⇒ **Mobile Identity (IMSI/ESN):** A1 Element Identifier = [0DH]								1
Length = [05H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD), [0H] (ESN)				Odd/even Indicator = [1,0]	Type of Identity = [101 (ESN),110 (IMSI)]			3
IF(Type of Identity = 101), Identity {1:								
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
} OR IF (Type of Identity = 110), Identity {1:								
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
} Type of Identity								
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **IS-2000 Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2

3.3.19 Registration Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td>REV_ PDCH Supported = [0, 1]</td><td>FOR_ PDCH Supported = [0,1]</td><td>ERAM Supported = [0,1]</td><td>DCCH Supported = [0,1]</td><td>FCH Supported = [0,1]</td><td>OTD Supported = [0,1]</td><td>Enhanced RC CFG Supported = [0,1]</td><td>QPCH Supported = [0,1]</td><td>3</td></tr>
<tr><td colspan="8">FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]</td><td>4</td></tr>
<tr><td>Reserved = [0]</td><td colspan="3">Geo Location Type = <any value> (Ignored)</td><td>Geo Location Included = <any value> (Ignored)</td><td colspan="3">FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]</td><td>5</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>6</td></tr>
<tr><td colspan="8">FCH Information Content = <any value></td><td>…</td></tr>
<tr><td></td><td>Seventh Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Sixth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fifth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fourth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Third Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Second Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>First Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>k</td></tr>
<tr><td colspan="8">DCCH Information: Bit-Exact Length – Octet Count = [00H to FFH]</td><td>k+1</td></tr>
<tr><td colspan="5">Reserved = [0000 0]</td><td colspan="3">DCCH Information: Bit-Exact Length – Fill Bits = [000 to 111]</td><td>k+2</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>k+3</td></tr>
<tr><td colspan="8">DCCH Information Content = <any value></td><td>…</td></tr>
<tr><td></td><td>Seventh Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Sixth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fifth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fourth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Third Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Second Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>First Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>m</td></tr>
<tr><td colspan="8">FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]</td><td>m+1</td></tr>
<tr><td colspan="5">Reserved = [0000 0]</td><td colspan="3">FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]</td><td>m+2</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>m+3</td></tr>
<tr><td colspan="8">FOR_PDCH Information Content = <any value></td><td>…</td></tr>
</table>

3.3.19 Registration Request

7	6	5	4	3	2	1	0	Octet
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7

3.3.19 Registration Request

7	6	5	4	3	2	1	0	Octet
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

3.3.20 Mobile Station Registered Notification

This BSMAP message is sent from MSC to BS to trigger the BS to send the Mobile Station Registered Message to the MS.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Cause	4.2.16	MSC -> BS	O	R

The following table shows the bitmap layout for the Mobile Station Registered Notification message.

3.3.20 Mobile Station Registered Notification

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04]								2
⇒ **Message Type** = [71H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext=[0]	Cause Value=[1EH (Autonomous Registration by the Network)]							3

3.3.21 BS Authentication Request

This BSMAP message is sent from the BS to the MSC to initiate an authentication check on the specified MS on the traffic channel.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	BS -> MSC	M
Mobile Identity (IMSI)	4.2.13	BS -> MSC	M

The following table shows the bitmap layout for the BS Authentication Request message

3.3.21 BS Authentication Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
Message Type = [07H]								1
⇒ **Mobile Identity (IMSI/ESN):** A1 Element Identifier = [0DH]								1
Length = [05H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD), [0H] (ESN)				Odd/even Indicator = [1,0]	Type of Identity = [101 (ESN),110 (IMSI)]			3
IF(Type of Identity = 101), Identity {1:								
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
} OR IF (Type of Identity = 110), Identity {1:								
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
} Type of Identity								

3.3.22 BS Authentication Request Ack

This BSMAP message is sent from the MSC to the BS in response to a BS Authentication Request message.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	BS -> MSC	M
Mobile Identity (IMSI)	4.2.13	BS -> MSC	M

The following table shows the bitmap layout for the BS Authentication Request Ack message.

3.3.22 BS Authentication Request Ack

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">Message Type = [08H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (IMSI/ESN): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [05H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD),
[0H] (ESN)</td><td>Odd/even Indicator
= [1,0]</td><td colspan="3">Type of Identity
= [101 (ESN),110 (IMSI)]</td><td>3</td></tr>
<tr><td colspan="9">IF(Type of Identity = 101), Identity {1:</td></tr>
<tr><td>(MSB)</td><td colspan="7">ESN = <any value></td><td>4</td></tr>
<tr><td colspan="8"></td><td>5</td></tr>
<tr><td colspan="8"></td><td>6</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>7</td></tr>
<tr><td colspan="9">} OR IF (Type of Identity = 110), Identity {1:</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit N = [0H-9H] (BCD)</td><td>n</td></tr>
<tr><td colspan="4">= [1111] (if even number of digits),
Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="9">} Type of Identity</td></tr>
</table>

3.3.23 BS Security Mode Request

This message is sent from the BS to the MSC to initiate receipt of encryption and/or message integrity information for the MS.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	O[a]	R
Tag	4.2.46	BS -> MSC	O[b]	C

a. This IE contains the identity of the MS for which the encryption and/or integrity information update is intended.

b. If this IE is present in this message, the value shall be saved at the MSC to be included in the Security Mode Request message sent in response to this message.

The following table shows the bitmap layout for the BS Security Mode Request message.

3.3.23 BS Security Mode Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [4BH]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (IMSI): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD)</td><td>Odd/even Indicator = [1,0]</td><td colspan="3">Type of Identity = [110] (IMSI)</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit N = [0H-9H] (BCD)</td><td>n</td></tr>
<tr><td colspan="4">= [1111] (if even number of digits),
Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="8">⇒ Tag: A1 Element Identifier = [33H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="7">Tag Value = <any value></td><td>2</td></tr>
<tr><td colspan="8"></td><td>3</td></tr>
<tr><td colspan="8"></td><td>4</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>5</td></tr>
</table>

3.3.24 Security Mode Request

This message is sent from the MSC to the BS to update encryption and/or integrity information with the MS. This is a DTAP message when used to perform an update on a voice/traffic channel and a BSMAP message otherwise.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M[a]	
Reserved Octet	4.2.32	MSC -> BS	M[a]	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	4.2.13	MSC -> BS	O[b,c]	C
Tag	4.2.46	MSC -> BS	O[c,d]	C
Cell Identifier List	4.2.18	MSC -> BS	O[c,e]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[c,f,g]	C
Encryption Information	4.2.10	MSC -> BS	O[h]	C
Integrity Info	4.2.95	MSC -> BS	O[h]	C
UIM Authentication Info	4.2.100	MSC -> BS	O[i]	C

a. This IE is not used when the Security Mode Request message is sent as a BSMAP message.

b. This IE contains the identity of the MS for which the encryption and/or integrity information update is intended. It shall be included when the Security Mode Command is to be sent on the paging channel(s).

c. This IE is not used when the Security Mode Request message is sent as a DTAP message.

d. If the Tag IE was received from the BS in the BS Security Mode Request message, the MSC shall include the same Tag IE in this message. If the Tag IE is present in this message, the value shall be saved at the BS to be included in the Security Mode Response message sent in response to this message.

e. This IE uniquely identifies cells within a BS from which the Security Mode Command is to be sent on paging channels. It is a variable length element dependent on the number of cells that need to be identified. This element is only included when the Security Mode Command is to be sent on paging channel(s) and is only required when a subset of the BS's cells shall be identified.

f. This IE is included when slotted paging is performed on cdma2000 paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. In cdma2000 systems, if this element is absent, then it is assumed that the MS is operating in non-slotted mode.

g. This IE shall not be included by the MSC when the BS and MS are operating in DS-41 mode.

h. This IE is included to update encryption and/or integrity information with the MS.

i. This IE is included to update the MS's UIM authentication information.

When the Security Mode Request message is sent as a BSMAP message, the following format applies.

3.3.24 Security Mode Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [4CH]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]					Slot Cycle Index = [000-111]			2
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = <variable>								2
} IF (Encryption Parameter Identifier = 00111) {1:								

3.3.24 Security Mode Request

7	6	5	4	3	2	1	0	Octet
ext = [1]	Encryption Parameter Identifier = [00111] (Enhanced Encryption Parameters)					Status = [0,1]	Available = [0]	3
Encryption Parameter Length = [17H]								4
(MSB)	Encryption Key = <any value>							5
…								…
							(LSB)	20
Reserved = 00 0000						KEY_ID = <any value>		21
(MSB)	Crypto-Sync = <any value>							22
…								23
…								24
							(LSB)	25
Encryption Algorithm in Use = <any value>								26
Encryption Algorithms Supported = <any value>								27
} End IF								
⇒ **Integrity Info:** A1 Element Identifier = [47H]								1
Length = 17H								2
(MSB)	Integrity Key = <any value>							3
…								…
							(LSB)	18
Reserved = 00 0000						KEY_ID = <any value>		19
(MSB)	Crypto-Sync = <any value>							20
…								21
…								22
							(LSB)	23
Integrity Algorithm in Use = <any value>								24
Integrity Algorithms Supported = <any value>								25
⇒ **UIM Authentication Info:** A1 Element Identifier = [4FH]								1
Length = 10H								2
(MSB)	UIM Authentication Key = <any value>							3
…								…
							(LSB)	18

When the Security Mode Request message is sent as a DTAP message, the following format applies.

3.3.24 Security Mode Request

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [08H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [4CH]								1
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = <variable>								2
} IF (Encryption Parameter Identifier = 00111) {1:								
ext = [1]	Encryption Parameter Identifier = [00111] (Enhanced Encryption Parameters)					Status = [0,1]	Available = [0]	3
Encryption Parameter Length = [17H]								4
(MSB)	Encryption Key = <any value>							5
…								…
							(LSB)	20
Reserved = 00 0000						KEY_ID = <any value>		21
(MSB)	Crypto-Sync = <any value>							22
…								23
…								24
							(LSB)	25
Encryption Algorithm in Use = <any value>								26
Encryption Algorithms Supported = <any value>								27
} End IF								
⇒ **Integrity Info:** A1 Element Identifier = [47H]								1
Length = 17H								2
(MSB)	Integrity Key = <any value>							3
…								…
							(LSB)	18
Reserved = 00 0000						KEY_ID = <any value>		19
(MSB)	Crypto-Sync = <any value>							20
…								21
…								22
							(LSB)	23

3.3.24 Security Mode Request

7	6	5	4	3	2	1	0	Octet
Integrity Algorithm in Use = <any value>								24
Integrity Algorithms Supported = <any value>								25
⇒ **UIM Authentication Info:** A1 Element Identifier = [4FH]								1
Length = 10H								2
(MSB)	UIM Authentication Key = <any value>							3
…								…
							(LSB)	18

3.3.25 Security Mode Response

This message is sent from the BS to the MSC in response to an encryption and/or integrity information update request by the MSC.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M[a]	
Reserved Octet	4.2.32	BS -> MSC	M[a]	
Message Type	4.2.4	BS -> MSC	M	
Tag	4.2.46	BS -> MSC	O[b]	C
Cause	4.2.16	BS -> MSC	O[c]	C

a. This IE is not used when the Security Mode Response message is sent as a BSMAP message.

b. This IE is included if it was received in the Security Mode Request message and value shall be set to value received in that message. This IE is not used when the Security Mode Response message is sent as a DTAP message.

c. This IE is sent if the MS responded to the Security Mode Command with incorrect integrity info.

When the Security Mode Response message is sent as a BSMAP message, the following format applies.

3.3.25 Security Mode Response

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [4DH]								1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Cause:** A1 Element Identifier **=** [04H]								1
Length = [01H]								2
Ext= [0]	Cause Value = [7CH] (MS incorrect integrity info)							3

When the Security Mode Response message is sent as a DTAP message, the following format applies.

3.3.25 Security Mode Response

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2

3.3.25 Security Mode Response

7	6	5	4	3	2	1	0	Octet
Length Indicator (LI) = [08H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [4DH]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
Ext= [0]	Cause Value = [7CH] (MS incorrect integrity info)							3

3.3.26 Authentication Report

This DTAP message is sent from the BS to the MSC to indicate an authentication or synchronization failure.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
AKA Report	4.2.97	BS -> MSC	O	R

The following table shows the bitmap layout for the Authentication Report message.

3.3.26 Authentication Report

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = 0000				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [4EH]								1
⇒ **AKA Report:** A1 Element Identifier = [49H]								1
Length <variable>								2
AKA Code = [01H (Success). 02H (Reject), 04H (Loss of radio contact), 05H (Synchronization failure), 06H (Unresolved synchronization failure)]								3
(MSB)	RES = <any value>							4
…								…
							(LSB)	19
(MSB)	AUTS = <any value>							20
…								…
							(LSB)	33

3.3.27 Authentication Report Response

This DTAP message is sent from the MSC to the BS to provide a new authentication vector in the event of a synchronization failure or to acknowledge the indication of an authentication failure.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Authentication Challenge Parameter (RAND)	4.2.35	MSC -> BS	O[a]	C
Authentication Vector Info	4.2.96	MSC -> BS	O[b]	C

a. This IE is included for 2G mutual authentication.

b. This IE is included if in the associated Authentication Report message, the BS indicated a synchronization failure in the AKA Report IE.

The following table shows the bitmap layout for the Authentication Report Response message.

3.3.27 Authentication Report Response

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = 0000				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [4FH]								1
⇒ **Authentication Challenge Parameter (RAND):** A1 Element Identifier = [41H]								1
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)	RAND = <any value>							4
								5
								6
							(LSB)	7
⇒ **Authentication Vector Info:** A1 Element Identifier = [48H]								1
Length <variable>								2
AKA Authentication Type = [01H]								3
(MSB)	RANDA = <any value>							4
…								…
							(LSB)	19
(MSB)	AUTN = <any value>							20
…								…

3.3.27 Authentication Report Response

7	6	5	4	3	2	1	0	Octet
							(LSB)	35

3.3.28 Event Notification

This message may be sent from the MSC to a BS to indicate that the BS should change the call processing for a particular MS, before and SCCP link has been established between the MSC and the BS for the call.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	4.2.13	MSC -> BS	M	
Event	4.2.92	MSC -> BS	O	R

The following table shows the bitmap layout for the Event Notification message.

3.3.28 Event Notification

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [04H]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Event:** A1 Element Identifier = [7EH]								1
Length = [01H]								2
Event Identifier = [0000 0001, 0000 0010, 0000 0011]								3
(MSB)	Event Time = <any value>							3
								4
								5
							(LSB)	6

3.3.29 Event Notification Ack

This message is sent from the BS to the MSC upon receipt of an Event Notification message.

Information Element	**Section Reference**	**Element Direction**	**Type**
Message Type	4.2.4	BS -> MSC	M
Mobile Identity (IMSI)	4.2.13	BS -> MSC	M

The following table shows the bitmap layout for the Event Notification Ack message.

3.3.29 Event Notification Ack

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ **BSMAP Header:** Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ **Message Type** = [06H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD)</td><td>Odd/even Indicator = [1,0]</td><td colspan="3">Type of Identity = [110] (IMSI)</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit N = [0H-9H] (BCD)</td><td>n</td></tr>
<tr><td colspan="4">= [1111] (if even number of digits),
Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
</table>

3.4 Handoff Message Formats

Within this section where a Cell Identifier List element is contained in a handoff message, care shall be taken in selection of the type of Cell Identifier Discriminator used. Only one discriminator type can be used in a single occurrence of the Cell Identifier List element, and all cells appearing in the list shall follow that format. For details, refer to sections 4.2.18, Cell Identifier List and 4.2.17, Cell Identifier.

3.4.1 Handoff Required

This BSMAP message is sent from the source BS to the MSC to indicate that for a given MS which already has a dedicated radio resource assigned, a handoff is required for the reason given by the cause element.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	BS -> MSC	M	
Cause	4.2.16	BS -> MSC	M	
Cell Identifier List (Target)	4.2.18	BS -> MSC	M[a]	
Classmark Information Type 2	4.2.12	BS -> MSC	O[b, g, p]	R
Response Request	4.2.28	BS -> MSC	O	R
Encryption Information	4.2.10	BS -> MSC	O[c]	R
IS-95 Channel Identity	4.2.9	BS -> MSC	O[d, h, q]	C
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[e]	C
Downlink Radio Environment	4.2.22	BS -> MSC	O[f, h, r]	C
Service Option	4.2.49	BS -> MSC	O[t]	C
CDMA Serving One Way Delay	4.2.57	BS -> MSC	O[h, r, x]	C
MS Measured Channel Identity	4.2.29	BS -> MSC	O[i, r]	C
IS-2000 Channel Identity	4.2.27	BS -> MSC	O[h, j, v, q]	C
Quality of Service Parameters	4.2.41	BS -> MSC	O[k]	C
IS-2000 Mobile Capabilities	4.2.53	BS -> MSC	O[h, aa]	C
IS-2000 Service Configuration Record	4.2.51	BS -> MSC	O[h, r]	C
Source PDSN Address	4.2.24	BS -> MSC	O[l]	C
Protocol Type	4.2.54	BS -> MSC	O[m]	C
Source RNC to Target RNC Transparent Container	4.2.71	BS -> MSC	O[n]	C
Slot Cycle Index	4.2.14	BS -> MSC	O[r]	C
Access Network Identifiers	4.2.70	BS -> MSC	O[s]	C
Service Option List	4.2.74	BS -> MSC	O[u]	C
IS-2000 Channel Identity 3X	4.2.23	BS -> MSC	O[h, v, q, o]	C
IS-2000 Non-Negotiable Service Configuration Record	4.2.52	BS -> MSC	O[h, q, x]	C
Anchor PDSN Address	4.2.78	BS -> MSC	O[w]	C
Anchor P-P Address	4.2.80	BS -> MSC	O[y]	C

Information Element	Section Reference	Element Direction	Type	
Packet Session Parameters	4.2.85	BS -> MSC	O[z]	C
Public Long Code Mask Identifier	4.2.87	BS -> MSC	O[bb]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[cc]	C
Mobile Subscription Information	4.2.91	BS -> MSC	O[dd]	C
Mobile Supported Service Options	4.2.94	BS -> MSC	O[ee]	C
Integrity Info	4.2.95	BS -> MSC	O[ff,h,q,r]	C
UIM Authentication Info	4.2.100	BS -> MSC	O[gg]	C

a. This element contains the preferred list of target cells in order of predicted best performance.

b. This element indicates the signaling modes and band classes the MS is capable of operating in. If an MS is capable of supporting multiple band classes, and this information is available at the BS, it shall be indicated in the band class entry field as shown in section 4.2.12.

c. This element conveys current Voice/Data Privacy and Signaling Message Encryption modes, as well as the Voice/Data Privacy and Signaling Message Encryption Keys, if applicable.

d. This element specifies the current *TIA/EIA/IS-95-B* channel for CDMA to CDMA handoff requests only. This element shall contain only a single instance of octets 4 to 7 when sent by an entity compliant with this version of the standard. For backward compatibility with older IOS versions, an entity compliant with this version of the standard shall be prepared to receive multiple instances of octets 4 to 7, but may ignore all additional instances, since the ARFCN value is already contained in the first instance. This element is not present if the *IS-2000* Channel Identity element is present.

e. Unless an instance of the Mobile Identity IE containing the MS's MEID is included, this element is required for *TIA/EIA/IS-95-B* and *cdma2000* handoffs and shall contain the MS's ESN, so that the target BS can calculate the Public Long Code Mask. ESN containing a pseudo-ESN is not required to be sent if the MEID is sent. This IE shall be sent if the ESN is received from the MS.

f. This element provides information for each cell in the Cell Identifier List element.

g. The fields in octets 4 and 5 shall be coded as shown in the bitmap that follows. The MSC shall ignore all fields except IS-95, Slotted, and Mobile_Term.

h. These elements are not required for a CDMA to AMPS handoff.

i. This element specifies the target channel for CDMA to CDMA hard handoff based on the MS measurement. It is required if the value is provided by the MS.

j. This element specifies the *IS-2000* physical channel(s) for CDMA to CDMA hard handoff requests only. This element is not present if the *IS-95* Channel Identity element or the *IS-2000* Channel Identity 3X element is present.

k. This element is only used for packet data calls. In this version of this standard, this element is used to carry the current non-assured mode priority of the packet data session.

l. This information element is only included when a packet data call is being handed off. It contains the IP address of the PDSN currently connected to the source PCF.

m. This element indicates the protocol type that is indicated in the Generic Routing Encapsulation (GRE) header for the A8 and A10 interfaces. The only allowed value in this revision of the standard is 88 81H Unstructured Byte Stream.

n. This element is only used when the target BS is operating in DS-41 mode.

o. This element is used for 3X systems. It is not present if either the *IS-2000* Channel Identity or *IS-95* Channel Identity elements are present.

p. When all target BSs indicated in this message (Cell Identifier List (Target)) are operating in DS-41 mode, only the following fields in the Classmark Type 2 IE shall be considered valid: MOB_P_REV, NAR_AN_CAP, Mobile Term, PSI (PACA Supported Indicator), SCM Length, Count of Band Class Entries, Band Class Entry Length, Band Class n, Band Class n Air Interfaces Supported, Band Class n MOB_P_REV

   When at least one target BS indicated in this message (Cell Identifier List (Target)) is operating in MC-41 mode, footnote 'h' applies. It is the responsibility of a source BS operating in DS-41 mode to properly populate all necessary fields in this element.

q. These elements shall not be included when the source BS and MS are operating in DS-41 mode.

r. These elements shall be included by the DS-41 source BS when the target BS is operating in MC-41 mode.

s. This element is only used for packet data calls. The Access Network Identifiers (ANIDs) are those of the source PCF.

t. This element is included if neither concurrent services nor multiple service instances are supported. This element is not present if the Service Option List element is present.

u. This element specifies the information of the service options being handed off. This element is not present if the Service Option element is present, but shall be present if the Service Option element is not present. This element may contain more than one service option. Multiple instances of 3G packet data (SO=21H) may be present. If this message is being used to hand off a packet data session, this element contains all active and dormant 3G packet data service instances which are associated with that packet data session. This element shall contain at most one instance from the following set of service options: 13K speech (SO=8000H), 13K high rate voice service (SO=11H), EVRC (SO=03H), 3G High Speed Packet Data (SO=21H), VoIP (SO=3CH, 3DH), SMV (SO=38H), EVRC-B (SO=44H), EVRC-WB (SO=46H), EVRC-NW (SO=0049H) or Wideband Speech Codec (SO=3EH). If this element contains either OTAPA (SO 12H, 13H), SMS (SO 06H, 0DH) or PDS (SO 23H, 24H) then the number of service options included shall equal one.

v. Hard handoffs of the Supplemental Channel or Packet Data Channel are not supported in this version of the standard. Allowed values for the Physical Channel Type in the *IS-2000* Channel Identity IE and IS-2000 Channel Identity 3X IE are: Fundamental Channel or Dedicated Control Channel.

w. This is the IP address of the A11 interface on the anchor PDSN. This element is present only if fast handoff is supported.

x. This element shall be included for CDMA-CDMA handoffs.

y. This is the IP address of the P-P interface on the anchor PDSN. Inclusion of this element indicates that fast handoff is requested

z. This element is included when there are one or more packet data parameters to be sent to the target BS. This information element is only included when a packet data call is being handed off.

aa. If the BS does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

bb. Omission of this element without use of a Private Long Code Mask implies that the ESN is used in generating the Public Long Code Mask.

This element shall be omitted if the Encryption IE includes an Encryption Parameter Identifier field with value set to ‘00100’ (Private Longcode), and if the corresponding Status bit has a value of ‘1’ (active).

cc. This element shall be included if the information is available at the BS.

dd. If an MS is capable of multiple band classes and at least one band class has band subclasses defined, the BS shall include the MS’s band class and band subclass capabilities in this element as shown in section 4.2.91 if this information is available at the BS. When included, the band class and band subclass information in this IE shall take precedence over any band class information included in the Classmark Information Type 2 IE. The MS’s band class and band subclass information is also included to support the Flex Duplex Channel (FDC) feature.

ee. This element may be included when the service option capabilities of the MS are available at the source BS. The source BS may report service options assigned to the service option group via the Service Option Bitmap fields and/or may report service options via the Service Option field.

ff. This IE shall be included if the source BS has the information.

gg. This IE is included to provide the MS’s UIM authentication information.

The following table shows the bitmap layout for the Handoff Required message.

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [11H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [07H (OAM&P intervention), 0DH (Timer expired), 0EH (Better cell), 0FH (Interference), 17H (Time critical relocation/handoff), 18H (Network optimization)]							3
⇒ **Cell Identifier List (Target):** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1+:								

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1+:								
(MSB)	MSCID = <any value>							J
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
⇒ **Classmark Information Type 2:** A1 Element Identifier = [12H]								1
Length = <variable>								2
MOB_P_REV = [000 – 111]			Reserved = [0]	See List of Entries = [0, 1]	RF Power Capability = [000-010]			3
Reserved = [00H]								4
NAR_ AN_ CAP = [0,1]	IS-95 = [1]	Slotted = [0,1]	Reserved = [00]		DTX = [0,1]	Mobile Term = [0,1]	TIA/ EIA-553 = [0,1]	5
Reserved = [00H]								6
Reserved = [0000 00]						Mobile Term = [0,1]	PSI = [0,1]	7
SCM Length = [01H]								8
Station Class Mark = [00H – FFH]								8
Count of Band Class Entries = [01H-20H]								9
Band Class Entry Length = [03H]								11
Mobile Band Class Capability Entry {1+:								
Reserved = [000]			Band Class n = [00000-11111]					k
Band Class n Air Interfaces Supported = [00H-FFH]								k+1
Band Class n MOB_P_REV = [00H-FFH]								k+2
} Mobile Band Class Capability Entry								
⇒ **Response Request:** A1 Element Identifier = [1BH]								1
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = <variable>								2
Encryption Info {0..4: ***IF (Encryption Parameter Identifier = 00001, 00101, or 00110) {1:***								

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
ext = [1]	Encryption Parameter Identifier = [00001 (SME), 00101 (Datakey (ORYX)), 00110 (Initial RAND)]					Status = [0,1]	Available = [0,1]	j
Encryption Parameter Length = <variable>								j+1
(MSB)	Encryption Parameter value = <any value>							j+2
								…
							(LSB)	k
} OR IF (Encryption Parameter Identifier = 00100) {1:								
ext = [1]	Encryption Parameter Identifier = [00100] (Private Longcode)					Status = [0,1]	Available = [0,1]	j
Encryption Parameter Length = [06H]								j+1
Unused = [000000]						(MSB)		j+2
Encryption Parameter value = <any value>								j+3
								j+4
								j+5
								j+6
							(LSB)	j+7
} OR IF (Encryption Parameter Identifier = 00111) {1:								
ext = [1]	Encryption Parameter Identifier = [00111] (Enhanced Encryption Parameters)					Status = [0,1]	Available = [0]	3
Encryption Parameter Length = [17H]								4
(MSB)	Encryption Key = <any value>							5
…								…
							(LSB)	20
Reserved = 00 0000						KEY_ID = <any value>		21
(MSB)	Crypto-Sync = <any value>							22
…								23
…								24
							(LSB)	25
Encryption Algorithm in Use = <any value>								26
Encryption Algorithms Supported = <any value>								27
} Encryption Parameter Identifier *} Encryption Info*								
⇒ **IS-95 Channel Identity:** A1 Element Identifier = [22H]								1

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
Length = <variable>								2
Hard Handoff = [1]	Number of Channels to Add = [001]			Frame Offset = [0H-FH]				3
{1+:								
Walsh Code Channel Index = <any value> (Ignored)								k
Pilot PN Code (low part) = <any value> (Ignored)								k+1
Pilot PN Code (high part) = <any value> (Ignored)	Power Combined = [0]	Freq. included = [1]	Reserved = [00]		ARFCN (high part) = [000-111]			k+2
ARFCN (low part) = [00H-FFH]								k+3
}								
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Downlink Radio Environment:** A1 Element Identifier = [29H]								1
Length = <variable>								2
Number of Cells = <variable>								3
Cell Identification Discriminator = [02H,07H]								4
Downlink Radio Environment entry {1+: ***IF (Discriminator = 02H), Cell Identification {1***								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
} Cell Identification								
Reserved = [00]		Downlink Signal Strength Raw = [000000-111111]						k
(MSB)	CDMA Target One Way Delay = [0000H-FFFFH] (x100ns)							k+1
							(LSB)	k+2
} Downlink Radio Environment entry								
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 0004H (Async Data Rate Set 1), 0005H (G3 Fax Rate Set 1), 000CH (Async Data Rate Set 2), 000DH (G3 Fax Rate Set 2), 0006H (SMS Rate Set 1), 000EH (SMS Rate Set 2) 0021H (3G High Speed Packet Data), 0012H (OTAPA Rate Set 1), 0013H (OTAPA Rate Set 2), 0025H (ISDN Interworking Service), 0023H (PDS Rate Set 1), 0024H (PDS Rate Set 2), 0038H (SMV)]							(LSB)	3
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [08H, 0BH]								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
(MSB)	CDMA Serving One Way Delay = [0000H-FFFFH]							k
							(LSB)	k+1
Reserved = [0000 00]						Resolution = [00, 01, 10]		k+2
(MSB)	CDMA Serving One Way Delay Time Stamp = [00 00H – FF FFH]							k+3
							(LSB)	k+4
⇒ **MS Measured Channel Identity:** A1 Element Identifier = [64H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					ARFCN (high part) = [000-111]			3
ARFCN (low part) = [00H – FFH]								4
⇒ **IS-2000 Channel Identity:** A1 Element Identifier = [09H]								1
Length = <variable>								2
OTD= [0] (Ignored)	Physical Channel Count = [001, 010]			Frame Offset = [0H-FH]				3
The following 6 octets are repeated once for each physical channel {1..2:								
Physical Channel Type = [01H (Fundamental Channel – FCH – *IS-2000*), 02H (Dedicated Control Channel – DCCH – *IS-2000*)]								n
Rev_ FCH_ Gating =[0,1]	Reverse Pilot Gating Rate = [00, 01, 10]		QOF Mask = <any value> (ignored)		Walsh Code Channel Index (high part) = <any value> (Ignored)			n+1
Walsh Code Channel Index (low part) = <any value> (Ignored)								n+2
Pilot PN Code (low part) = <any value> (Ignored)								n+3
Pilot PN Code (high part) = <any value> (Ignored)	Reserved = [00]		Power Combined = [0]	Freq. included = [1]	ARFCN (high part) = [000-111]			n+4
ARFCN (low part) = [00H-FFH]								n+5
FDC Length = [00H, 04H]								n+6
FDC Band Class = <any value>					FDC Forward Channel Frequency = <any value>			n+7

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
…								n+8
FDC Reverse Channel Frequency = <any value>								n+9
…			Reserved = 00000					n+10
} Channel Information								
⇒ **Quality of Service Parameters:** A1 Element Identifier = [07H]								1
Length = [01H]								2
Reserved = [0000]				Non-Assured Mode Packet Priority = [0000 – 1101]				3
⇒ **IS-2000 Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								4
Reserved = [0]	Geo Location Type = <any value> (Ignored)		Geo Location Included = <any value> (Ignored)		FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			5
(MSB)								6
FCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
DCCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								k+1
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			k+2
(MSB)								k+3
DCCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	m

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								m+1
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			m+2
(MSB)								m+3
FOR_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **IS-2000 Service Configuration Record:** A1 Element Identifier = [0EH]								1
Bit-Exact Length – Octet Count = <variable>								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 – 111]			3
(MSB)								4
IS-2000 Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ **Source PDSN Address:** A1 Element Identifier = [14H]								1

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
Length = [04H]								2
(MSB)	Source PDSN Address = <any value>							3
								4
								5
							(LSB)	6
⇒ **Protocol Type:** A1 Element Identifier = [18H]								1
Length = [02H]								2
(MSB)	Protocol Type = [88 81H] (Unstructured Byte Stream)							3
							(LSB)	4
⇒ **Source RNC to Target RNC Transparent Container:** A1 Element Identifier = [39H]								1
Length = [01H – FFH]								2
(MSB)	Container = <any value>							3
								…
							(LSB)	k
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒**Access Network Identifiers:** A1 Element Identifier = [20H]								1
Length = [05H]								2
Reserved = [0]	(MSB)	SID = <any value>						3
							(LSB)	4
(MSB)	NID = <any value>							5
							(LSB)	6
PZID = <any value>								7
⇒ **Service Option List:** A1 Element Identifier = [2AH]								1
Length = <variable>								2
Number of Service Option Instances = [01H-06H]								3
Service Option Connection {1..6:								
Reserved = [00]		SR_ID = [001 – 110]			Service Option Connection Identifier = [001 - 110]			i
(MSB)	Service Option							i+1

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 0004H (Async Data Rate Set 1), 0005H (G3 Fax Rate Set 1), 000CH (Async Data Rate Set 2), 000DH (G3 Fax Rate Set 2), 0006H (SMS Rate Set 1), 000EH (SMS Rate Set 2) 0021H (3G High Speed Packet Data), 0012H (OTAPA Rate Set 1), 0013H (OTAPA Rate Set 2), 0023H (PDS Rate Set 1), 0024H (PDS Rate Set 2), 0025H (ISDN Interworking), 0038H (SMV), 003CH (Link Layer Assisted Header Removal), 003DH (Link Layer Assisted RObust Header Compression)]							(LSB)	i+2
} Service Option Connection								
⇒ ***IS-2000* Channel Identity 3X:** A1 Element Identifier = [27H]								1
Length = <variable>								2
OTD= [0] (Ignored)	Physical Channel Count = [001, 010]			Frame Offset = [0H-FH]				3
The following 10 octets are repeated once for each physical channel {1..2:								
Physical Channel Type = [01H (Fundamental Channel – FCH – *IS-2000*), 02H (Dedicated Control Channel – DCCH – *IS-2000*)]								n
Rev_ FCH_ Gating = [0,1]	Reverse Pilot Gating Rate = [00, 01, 10]		QOF Mask = <any value> (ignored)		Walsh Code Channel Index (high part) = <any value> (Ignored)			n+1
Walsh Code Channel Index (low part) = <any value> (Ignored)								n+2
Pilot PN Code (low part) = <any value> (Ignored)								n+3

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
Pilot PN Code (high part) = <any value> (Ignored)	Reserved = [00]		Power Combined = [0]	Freq. included = [1]	ARFCN (high part) = [000-111]			n+4
ARFCN (low part) = [00H-FFH]								n+5
Reserved = [000]			Lower QOF Mask = <any value> (ignored)		Upper Walsh Code Channel Index (high part) = <any value>(Ignored)			n+6
Lower Walsh Code Channel Index (low part) = <any value> (Ignored)								n+7
Reserved = [000]			Upper QOF Mask = <any value> (ignored)		Upper Walsh Code Channel Index (high part) = <any value>(Ignored)			n+8
Upper Walsh Code Channel Index (low part) = <any value> (Ignored)								n+9
} Channel Information								
⇒ ***IS-2000* Non-negotiable Service Configuration Record:** A1 Element Identifier = [0FH]								1
Bit-Exact Length – Octet Count = [00H to FFH]								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 to 111]			3
(MSB)								4
IS-2000 Non-Negotiable Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ **Anchor PDSN Address:** A1 Element Identifier = [30H]								1
Length = [04H]								2
(MSB)	Anchor PDSN Address = <any value>							3
								4
								5
							(LSB)	6
⇒ **Anchor P-P Address:** A1 Element Identifier = [7CH]								1
Length = [04H]								2
(MSB)	Anchor P-P Address = <any value>							3
								4
								5

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
							(LSB)	6
⇒ **Packet Session Parameters:** A1 Element Identifier = [70H]								1
Length = <variable>								2
Service Instance {1..6:								
Reserved = [00000]					SR_ID = [001-110]			k
Data Length = [03H]								k+1
Parameter Identifier = [01H] (RN-PDIT)								k+2
Parameter Length = [01H]								k+3
Parameter Value = [01H-FFH]								k+4
} Service Instance								
⇒ **Public Long Code Mask Identifier:** A1 Element Identifier = [72H]								1
Length = [06H]								2
PLCM_TYPE = [0000 (ESN-based), 0001 (BS assigned), 0010 (IMSI_M based), 0011 (IMSI_T based), 0100 (MEID based)]				Reserved = [00]		(MSB)		3
PLCM_42 = <any value>								4
								5
								6
								7
							(LSB)	8
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								
⇒ **Mobile Supported Service Options** A1 Element Identifier = [3FH]								1
Length = <variable>								2
Number of Service Option Groups = [00H - FFH]								3
Service Option Group {0..:								

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
Service Option Group Number = [00000 (Voice Services), 00001 (Low Speed Async Data Services), 00010 (Digital Facsimile Services), 00100 (Non-CDPD Packet Data Services), 00110 (SMS Services), 00111 (OTAPA Services) 01000 (Location Services)]					Reserved = [0]	Service Option Bitmap Indicator = [00-11]		k
(MSB)	Service Option Bitmap							k+1
Service Option Bitmap (LSB)	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k+2
} Service Option Group								
Ordered = [0, 1]	Number of Service Option Values = [00H-8FH]							m
Service Option {0.:								
(MSB)	Service Option = [0000H-FFFFH]							m+1
							(LSB)	m+2
} Service Option								
⇒ **Integrity Info:** A1 Element Identifier = [47H]								1
Length = 17H								2
(MSB)	Integrity Key = <any value>							3
…								…
							(LSB)	18
Reserved = 00 0000						KEY_ID = <any value>		19
(MSB)	Crypto-Sync = <any value>							20
…								21
…								22
							(LSB)	23
Integrity Algorithm in Use = <any value>								24
Integrity Algorithms Supported = <any value>								25
⇒ **UIM Authentication Info:** A1 Element Identifier = [4FH]								1

3.4.1 Handoff Required

7	6	5	4	3	2	1	0	Octet
Length = 10H								2
(MSB)	UIM Authentication Key = <any value>							3
…								…
							(LSB)	18

3.4.2 Handoff Request

The BSMAP Handoff Request message is sent from the MSC to the target BS to indicate that an MS is to be handed off to that BS.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Channel Type	4.2.6	MSC -> BS	M[a]	
Encryption Information	4.2.10	MSC -> BS	M[b]	
Classmark Information Type 2	4.2.12	MSC -> BS	M[c,o]	
Cell Identifier List (Target)	4.2.18	MSC -> BS	M[d]	
Circuit Identity Code Extension	4.2.20	MSCcs -> BS	O[e]	C
IS-95 Channel Identity	4.2.9	MSC -> BS	O[f,l,p]	C
Mobile Identity (IMSI)	4.2.13	MSC -> BS	O	R
Mobile Identity (ESN)	4.2.13	MSC -> BS	O[g,l]	C
Downlink Radio Environment	4.2.22	MSC -> BS	O[h,q]	R
Service Option	4.2.49	MSC -> BS	O[t]	C
CDMA Serving One Way Delay	4.2.57	MSC -> BS	O[q]	R
MS Measured Channel Identity	4.2.29	MSC -> BS	O[i,q]	C
IS-2000 Channel Identity	4.2.27	MSC -> BS	O[j,l,p]	C
Quality of Service Parameters	4.2.41	MSC -> BS	O[k,l]	C
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[s,l,z]	C
IS-2000 Service Configuration Record	4.2.51	MSC -> BS	O[q,l,s]	C
Source PDSN Address	4.2.24	MSC -> BS	O[l, s]	C
Protocol Type	4.2.54	MSC -> BS	O[m,l,s]	C
Source RNC to Target RNC Transparent Container	4.2.71	MSC -> BS	O[r,l]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[q,l,s]	C
Access Network Identifiers	4.2.70	MSC -> BS	O[n,l,s]	C
Service Option List	4.2.74	MSC -> BS	O[u,l]	C
IS-2000 Channel Identity 3X	4.2.23	MSC -> BS	O[p,l.v]	C
IS-2000 Non-Negotiable Service Configuration Record	4.2.52	MSC -> BS	O[l, q]	C
Anchor PDSN Address	4.2.78	MSC -> BS	O[w,l]	C
Anchor P-P Address	4.2.80	MSC -> BS	O[x,l]	C
Packet Session Parameters	4.2.85	MSC -> BS	O[y,l]	C
Public Long Code Mask Identifier	4.2.87	MSC -> BS	O[l]	C
A2p Bearer Session-Level Parameters	4.2.89	MSCe -> BS	O[aa]	C
A2p Bearer Format-Specific Parameters	4.2.90	MSCe -> BS	O[bb]	C
Mobile Identity (MEID)	4.2.13	MSC -> BS	O[cc]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[l,dd]	C

Information Element	**Section Reference**	**Element Direction**	**Type**	
Mobile Supported Service Options	4.2.94	MSC -> BS	O[ee]	C
Integrity Info	4.2.95	MSC -> BS	O[p,q,ff]	C
UIM Authentication Info	4.2.100	MSC -> BS	O[gg]	C

a. Channel Type is being included for historical reasons and is hard coded as shown. The BS should examine the Service Option element instead.

b. This element conveys the current Voice/Data Privacy Signaling Message Encryption mode, as well as the Voice/Data Privacy and/or Signaling Message Encryption Keys, if applicable.

Whatever encryption information is received from the source BS in the Handoff Required message is sent to the target BS in the Handoff Request message.

c. This element provides the signaling types and band classes that the MS is permitted to use. More than one is permitted. If an MS is capable of supporting multiple band classes, and this information was included in the Handoff Required message, it shall be indicated in the band class entry field as shown in section 4.2.12.

d. If more than one cell is specified, then they shall be in order of selection preference. Only discriminator types ‘0000 0010’ and ‘0000 0111’ are used.

e. This element contains the full-rate circuit identifier allocated by the circuit-switched MSC.

In the case of hard handoff for an async data/fax call, this element indicates the Circuit Identity Code of the circuit to be connected to the target BS to support the A5 connection to the IWF.

In the case of hard handoff for a voice call, this element indicates the Circuit Identity Code of the circuit to be connected to the target BS to support the A2 connection.

In the case of hard handoff for a packet data call, SMS delivery on a traffic channel (SMS service option in use), OTAPA delivery on a traffic channel, or PDS on a traffic channel, this element shall not be included.

f. This element specifies the current *TIA/EIA/IS-95-B* channel for CDMA to CDMA handoff requests only. This element shall contain only a single instance of octets 4 to 7 when sent by an entity compliant with this version of the standard. For backward compatibility with older IOS versions, an entity compliant with this version of the standard shall be prepared to receive multiple instances of octets 4 to 7, but may ignore all additional instances, since the ARFCN value is already contained in the first instance. This element is not present if the *IS-2000* Channel Identity element or *IS-2000* Channel Identity 3X element is present.

g. Unless an instance of the Mobile Identity IE containing the MS’s MEID is included, this element is required for CDMA to CDMA handoffs and shall contain the MS's ESN. The target BS may use this information to calculate the Public Long Code Mask. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

h. This element provides information for each cell in the Cell Identifier List (target) element.

i. If the MS Measured Channel Identity element was included in the Handoff Required message, this element is required in this message.

j. This element specifies the *IS-2000* physical channel(s) for CDMA to CDMA hard handoff requests only. This element is not present if the IS-95 Channel Identity element or the *IS-2000* Channel Identity 3X element is present.

k. This element is only used for packet data calls. In this version of this standard, this element is used to carry the current non-assured mode priority of the packet data session.

l. This element is included if it was received by the MSC from the source BS.

m. This element indicates the Protocol Type that is indicated in the GRE header for the A8 and A10 interfaces.

n. This element is only used for packet data calls. The Access Network Identifiers are those of the source PCF.

o. When all target BSs indicated in this message (Cell Identifier List (Target)) are operating in DS-41 mode, only the following fields in the Classmark Type 2 IE shall be considered valid: MOB_P_REV, NAR_AN_CAP, Mobile Term, PSI (PACA Supported Indicator), SCM Length, Count of Band Class Entries, Band Class Entry Length, Band Class n, Band Class n Air Interfaces Supported, Band Class n MOB_P_REV.

   When at least one target BS indicated in this message (Cell Identifier List (Target)) is operating in MC-41 mode, all fields of this element shall be considered as valid. It is the responsibility of a source BS operating in DS-41 mode to properly complete all necessary fields in this element.

p. These elements shall not be included when the source BS and MS are operating in DS-41 mode.

q. These elements shall be included by the DS-41 source BS when the target BS is operating in MC-41 mode.

r. This element is only used when the target BS is operating in DS-41 mode.

s. This element is included for CDMA to CDMA handoffs.

t. This element shall be present if it was received by the MSC from the source BS, or if the target BS does not support concurrent services or multiple service instances.

u. This element specifies the information of the service options being handed off. This element shall be present if it was received by the MSC from the source BS and if the Service Option element is not present in the Handoff Request message. This element may contain more than one service option. Multiple instances of 3G packet data (SO=21H) may be present. If this message is being used to hand off a packet data session, this element contains all active and dormant 3G packet data service instances which are associated with that packet data session. This element shall contain at most one instance from the following set of service options: 13K speech (SO=8000H), 13K high rate voice service (SO=11H), EVRC (SO=03H), 3G High Speed Packet Data (SO=21H), VoIP (SO=3CH, 3DH), SMV (SO=38H), EVRC-B (SO=44H), EVRC-WB (SO=46H), EVRC-NW (SO=0049H) or Wideband Speech Codec (SO=3EH). If this element contains either OTAPA (SO 12H, 13H), SMS (SO 06H, 0DH) or PDS (SO 23H, 24H), then the number of service options included shall equal one.

v. This element specifies the *IS-2000* physical channel(s) for CDMA to CDMA hard handoff requests in a 3X system only. This element is not present if the IS-95 Channel Identity element or the *IS-2000* Channel Identity element is present.

w. This is the IP address of the A11 interface on the anchor PDSN. This element is present only if fast handoff is supported.

x. This is the IP address of the P-P interface on the anchor PDSN. Inclusion of this element indicates that fast handoff is requested.

y. This element is included when there are one or more packet data parameters to be sent to the target BS.

z. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

aa. If an A2p connection is required, the MSCe may send this element to indicate the session parameters that the target BS is to use for the call. This IE may contain the A2p bearer address and port to which the target BS is to send information. If the MSCe does not have the information required to correctly populate a field in this IE, it shall omit this element. This IE is omitted if an A2p bearer is not required for the call (e.g., for SO 33 calls).

bb. If an A2p connection is required, the MSCe may send this element to indicate the bearer format that the target BS is to use for the call. This IE may contain the A2p bearer address and port to which the target BS is to send information. If the MSCe does not have the information required to correctly populate a field in this IE, it shall omit this element. The highest priority bearer format and the Service Option IE should be consistent. If they are not consistent, then the Service Option IE shall take precedence. This IE is omitted if an A2p bearer is not required for the call (e.g., for SO 33 calls).

If the A2p Bearer Format Specific Parameters IE contains the Bearer IP Address and UDP Port, they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters information element for the corresponding bearer format.

cc. This element is included if it is available at the MSC.

dd. If a Band Class/Band Subclass Record is included in this IE, the band class and band subclass information in the record shall take precedence over any band class information included in the Classmark Information Type 2 IE.

ee. This element may be included when the service option capabilities of the MS are available at the MSC. The MSC may report service options assigned to a service option group via the Service Option Bitmap fields and/or may report service options via the Service Option field.

ff. This IE shall be included if the MSC received the information and the target BS support message integrity.

gg. This IE is included to provide the MS’s UIM authentication information.

The following table shows the bitmap layout for the Handoff Request message.

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [10H]								1
⇒ **Channel Type:** A1 Element Identifier = [0BH]								1
Length = [03H]								2
Speech or Data Indicator =[01H] (speech)								3
Channel Rate and Type = [08H] (Full Rate)								4
Speech Encoding Algorithm/data rate + Transparency Indicator = [05H (13 kbps vocoder - speech)]								5
⇒ **Encryption Information:** A1 Element Identifier = [0AH]								1
Length = <variable>								2
Encryption Info {0..4:								
IF (Encryption Parameter Identifier = 00001, 00101, or 00110) {1:								
ext = [1]	Encryption Parameter Identifier = [00001] (SME), 00101 (Datakey (ORYX)), 00110 (Initial RAND)]					Status = [0,1]	Available = [0]	j
Encryption Parameter Length = <variable>								j+1
(MSB)	Encryption Parameter value = <any value>							j+2
								…
							(LSB)	k
} OR IF (Encryption Parameter Identifier = 00100) {1:								
ext = [1]	Encryption Parameter Identifier = [00100] (Private Longcode)					Status = [0,1]	Available = [0]	j
Encryption Parameter Length = [06H]								j+1
Unused = [000000]						(MSB)		j+2
Encryption Parameter value = <any value>								j+3
								j+4
								j+5
								j+6
							(LSB)	j+7
} OR IF (Encryption Parameter Identifier = 00111) {1:								
ext = [1]	Encryption Parameter Identifier = [00111] (Enhanced Encryption Parameters)					Status = [0,1]	Available = [0]	3
Encryption Parameter Length = [17H]								4

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
(MSB)	Encryption Key = <any value>							5
…								…
							(LSB)	20
Reserved = 00 0000						KEY_ID = <any value>		21
(MSB)	Crypto-Sync = <any value>							22
…								23
…								24
							(LSB)	25
Encryption Algorithm in Use = <any value>								26
Encryption Algorithms Supported = <any value>								27
} Encryption Parameter Identifier								
} Encryption Info								
⇒ **Classmark Information Type 2:** A1 Element Identifier = [12H]								1
Length = <variable>								2
MOB_P_REV = [000 – 111]			Reserved = [0]	See List of Entries = [0, 1]	RF Power Capability = [000-010]			3
Reserved = [00H]								4
NAR_ AN_ CAP = [0,1]	IS-95 = [1]	Slotted = [0,1]	Reserved = [00]		DTX = [0,1]	Mobile Term = [0,1]	TIA/ EIA-553 = [0,1]	5
Reserved = [00H]								6
Reserved = [0000 00]						Mobile Term = [0,1]	PSI = [0,1]	7
SCM Length = [01H]								8
Station Class Mark = [00H – FFH]								9
Count of Band Class Entries = [01H-20H]								10
Band Class Entry Length = [03H]								11
Mobile Band Class Capability Entry {1+:								
Reserved = [000]			Band Class n = [00000-11111]					k
Band Class n Air Interfaces Supported = [00H-FFH]								k+1
Band Class n MOB_P_REV = [00H-FFH]								k+2
} Mobile Band Class Capability Entry								

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
⇒ **Cell Identifier List (Target):** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1+:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
⇒ **Circuit Identity Code Extension:** A1 Element Identifier = [24H]								1
Length = [03H]								2
(MSB)	PCM Multiplexer = <any value>							3
		(LSB)	Timeslot = [00000-11111]					4
Reserved = [0H]				Circuit Mode = [0H] (Full-rate)				5
⇒ **IS-95 Channel Identity:** A1 Element Identifier = [22H]								1
Length = <variable>								2
Hard Handoff = [1]	Number of Channels to Add = [001]			Frame Offset = [0H-FH]				3
{1+:								
Walsh Code Channel Index = <any value> (Ignored)								n
Pilot PN Code (low part) = <any value> (Ignored)								n+1
Pilot PN Code (high part) = <any value> (Ignored)	Power Combined = [0]	Freq. included = [1]	Reserved = [00]		ARFCN (high part) = [000-111]			n+2
ARFCN (low part) = [00H-FFH]								n+3
}								
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = 1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Downlink Radio Environment:** A1 Element Identifier = [29H]								1
Length = <variable>								2
Number of Cells = <variable>								3
Cell Identification Discriminator = [02H,07H]								4
Downlink Radio Environment entry {1+:								
IF (Discriminator = 02H), Cell Identification {1								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
Reserved = [00]		Downlink Signal Strength Raw = [000000-111111]						k

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
(MSB)	CDMA Target One Way Delay = [0000H-FFFFH] (x100ns)							k+1
							(LSB)	k+2
} Downlink Radio Environment entry								
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 0004H (Async Data Rate Set 1), 0005H (G3 Fax Rate Set 1), 000CH (Async Data Rate Set 2), 000DH (G3 Fax Rate Set 2), 0006H (SMS Rate Set 1), 000EH (SMS Rate Set 2) 0021H (3G High Speed Packet Data), 0012H (OTAPA Rate Set 1), 0013H (OTAPA Rate Set 2), 0016H (2G High Speed Packet Data), 0017H (2G High Speed Packet Data), 0018H (2G High Speed Packet Data), 0019H (2G High Speed Packet Data), 0023H (PDS Rate Set 1), 0024H (PDS Rate Set 2), 0025H (ISDN Interworking Service), 0038H (SMV), 003CH (Link Layer Assisted Header Removal), 003DH (Link Layer Assisted RObust Header Compression)]							(LSB)	3
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [08H, 0BH]								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							j

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+4
} Cell Identification								
(MSB)	CDMA Serving One Way Delay = [0000H-FFFFH]							k
							(LSB)	k+1
Reserved = [0000 00]						Resolution = [00, 01, 10]		k+2
(MSB)	CDMA Serving One Way Delay Time Stamp = [00 00H – FF FFH]							k+3
							(LSB)	k+4
⇒ **MS Measured Channel Identity:** A1 Element Identifier = [64H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					ARFCN (high part) = [000-111]			3
ARFCN (low part) = [00H – FFH]								4
⇒ **IS-2000 Channel Identity:** A1 Element Identifier = [09H]								1
Length = <variable>								2
OTD= [0] (Ignored)	Physical Channel Count = [001, 010]			Frame Offset = [0H-FH]				3
The following 6 octets are repeated once for each physical channel {1..2:								
Physical Channel Type = [01H (Fundamental Channel – FCH – *IS-2000*), 02H (Dedicated Control Channel – DCCH – *IS-2000*)]								n
Rev_ FCH_ Gating	Reverse Pilot Gating Rate = [00, 01, 10]		QOF Mask = <any value> (ignored)		Walsh Code Channel Index (high part) = <any value> (Ignored)			n+1
Walsh Code Channel Index (low part) = <any value> (Ignored)								n+2
Pilot PN Code (low part) = <any value> (Ignored)								n+3

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
Pilot PN Code (high part) = <any value> (Ignored)	Reserved = [00]		Power Combined = [0]	Freq. included = [1]	ARFCN (high part) = [000-111]			n+4
ARFCN (low part) = [00H-FFH]								n+5
FDC Length = [00H, 04H]								n+6
FDC Band Class = <any value>					FDC Forward Channel Frequency = <any value>			n+7
…								n+8
FDC Reverse Channel Frequency = <any value>								n+9
…			Reserved = 00000					n+10
} Channel Information								
⇒ **Quality of Service Parameters:** A1 Element Identifier = [07H]								1
Length = [01H]								2
Reserved = [0000]				Non-Assured Mode Packet Priority = [0000 – 1101]				3
⇒ **IS-2000 Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								4
Reserved = [0]	Geo Location Type = <any value> (Ignored)		Geo Location Included = <any value> (Ignored)		FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			5
(MSB)								6
FCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k

3.4.2 Handoff Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">DCCH Information: Bit-Exact Length – Octet Count
= [00H to FFH]</td><td>k+1</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">DCCH Information:
Bit-Exact Length – Fill Bits
= [000 to 111]</td><td>k+2</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>k+3</td></tr>
<tr><td colspan="8">DCCH Information Content
= <any value></td><td>…</td></tr>
<tr><td></td><td>Seventh Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Sixth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fifth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fourth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Third Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Second Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>First Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>m</td></tr>
<tr><td colspan="8">FOR_PDCH Information: Bit-Exact Length – Octet Count
= [00H-FFH]</td><td>m+1</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">FOR_PDCH Information:
Bit-Exact Length – Fill Bits
= [000 to 111]</td><td>m+2</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>m+3</td></tr>
<tr><td colspan="8">FOR_PDCH Information Content
= <any value></td><td>…</td></tr>
<tr><td></td><td>Seventh Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Sixth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fifth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fourth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Third Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Second Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>First Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>n</td></tr>
<tr><td colspan="8">REV_PDCH Information: Bit-Exact Length – Octet Count
= [00H-FFH]</td><td>n+1</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">REV_PDCH Information:
Bit-Exact Length – Fill Bits
= [000 to 111]</td><td>n+2</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>n+3</td></tr>
<tr><td colspan="8">REV_PDCH Information Content
= <any value></td><td>…</td></tr>
</table>

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **IS-2000 Service Configuration Record:** A1 Element Identifier = [0EH]								1
Bit-Exact Length – Octet Count = <variable>								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 – 111]			3
(MSB)								4
IS-2000 Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ **Source PDSN Address:** A1 Element Identifier = [14H]								1
Length = [04H]								2
(MSB)	Source PDSN Address = <any value>							3
								4
								5
							(LSB)	6
⇒ **Protocol Type:** A1 Element Identifier = [18H]								1
Length = [02H]								2
(MSB)	Protocol Type = [8881H] (Unstructured Byte Stream)							3
							(LSB)	4
⇒ **Source RNC to Target RNC Transparent Container:** A1 Element Identifier = [39H]								1
Length = [01H – FFH]								2
(MSB)	Container = <any value>							3
								…
							(LSB)	k

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒**Access Network Identifiers:** A1 Element Identifier = [20H]								1
Length = [05H]								2
Reserved = [0]	(MSB)	SID = <any value>						3
							(LSB)	4
(MSB)	NID = <any value>							5
							(LSB)	6
PZID = <any value>								7
⇒ **Service Option List:** A1 Element Identifier = [2AH]								1
Length = <variable>								2
Number of Service Option Instances = [01H-06H]								3
Service Option Connection {1..6:								
Reserved = [00]		SR_ID = [001 – 110]			Service Option Connection Identifier = [001 - 110]			i
(MSB)	Service Option							i+1

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 0004H (Async Data Rate Set 1), 0005H (G3 Fax Rate Set 1), 000CH (Async Data Rate Set 2), 000DH (G3 Fax Rate Set 2), 0006H (SMS Rate Set 1), 000EH (SMS Rate Set 2) 0021H (3G High Speed Packet Data), 0012H (OTAPA Rate Set 1), 0013H (OTAPA Rate Set 2), 0023H (PDS Rate Set 1), 0024H (PDS Rate Set 2), 0025H (ISDN Interworking), 0038H (SMV), 003CH (Link Layer Assisted Header Removal), 003DH (Link Layer Assisted RObust Header Compression)]							(LSB)	i+2
} Service Option Connection								
⇒ ***IS-2000* Channel Identity 3X:** A1 Element Identifier = [27H]								1
Length = <variable>								2
OTD= [0] (Ignored)	Physical Channel Count = [001, 010]			Frame Offset = [0H-FH]				3
The following 10 octets are repeated once for each physical channel {1..2:								
Physical Channel Type = [01H (Fundamental Channel – FCH – *IS-2000*), 02H (Dedicated Control Channel – DCCH – *IS-2000*)]								n
Rev_ FCH_ Gating = [0,1]	Reverse Pilot Gating Rate = [00, 01, 10]		QOF Mask = <any value> (ignored)		Walsh Code Channel Index (high part) = <any value> (Ignored)			n+1
Walsh Code Channel Index (low part) = <any value> (Ignored)								n+2
Pilot PN Code (low part) = <any value> (Ignored)								n+3

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
Pilot PN Code (high part) = <any value> (Ignored)	Reserved = [00]		Power Combined = [0]	Freq. included = [1]	ARFCN (high part) = [000-111]			n+4
ARFCN (low part) = [00H-FFH]								n+5
Reserved = [000]			Lower QOF Mask = <any value> (ignored)		Lower Walsh Code Channel Index (high part) = <any value>(Ignored)			n+6
Lower Walsh Code Channel Index (low part) = <any value> (Ignored)								n+7
Reserved = [000]			Upper QOF Mask = <any value> (ignored)		Upper Walsh Code Channel Index (high part) = <any value>(Ignored)			n+8
Upper Walsh Code Channel Index (low part) = <any value> (Ignored)								n+9
} Channel Information								
⇒ ***IS-2000* Non-negotiable Service Configuration Record:** A1 Element Identifier = [0FH]								1
Bit-Exact Length – Octet Count = [00H to FFH]								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 to 111]			3
(MSB)								4
IS-2000 Non-Negotiable Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ **Anchor PDSN Address:** A1 Element Identifier = [30H]								1
Length = [04H]								2
(MSB)	Anchor PDSN Address = <any value>							3
								4
								5
							(LSB)	6
⇒ **Anchor P-P Address:** A1 Element Identifier = [7CH]								1
Length = [04H]								2

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
(MSB)	Anchor P-P Address = <any value>							3
								4
								5
							(LSB)	6
⇒ **Packet Session Parameters:** A1 Element Identifier = [70H]								1
Length = <variable>								2
Service Instance {1..6:								
Reserved = [00000]					SR_ID = [001-110]			k
Data Length = [03H]								k+1
Parameter Identifier = [01H] (RN-PDIT)								k+2
Parameter Length = [01H]								k+3
Parameter Value = [01H-FFH]								k+4
} Service Instance								
⇒ **Public Long Code Mask Identifier:** A1 Element Identifier = [72H]								1
Length = [06H]								2
PLCM_TYPE = [0000 (ESN-based), 0001 (BS assigned), 0010 (IMSI_M based), 0011 (IMSI_T based), 0100 (MEID based)]				Reserved = [00]		(MSB)		3
PLCM_42 = <any value>								4
								5
								6
								7
							(LSB)	8
⇒ **A2p Bearer Session-Level Parameters:** A1p Element Identifier [45H]								1
Length = <variable>								2
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1
RTP Payload Type = [00H = (PCMU), 08H = (PCMA), 0CH = (13K Vocoder), 60H - 7FH (dynamically assigned = EVRC), 60H - 7FH (dynamically assigned = EVRC0), 60H - 7FH (dynamically assigned = SMV), 60H - 7FH (dynamically assigned = SMV0), 60H - 7FH (dynamically assigned = telephone-event), 60H - 7FH (dynamically assigned = EVRCB), 60H - 7FH (dynamically assigned = EVRCB0), 60H - 7FH (dynamically assigned = EVRCWB), 60H - 7FH (dynamically assigned = EVRCWB0) 60H - 7FH (dynamically assigned = EVRCNW) 60H - 7FH (dynamically assigned = EVRCNW0)]							Bearer Addr Flag= [0, 1]	m+2
(MSB)	Bearer IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Bearer UDP Port= <any value>							j+1
							(LSB)	j+2
Extension Length = [0001]				Extension ID = [0000]				k
Extension Parameters = <any value>								k+1
} Bearer Format Parameters								
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/ Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								
⇒ **Mobile Supported Service Options** A1 Element Identifier = [3FH]								1
Length = <variable>								2

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
Number of Service Option Groups = [00H - FFH]								3
Service Option Group {0..:								
Service Option Group Number = [00000 (Voice Services), 00001 (Low Speed Async Data Services), 00010 (Digital Facsimile Services), 00100 (Non-CDPD Packet Data Services), 00110 (SMS Services), 00111 (OTAPA Services) 01000 (Location Services)]					Reserved = [0]	Service Option Bitmap Indicator = [00-11]		k
(MSB)	Service Option Bitmap							k+1
Service Option Bitmap (LSB)	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k+2
} Service Option Group								
Ordered = [0, 1]	Number of Service Option Values = [00H-8FH]							m
Service Option {0.:								
(MSB)	Service Option = [0000H-FFFFH							m+1
							(LSB)	m+2
} Service Option								
⇒ **Integrity Info:** A1 Element Identifier = [47H]								1
Length = 17H								2
(MSB)	Integrity Key = <any value>							3
…								…
							(LSB)	18
Reserved = 00 0000						KEY_ID = <any value>		19
(MSB)	Crypto-Sync = <any value>							20
…								21
…								22
							(LSB)	23
Integrity Algorithm in Use = <any value>								24

3.4.2 Handoff Request

7	6	5	4	3	2	1	0	Octet
Integrity Algorithms Supported = <any value>								25
⇒ **UIM Authentication Info:** A1 Element Identifier = [4FH]								1
Length = 10H								2
(MSB)	UIM Authentication Key = <any value>							3
…								…
							(LSB)	18

3.4.3 Handoff Request Acknowledge

This BSMAP message is sent from the target BS to the MSC to indicate that a target channel has been allocated for handoff as requested. This is in response to the Handoff Request message. This message is only used for CDMA-CDMA hard handoff and hard handoff to or from DS-41 systems.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
IS-95 Channel Identity	4.2.9	BS -> MSC	O[a,f]	C
Cell Identifier List	4.2.18	BS -> MSC	O[b]	R
Extended Handoff Direction Parameters	4.2.56	BS -> MSC	O[f,k]	C
Hard Handoff Parameters	4.2.47	BS -> MSC	O[f]	C
IS-2000 Channel Identity	4.2.27	BS -> MSC	O[c,f]	C
IS-2000 Service Configuration Record	4.2.51	BS -> MSC	O[d,f]	C
IS-2000 Non-Negotiable Service Configuration Record	4.2.52	BS -> MSC	O[e,f]	C
Target RNC to Source RNC Transparent Container	4.2.72	BS -> MSC	O[g]	C
Service Option List	4.2.74	BS -> MSC	O[h]	C
Cause	4.2.16	BS -> MSC	O[i]	C
IS-2000 Channel Identity 3X	4.2.23	BS -> MSC	O[f,j]	C
Public Long Code Mask Identifier	4.2.87	BS -> MSC	O[l]	C
A2p Bearer Session-Level Parameters	4.2.89	BS -> MSCe	O[m, o]	C
A2p Bearer Format-Specific Parameters	4.2.90	BS -> MSCe	O[n, o]	C

a. This element is included if the air interface channel allocated by the target is *TIA/EIA/IS-95-B*. It lists each *TIA/EIA/IS-95-B* channel, one for each cell listed in the Cell Identifier List, that has been allocated by the target BS. This element is not present if the *IS-2000* Channel Identity element or *IS-2000* Channel Identity 3X element is present.

b. The first cell in this cell identifier list element shall be treated as the "designated cell" by the MSC. The cell identifier list consists of all cells set up by the target BS.

c. This element is included if the air interface channel allocated by the target is *cdma2000*. It lists the *cdma2000* channel(s) for each cell listed in the Cell Identifier List that have been allocated by the target BS. The total number instances of octets n through n+5 is the Physical Channel Count multiplied by the number of cells in the Cell Identifier List element. This version of the standard allows for a maximum of six cells for each physical channel. This element is not present if the *IS-95* Channel Identity element or the *IS-2000* Channel Identity 3X element is present.

d. This element is included if the target BS indicates a desired configuration different from that currently being used at the source BS.

e. This element contains the *cdma2000* non-negotiable service configuration record to support the transport of information related to *IS-2000* logical to physical mapping (LPM) tables, and if needed, FPC power control information. It is included if the target BS provides the source BS with non-negotiable service configuration parameter values that may be sent to the MS. It is up to the source BS to decide whether or not to include the received non-negotiable service configuration record in the Universal Handoff Direction Message / General Handoff Direction Message sent to the MS.

f. These elements are only applicable when the target BS is not operating in DS-41 mode.

g. This element is only included when the target BS is operating in DS-41 mode.

h. This element is used when a partially successful service transfer occurs. In this case, this element has only the service instances successfully transferred.

i. This element is used to indicate the reason for the occurrence of the partially successful service transfer. In this case, this element is associated with the failed service option connections.

j. This element is included if the air interface channel allocated by the target is *cdma2000* 3X. It lists the *cdma2000* channel(s) for each cell listed in the Cell Identifier List that have been allocated by the target BS. The total number instances of octets n through n+9 is the Physical Channel Count multiplied by the number of cells in the Cell Identifier List element. This version of the standard allows for a maximum of six cells for each physical channel. This element is not present if the *IS-95* Channel Identity element or the *IS-2000* Channel Identity element is present.

k. The target BS Values Included field of this IE is hard-coded to ‘10’ in this message.

l. This element shall be omitted if the Hard Handoff Parameters element is present with Private LCM field set to ‘1’ (Use Private Long Code Mask). Omission of this element without use of a Private Long Code Mask implies that the ESN is to be used in generating the Public Long Code Mask.

m. If an A2p connection is required, the BS may send this element to indicate the A2p session-level parameters to be used for this call.

n. The BS may send this element to indicate the A2p bearer format or formats that are supported for the call. If the A2p Bearer Format Specific Parameters IE contains the Bearer IP Address and UDP Port, they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters information element for the corresponding bearer format.

o. For A2p connections, both the A2p Bearer Session-Level Parameters element and the A2p Bearer Format-Specific Parameters element shall be included in this message and indicate the A2p bearer address of the BS.

The following table shows the bitmap layout for the Handoff Request Acknowledge message.

3.4.3 Handoff Request Acknowledge

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [12H]								1
⇒ **IS-95 Channel Identity:** A1 Element Identifier = [22H]								1
Length = <variable>								2
Hard Handoff = [1]	Number of Channels to Add = <any value> (Ignored)			Frame Offset = [0H-FH]				3
The following 4 octets are repeated once for each entry in the Cell Identifier List {1..6								
Walsh Code Channel Index = [00H-3FH]								i
Pilot PN Code (low part) = [00H-FFH]								i+1
Pilot PN Code (high part) = [0,1]	Power Combined = [0,1]	Freq. included = [1]	Reserved = [00]		ARFCN (high part) = [000-111]			i+2
ARFCN (low part) = [00H-FFH]								i+3
}								
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H {1..6:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1..6:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
⇒ **Extended Handoff Direction Parameters:** A1 Element Identifier = [10H]								1
Length = [09H]								2
Search Window A Size (Srch_Win_A) = [0H-FH]				Search Window N Size (Srch_Win_N) = [0H-FH]				3

3.4.3 Handoff Request Acknowledge

7	6	5	4	3	2	1	0	Octet
Search Window R Size (Srch_Win_R) = [0H-FH]				Add Pilot Threshold (T_Add) high order = [0H-FH]				4
T_Add (low order) = [00-11]		Drop Pilot Threshold (T_Drop) = [000000-111111]						5
Compare Threshold (T_Comp) = [0H-FH]				Drop Timer Value (T_TDrop) = [0H-FH]				6
Neighbor Max Age (Nghbor_Max_AGE) = [0H-FH]				Reserved = [00]		Target BS Values Included = [10]		7
Reserved = [00]		SOFT_SLOPE = [00 0000 - 11 1111]						8
Reserved = [00]		ADD_INTERCEPT = [00 0000 - 11 1111]						9
Reserved = [00]		DROP_INTERCEPT = [00 0000 - 11 1111]						10
Target BS P_REV = [00H-FFH]								11
⇒ **Hard Handoff Parameters:** A1 Element Identifier = [16H]								1
Reserved = [000]			Band Class = [0 0000 - 1 1111]					2
Number of Preamble Frames = [000-111]			Reset L2 = [0,1]	Reset FPC = [0,1]	Encryption Mode = [00,01]		Private LCM = [0,1]	3
Rev_ Pwr_ Cntl_ Delay_ Incl = [0,1]	Rev_Pwr_Cntl_ Delay_ = [00-11]		Nom_ Pwr_Ext = [0,1]	Nom_Pwr = [0000-1111]				4
Reserved = [00]		FPC Subchannel Information = <any value>					FPC SubChan Info Included = [0,1]	5
Reserved = [0000]				Power Control Step = <any value>			Power Control Step Included = [0,1]	6
⇒ **IS-2000 Channel Identity:** A1 Element Identifier = [09H]								1
Length = <variable>								2
OTD = [0,1]	Physical Channel Count = [001, 010]			Frame Offset = [0H-FH]				3
The following 6 octets are included once for each physical channel in each cell listed in the Cell Identifier List {1..12:								

3.4.3 Handoff Request Acknowledge

7	6	5	4	3	2	1	0	Octet
Physical Channel Type = [01H (Fundamental Channel – FCH – *IS-2000*), 02H (Dedicated Control Channel – DCCH – *IS-2000*)]								n
Rev_ FCH_ Gating =[0,1]	Reverse Pilot Gating Rate = [00, 01, 10]		QOF Mask = [00,01,10,11]		Walsh Code Channel Index (high part) = <any value>			n+1
Walsh Code Channel Index (low part) = <any value>								n+2
Pilot PN Code (low part) = <any value>								n+3
Pilot PN Code (high part) = [0,1]	Reserved = [00]		Power Combined = [0,1]	Freq. included = [1]	ARFCN (high part) = [000-111]			n+4
ARFCN (low part) = [00H-FFH]								n+5
FDC Length = [00H, 04H]								n+6
FDC Band Class = <any value>					FDC Forward Channel Frequency = <any value>			n+7
…								n+8
FDC Reverse Channel Frequency = <any value>								n+9
…			Reserved = 00000					n+10
} Channel Information								
⇒ **IS-2000 Service Configuration Record:** A1 Element Identifier = [0EH]								1
Bit-Exact Length – Octet Count = [00H to FFH]								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 – 111]			3
(MSB)								4
IS-2000 Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ ***IS-2000* Non-negotiable Service Configuration Record:** A1 Element Identifier = [0FH]								1
Bit-Exact Length – Octet Count = [00H to FFH]								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 – 111]			3
(MSB)								4

3.4.3 Handoff Request Acknowledge

7	6	5	4	3	2	1	0	Octet
IS-2000 Non-Negotiable Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ **Target RNC to Source RNC Transparent Container:** A1 Element Identifier = [3AH]								1
Length = [01H – FFH]								2
(MSB)	Container = <any value>							3
								…
							(LSB)	k
⇒ **Service Option List:** A1 Element Identifier = [2AH]								1
Length = <variable>								2
Number of Service Option Instances = [01H-05H]								3
Service Option Connection {1..5:								
Reserved = [00]		SR_ID = [001 – 110]			Service Option Connection Identifier = [001 - 110]			i
(MSB)	Service Option							i+1
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 0021H (3G High Speed Packet Data), 0038H (SMV), 003CH (Link Layer Assisted Header Removal), 003DH (Link Layer Assisted RObust Header Compression)]							(LSB)	i+2
} Service Option Connection								
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2

3.4.3 Handoff Request Acknowledge

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td>ext
= [0]</td><td colspan="7">Cause Value =
[01H (Radio interface failure),
07H (OAM&P intervention),
0AH (Reversion to old channel),
20H (Equipment failure),
21H (No radio resource available),
22H (Requested terrestrial resource unavailable),
25H (BS not equipped),
26H (MS not equipped),
27H (2G only sector),
28H (2G only carrier),
2BH (Alternate signaling type reject),
30H (Requested transcoding/rate adaptation unavailable),
50H (Terrestrial circuit already allocated)
7FH (Handoff procedure time-out)]</td><td>3</td></tr>
<tr><td colspan="8">⇒ IS-2000 Channel Identity 3X: A1 Element Identifier = [27H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td>OTD
= [0,1]</td><td colspan="3">Physical Channel Count =
[001, 010]</td><td colspan="4">Frame Offset = [0H-FH]</td><td>3</td></tr>
<tr><td colspan="9">The following 10 octets are included once for each physical channel in each cell listed in the Cell Identifier List {1..12:</td></tr>
<tr><td colspan="8">Physical Channel Type =
[01H (Fundamental Channel – FCH – IS-2000),
02H (Dedicated Control Channel – DCCH – IS-2000)]</td><td>n</td></tr>
<tr><td>Rev_
FCH_
Gating
= [0,1]</td><td colspan="2">Reverse Pilot
Gating Rate
= [00, 01, 10]</td><td colspan="2">QOF Mask
= [00,01,10,11]</td><td colspan="3">Walsh Code Channel Index
(high part) = <any value></td><td>n+1</td></tr>
<tr><td colspan="8">Walsh Code Channel Index (low part) = <any value></td><td>n+2</td></tr>
<tr><td colspan="8">Pilot PN Code (low part) = <any value></td><td>n+3</td></tr>
<tr><td>Pilot PN
Code
(high
part) =
[0,1]</td><td colspan="2">Reserved = [00]</td><td>Power
Combined =
[0,1]</td><td>Freq.
included
= [1]</td><td colspan="3">ARFCN (high part)
= [000-111]</td><td>n+4</td></tr>
<tr><td colspan="8">ARFCN (low part) = [00H-FFH]</td><td>n+5</td></tr>
<tr><td colspan="3">Reserved = [000]</td><td colspan="2">Lower QOF Mask
= [00,01,10,11]</td><td colspan="3">Lower Walsh Code Channel
Index (high part) = <any value></td><td>n+6</td></tr>
<tr><td colspan="8">Lower Walsh Code Channel Index (low part) = <any value></td><td>n+7</td></tr>
</table>

3.4.3 Handoff Request Acknowledge

7	6	5	4	3	2	1	0	Octet
Reserved = [000]			Upper QOF Mask = [00,01,10,11]		Upper Walsh Code Channel Index (high part) = <any value>			n+8
Upper Walsh Code Channel Index (low part) = <any value>								n+9
} Channel Information								
⇒ **Public Long Code Mask Identifier:** A1 Element Identifier = [72H]								1
Length = [06H]								2
PLCM_TYPE = [0000 (ESN-based), 0001 (BS assigned), 0010 (IMSI_M based), 0011 (IMSI_T based), 0100 (MEID based)]]				Reserved = [00]		(MSB)		3
PLCM_42 = <any value>								4
								5
								6
								7
							(LSB)	8
⇒ **A2p Bearer Session-Level Parameters:** A1p Element Identifier [45H]								1
Length = <variable>								2
Reserved = [00]		Max Frames = [000 to 101]			Session IP Address Type = [00 = IPv4]		Session Addr Flag = [0,1]	3
(MSB)	Session IP Address = <any value>							i
…								…
							(LSB)	j
(MSB)	Session UDP Port = <any value>							j+1
							(LSB)	j+2
⇒ **A2p Bearer Format-Specific Parameters:** A1p Element Identifier = [46H]								1
Length = <variable>								2
Number of Bearer Formats = <variable>						Bearer IP Address Type= [00 = IPv4]		3
Bearer Format Parameters {1+:								
Bearer Format Length = <variable>								m
Ext = [0,1]	Bearer Format Tag Type = [001-100]			Bearer Format ID = [<any value>]				m+1

3.4.3 Handoff Request Acknowledge

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="7">RTP Payload Type =
[00H = (PCMU),
08H = (PCMA),
0CH = (13K Vocoder),
60H - 7FH (dynamically assigned = EVRC),
60H - 7FH (dynamically assigned = EVRC0),
60H - 7FH (dynamically assigned = SMV),
60H - 7FH (dynamically assigned = SMV0),
60H - 7FH (dynamically assigned = telephone-event),
60H - 7FH (dynamically assigned = EVRCB),
60H - 7FH (dynamically assigned = EVRCB0),
60H - 7FH (dynamically assigned = EVRCWB),
60H - 7FH (dynamically assigned = EVRCWB0)
60H - 7FH (dynamically assigned = EVRCNW)
60H - 7FH (dynamically assigned = EVRCNW0)]</td><td>Bearer Addr Flag= [0, 1]</td><td>m+2</td></tr>
<tr><td>(MSB)</td><td colspan="7">Bearer IP Address = <any value></td><td>i</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j</td></tr>
<tr><td>(MSB)</td><td colspan="7">Bearer UDP Port= <any value></td><td>j+1</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j+2</td></tr>
<tr><td colspan="4">Extension Length = [0001]</td><td colspan="4">Extension ID = [0000]</td><td>k</td></tr>
<tr><td colspan="8">Extension Parameters = <any value></td><td>k+1</td></tr>
<tr><td colspan="9">} Bearer Format Parameters</td></tr>
</table>

3.4.4 Handoff Command

This BSMAP message is sent from the MSC to the source BS to commence source cell handoff procedures. This message is in response to the Handoff Required message.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	MSC -> BS	M	
RF Channel Identity	4.2.7	MSC -> BS	O[a]	C
IS-95 Channel Identity	4.2.9	MSC -> BS	O[b, j]	C
Cell Identifier List	4.2.18	MSC -> BS	O[i]	C
Handoff Power Level	4.2.25	MSC -> BS	O[a]	C
SID	4.2.8	MSC -> BS	O[a,d]	C
Extended Handoff Direction Parameters	4.2.56	MSC -> BS	O[c,e,j]	C
Hard Handoff Parameters	4.2.47	MSC -> BS	O[c,j]	C
IS-2000 Channel Identity	4.2.27	MSC -> BS	O[f,j]	C
IS-2000 Service Configuration Record	4.2.51	MSC -> BS	O[g,j]	C
IS-2000 Non-Negotiable Service Configuration Record	4.2.52	MSC -> BS	O[h,j]	C
Target RNC to Source RNC Transparent Container	4.2.72	MSC -> BS	O[k]	C
Service Option List	4.2.74	MSC -> BS	O[l]	C
Cause	4.2.16	MSC -> BS	O[m]	C
AMPS Hard Handoff Parameters	4.2.75	MSC -> BS	O[a]	C
IS-2000 Channel Identity 3X	4.2.23	MSC -> BS	O[j, n]	C
Public Long Code Mask Identifier	4.2.87	MSC -> BS	O[o]	C

a. This element is included if the air interface channel allocated by the target is within an analog system [19]. Information received from the AMPS target BS may be used to populate the fields contained in this IE.

b. This element is included if the air interface channel allocated by the target is *TIA/EIA/IS-95-B*. It lists each *TIA/EIA/IS-95-B* channel, one for each cell listed in the Cell Identifier List, that has been allocated by the target BS. This element is not present if the *IS-2000* Channel Identity element or *IS-2000* Channel Identity 3X element is present.

c. This element is included if the air interface channel allocated by the target is *TIA/EIA/IS-95-B* or *cdma2000*.

d. This element is only provided for analog [19] handoffs. In the event that an *cdma2000* channel cannot be allocated but an analog channel is allocated and identified in the RF Channel Identity element, then this element provides the SID of the target. The SID is sent to the MS in the Analog Handoff Direction message from the source BS.

e. The MSC, for intra-MSC handoffs, should use the Extended Handoff Direction Parameters element supplied in the Handoff Request Acknowledge message. For intra-MSC handoffs the MSC sets the Target BS Values Included field to ‘10’.

For inter-MSC handoffs, the source BS uses the Target BS Values Included field to determine which fields within this element were successfully conveyed from the

Target BS via the ANSI-41 network. Note that [9] supports only Search Window A [Size], [26] supports Search Window A Size, Add Pilot Threshold, Drop Pilot Threshold, Compare Threshold, and Drop Timer Value and [27] supports all fields of the Extended Handoff Direction Parameters IE. If the source MSC received parameters supported by [26], it sets the Target BS Values Included field to ‘01’.

f. This element is included if the air interface channel allocated by the target is *cdma2000*. It lists the *cdma2000* channel(s) for each cell listed in the Cell Identifier List that have been allocated by the target BS. The total number instances of octets n through n+5 is the Physical Channel Count multiplied by the number of cells in the Cell Identifier List element. This version of the standard allows for a maximum of six cells for each physical channel. This element is not present if the *IS-95* Channel Identity element or *IS-2000* Channel Identity 3X element is present.

g. This element is included if the MSC receives this element from the target BS in the Handoff Request Acknowledge message.

h. This element contains the *cdma2000* non-negotiable Service configuration record to support the transport of information related to *IS-2000* logical to physical mapping (LPM) tables, and if needed, FPC power control information. It is included if the target BS provides the source BS with non-negotiable service configuration parameter values that may be sent to the MS. It is up to the source BS to decide whether or not to include the received non negotiable service configuration record in the Universal Handoff Direction Message / General Handoff Direction Message sent to the MS.

i. The cell(s) or channel(s) shall be identical to the cell(s) or channel(s) listed in the Handoff Request Acknowledge message, provided that this does not violate backwards compatibility rules.

j. These elements are only applicable when the target BS is not operating in DS-41 mode.

k. This element is only included when the target BS is operating in DS-41 mode.

l. This element is used when a partially successful service transfer occurs. In this case, this element has only the service instances successfully transferred.

m. This element is used to indicate the reason for the occurrence of the partially successful service transfer. In this case, this element is associated with the failed service option connections.

n. This element is included if the air interface channel allocated by the target is cdma2000 3X. It lists the *cdma2000* channel(s) for each cell listed in the Cell Identifier List that have been allocated by the target BS. The total number instances of octets n through n+9 is the Physical Channel Count multiplied by the number of cells in the Cell Identifier List element. This version of the standard allows for a maximum of six cells for each physical channel. This element is not present if the IS-95 Channel Identity element or *IS-2000* Channel Identity element is present.

o. This element shall be present if it was received by the MSC from the target BS.

The coding of the Handoff Command message for **CDMA – CDMA** and **DS-41** hard handoff is as follows.

3.4.4 Handoff Command

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [13H]								1
⇒ **IS-95 Channel Identity:** A1 Element Identifier = [22H]								1
Length = <variable>								2
Hard Handoff = [1]	Number of Channels to Add = [001] (Ignored)			Frame Offset = [0H-FH]				3
The following 4 octets are repeated once for each entry in the Cell Identifier List {1..6								
Walsh Code Channel Index = [00H-3FH]								j
Pilot PN Code (low part) = [00H-FFH]								j+1
Pilot PN Code (high part) = [0,1]	Power Combined = [0,1]	Freq. included = [1]	Reserved = [00]		ARFCN (high part) = [000-111]			j+2
ARFCN (low part) = [00H-FFH]								j+3
}								
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H) , Cell Identification {1..6:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1..6:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
⇒ **Extended Handoff Direction Parameters:** A1 Element Identifier = [10H]								1
Length = [09H]								2
Search Window A Size (Srch_Win_A) = [0H-FH]				Search Window N Size (Srch_Win_N) = [0H-FH]				3

3.4.4 Handoff Command

7	6	5	4	3	2	1	0	Octet
Search Window R Size (Srch_Win_R) = [0H-FH]				Add Pilot Threshold (T_Add) high order = [0H-FH]				4
T_Add (low order) = [00-11]		Drop Pilot Threshold (T_Drop) = [000000-111111]						5
Compare Threshold (T_Comp) = [0H-FH]				Drop Timer Value (T_TDrop) = [0H-FH]				6
Neighbor Max Age (Nghbor_Max_AGE) = [0H-FH]				Reserved = [00]		Target BS Values Included = [00,01,10]		7
Reserved = [00]		SOFT_SLOPE = [00 0000 - 11 1111]						8
Reserved = [00]		ADD_INTERCEPT = [00 0000 - 11 1111]						9
Reserved = [00]		DROP_INTERCEPT = [00 0000 - 11 1111]						10
Target BS P_REV = [00H-FFH]								11
⇒ **Hard Handoff Parameters:** A1 Element Identifier = [16H]								1
Reserved = [000]			Band Class = [0 0000 - 1 1111]					2
Number of Preamble Frames = [000-111]			Reset L2 = [1]	Reset FPC = [1]	Encryption Mode = [00,01]		Private LCM = [0,1]	3
Rev_ Pwr_ Cntl_ Delay_ Incl = [0,1]	Rev_Pwr_Cntl_ Delay_ = [00-11]		Nom_ Pwr_Ext = [0,1]	Nom_Pwr = [0000-1111]				4
Reserved = [00]		FPC Subchannel Information = <any value>					FPC SubChan Info Included = [0,1]	5
Reserved = [0000]				Power Control Step = <any value>			Power Control Step Included = [0,1]	6
⇒ **IS-2000 Channel Identity:** A1 Element Identifier = [09H]								1
Length = <variable>								2
OTD = [0,1]	Physical Channel Count = [001, 010]			Frame Offset = [0H-FH]				3
The following 6 octets are included once for each physical channel in each cell listed in the Cell Identifier List {1..12:								

3.4.4 Handoff Command

7	6	5	4	3	2	1	0	Octet
Physical Channel Type = [01H (Fundamental Channel – FCH – *IS-2000*), 02H (Dedicated Control Channel – DCCH – *IS-2000*)]								n
Rev_ FCH_ Gating =[0,1]	Reverse Pilot Gating Rate = [00, 01, 10]		QOF Mask = [00,01,10,11]		Walsh Code Channel Index (high part) = <any value>			n+1
Walsh Code Channel Index (low part) = <any value>								n+2
Pilot PN Code (low part) = <any value>								n+3
Pilot PN Code (high part) = [0,1]	Reserved = [00]		Power Combined = [0,1]	Freq. included = [1]	ARFCN (high part) = [000-111]			n+4
ARFCN (low part) = [00H-FFH]								n+5
FDC Length = [00H, 04H]								n+6
FDC Band Class = <any value>					FDC Forward Channel Frequency = <any value>			n+7
…								n+8
FDC Reverse Channel Frequency = <any value>								n+9
…			Reserved = 00000					n+10
} Channel Information								
⇒ **IS-2000 Service Configuration Record:** A1 Element Identifier = [0EH]								1
Bit-Exact Length – Octet Count = [00H to FFH]								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 – 111]			3
(MSB)								4
IS-2000 Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ ***IS-2000* Non-negotiable Service Configuration Record:** A1 Element Identifier = [0FH]								1
Bit-Exact Length – Octet Count = [00H to FFH]								2
Reserved = [0000 0]					Bit-Exact Length – Fill Bits = [000 – 111]			3
(MSB)								4

3.4.4 Handoff Command

7	6	5	4	3	2	1	0	Octet
IS-2000 Non-Negotiable Service Configuration Record Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k
⇒ **Target RNC to Source RNC Transparent Container:** A1 Element Identifier = [3AH]								1
Length = [01H – FFH]								2
(MSB)	Container = <any value>							3
								…
							(LSB)	k
⇒ **Service Option List:** A1 Element Identifier = [2AH]								1
Length = <variable>								2
Number of Service Option Instances = [01H-05H]								3
Service Option Connection {1..5:								
Reserved = [00]		SR_ID = [001 – 110]			Service Option Connection Identifier = [001 - 110]			i
(MSB)	Service Option							i+1
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 003EH (Wideband Speech Codec), 0044H (EVRC-B), 0046H (EVRC-WB), 0049H (EVRC-NW), 0021H (3G High Speed Packet Data), 0038H (SMV), 003CH (Link Layer Assisted Header Removal), 003DH (Link Layer Assisted RObust Header Compression)]							(LSB)	i+2
} Service Option Connection								
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2

3.4.4 Handoff Command

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td>ext = [0]</td><td colspan="7">Cause Value =
[01H (Radio interface failure),
07H (OAM&P intervention),
0AH (Reversion to old channel),
20H (Equipment failure),
21H (No radio resource available),
22H (Requested terrestrial resource unavailable),
25H (BS not equipped),
26H (MS not equipped),
27H (2G only sector),
28H (2G only carrier),
2BH (Alternate signaling type reject),
30H (Requested transcoding/rate adaptation unavailable),
50H (Terrestrial circuit already allocated)
7FH (Handoff procedure time-out)]</td><td>3</td></tr>
<tr><td colspan="8">⇒ IS-2000 Channel Identity 3X: A1 Element Identifier = [27H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td>OTD = [0,1]</td><td colspan="3">Physical Channel Count = [001, 010]</td><td colspan="4">Frame Offset = [0H-FH]</td><td>3</td></tr>
<tr><td colspan="9">The following 10 octets are included once for each physical channel in each cell listed in the Cell Identifier List {1..12:</td></tr>
<tr><td colspan="8">Physical Channel Type =
[01H (Fundamental Channel – FCH – IS-2000),
02H (Dedicated Control Channel – DCCH – IS-2000)]</td><td>n</td></tr>
<tr><td>Rev_ FCH_ Gating = [0,1]</td><td colspan="2">Reverse Pilot Gating Rate = [00, 01, 10]</td><td colspan="2">QOF Mask = [00,01,10,11]</td><td colspan="3">Walsh Code Channel Index (high part) = <any value></td><td>n+1</td></tr>
<tr><td colspan="8">Walsh Code Channel Index (low part) = <any value></td><td>n+2</td></tr>
<tr><td colspan="8">Pilot PN Code (low part) = <any value></td><td>n+3</td></tr>
<tr><td>Pilot PN Code (high part) = [0,1]</td><td colspan="2">Reserved = [00]</td><td>Power Combined = [0,1]</td><td>Freq. included = [1]</td><td colspan="3">ARFCN (high part) = [000-111]</td><td>n+4</td></tr>
<tr><td colspan="8">ARFCN (low part) = [00H-FFH]</td><td>n+5</td></tr>
<tr><td colspan="3">Reserved = [000]</td><td colspan="2">Lower QOF Mask = [00,01,10,11]</td><td colspan="3">Lower Walsh Code Channel Index (high part) = <any value></td><td>n+6</td></tr>
<tr><td colspan="8">Lower Walsh Code Channel Index (low part) = <any value></td><td>n+7</td></tr>
</table>

3.4.4 Handoff Command

7	6	5	4	3	2	1	0	Octet
Reserved = [000]			Upper QOF Mask = [00,01,10,11]		Upper Walsh Code Channel Index (high part) = <any value>			n+8
Upper Walsh Code Channel Index (low part) = <any value>								n+9
} Channel Information								
⇒ **Public Long Code Mask Identifier:** A1 Element Identifier = [72H]								1
Length = [06H]								2
PLCM_TYPE = [0000 (ESN-based), 0001 (BS assigned), 0010 (IMSI_M based), 0011 (IMSI_T based), 0100 (MEID based)]				Reserved = [00]		(MSB)		3
PLCM_42 = <any value>								4
								5
								6
								7
							(LSB)	8

The coding of the Handoff Command message for **CDMA – AMPS** hard handoff is as follows.

3.4.4 Handoff Command

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [13H]								1
⇒ **RF Channel Identity:** A1 Element Identifier = [21H]								1
Color Code = [00H-FFH]								2
Reserved = [0000 00]						N-AMPS = [0,1]	TIA/ EIA-553 = [0,1]	3
Reserved = [000000]						Timeslot Number = [00-11]		4
Reserved = [00000]					ARFCN (high part) = [000-111]			5
ARFCN (low part) = [00H-FFH]								6
⇒ **Handoff Power Level:** A1 Element Identifier = [26H]								1

3.4.4 Handoff Command

7	6	5	4	3	2	1	0	Octet
Length = [06H]								2
Number of Cells = [01H]								3
Reserved = [0]	ID Type = [00,01,10] (Discriminator 1,7,8)		Handoff Power Level = [00000-11111]					4
(MSB)	LAC = [0001H-FFFFH]							5
							(LSB)	6
(MSB)	Cell = [001H-FFFH]							7
			(LSB)	Sector = [0H-FH] (0H = Omni)				8
⇒ **SID:** A1 Element Identifier = [32H]								1
Reserved = [0]	(MSB)	SID (high order) = [000 0000 – 111 1111]						2
SID (low order) = [00H-FFH]							(LSB)	3
⇒ **AMPS Hard Handoff Parameters:** A1 Element Identifier = [25H]								1
Length = [01H]								2
Reserved = [0000 00]						Encryption Mode = [00, 01]		3

3.4.5 Handoff Commenced

This BSMAP message is used for *cdma2000* hard handoffs. It is sent by the source BS to the MSC to indicate that the Handoff Command message has been sent to the MS, and that an acknowledgment has been received from the MS. For *cdma2000*, if the Handoff Command message is sent using quick repeats, the source BS may not request an acknowledgment from the MS. In this case, the source BS sends the Handoff Commenced message after all the quick repeats have been transmitted to the MS.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	BS -> MSC	M

The following table shows the bitmap layout for the Handoff Commenced message.

3.4.5 Handoff Commenced

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [01H]								2
⇒ **Message Type** = [15H]								1

3.4.6 Handoff Complete

This BSMAP message is sent from the target BS to the MSC to inform the MSC that the MS has arrived on the new channel and has completed all (if any) required connection procedures. This message is only used for CDMA-CDMA hard handoff and hard handoff to or from DS-41 systems.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Service Option	4.2.49	BS -> MSC	O[a]	C

a. This IE is included only during packet data intergeneration handoff.

The following table shows the bitmap layout for the Handoff Complete message.

3.4.6 Handoff Complete

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [01H, 04H]								2
⇒ **Message Type** = [14H]								1
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [0021H (3G High Speed Packet Data)] 0016H (High Speed Packet Data Service), 0017H (High Speed Packet Data Service), 0018H (High Speed Packet Data Service), 0019H (High Speed Packet Data Service)]							(LSB)	3

3.4.7 Handoff Required Reject

This BSMAP message is sent from the MSC to the BS. It indicates to the BS that it was not possible to execute a handoff as requested.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	MSC -> BS	M
Cause	4.2.16	MSC -> BS	M

The following table shows the bitmap layout for the Handoff Required Reject message.

3.4.7 Handoff Required Reject

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								2
⇒ **Message Type** = [1AH]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [07H (OAM&P intervention), 20H (Equipment failure), 21H (No radio resource available), 22H (Requested terrestrial resource unavailable), 25H (BS not equipped), 2AH (Handoff blocked), 30H (Requested transcoding/rate adaptation unavailable), 7FH (Handoff procedure time-out)]							3

3.4.8 Handoff Failure

This BSMAP message is sent from the BS to the MSC. It indicates to the MSC that there has been a failure in the resource allocation process on an inter-BS handoff, and that the handoff has been aborted.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	BS -> MSC	M
Cause	4.2.16	BS -> MSC	M

The following table shows the bitmap layout for the Handoff Failure message.

3.4.8 Handoff Failure

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								2
⇒ **Message Type** = [16H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [01H (Radio interface failure), 07H (OAM&P intervention), 0AH (Reversion to old channel), 20H (Equipment failure), 21H (No radio resource available), 22H (Requested terrestrial resource unavailable), 25H (BS not equipped), 26H (MS not equipped), 2BH (Alternate signaling type reject), 30H (Requested transcoding/rate adaptation unavailable), 50H (Terrestrial circuit already allocated), 7FH (Handoff procedure time-out)]							3

3.4.9 Handoff Performed

This BSMAP message is sent from the BS to the MSC to indicate that the BS has performed an internal handoff that has resulted in the change of the designated cell, bandclass or frequency. The handoff may have been internal or in conjunction with another BS. The purpose of this message is to update the call configuration for the MSC. The Cell Identifier List is included for billing, trace, etc.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Cause	4.2.16	BS -> MSC	M	
Cell Identifier List	4.2.18	BS -> MSC	O[a]	R
Channel Number	4.2.5	BS -> MSC	O[b]	C
Band Class	4.2.76	BS -> MSC	O[c]	C
Mobile Subscription Information	4.2.91	BS -> MSC	O[d]	C

a. The MSC shall consider the first cell in the Cell Identifier List to be the “designated cell”.

b. The Channel Number IE is included when the CDMA Channel Number is altered.

c. The Band Class IE is included when the band class is altered. This IE shall not be included if the Mobile Subscription Information IE is included in the message.

d. The Mobile Subscription Information IE is included (with Band Class/Band Subclass Record) when the current band subclass is changed by the handoff. Either this IE or the Band Class IE is included when the current band class is changed by the handoff. When including this record, the BS shall include the current band class and current band subclass. The BS may omit band class capabilities and band subclass capabilities other than the current band class and current band subclass.

The following table shows the bitmap layout for the Handoff Performed message.

3.4.9 Handoff Performed

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [17H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2

3.4.9 Handoff Performed

7	6	5	4	3	2	1	0	Octet
ext = [0]	Cause Value = [02H (uplink quality), 03H (uplink strength), 04H (downlink quality), 05H (downlink strength), 06H (distance), 07H (OAM&P intervention), 1BH (inter-BS soft handoff drop target), 0EH (better cell), 0FH (interference), 1DH (intra-BS soft handoff drop target)]							3
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1..6:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H)), Cell Identification {1..6:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
⇒ **Channel Number:** A1 Element Identifier = [23H]								1
Reserved = [0 0000]					ARFCN High Part (MSB) = [000 – 111]			2
ARFCN Low Part (LSB) = [00H – FFH]								3
⇒ **Band Class:** A1 Element Identifier = [37H]								1
Length = [01H]								2
Reserved = [000]			Band Class = [0 0000 – 0 1100]					3
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3

3.4.9 Handoff Performed

7	6	5	4	3	2	1	0	Octet
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

3.5 Facility Management Message Formats

These sections do not apply to the MSCe, with the exception of sections 3.5.7 and 3.5.8.

3.5.1 Block

This BSMAP message is sent from the BS to the circuit-switched MSC to indicate that one or more terrestrial circuits shall be blocked at the circuit-switched MSC, and cannot therefore be used for traffic.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSCcs	M	
Circuit Identity Code	4.2.19	BS -> MSCcs	M	
Cause	4.2.16	BS -> MSCcs	M[a]	
Circuit Group	4.2.66	BS -> MSCcs	O[b]	C

a. This cause value applies to all circuits identified in this message.

b. If this element is present it shall include the value found within the Circuit Identity Code element as the first value represented within its range of circuit identity code values.

The following table shows the bitmap layout for the Block message.

3.5.1 Block

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [40H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [07H (OAM&P intervention), 20H (Equipment failure), 21H (No radio resource available)]							3
⇒ **Circuit Group :** A1 Element Identifier = [19H]								1
Length = <variable>								2
Reserved = [000000]						All Circuits = [0,1]	Inclusive = [0,1]	3
Count = [01H to FFH]								4

3.5.1 Block

7	6	5	4	3	2	1	0	Octet
(MSB)	First CIC: PCM Multiplexer = <any value>							5
		(LSB)	Timeslot = [00000-11111]					6
(first unused bit - if any)	(second unused bit - if any)	(third unused bit - if any)	(fourth unused bit - if any)	(fifth unused bit - if any)	(sixth unused bit - if any)	(seventh unused bit - if any)		7
Circuit Bitmap = <any value>								8
…								…
							(corresp to value in First CIC field)	k

3.5.2 Block Acknowledge

The circuit-switched MSC sends this BSMAP message to BS to acknowledge the receipt of an earlier Block message, and to indicate that the circuits concerned have been removed from service.

Information Element	**Section Reference**	**Element Direction**	**Type**
Message Type	4.2.4	MSCcs -> BS	M
Circuit Identity Code	4.2.19	MSCcs -> BS	M[a]

a. This element is the same as the one received in the Block message.

The following table shows the bitmap layout for the Block Acknowledge message.

3.5.2 Block Acknowledge

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								2
⇒ **Message Type** = [41H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3

3.5.3 Unblock

This BSMAP message is sent from the BS to the circuit-switched MSC to indicate that one or more terrestrial resources may be returned to service at the circuit-switched MSC, and can therefore be used for traffic.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSCcs	M	
Circuit Identity Code	4.2.19	BS -> MSCcs	M	
Circuit Group	4.2.66	BS -> MSCcs	O[a]	C

a. If this element is present it shall include the value found within the Circuit Identity Code element as the first value represented within its range of circuit identity code values.

The following table shows the bitmap layout for the Unblock message.

3.5.3 Unblock

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [42H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3
⇒ **Circuit Group:** A1 Element Identifier = [19H]								1
Length = <variable>								2
Reserved = [000000]						All Circuits = [0,1]	Inclusive = [0,1]	3
Count = [01H to FFH]								4
(MSB)	First CIC**:** PCM Multiplexer = <any value>							5
		(LSB)	Timeslot = [00000-11111]					6
(first unused bit - if any)	(second unused bit - if any)	(third unused bit - if any)	(fourth unused bit - if any)	(fifth unused bit - if any)	(sixth unused bit - if any)	(seventh unused bit - if any)		7
Circuit Bitmap = <any value>								8
…								…
							(corresp to value in First CIC field)	k

3.5.4 Unblock Acknowledge

The circuit-switched MSC sends this BSMAP message to BS to acknowledge the receipt of an earlier Unblock message, and to indicate that the circuits concerned have been returned to service.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	MSCcs -> BS	M
Circuit Identity Code	4.2.19	MSCcs -> BS	M

The following table shows the bitmap layout for the Unblock Acknowledge message.

3.5.4 Unblock Acknowledge

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								2
⇒ **Message Type** = [43H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3

3.5.5 Reset Circuit

This BSMAP message can be sent either from the BS to the circuit-switched MSC or from the circuit-switched MSC to the BS. It indicates to the receiving entity that the state of the circuits indicated in the message is unknown.

This message is sent as a connectionless message.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS <-> MSCcs	M	
Circuit Identity Code	4.2.19	BS <-> MSCcs	M	
Cause	4.2.16	BS <-> MSCcs	M[a]	
Circuit Group	4.2.66	BS <-> MSCcs	O[b,c]	C

a. This cause value applies to all circuits identified in this message.

b. If this element is present it shall include the value found within the Circuit Identity Code element as the first value represented within its range of circuit identity code values.

c. This element shall not be sent to implementations of the CDG IOS earlier than IOS v3.1.0.

The following table shows the bitmap layout for the Reset Circuit message.

3.5.5 Reset Circuit

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = <variable></td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [34H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Circuit Identity Code: A1 Element Identifier = [01H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="7">PCM Multiplexer = <any value></td><td>2</td></tr>
<tr><td colspan="2"></td><td>(LSB)</td><td colspan="5">Timeslot = [00000-11111]</td><td>3</td></tr>
<tr><td colspan="8">⇒ Cause: A1 Element Identifier = [04H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td>ext = [0]</td><td colspan="7">Cause Value =
[07H (OAM&P intervention),
09H (Call processing),
20H (Equipment failure)]</td><td>3</td></tr>
<tr><td colspan="8">⇒ Circuit Group: A1 Element Identifier = [19H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="6">Reserved = [000000]</td><td>All Circuits = [0,1]</td><td>Inclusive = [0,1]</td><td>3</td></tr>
<tr><td colspan="8">Count = [01H to FFH]</td><td>4</td></tr>
</table>

3.5.5 Reset Circuit

7	6	5	4	3	2	1	0	Octet
(MSB)	First CIC: PCM Multiplexer = <any value>							5
		(LSB)	Timeslot = [00000-11111]					6
(first unused bit - if any)	(second unused bit - if any)	(third unused bit - if any)	(fourth unused bit - if any)	(fifth unused bit - if any)	(sixth unused bit - if any)	(seventh unused bit - if any)		7
Circuit Bitmap = <any value>								8
…								…
							(corresp to value in First CIC field)	k

3.5.6 Reset Circuit Acknowledge

This BSMAP message can be sent either from the BS to the circuit-switched MSC, or from the circuit-switched MSC to the BS. It indicates to the receiving entity that the transmitting entity has cleared any possible calls using the specified circuits (i.e., the circuits are idled).

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	BS <-> MSCcs	M
Circuit Identity Code	4.2.19	BS <-> MSCcs	M

The following table shows the bitmap layout for the Reset Circuit Acknowledge message.

3.5.6 Reset Circuit Acknowledge

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [04H]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [35H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Circuit Identity Code: A1 Element Identifier = [01H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="7">PCM Multiplexer = <any value></td><td>2</td></tr>
<tr><td colspan="2"></td><td>(LSB)</td><td colspan="5">Timeslot = [00000-11111]</td><td>3</td></tr>
</table>

3.5.7 Reset

This BSMAP message can be sent either from the BS to the MSC or from the MSC to the BS. It indicates to the receiving entity that the transmitting entity has failed and has lost memory of the calls in progress, calls set up, and associated references.

This message is sent as a connectionless message.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	BS <-> MSC	M	
Cause	4.2.16	BS <-> MSC	M	
Software Version	4.2.48	BS <-> MSC	O	R

The following table shows the bitmap layout for the Reset message.

3.5.7 Reset

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [30H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = <variable>								2
ext = [0]	Cause Value = [07H (OAM&P intervention), 20H (Equipment failure)]							3
⇒ **Software Version:** A1 Element Identifier = [31H]								1
Length = <variable>								2
IOS Major Revision Level (X) = [05H]								3
IOS Minor Revision Level (Y) = [01H]								4
IOS Point Release Level (Z) = [01H]								5
Manufacturer/Carrier Software Information = <printable ASCII character>								6
…								…
Manufacturer/Carrier Software Information = <printable ASCII character>								n

3.5.8 Reset Acknowledge

This BSMAP message can be sent either from the BS to the MSC, or from the MSC to the BS. It indicates to the receiving entity that the transmitting entity has cleared all calls and reset all references, and is ready to resume service. If sent by the MSC, it also indicates that all MSC-BS terrestrial circuits have been idled.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS <-> MSC	M	
Software Version	4.2.48	BS <-> MSC	O	R

The following table shows the bitmap layout for the Reset Acknowledge message.

3.5.8 Reset Acknowledge

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [31H]								1
⇒ **Software Version:** A1 Element Identifier = [31H]								1
Length = <variable>								2
IOS Major Revision Level (X) = [05H]								3
IOS Minor Revision Level (Y) = [01H]								4
IOS Point Release Level (Z) = [01H]								5
Manufacturer/Carrier Software Information = <printable ASCII character>								6
…								…
Manufacturer/Carrier Software Information = <printable ASCII character>								n

3.5.9 Transcoder Control Request

This BSMAP message is sent from the circuit-switched MSC to the BS to change the state of the inband signaling mechanism at the BS. A “disable” directive also results in the BS reverting to tandem vocoding mode if already in tandem free operation.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	MSCcs->BS	M
Transcoder Mode	4.2.43	MSCcs->BS	M

The following table shows the bitmap layout for the Transcoder Control Request message.

3.5.9 Transcoder Control Request

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">⇒ BSMAP Header: Message Discrimination = [00H]</td><td>1</td></tr>
<tr><td colspan="8">Length Indicator (LI) = [04H]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [38H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Transcoder Mode: A1 Element Identifier = [36H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="7">Reserved = [0000 000]</td><td>TFO Mode = [0,1]</td><td>3</td></tr>
</table>

3.5.10 Transcoder Control Acknowledge

This BSMAP message is sent from the BS to the circuit-switched MSC to acknowledge whether tandem free operation was successfully enabled or disabled in response to the circuit-switched MSC's mode setting request.

Information Element	Section Reference	Element Direction	Type
Message Type	4.2.4	BS -> MSCcs	M
Cause	4.2.16	BS -> MSCcs	O[a]

a. If this element is not present, then tandem free operation was either successfully established or disabled (depending on the directive from the circuit-switched MSC). If the element is present, its only allowable value is TFO Control Request Failed. This value is used when the circuit-switched MSC directive received in the Transcoder Control Request could not be accomplished.

The following table shows the bitmap layout for the Transcoder Control Request message.

3.5.10 Transcoder Control Acknowledge

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								2
⇒ **Message Type** = [39H]								1
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [33H (TFO control request failed)]							3

3.6 Application Data Delivery Service (ADDS) Message Formats

3.6.1 ADDS Page

This BSMAP message is sent from the MSC to the BS to request delivery of an application data message on the paging channel.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI/Broadcast Address)	4.2.13	MSC -> BS	M[a]	
ADDS User Part	4.2.50	MSC -> BS	M[b]	
Tag	4.2.46	MSC -> BS	O[c]	C
Cell Identifier List	4.2.18	MSC -> BS	O[d]	C
Slot Cycle Index	4.2.14	MSC -> BS	O[e,f]	C
IS-2000 Mobile Capabilities	4.2.53	MSC -> BS	O[f, h]	C
Protocol Revision	4.2.79	MSC -> BS	O[g]	C
MS Designated Frequency	4.2.88	MSC -> BS	O[f, i]	C
Mobile Subscription Information	4.2.91	MSC -> BS	O[j]	C

a. This element contains IMSI or Broadcast Address.

b. This element contains the application data information to be sent to the mobile user, encoded using the syntax appropriate for the current radio channel and service type. When this message is used to deliver an SDB to the MS, the Application Data Message field is included and contains the SDB.

c. If this element is present in this message, the value shall be saved at the BS to be included if an ADDS Page Ack message is sent in response to this message.

d. The cell identifiers indicate the cells and location areas in which the BS is to attempt delivery of the message. When the Cell Identifier IE is absent, the BS shall attempt delivery in all cells controlled by the BS.

e. This element is included when slotted paging is performed on *cdma2000* paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. In *cdma2000* systems, if this element is absent, then it is assumed that the MS is operating in non-slotted mode. Note: For SMS Broadcast, the presence or absence of this element does not indicate the slotted/non-slotted operating mode of the MS.

f. This element shall not be included when the BS and MS are operating in DS-41 mode.

g. This element contains the MS’s MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

h. If the MSC does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

i. This element is included when the MSC has the information available. For BCMCS, this IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.

j. If available at the MSC, the MSC shall include a Band Class/Band Subclass Record within this element to report the last known band class and band subclass (if applicable) as well as any other band classes and band subclasses supported by the MS.

The following table shows the bitmap layout for the ADDS Page message.

3.6.1 ADDS Page

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [65H]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
IF (Type of Identity in octet 3 = ‘110’), Mobile Identity {1:								
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110 (IMSI)]			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
} OR IF (Type of Identity in octet 3 = ‘010’), Mobile Identity {1:								
Reserved = [0000 0]					Type of Identity = [010 Broadcast Identifier]			3
Priority = [00 – 11]		Message ID = [00 0000 – 11 1111]						4
Zone ID = [00H – FFH]								5
(MSB)	Service = [0000H – FFFFH]							6
							(LSB)	7
Language = [00H – FFH]								8
} Mobile Identity								
⇒ **ADDS User Part:** A1 Element Identifier = [3DH]								1
Length = <variable>								2
Reserved = [00]		Data Burst Type = [[000011] (SMS), [000101] (PDS), [000110] (SDB)]						3
(MSB)	Application Data Message = <any value>							4
…								…
							(LSB)	n

3.6.1 ADDS Page

7	6	5	4	3	2	1	0	Octet
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Cell Identifier List:** A1 Element Identifier = [1AH]								1
Length = <variable>								2
Cell Identification Discriminator = [02H,05H]								3
IF (Discriminator = 02H), Cell Identification {1+:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [0000]				SCI Sign = [0,1]	Slot Cycle Index = [000-111]			2
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
REV_ PDCH Supported = [0, 1]	FOR_ PDCH Supported = [0,1]	ERAM Supported = [0,1]	DCCH Supported = [0,1]	FCH Supported = [0,1]	OTD Supported = [0,1]	Enhanced RC CFG Supported = [0,1]	QPCH Supported = [0,1]	3
FCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								4
Reserved = [0]	Geo Location Type = <any value> (Ignored)		Geo Location Included = <any value> (Ignored)		FCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			5
(MSB)								6
FCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k

3.6.1 ADDS Page

7	6	5	4	3	2	1	0	Octet
DCCH Information: Bit-Exact Length – Octet Count = [00H to FFH]								k+1
Reserved = [0000 0]					DCCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			k+2
(MSB)								k+3
DCCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	m
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								m+1
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			m+2
(MSB)								m+3
FOR_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…

3.6.1 ADDS Page

7	6	5	4	3	2	1	0	Octet
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **MS Designated Frequency:** A1 Element Identifier = [73H]								1
Length = [02H]								2
Band Class = [00000 – 11111]					CDMA channel (high part) = [000 – 111]			3
CDMA channel (low part) = [00H – FFH]								4
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k

3.6.1 ADDS Page

7	6	5	4	3	2	1	0	Octet
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

3.6.2 ADDS Page Ack

This BSMAP message is sent from the BS to the MSC to indicate that the BS received a Layer 2 Ack from the MS indicating that the point-to-point application data message was successfully delivered, or that the BS received the ADDS Page message to send an SMS broadcast message, or that the ADDS message was too long for delivery on the Paging channel, or that an internal BS failure has occurred with respect to the ability to complete an ADDS Page activity.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	BS -> MSC	M	
Mobile Identity (IMSI/Broadcast Address)	4.2.13	BS -> MSC	M[a]	
Tag	4.2.46	BS -> MSC	O[e]	R
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[b]	C
Cause	4.2.16	BS -> MSC	O[c]	C
Cell Identifier	4.2.17	BS -> MSC	O[d]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[f]	C

a. This element contains an IMSI or Broadcast Address.

b. This IE is included if the ESN is available at the BS. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

c. This element is used to indicate an error situation. In particular, this element can be used to carry information to the MSC that the ADDS User Part element contained in the ADDS Page message is too long to be carried on the paging channel.

d. This element identifies the cell where the air interface acknowledgement was received corresponding to the paging channel message sent as a result of an ADDS Page message. This element is not included for SMS Broadcast.

e. This IE contains the same value received in the ADDS Page message.

f. This IE is included if the MEID is available at the BS.

The following table shows the bitmap layout for the ADDS Page Ack message.

3.6.2 ADDS Page Ack

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [66H]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
IF (Type of Identity in octet 3 = ‘110’), Mobile Identity {1:								
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4

3.6.2 ADDS Page Ack

7	6	5	4	3	2	1	0	Octet
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
} OR IF {Type of Identity in octet 3 = '010'), Mobile Identity {1:								
Reserved = [0000 0]					Type of Identity = [010 (Broadcast Identifier)]			3
Priority = [00-11]		Message ID=[00 0000 - 11 1111]						4
Zone ID = [00H – FFH]								5
(MSB)	Service = [00 00H – FF FFH]							6
…							(LSB)	7
Language = [00H – FFH]								8
} Mobile Identity								
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [20H (equipment failure), 71H (ADDS message too long for delivery on paging channel)]							3
⇒ **Cell Identifier:** A1 Element Identifier = [05H]								1
Length = [03H]								2
Cell Identification Discriminator = [02H]								3

3.6.2 ADDS Page Ack

7	6	5	4	3	2	1	0	Octet
(MSB)	Cell = [001H-FFFH]							4
				Sector = [0H-FH] (0H = Omni)			(LSB)	5
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10

3.6.3 ADDS Transfer

This BSMAP message is sent from the BS to the MSC whenever an application data message is received from the MS on the access channel. It is also sent from the BS to the MSC to transfer authentication parameters when an MS originates a Short Data Burst, requests CCPD mode, or requests alternate dormant mode handoff from the network.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	4.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	M	
ADDS User Part	4.2.50	BS -> MSC	M[a]	
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[b]	C
Authentication Response Parameter AUTHR	4.2.36	BS -> MSC	O[c]	C
Authentication Confirmation Parameter RANDC	4.2.33	BS -> MSC	O[d]	C
Authentication Parameter COUNT	4.2.37	BS -> MSC	O[e]	C
Authentication Challenge Parameter RAND	4.2.35	BS -> MSC	O[f]	C
Authentication Event	4.2.61	BS -> MSC	O[g]	C
Cell Identifier	4.2.17	BS -> MSC	O[h]	R
CDMA Serving One Way Delay	4.2.57	BS -> MSC	O[i]	C
Authentication Data	4.2.62	BS -> MSC	O[j]	C
Tag	4.2.46	BS -> MSC	O[k]	C
Classmark Information Type 2	4.2.12	BS -> MSC	O[l, m,q]	C
Slot Cycle Index	4.2.14	BS -> MSC	O[l,n,o]	C
Service Option	4.2.49	BS -> MSC	O[l,q]	C
User Zone ID	4.2.26	BS -> MSC	O[l]	C
IS-2000 Mobile Capabilities	4.2.53	BS -> MSC	O[l,o,p,r]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[s]	C
Mobile Subscription Information	4.2.91	BS -> MSC	O[t]	C

a. This element contains the application data information that was received from the MS. When this message is used to transfer authentication parameters to the MSC after the BS has received a SDB or a request for CCPD mode from the MS, the Data Burst Type field is set to 'SDB (000110)' and the Application Data Message field is not included. When this message is used to transfer authentication parameters to the MSC after the BS has received a request for alternate dormant mode handoff from the MS, the Data Burst Type field is set to 'Asynchronous Data Services (000001)' and the Application Data Message field is not included.

b. This IE is included if the ESN is available at the BS. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

c. This element is included when broadcast authentication is performed and contains the Authentication Response Parameter, AUTHR, as computed by the MS.

d. This element contains the RANDC received from the MS. RANDC shall be included whenever it is received from the MS and authentication is enabled.

e. This element is included when broadcast authentication is performed and contains the MS's call history count for authentication operations.

f. This element is included when broadcast authentication is performed and contains the random number (RAND) value used when the BS is responsible for RAND assignment and can correlate this parameter with the RAND used by the MS in its authentication computation.

g. This element is present when an authentication enabled BS does not receive the authentication parameters (AUTHR, RANDC and COUNT) from the MS, or when a RAND/RANDC mismatch has occurred.

h. This element identifies the cell where the application data (e.g., SMS-MO) was received from the MS. Discriminator type '0000 0010' (Cell ID) may be used in the ADDS Transfer message. For more information, refer to section 4.2.17.

i. This element is included if the data burst type is set to '05H (PDS)', if applicable to the geo-location technology, and if this technology is supported at the base station.

j. This element is included if the BS determines that authentication should be applied.

k. These elements are required when the ADDS user part element data burst type field is set to SDB for Short Data Burst or Asynchronous Data Services for dormant handoff, and shall be returned in the ADDS Transfer Ack message.

l. This element is included if the message is triggered by an Origination Message from the MS.

m. When the BS is operating in DS-41 mode, only the following fields in the Classmark Type 2 IE shall be considered valid by the MSC: MOB_P_REV, NAR_AN_CAP, Mobile Term, PSI (PACA Supported Indicator), SCM Length, Count of Band Class Entries, Band Class Entry Length, Band Class n, Band Class n Air Interfaces Supported, Band Class n MS Protocol Level.

n. This element applies only to MSs operating in slotted mode (discontinuous reception). It contains the sign and index value used in paging channel slot computation [1]. The Slot Cycle Index shall be stored by the MSC, and returned to the BS for call termination to the MS to ensure that the Paging Message is broadcast in the paging channel slots monitored by the MS.

o. These elements shall not be included by the BS when the BS and MS are operating in DS-41 mode.

p. This element is only included when the MS operates at revision level 6 or greater as defined by [1]~[6].

q. If any of these elements are not correctly present in case of dormant handoff, failure handling may be initiated by the MSC.

r. If the BS does not have the information required to correctly populate a field in this IE, it shall code the field to zero.

s. This IE is included if the MEID is available at the BS.

t. If an MS is capable of multiple band classes and at least one band class has band subclasses defined, the BS shall include the MS's band class and band subclass capabilities in this element as shown in section 4.2.91 if this information is available at the BS. When included, the band class and band subclass information in this IE shall take precedence over any band class information included in the Classmark Information Type 2 IE.

The following table shows the bitmap layout for the ADDS Transfer message.

3.6.3 ADDS Transfer

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [67H]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **ADDS User Part:** A1 Element Identifier = [3DH]								1
Length = <variable>								2
Reserved = [00]		Data Burst Type = [[000001] (Asynchronous Data Services), [000011] (SMS), [000101] (PDS), [000110] (SDB)]						3
(MSB)	Application Data Message = <any value>							4
…								…
							(LSB)	n
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Authentication Response Parameter (AUTHR):** A1 Element Identifier = [42H]								1
Length = [04H]								2
Reserved = [0000]				Auth Signature Type = [0001] (AUTHR)				3
[0]	[0]	[0]	[0]	[0]	[0]	(MSB)		4

3.6.3 ADDS Transfer

7	6	5	4	3	2	1	0	Octet
Auth Signature = <any value>								5
							(LSB)	6
⇒ **Authentication Confirmation Parameter (RANDC):** A1 Element Identifier = [28H]								1
RANDC = [00H-FFH]								2
⇒ **Authentication Parameter COUNT:** A1 Element Identifier = [40H]								1
Reserved = [00]		Count = [000000-111111]						2
⇒ **Authentication Challenge Parameter (RAND):** A1 Element Identifier = [41H]								1
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)	RAND = <any value>							4
								5
								6
							(LSB)	7
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1
Length = [01H]								2
Event = [01H, 02H] (Parameters not received, RANDC/RAND mismatch)								3
⇒ **Cell Identifier:** A1 Element Identifier = [05H]								1
Length = [03H]								2
Cell Identification Discriminator = [02H]								3
IF (Discriminator = 02H) , Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							4
				Sector = [0H-FH] (0H = Omni)			(LSB)	5
} Cell Identification								
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [08H, 0BH]								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							4
				Sector = [0H-FH] (0H = Omni)			(LSB)	5
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSCID = <any value>							4
								5
							(LSB)	6
(MSB)	Cell = [001H-FFFH]							7

3.6.3 ADDS Transfer

7	6	5	4	3	2	1	0	Octet
			(LSB)	Sector = [0H-FH] (0H = Omni)				8
} Cell Identification								
(MSB)	CDMA Serving One Way Delay = [0000H-FFFFH]							k
							(LSB)	k+1
Reserved = [0000 00]						Resolution = [00, 01, 10]		k+2
(MSB)	CDMA Serving One Way Delay Time Stamp = [00 00H – FF FFH]							k+3
							(LSB)	k+4
⇒ **Authentication Data:** A1 Element Identifier = [59H]								1
Length = [03H]								2
(MSB)	Auth-Data = <any value>							3
								4
							(LSB)	5
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Classmark Information Type 2:** A1 Element Identifier = [12H]								1
Length = <variable>								2
MOB_P_REV = [000 – 111]			Reserved = [0]	See List of Entries = [0,1]	RF Power Capability = [000-010]			3
Reserved = [00H]								4
NAR_ AN_ CAP = [0,1]	IS-95 = [1]	Slotted = [0,1]	Reserved = [00]		DTX = [0,1]	Mobile Term = [0,1]	TIA/ EIA-553 = [0,1]	5
Reserved = [00H]								6
Reserved = [000000]						Mobile Term = [0,1]	PSI = [0,1]	7
SCM Length = [01H]								8
Station Class Mark = [00H – FFH]								9
Count of Band Class Entries = [01H-20H]								10
Band Class Entry Length = [03H]								11
Mobile Band Class Capability Entry {1+:								
Reserved = [000]			Band Class n = [00000-11111]					k

3.6.3 ADDS Transfer

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">Band Class n Air Interfaces Supported = [00H-FFH]</td><td>k+1</td></tr>
<tr><td colspan="8">Band Class n MOB_P_REV = [00H-FFH]</td><td>k+2</td></tr>
<tr><td colspan="9">} Mobile Band Class Capability Entry</td></tr>
<tr><td colspan="8">⇒ Slot Cycle Index: A1 Element Identifier = [35H]</td><td>1</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td>SCI Sign = [0,1]</td><td colspan="3">Slot Cycle Index = [000-111]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Service Option: A1 Element Identifier = [03H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="7">Service Option = <any value></td><td>2</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>3</td></tr>
<tr><td colspan="8">⇒ User Zone ID: A1 Element Identifier = [02H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [02H]</td><td>2</td></tr>
<tr><td>(MSB)</td><td colspan="7">UZID = <any value></td><td>3</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>4</td></tr>
<tr><td colspan="8">⇒ IS-2000 Mobile Capabilities: A1 Element Identifier = [11H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td>REV_ PDCH Supported = [0, 1]</td><td>FOR_ PDCH Supported = [0,1]</td><td>ERAM Supported = [0,1]</td><td>DCCH Supported = [0,1]</td><td>FCH Supported = [0,1]</td><td>OTD Supported = [0,1]</td><td>Enhanced RC CFG Supported = [0,1]</td><td>QPCH Supported = [0,1]</td><td>3</td></tr>
<tr><td colspan="8">FCH Information: Bit-Exact Length – Octet Count
= [00H to FFH]</td><td>4</td></tr>
<tr><td>Reserved = [0]</td><td colspan="3">Geo Location Type = [000, 001, 010, 011]</td><td>Geo Location Included = [0,1]</td><td colspan="3">FCH Information:
Bit-Exact Length – Fill Bits
= [000 to 111]</td><td>5</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>6</td></tr>
<tr><td colspan="8">FCH Information Content
= <any value></td><td>…</td></tr>
<tr><td></td><td>Seventh Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Sixth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fifth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Fourth Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Third Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>Second Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>First Fill Bit – if needed = [0 (if used as a fill bit)]</td><td>k</td></tr>
<tr><td colspan="8">DCCH Information: Bit-Exact Length – Octet Count
= [00H to FFH]</td><td>k+1</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">DCCH Information:
Bit-Exact Length – Fill Bits
= [000 to 111]</td><td>k+2</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>k+3</td></tr>
</table>

3.6.3 ADDS Transfer

7	6	5	4	3	2	1	0	Octet
DCCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	m
FOR_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								m+1
Reserved = [0000 0]					FOR_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			m+2
(MSB)								m+3
FOR_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	n
REV_PDCH Information: Bit-Exact Length – Octet Count = [00H-FFH]								n+1
Reserved = [0000 0]					REV_PDCH Information: Bit-Exact Length – Fill Bits = [000 to 111]			n+2
(MSB)								n+3
REV_PDCH Information Content = <any value>								…
	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	p
VP Algorithms Supported = <any value>								q
Additional Geo Location Type Length = [0000 0000]								q+1
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = '0'	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4

3.6.3 ADDS Transfer

7	6	5	4	3	2	1	0	Octet
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10
⇒ **Mobile Subscription Information:** A1 Element Identifier = [7DH]								1
Length = <variable>								2
Record: {1:								
Record Identifier = [00H]								3
Record Length = <variable>								4
All Band Classes Included = [0,1]	Current Band Subclass = <variable>							5
Band Class = <variable>								6
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				7
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	i
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	j
…								…
Band Class n = <variable>								k
All Band Subclasses Included = [0,1]	Reserved = [000]			Band Subclass Length = <variable>				k+1
SC7 = [0,1]	SC6 = [0,1]	SC5 = [0,1]	SC4 = [0,1]	SC3 = [0,1]	SC2 = [0,1]	SC1 = [0,1]	SC0 = [0,1]	k+2
…								…
SCn = [0,1]	SCn-1 = [0,1]	SCn-2 = [0,1]	SCn-3 = [0,1]	SCn-4 = [0,1]	SCn-5 = [0,1]	SCn-6 = [0,1]	SCn-7 = [0,1]	m
} Record								

3.6.4 ADDS Transfer Ack

This BSMAP message is sent from the MSC to the BS to indicate the result of the authentication for an MS which has sent a Short Data Burst, requested CCPD Mode or requested dormant handoff from the network. This message may be sent twice in the case of dormant handoff. The first message is sent to the BS to indicate that authentication is done in parallel and the BS can continue with the dormant handoff. The second message is sent to the BS to indicate the result of the authentication.

Information Element	Section Reference	Element Direction	Type	
Message Type	4.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	4.2.13	MSC -> BS	M	
Tag	4.2.46	MSC -> BS	O[a]	C
Cause	4.2.16	MSC -> BS	O[b]	C

a. The MSC copies the tag field from the ADDS Transfer message sent by the BS into the tag field in the ADDS Transfer Ack message.

b. If the cause value is set to ‘Concurrent Authentication’ for a alternate dormant mode handoff, the MSC shall resend the ADDS Transfer Ack message to the BS when the authentication results are received provided that the MSC has not received a CM Service Request from the BS prior to authentication results being received. If the authentication was successful or if the MSC chose to not perform authentication, this element is not included.

The following table shows the bitmap layout for the ADDS Transfer Ack message.

3.6.4 ADDS Transfer Ack

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [68H]								1
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								2
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			3
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3

3.6.4 ADDS Transfer Ack

7	6	5	4	3	2	1	0	Octet
								4
							(LSB)	5
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
Ext = [0]	Cause Value = [15H (Short data burst authentication failure), 1AH (Authentication failure), 7BH (Concurrent authentication)]							3

3.6.5 ADDS Deliver

This DTAP message is sent from the MSC to the BS to request delivery of an application data message to an MS on a traffic channel. This message can also be sent from the BS to the MSC to deliver an application data message received on the traffic channel.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC <-> BS	M	
Reserved Octet	4.2.32	MSC <-> BS	M	
Message Type	4.2.4	MSC <-> BS	M	
ADDS User Part	4.2.50	MSC <-> BS	M[a,d]	
Tag	4.2.46	MSC -> BS	O[b]	C
CDMA Serving One Way Delay	4.2.57	MSC <- BS	O[c]	C

a. This element contains the application data information that was received from or is to be delivered to the MS. This element may contain an SDB in the MSC-to-BS direction only. When this message is used to deliver an SDB to the MS, the Application Data Message field is included and contains the SDB.

b. If this element is used in this message, it shall be returned to the MSC in the ADDS Deliver Ack.

c. This element is included if the Data Burst Type field of the ADDS User Part IE is set to ‘000101 (PDS)’, if applicable to the geo-location technology, and if this technology is supported at the base station.

d. Because this IE is sent as a mandatory IE in a DTAP message, the IE identifier is not included**.**

The following table shows the bitmap layout for the ADDS Deliver message.

3.6.5 ADDS Deliver

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ Protocol Discriminator = [0011]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [53H]								1
⇒ **ADDS User Part:** Length = <variable>								1
Reserved = [00]		Data Burst Type = [[000011] (SMS), [000100] (OTASP), [000101] (PDS), [000110] (SDB)]						2
(MSB)	Application Data Message = <any value>							3

3.6.5 ADDS Deliver

7	6	5	4	3	2	1	0	Octet
…								…
							(LSB)	n
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [08H, 0BH]								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							j
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)	MSCID = <any value>							j
								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
				Sector = [0H-FH] (0H = Omni)			(LSB)	j+4
} Cell Identification								
(MSB)	CDMA Serving One Way Delay = [0000H-FFFFH]							k
							(LSB)	k+1
Reserved = [0000 00]						Resolution = [00, 01, 10]		k+2
(MSB)	CDMA Serving One Way Delay Time Stamp = [00 00H – FF FFH]							k+3
							(LSB)	k+4

3.6.6 ADDS Deliver Ack

This DTAP message shall be sent from the BS to the MSC when a Layer 2 Ack from the MS has been received at the BS for an ADDS Deliver message that contains a Tag element.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M	
Reserved Octet	4.2.32	BS -> MSC	M	
Message Type	4.2.4	BS -> MSC	M	
Tag	4.2.46	BS -> MSC	O	R
Cause	4.2.16	BS -> MSC	O[a]	C

a. Used to indicate an error situation.

The following table shows the bitmap layout for the ADDS Deliver Ack message.

3.6.6 ADDS Deliver Ack

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [54H]								1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5
⇒ **Cause:** A1 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [34H (MS rejected order)]							3

3.7 Error Handling Messages

This section contains messages used for general error handling.

3.7.1 Rejection

The Rejection message is used by the BS to indicate to the MSC that the MS has indicated rejection of a command/message. This is coded as a BSMAP message when triggered by a Mobile Station Reject Order on the access channel and a DTAP message otherwise.

This message shall not be used in DS-41 systems.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	BS -> MSC	M[a]	
Reserved Octet	4.2.32	BS -> MSC	M[a]	
Message Type	4.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	4.2.13	BS -> MSC	O[b]	R
Mobile Identity (ESN)	4.2.13	BS -> MSC	O[c]	C
IS-2000 Cause Value	4.2.60	BS -> MSC	O[d]	R
Service Option Connection Identifier (SOCI)	4.2.73	BS -> MSC	O[e]	C
Mobile Identity (MEID)	4.2.13	BS -> MSC	O[f]	C
Tag	4.2.46	BS -> MSC	O[g]	C

a. These elements are not used in BSMAP messages and shall be included in a DTAP message.

b. This element is not used in DTAP messages and shall be included in a BSMAP message.

c. This IE is included if the ESN is available at the BS. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

d. This element contains the cause indication sent by the MS in a Mobile Station Reject Order.

e. This element is required if concurrent services are supported. This is only included when the message is sent as DTAP.

f. This IE is included if the MEID is available at the BS.

g. This element is included only if the message is sent as a BSMAP message. If a Tag element was received from the MSC in the ADDS Page message, the BS shall include the Tag element in the Rejection message. The Tag value used in this message shall be the same as the Tag value received from the MSC.

When the Rejection message is sent as a BSMAP message, the following format applies.

3.7.1 Rejection

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1

3.7.1 Rejection

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">Length Indicator (LI) = [06H, 09H]</td><td>2</td></tr>
<tr><td colspan="8">⇒ Message Type = [56H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (IMSI): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H-08H] (10-15 digits)</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0H-9H] (BCD)</td><td>Odd/even Indicator = [1,0]</td><td colspan="3">Type of Identity = [110] (IMSI)</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit 2 = [0H-9H] (BCD)</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1 = [0H-9H] (BCD)</td><td colspan="4">Identity Digit N = [0H-9H] (BCD)</td><td>n</td></tr>
<tr><td colspan="4">= [1111] (if even number of digits),
Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (ESN): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [05H]</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0000]</td><td>Odd/even Indicator = [0]</td><td colspan="3">Type of Identity = [101] (ESN)</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">ESN = <any value></td><td>4</td></tr>
<tr><td colspan="8"></td><td>5</td></tr>
<tr><td colspan="8"></td><td>6</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>7</td></tr>
<tr><td colspan="8">⇒ IS-2000 Cause Value: A1 Element Identifier = [62H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="8">IS-2000 Cause Information = <any value></td><td>3</td></tr>
<tr><td colspan="8">⇒ Mobile Identity (MEID): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [08H]</td><td>2</td></tr>
<tr><td colspan="4">MEID Hex Digit 1 = [0H-FH]</td><td>Odd/Even Indicator = ‘0’</td><td colspan="3">Type of Identity = [001] (MEID)</td><td>3</td></tr>
<tr><td colspan="4">MEID Hex Digit 3 = [0H-FH]</td><td colspan="4">MEID Hex Digit 2 = [0H-FH]</td><td>4</td></tr>
<tr><td colspan="4">MEID Hex Digit 5 = [0H-FH]</td><td colspan="4">MEID Hex Digit 4 = [0H-FH]</td><td>5</td></tr>
<tr><td colspan="4">MEID Hex Digit 7 = [0H-FH]</td><td colspan="4">MEID Hex Digit 6 = [0H-FH]</td><td>6</td></tr>
<tr><td colspan="4">MEID Hex Digit 9 = [0H-FH]</td><td colspan="4">MEID Hex Digit 8 = [0H-FH]</td><td>7</td></tr>
<tr><td colspan="4">MEID Hex Digit 11 = [0H-FH]</td><td colspan="4">MEID Hex Digit 10 = [0H-FH]</td><td>8</td></tr>
<tr><td colspan="4">MEID Hex Digit 13 = [0H-FH]</td><td colspan="4">MEID Hex Digit 12 = [0H-FH]</td><td>9</td></tr>
<tr><td colspan="4">Fill = [FH]</td><td colspan="4">MEID Hex Digit 14 = [0H-FH]</td><td>10</td></tr>
</table>

3.7.1 Rejection

7	6	5	4	3	2	1	0	Octet
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)	Tag Value = <any value>							2
								3
								4
							(LSB)	5

When the Rejection message is sent as a DTAP message, the following format applies.

3.7.1 Rejection

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = [06H]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0011]				1
⇒ **Reserved Octet** = [00H]								1
⇒ **Message Type** = [56H]								1
⇒ ***IS-2000* Cause Value:** A1 Element Identifier = [62H]								1
Length = [01H]								2
IS-2000 Cause Information = <any value>								3
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

3.8 NDSS Message Formats

3.8.1 Service Redirection

This DTAP message is sent from the MSC to the BS to request that the BS redirect the MS to another system.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	4.2.31	MSC -> BS	M	
Reserved Octet	4.2.32	MSC -> BS	M	
Message Type	4.2.4	MSC -> BS	M	
IS-2000 Redirection Record	4.2.82	MSC -> BS	O	R
Service Redirection Info	4.2.84	MSC -> BS	O	R
Mobile Identity (IMSI)	4.2.13	MSC -> BS	O	R
Mobile Identity (ESN)	4.2.13	MSC -> BS	O[b]	C
Protocol Revision	4.2.79	MSC -> BS	O[a]	C
Mobile Identity (MEID)	4.2.13	MSC -> BS	O[c]	C

a. This element contains the MS’s MOB_P_REV of the current band class and shall be included if the value is greater than or equal to 7.

b. This IE is included if the ESN is available at the MSC. ESN containing a pseudo ESN is not required to be sent if the MEID is sent.

c. This IE is included if the MEID is available at the MSC.

The following table shows the bitmap layout for the Service Redirection message.

3.8.1 Service Redirection

7	6	5	4	3	2	1	0	Octet
⇒ **DTAP Header:** Message Discrimination = [01H]								1
Data Link Connection Identifier (DLCI) = [00H]								2
Length Indicator (LI) = <variable>								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved - Octet** = [00H]								1
⇒ **Message Type** = [70H]								1
⇒ **IS-2000 Redirection Record:** A1 Element Identifier = [67H]								1
Length = <variable>								2
Redirection Record Type = [00H – 04H]								3
Redirection Record Length = <variable>								4
(MSB)	Redirection Record Content = <any value>							5
								…

3.8.1 Service Redirection

7	6	5	4	3	2	1	0	Octet
							(LSB)	j
⇒ **Service Redirection Info:** A1 Element Identifier = [69H]								1
Length = [03H]								2
Reserved = [000]			Excl_P_REV_Ind = [0, 1]	Redirect_P_REV_Incl = [0, 1]	Redirect Type = [0, 1]	Reserved = [0]	Return If Fail = [0, 1]	3
(MSB)	REDIRECT_P_MIN = [06H – FFH]						(LSB)	4
(MSB)	REDIRECT_P_MAX = [06H - FFH]						(LSB)	5
⇒ **Mobile Identity (IMSI):** A1 Element Identifier = [0DH]								1
Length = [06H-08H] (10-15 digits)								
Identity Digit 1 = [0H-9H] (BCD)				Odd/even Indicator = [1,0]	Type of Identity = [110] (IMSI)			2
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				3
…								…
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits), Identity Digit N+3 = [0H-9H] (BCD) (if odd number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
⇒ **Mobile Identity (ESN):** A1 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
MOB_P_REV = [07H-FFH]								3
⇒ **Mobile Identity (MEID):** A1 Element Identifier = [0DH]								1
Length = [08H]								2
MEID Hex Digit 1 = [0H-FH]				Odd/Even Indicator = ‘0’	Type of Identity = [001] (MEID)			3
MEID Hex Digit 3 = [0H-FH]				MEID Hex Digit 2 = [0H-FH]				4

3.8.1 Service Redirection

7	6	5	4	3	2	1	0	Octet
MEID Hex Digit 5 = [0H-FH]				MEID Hex Digit 4 = [0H-FH]				5
MEID Hex Digit 7 = [0H-FH]				MEID Hex Digit 6 = [0H-FH]				6
MEID Hex Digit 9 = [0H-FH]				MEID Hex Digit 8 = [0H-FH]				7
MEID Hex Digit 11 = [0H-FH]				MEID Hex Digit 10 = [0H-FH]				8
MEID Hex Digit 13 = [0H-FH]				MEID Hex Digit 12 = [0H-FH]				9
Fill = [FH]				MEID Hex Digit 14 = [0H-FH]				10

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4.0 Information Element Definitions

This section contains the coding of the IEs used in the messages defined in section 3.0.

The following subsections define information element formats and ranges for parameter values. In the event that text in this section conflicts with text in section 3, the text in section 3 shall take precedence. Parameter usage may vary per message in that only a subset of the defined values may be applicable in a particular message. Therefore, the allowed values are specified per message in the subsections of section 3.0.

4.1 Generic Information Element Encoding

4.1.1 Conventions

The following conventions are assumed for the sequence of transmission of bits and bytes:

- Each bit position is marked as 0 to 7. Bit 0 is the least significant bit and is transmitted first.
- In a message, octets are identified by number. Octet 1 is transmitted first, then octet 2, etc.

For variable length elements, a length indicator is included. This indicates the number of octets following in the element.

The definition of whether an IE is mandatory or optional is specified in the Type column of the individual message IE tables in section 3.0.

All IEs of BSMAP messages shall include their IE identifier (IEI). Mandatory IEs of DTAP messages, except as noted for Type 1 elements (refer to section 4.1.3), shall not include their IEI. Optional IEs of DTAP messages shall include their IEI. All unused and reserved bits are set to 0, unless otherwise indicated.

For future expansion purposes, some of these IEs have fields within them that have been reserved.

4.1.2 Information Element Identifiers

The following table contains a list of all IEs that make up the messages defined in section 3.0. The table is sorted by the IE Identifier (IEI) coding which distinguishes one IE from another. The table also includes a reference to the section where the element coding can be found.

A listing of IEs, sorted by name, is included in Table 4.1.5-1, which also specifies the messages in which each IE is used.

Table 4.1.2-1 A1 Information Element Identifiers Sorted by Identifier Value

Element Name	**IEI (Hex)**	**Reference**
Circuit Identity Code	01H	4.2.19
User Zone ID	02H	4.2.26
Service Option	03H	4.2.49
Cause	04H	4.2.16
Cell Identifier	05H	4.2.17
Priority	06H	4.2.15
Quality of Service Parameters	07H	4.2.41
Cause Layer 3	08H	4.2.42
IS-2000 Channel Identity	09H	4.2.27
Encryption Information	0AH	4.2.10
Channel Type	0BH	4.2.6
CDMA Serving One Way Delay	0CH	4.2.57
Mobile Identity	0DH	4.2.13
IS-2000 Service Configuration Record	0EH	4.2.51
IS-2000 Non-Negotiable Service Configuration Record	0FH	4.2.52
Extended Handoff Direction Parameters	10H	4.2.56
IS-2000 Mobile Capabilities	11H	4.2.53
Classmark Information Type 2	12H	4.2.12
Reserved (This value is used to identify Location Area Identification in [20]).	13H	
Source PDSN Address	14H	4.2.24
MS Information Records	15H	4.2.55
Hard Handoff Parameters	16H	4.2.47
Layer 3 Information	17H	4.2.30
Protocol Type	18H	4.2.54
Circuit Group	19H	4.2.66
Cell Identifier List	1AH	4.2.18
Response Request	1BH	4.2.28
(unused – available element identifier values)	1CH	
Radio Environment and Resources	1DH	4.2.58
Service Option Connection Identifier (SOCI)	1EH	4.2.73
Registration Type	1FH	4.2.45
Access Network Identifiers	20H	4.2.70
RF Channel Identity	21H	4.2.7

Table 4.1.2-1 A1 Information Element Identifiers Sorted by Identifier Value

Element Name	IEI (Hex)	Reference
IS-95 Channel Identity	22H	4.2.9
Channel Number	23H	4.2.5
Circuit Identity Code Extension	24H	4.2.20
AMPS Hard Handoff Parameters	25H	4.2.75
Handoff Power Level	26H	4.2.25
IS-2000 Channel Identity 3X	27H	4.2.23
Authentication Confirmation Parameter (RANDC)	28H	4.2.33
Downlink Radio Environment	29H	4.2.22
Service Option List	2AH	4.2.74
Downlink Radio Environment List	2BH	4.2.65
Geographic Location	2CH	4.2.64
PSMM Count	2DH	4.2.63
Information Record Requested	2EH	4.2.77
(unused – available element identifier values)	2FH	
Anchor PDSN Address	30H	4.2.78
Software Version	31H	4.2.48
SID	32H	4.2.8
Tag	33H	4.2.46
Signal	34H	4.2.38
Slot Cycle Index	35H	4.2.14
Transcoder Mode	36H	4.2.43
Band Class	37H	4.2.76
Source RNC to Target RNC Transparent Container	39H	4.2.71
Target RNC to Source RNC Transparent Container	3AH	4.2.72
Protocol Revision	3BH	4.2.79
(unused – available element identifier values)	3CH	
ADDS User Part	3DH	4.2.50
(unused – available element identifier value)	3EH	
Mobile Supported Service Options	3FH	4.2.94
Authentication Parameter COUNT	40H	4.2.37
Authentication Challenge Parameter	41H	4.2.35
Authentication Response Parameter	42H	4.2.36
Reserved (this value is used by the Private Parameters Information Element in [20])	43H	

Table 4.1.2-1 A1 Information Element Identifiers Sorted by Identifier Value

Element Name	IEI (Hex)	Reference
Reject Cause	44H	4.2.34
A2p Bearer Session-Level Parameters	45H	4.2.89
A2p Bearer Format-Specific Parameters	46H	4.2.90
Integrity Info	47H	4.2.95
Authentication Vector	48H	4.2.96
AKA Report	49H	4.2.97
Authentication Event	4AH	4.2.61
Enhanced Voice Privacy Request	4CH	4.2.98
Encryption and Integrity Info	4DH	4.2.99
PACA Timestamp	4EH	4.2.67
UIM Authentication Info	4F	4.2.100
(unused - available element identifier values)	50H – 58H	
Authentication Data	59H	4.2.62
Special Service Call Indicator	5AH	4.2.21
Called Party ASCII Number	5BH	4.2.59
Reserved (this value is used by the Calling Party BCD Information Element in [20])	5CH	
(unused – available element identifier value)	5DH	
Called Party BCD Number	5EH	4.2.40
PACA Order	5FH	4.2.68
PACA Reorigination Indicator	60H	4.2.69
(unused – available element identifier value)	61H	
IS-2000 Cause Value	62H	4.2.60
(unused – available element identifier value)	63H	
MS Measured Channel Identity	64H	4.2.29
(unused – available element identifier value)	65H	
(unused – available element identifier value)	66H	
IS-2000 Redirection Record	67H	4.2.82
Return Cause	68H	4.2.83
Service Redirection Info	69H	4.2.84
(unused – available element identifier values)	6AH – 6FH	
Packet Session Parameters	70H	4.2.85
Service Reference Identifier (SR_ID)	71H	4.2.86
Public Long Code Mask Identifier	72H	4.2.87
MS Designated Frequency	73H	4.2.88
(unused – available element identifier values)	74H – 7AH	

Table 4.1.2-1 A1 Information Element Identifiers Sorted by Identifier Value

Element Name	IEI (Hex)	Reference
Page Indicator	7BH	4.2.93
Anchor P-P Address	7CH	4.2.80
Mobile Subscription Information	7DH	4.2.91
Event	7EH	4.2.92
(unused – available element identifier values)	7FH	
Type 1 Information Elements		
(unused - available element identifier value)	8XH[a]	
CM Service Type	9XH[a]	4.2.39
Type 2 Information Elements		
Origination Continuation Indicator	A0H	4.2.81
Voice Privacy Request	A1H	4.2.11
Power Down Indicator	A2H	4.2.44
(unused - available type 2 element identifier values)	A3H - AFH	
Additional Type 1 Information Elements		
(unused - available type 1 element identifier value)	EXH[a] - FXH[a]	
Information Elements without Identifiers		
Message Discrimination	none	4.2.1
Message Type	none	4.2.4
Data Link Connection Identifier (DLCI)	none[b]	4.2.2
Protocol Discriminator	none[b]	4.2.31
Reserved – Octet	none[b]	4.2.32

a. This is a type 1 IE (refer to section 4.1.3). The X in the IEI column) is data.

b. This is a type 3 IE (refer to section 4.1.3) that is contained as a mandatory element in a DTAP message.

4.1.3 A1 Interface Information Element Types

This section describes the four IE types used on the A1 interface.

Two main categories of IEs are defined:

- IEs with fixed length
- IEs with variable length

The number of octets in fixed length elements is previously defined: a fixed value is associated with the element identifier.

Variable length elements shall include the length field immediately following the element identifier when present. When the element identifier is absent, the length field occupies the first octet of the message.

Four types of IEs are defined:

- IEs with 1/2 octet of content (Type 1)
- IEs with 0 octets of content (Type 2)
- IEs with fixed length and at least one octet of content (Type 3)
- IEs with variable length (Type 4).

IE Response Request (1BH) is an exception to the rules specified in this section. Bit position 7 is hard coded to ‘1’ to indicate a Type 1 or a Type 2 IE.

Type 1 Information Element

Type 1 IEs provide the IE identifier in bit positions 6, 5, 4. The value ‘0 1 0’ in these bit positions is reserved for Type 2 IEs which together with this value provide the IE identifier in bit positions 3,2,1,0. Type 3 and 4 IEs provide the IE identifier in the first octet.

These IEs are shown in the figures below for both the case where the IE is optional in a message and mandatory in a message.

In the figures below, IEI is used as an abbreviation for IE Identifier. CIE as an abbreviation for Content of IE and LI as an abbreviation for Length Indicator.

Type 1 IEs with 1/2 octet of content:

7	6	5	4	3	2	1	0	Octet
1	IEI			CIE				1

Type 1 IEs may be either optional or mandatory in a BSMAP or a DTAP message. When a Type 1 element is included as a mandatory IE in a DTAP message, the IE identifier field shall be coded appropriately by the sender, but may be ignored by the receiver.

Type 2 Information Element

Type 2 IEs have fixed length and zero octets of content:

7	6	5	4	3	2	1	0	Octet
1	0	1	0	IEI				1

Note: A Type 2 IE cannot be mandatory in a DTAP message.

Type 3 Information Element

Type 3 IEs have fixed length and at least one octet of content as shown below. The first instance includes the IE identifier (IEI). The second excludes the IEI to demonstrate the coding for a mandatory DTAP element.

7	6	5	4	3	2	1	0	Octet
0	IEI							1
CIE								2
…								…
CIE								n

7	6	5	4	3	2	1	0	Octet
CIE								1
CIE								2
…								…
CIE								n

Type 4 Information Element

Type 4 IEs have variable length as shown below. The first instance includes the IE identifier (IEI). The second excludes the IEI to demonstrate the coding for a mandatory DTAP element.

7	6	5	4	3	2	1	0	Octet
0	IEI							1
LI								2
CIE								3
…								…
CIE								n

7	6	5	4	3	2	1	0	Octet
LI								1
CIE								2
…								…
CIE								n

4.1.4 Additional Coding and Interpretation Rules for Information Elements

IEs shall always use the same IE Identifier for all occurrences on a specific IOS interface. Insofar as possible, the same IE Identifier shall be used for a given IE when it is used on more than one of the IOS interfaces.

The order of appearance for each IE which is mandatory or optional in a message is laid down in the definition of the message.

Where the description of the IE in this standard contains unused bits, these bits are indicated as being set to ‘0’. To allow compatibility with future implementation, messages shall not be rejected simply because an unused bit is set to ‘1’.

An optional variable length IE may be present, but empty. For example, a message may contain a Called Party BCD Number IE, the content of which is zero length. This shall be interpreted by the receiver as equivalent to that IE being absent.

On the A1 interface, all new IEs shall be defined with a length field.

Some existing elements make use of an extension bit mechanism that allows the size of the IE to be increased. This mechanism consists of the use of the high order bit (bit 7) of an octet as an “extension bit”. When an octet within an IE has bit 7 defined as an extension bit, then the value ‘0’ in that bit position indicates that the following octet is an extension of the current octet. When the value is ‘1’, there is no extension.

An example of the use of the extension bit mechanism is found in octets 3 and 4 of the Cause Layer 3 element. Octet 3 is extended by setting bit 7 to ‘1’ and including octet 4. This would allow the transmission of the presentation indicator and screening indicator values as part of this element.

4.1.5 Cross Reference of Information Elements With Messages

The following table provides a cross reference between the elements defined in this specification and the messages defined herein.

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
A2p Bearer Session-Level Parameters	4.2.89	45H	Additional Service Request	3.1.20
			Assignment Complete	3.1.8
			Assignment Request	3.1.7
			Bearer Update Request	3.1.21
			Bearer Update Required	3.1.23
			Bearer Update Response	3.1.22
			CM Service Request	3.1.2
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Paging Response	3.1.5
A2p Bearer Format-Specific Parameters	4.2.90	46H	Additional Service Notification	3.1.19
			Additional Service Request	3.1.20
			Assignment Complete	3.1.8
			Assignment Request	3.1.7
			Bearer Update Request	3.1.21
			Bearer Update Required	3.1.23
			Bearer Update Response	3.1.22
			CM Service Request	3.1.2
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Paging Request	3.1.4
			Paging Response	3.1.5
Access Network Identifiers	4.2.70	20H	Handoff Request	3.4.2
			Handoff Required	3.4.1
ADDS User Part	4.2.50	3DH	ADDS Deliver	3.6.5
			ADDS Page	3.6.1
			ADDS Transfer	3.6.3
			BS Service Request	3.1.17
AKA Report	4.2.97	49H	Authentication Response	3.3.2
			Authentication Report	3.3.26

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
AMPS Hard Handoff Parameters	4.2.75	25H	Handoff Command	3.4.4
Anchor PDSN Address	4.2.78	30H	Handoff Request	3.4.2
			Handoff Required	3.4.1
Anchor P-P Address	4.2.80	7CH	Handoff Request	3.4.2
			Handoff Required	3.4.1
Authentication Challenge Parameter (RAND/RANDU/RANDBS/RANDSSD)	4.2.35	41H	ADDS Transfer	3.6.3
			Authentication Request	3.3.1
			Authentication Report Response	3.3.27
			Base Station Challenge	3.3.5
			CM Service Request	3.1.2
			Location Updating Request	3.3.7
			PACA Update	3.2.7
			Paging Response	3.1.5
			SSD Update Request	3.3.3
Authentication Confirmation Parameter (RANDC)	4.2.33	28H	ADDS Transfer	3.6.3
			CM Service Request	3.1.2
			Location Updating Request	3.3.7
			PACA Update	3.2.7
			Paging Response	3.1.5
Authentication Data	4.2.62	59H	ADDS Transfer	3.6.3
			CM Service Request	3.1.2
Authentication Event	4.2.61	4AH	ADDS Transfer	3.6.3
			CM Service Request	3.1.2
			Location Updating Request	3.3.7
			PACA Update	3.2.7
			Paging Response	3.1.5
Authentication Parameter COUNT	4.2.37	40H	ADDS Transfer	3.6.3
			CM Service Request	3.1.2
			Location Updating Request	3.3.7
			PACA Update	3.2.7
			Paging Response	3.1.5
Authentication Response Parameter (AUTHR/AUTHU/AUTHBS)	4.2.36	42H	ADDS Transfer	3.6.3
			Authentication Response	3.3.2
			Base Station Challenge Response	3.3.6

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			CM Service Request	3.1.2
			Location Updating Request	3.3.7
			PACA Update	3.2.7
			Paging Response	3.1.5
Authentication Vector	4.2.96	48H	Assignment Request	3.1.7
			Authentication Request	3.3.1
			Authentication Report Response	3.3.27
			Location Updating Accept	3.3.8
Band Class	4.2.76	37H	Handoff Performed	3.4.9
Called Party ASCII Number	4.2.59	5BH	Additional Service Request	3.1.20
			CM Service Request	3.1.2
			CM Service Request Continuation	3.1.3
Called Party BCD Number	4.2.40	5EH	Additional Service Request	3.1.20
			CM Service Request	3.1.2
			CM Service Request Continuation	3.1.3
			Flash with Information	3.2.1
Cause	4.2.16	04H	ADDS Deliver Ack	3.6.6
			ADDS Page Ack	3.6.2
			ADDS Transfer Ack	3.6.4
			Assignment Failure	3.1.9
			Bearer Update Response	3.1.22
			Bearer Update Required	3.1.23
			Block	3.5.1
			BS Service Response	3.1.18
			Clear Command	3.1.14
			Clear Request	3.1.13
			Handoff Command	3.4.4
			Handoff Failure	3.4.8
			Handoff Performed	3.4.9
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
			Handoff Required Reject	3.4.7
			Location Updating Accept	3.3.8
			PACA Command Ack	3.2.6

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			PACA Update Ack	3.2.8
			Radio Measurements for Position Response	3.2.10
			Reset	3.5.7
			Reset Circuit	3.5.5
			Security Mode Response	3.3.25
			Service Release	3.1.11
			Transcoder Control Acknowledge	3.5.10
Cause Layer 3	4.2.42	08H	Clear Command	3.1.14
			Clear Request	3.1.13
			Service Release	3.1.11
			SSD Update Response	3.3.4
CDMA Serving One Way Delay	4.2.57	0CH	ADDS Deliver	3.6.5
			ADDS Transfer	3.6.3
			CM Service Request	3.1.2
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Paging Response	3.1.5
			Radio Measurements for Position Response	3.2.10
Cell Identifier	4.2.17	05H	ADDS Page Ack	3.6.2
			ADDS Transfer	3.6.3
			Complete Layer 3 Information	3.1.1
Cell Identifier List	4.2.18	1AH	ADDS Page	3.6.1
			Authentication Request	3.3.1
			Feature Notification	3.2.3
			Handoff Command	3.4.4
			Handoff Performed	3.4.9
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
			Paging Request	3.1.4
			Registration Request	3.3.19
			Security Mode Request	3.3.24
			Status Request	3.3.14
			User Zone Reject	3.3.18

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
Channel Number	4.2.5	23H	Assignment Complete	3.1.8
			Handoff Performed	43.4.9
Channel Type	4.2.6	0BH	Assignment Request	3.1.7
			Handoff Request	3.4.2
Circuit Group	4.2.66	19H	Block	3.5.1
			Reset Circuit	3.5.5
			Unblock	3.5.3
Circuit Identity Code	4.2.19	01H	Additional Service Request	3.1.20
			Assignment Request	3.1.7
			Block	3.5.1
			Block Acknowledge	3.5.2
			CM Service Request	3.1.2
			Paging Response	3.1.5
			Reset Circuit	3.5.5
			Reset Circuit Acknowledge	3.5.6
			Unblock	3.5.3
			Unblock Acknowledge	3.5.4
Circuit Identity Code Extension	4.2.20	24H	Handoff Request	3.4.2
Classmark Information Type 2	4.2.12	12H	ADDS Transfer	3.6.3
			CM Service Request	3.1.2
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Location Updating Request	3.3.7
			Paging Response	3.1.5
CM Service Type	4.2.39	9XH[a]	CM Service Request	3.1.2
Data Link Connection Identifier (DLCI)	4.2.2	none[b]	Additional Service Request	3.1.20
			ADDS Deliver	3.6.5
			ADDS Deliver Ack	3.6.6
			Alert with Information	3.1.16
			Authentication Request	3.3.1
			Authentication Response	3.3.2
			Base Station Challenge	3.3.5
			Base Station Challenge Response	3.3.6
			Connect	3.1.10
			Flash with Information	3.2.1

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Flash with Information Ack	3.2.2
			Location Updating Accept	3.3.8
			Location Updating Reject	3.3.9
			Parameter Update Confirm	3.3.11
			Parameter Update Request	3.3.10
			Progress	3.1.6
			Rejection	3.7.1
			Service Redirection	3.8.1
			Service Release	3.1.11
			Service Release Complete	3.1.12
			SSD Update Request	3.3.3
			SSD Update Response	3.3.4
			Status Request	3.3.14
			Status Response	3.3.15
			User Zone Reject	3.3.18
			User Zone Update	3.3.17
			User Zone Update Request	3.3.16
Downlink Radio Environment	4.2.22	29H	Handoff Request	3.4.2
			Handoff Required	3.4.1
Downlink Radio Environment List	4.2.65	2BH	Radio Measurements for Position Response	3.2.10
Encryption and Integrity Info	4.2.99	4DH	CM Service Request	3.1.2
			Paging Response	3.1.5
Encryption Information	4.2.10	0AH	Assignment Complete	3.1.8
			Assignment Request	3.1.7
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Privacy Mode Command	3.3.12
			Privacy Mode Complete	3.3.13
			Security Mode Request	3.3.24
Enhanced Voice Privacy Request	4.2.98	4CH	Additional Service Request	3.1.20
			CM Service Request	3.1.2
			Page Response	3.1.5
			Privacy Mode Complete	3.3.13
Event	4.2.92	7EH	Event Notification	3.3.28
Extended Handoff Direction Parameters	4.2.56	10H	Handoff Command	3.4.4

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Handoff Request Acknowledge	3.4.3
Geographic Location	4.2.64	2CH	Radio Measurements for Position Response	3.2.10
Handoff Power Level	4.2.25	26H	Handoff Command	3.4.4
Hard Handoff Parameters	4.2.47	16H	Handoff Command	3.4.4
			Handoff Request Acknowledge	3.4.3
Information Record Requested	4.2.77	2EH	Status Request	3.3.14
Integrity Info	4.2.95	47H	Security Mode Request	3.3.24
			Handoff Request	3.4.2
			Handoff Required	3.4.1
IS-2000 Cause Value	4.2.60	62H	Rejection	3.7.1
IS-2000 Channel Identity	4.2.27	09H	Handoff Command	3.4.4
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
IS-2000 Channel Identity 3X	4.2.23	27H	Handoff Command	3.4.4
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
IS-2000 Mobile Capabilities	4.2.53	11H	ADDS Page	3.6.1
			ADDS Transfer	3.6.3
			Authentication Request	3.3.1
			CM Service Request	3.1.2
			Feature Notification	3.2.3
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Location Updating Request	3.3.7
			Paging Request	3.1.4
			Paging Response	3.1.5
			Registration Request	3.3.19
			Status Request	3.3.14
			User Zone Reject	3.3.18
IS-2000 Non-Negotiable Service Configuration Record	4.2.52	0FH	Handoff Command	3.4.4
			Handoff Request	3.4.2

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
IS-2000 Redirection Record	4.2.82	67H	Service Redirection	3.8.1
IS-2000 Service Configuration Record	4.2.51	0EH	Handoff Command	3.4.4
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
IS-95 Channel Identity	4.2.9	22H	Handoff Command	3.4.45
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
Layer 3 Information	4.2.30	17H	Complete Layer 3 Information	3.1.1
Message Type	4.2.4	none[b]	Additional Service Notification	3.1.19
			Additional Service Request	3.1.20
			ADDS Deliver	3.6.5
			ADDS Deliver Ack	3.6.6
			ADDS Page	3.6.1
			ADDS Page Ack	3.6.2
			ADDS Transfer	3.6.3
			ADDS Transfer Ack	3.6.4
			Alert with Information	3.1.16
			Assignment Complete	3.1.8
			Assignment Failure	3.1.9
			Assignment Request	3.1.7
			Authentication Request	3.3.1
			Authentication Response	3.3.2
			Authentication Report	3.3.26
			Authentication Report Response	3.3.27
			Base Station Challenge	3.3.5
			Base Station Challenge Response	3.3.6
			Block	3.5.1
			Block Acknowledge	3.5.2

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			BS Authentication Request	3.3.21
			BS Authentication Request Ack	3.3.22
			BS Security Mode Request	3.3.23
			BS Service Request	3.1.17
			BS Service Response	3.1.18
			Clear Command	3.1.14
			Clear Complete	3.1.15
			Clear Request	3.1.13
			CM Service Request	3.1.2
			CM Service Request Continuation	3.1.3
			Complete Layer 3 Information	3.1.1
			Connect	3.1.10
			Event Notification	3.2.28
			Event Notification Ack	3.2.29
			Feature Notification	3.2.3
			Feature Notification Ack	3.2.4
			Flash with Information	3.2.1
			Flash with Information Ack	3.2.2
			Handoff Command	3.4.4
			Handoff Commenced	3.4.5
			Handoff Complete	3.4.6
			Handoff Failure	3.4.8
			Handoff Performed	3.4.9
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
			Handoff Required Reject	3.4.7
			Location Updating Accept	3.3.8
			Location Updating Reject	3.3.9
			Location Updating Request	3.3.7
			PACA Command	3.2.5
			PACA Command Ack	3.2.6
			PACA Update	3.2.7
			PACA Update Ack	3.2.8
			Paging Request	3.1.4

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Paging Response	3.1.5
			Parameter Update Confirm	3.3.11
			Parameter Update Request	3.3.10
			Privacy Mode Command	3.3.12
			Privacy Mode Complete	3.3.13
			Progress	3.1.6
			Radio Measurements for Position Request	3.2.9
			Radio Measurements for Position Response	3.2.10
			Registration Request	3.3.19
			Rejection	3.7.1
			Reset	3.5.7
			Reset Acknowledge	3.5.8
			Reset Circuit	3.5.5
			Reset Circuit Acknowledge	3.5.6
			Security Mode Request	3.3.24
			Security Mode Response	3.3.25
			Service Redirection	3.8.1
			Service Release	3.1.11
			Service Release Complete	3.1.12
			SSD Update Request	3.3.3
			SSD Update Response	3.3.4
			Status Request	3.3.14
			Status Response	3.3.15
			Transcoder Control Acknowledge	3.5.109
			Transcoder Control Request	3.5.98
			Unblock	3.5.3
			Unblock Acknowledge	3.5.4
			User Zone Reject	3.3.18
			User Zone Update	3.3.17
			User Zone Update Request	3.3.16
Mobile Identity	4.2.13	0DH	Additional Service Notification	3.1.19
			ADDS Page	3.6.1
			ADDS Page Ack	3.6.2
			ADDS Transfer	3.6.3

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			ADDS Transfer Ack	3.6.4
			Assignment Request	3.1.7
			Assignment Complete	3.1.8
			Authentication Request	3.3.1
			Authentication Response	3.3.2
			BS Authentication Request	3.3.21
			BS Authentication Request Ack	3.3.22
			BS Security Mode Request	3.3.23
			BS Service Request	3.1.17
			BS Service Response	3.1.18
			CM Service Request	3.1.2
			Event Notification	3.2.28
			Event Notification Ack	3.2.29
			Feature Notification	3.2.3
			Feature Notification Ack	3.2.4
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Location Updating Request	3.3.7
			PACA Update	3.2.7
			PACA Update Ack	3.2.8
			Paging Request	3.1.4
			Paging Response	3.1.5
			Registration Request	3.3.19
			Rejection	3.7.1
			Security Mode Request	3.3.24
			Service Redirection	3.8.1
			Status Request	3.3.14
			Status Response	3.3.15
			User Zone Reject	3.3.18
Mobile Subscription Information	4.2.91	7DH	ADDS Page	3.6.1
			ADDS Transfer	3.6.3
			Assignment Request	3.1.7
			Authentication Request	3.3.1
			CM Service Request	3.1.2
			Clear Complete	3.1.15
			Feature Notification	3.2.3

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Handoff Performed	3.4.9
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Location Updating Request	3.3.7
			Paging Request	3.1.4
			Registration Request	3.3.19
			Status Request	3.3.14
			User Zone Reject	3.3.18
Mobile Supported Service Options	4.2.94	3FH	Handoff Request	3.4.2
			Handoff Required	3.4.1
MS Designated Frequency	4.2.88	73H	ADDS Page	3.6.1
			Authentication Request	3.3.1
			Feature Notification	3.2.3
			Location Updating Request	3.3.8
			Paging Request	3.1.4
			PACA Update	3.2.7
			Location Updating Accept	3.3.8
			Location Updating Reject	3.3.9
			Registration Request	3.3.19
			Status Request	3.3.14
			User Zone Reject	3.3.18
MS Information Records	4.2.55	15H	Alert with Information	3.1.16
			Assignment Request	3.1.7
			CM Service Request Continuation	3.1.3
			Feature Notification	3.2.3
			Flash With Information	3.2.1
			Progress	3.1.6
			Status Response	3.3.15
MS Measured Channel Identity	4.2.29	64H	Handoff Request	3.4.2
			Handoff Required	3.4.1
Origination Continuation Indicator	4.2.81	A0H	CM Service Request	3.1.2
PACA Order	4.2.68	5FH	PACA Update	3.2.7
PACA Reorigination Indicator	4.2.69	60H	CM Service Request	3.1.2
PACA Timestamp	4.2.67	4EH	Assignment Request	3.1.7
			PACA Command	3.2.5
Packet Session Parameters	4.2.85	70H	Handoff Request	3.4.2

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Handoff Required	3.4.1
Power Down Indicator	4.2.44	A2H	Clear Complete	3.1.15
Priority	4.2.15	06H	Assignment Request	3.1.7
			PACA Command	3.2.5
			PACA Update	3.2.7
			PACA Update Ack	3.2.8
Protocol Discriminator	4.2.31	none[b]	Additional Service Request	3.1.20
			ADDS Deliver	3.6.5
			ADDS Deliver Ack	3.6.6
			Alert with Information	3.1.16
			Authentication Request	3.3.1
			Authentication Response	3.3.2
			Base Station Challenge	3.3.5
			Base Station Challenge Response	3.3.6
			CM Service Request	3.1.2
			CM Service Request Continuation	3.1.3
			Connect	3.1.10
			Flash with Information	3.2.1
			Flash with Information Ack	3.2.2
			Location Updating Accept	3.3.8
			Location Updating Reject	3.3.9
			Location Updating Request	3.3.7
			Paging Response	3.1.5
			Parameter Update Confirm	3.3.11
			Parameter Update Request	3.3.10
			Progress	3.1.6
			Rejection	3.7.1
			Security Mode Request	3.2.24
			Security Mode Response	3.2.25
			Service Redirection	3.8.1
			Service Release	3.1.11
			Service Release Complete	3.1.12
			SSD Update Request	3.3.3
			SSD Update Response	3.3.4
			Status Request	3.3.14

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Status Response	3.3.15
			User Zone Reject	3.3.18
			User Zone Update	3.3.17
			User Zone Update Request	3.3.16
Protocol Revision	4.2.79	3BH	ADDS Page	3.6.1
			Authentication Request	3.3.1
			Feature Notification	3.2.3
			Location Updating Accept	3.3.8
			Location Updating Reject	3.3.9
			Paging Request	3.1.4
			Registration Request	3.3.19
			Service Redirection	3.8.1
			Status Request	3.3.14
			User Zone Reject	3.3.18
Protocol Type	4.2.54	18H	Handoff Request	3.4.2
			Handoff Required	3.4.1
PSMM Count	4.2.63	2DH	Radio Measurements for Position Request	3.2.9
Public Long Code Mask Identifier	4.2.87	72H	Handoff Required	3.4.1
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Command	3.4.4
Quality of Service Parameters	4.2.41	07H	Assignment Request	3.1.7
			Handoff Request	3.4.2
			Handoff Required	3.4.1
Radio Environment and Resources	4.2.58	1DH	CM Service Request	3.1.2
			Paging Response	3.1.5
Registration Type	4.2.45	1FH	Location Updating Request	3.3.7
Reject Cause	4.2.34	44H	Location Updating Reject	3.3.9
Reserved – Octet	4.2.32	none[b]	Additional Service Request	3.1.20
			ADDS Deliver	3.6.5
			ADDS Deliver Ack	3.6.6
			Alert with Information	3.1.16
			Authentication Request	3.3.1
			Authentication Response	3.3.2
			Base Station Challenge	3.3.5

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Base Station Challenge Response	3.3.6
			CM Service Request	3.1.2
			CM Service Request Continuation	3.1.3
			Connect	3.1.10
			Flash with Information	3.2.1
			Flash with Information Ack	3.2.2
			Location Updating Accept	3.3.8
			Location Updating Reject	3.3.9
			Location Updating Request	3.3.7
			Paging Response	3.1.5
			Parameter Update Confirm	3.3.11
			Parameter Update Request	3.3.10
			Progress	3.1.6
			Rejection	3.7.1
			Security Mode Request	3.2.24
			Security Mode Response	3.2.25
			Service Redirection	3.8.1
			Service Release	3.1.11
			Service Release Complete	3.1.12
			SSD Update Request	3.3.3
			SSD Update Response	3.3.4
			Status Request	3.3.14
			Status Response	3.3.15
			User Zone Reject	3.3.18
			User Zone Update	3.3.17
			User Zone Update Request	3.3.16
Response Request	4.2.28	1BH	Handoff Required	3.4.1
Return Cause	4.2.83	68H	CM Service Request	3.1.2
			Location Updating Request	3.3.7
RF Channel Identity	4.2.7	21H	Handoff Command	3.4.4
Service Option	4.2.49	03H	Additional Service Notification	3.1.19
			Additional Service Request	3.1.20
			ADDS Transfer	3.6.3
			Assignment Complete	3.1.8
			Assignment Request	3.1.7

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			BS Service Request	3.1.17
			CM Service Request	3.1.2
			Handoff Complete	3.4.6
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Paging Request	3.1.4
			Paging Response	3.1.5
Service Option Connection Identifier (SOCI)	4.2.73	1EH	Additional Service Request	3.1.20
			Alert with Information	3.1.16
			Assignment Complete	3.1.8
			Assignment Failure	3.1.9
			Assignment Request	3.1.7
			CM Service Request	3.1.2
			Connect	3.1.10
			Flash with Information	3.2.1
			Flash with Information Ack	3.2.2
			Paging Response	3.1.5
			Progress	3.1.6
			Rejection	3.7.1
			Service Release	3.1.11
			Service Release Complete	3.1.12
Service Option List	4.2.74	2AH	Handoff Command	3.4.45
			Handoff Request	3.4.2
			Handoff Request Acknowledge	3.4.3
			Handoff Required	3.4.1
Service Redirection Info	4.2.84	69H	Service Redirection	3.8.1
Service Reference Identifier (SR_ID)	4.2.86	71H	Assignment Request	3.1.7
			BS Service Request	3.1.17
SID	4.2.8	32H	Handoff Command	3.4.4
Signal	4.2.38	34H	Assignment Request	3.1.7
			Feature Notification	3.2.3
			Flash with Information	3.2.1
			Progress	3.1.6
Slot Cycle Index	4.2.14	35H	ADDS Page	3.6.1
			ADDS Transfer	3.6.3
			Authentication Request	3.3.1

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			CM Service Request	3.1.2
			Feature Notification	3.2.3
			Handoff Request	3.4.2
			Handoff Required	3.4.1
			Location Updating Request	3.3.7
			Paging Request	3.1.4
			Paging Response	3.1.5
			Registration Request	3.3.19
			Security Mode Request	3.3.24
			Status Request	3.3.14
			User Zone Reject	3.3.18
Software Version	4.2.48	31H	Reset	3.5.7
			Reset Acknowledge	3.5.8
Source PDSN Address	4.2.24	14H	Handoff Request	3.4.2
			Handoff Required	3.4.1
Source RNC to Target RNC Transparent Container	4.2.71	39H	Handoff Request	3.4.2
			Handoff Required	3.4.1
Special Service Call Indicator	4.2.21	5AH	Additional Service Request	3.1.20
			CM Service Request	3.1.2
Tag	4.2.46	33H	ADDS Deliver	3.6.5
			ADDS Deliver Ack	3.6.6
			ADDS Page	3.6.1
			ADDS Page Ack	3.6.2
			ADDS Transfer	3.6.3
			ADDS Transfer Ack	3.6.4
			Authentication Request	3.3.1
			Authentication Response	3.3.2
			BS Security Mode Request	3.3.23
			BS Service Request	3.1.17
			BS Service Response	3.1.18
			Feature Notification	3.2.3
			Feature Notification Ack	3.2.4
			Flash with Information	3.2.1
			Flash with Information Ack	3.2.2
			Paging Request	3.1.4
			Paging Response	3.1.5

4.1.5 Cross Reference of Information Elements With Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			Security Mode Request	3.3.24
			Security Mode Response	3.3.25
			Status Request	3.3.14
			Status Response	3.3.15
			Rejection	3.7.1
Target RNC to Source RNC Transparent Container	4.2.72	3AH	Handoff Command	3.4.4
			Handoff Request Acknowledge	3.4.3
Transcoder Mode	4.2.43	36H	Transcoder Control Request	3.5.9
UIM Authentication Info	4.2.100	4FH	Security Mode Request	3.3.24
			Handoff Required	3.4.1
			Handoff Request	3.4.2
User Zone ID	4.2.26	02H	ADDS Transfer	3.6.3
			CM Service Request	3.1.2
			Paging Response	3.1.5
			Location Updating Request	3.3.7
			User Zone Reject	3.3.18
			User Zone Update	3.3.17
			User Zone Update Request	3.3.16
Voice Privacy Request	4.2.11	A1H	Additional Service Request	3.1.20
			CM Service Request	3.1.2
			Paging Response	3.1.5
			Privacy Mode Complete	3.3.13

a. This is a type 1 IE (refer to section 4.1.3). The X in the IEI column is data.

b. This is a type 3 IE (refer to section 4.1.3) that is contained as a mandatory element in a DTAP message.

4.2 Information Elements

4.2.1 Message Discrimination

A one octet field is used in all messages to discriminate between DTAP and BSMAP messages.

4.2.1 Message Discrimination

7	6	5	4	3	2	1	0	Octet
0	0	0	0	0	0	0	D-bit	1

The D-bit is set to 1 to indicate that the message is a DTAP message. All other messages shall have the D-bit set to 0. Refer to section 4.2.4 for message types.

4.2.1.1 A1 Message Header

Each message transferred between the BS and MSC is classified either as a DTAP or a BSMAP message. The BS performs protocol conversion between the DTAP/BSMAP messages and the specific air interface signaling system in use.

To distinguish between the DTAP messages and BSMAP messages, a header is prefixed on each A1 or A1p interface message transferred between the BS and MSC. Refer to Figure 4.2.1.1.1.3-1.

4.2.1.1.1 Transfer of DTAP and BSMAP Messages

Refer to [12] for information on the transport of DTAP and BSMAP messages on the A1 or A1p interfaces.

4.2.1.1.1.1 Distribution Function

The distribution of messages between the BSMAP and DTAP functions and the distribution or multiplexing of DTAP messages to or from the various radio link layer 2 access points are performed in an intermediate layer of protocol between the transport layer and Layer 3 referred to as the distribution sub-layer.

The protocol for this sub-layer simply consists of the management of a one or two octet Distribution Data Unit as a header, followed by the actual Layer 3 BSMAP or DTAP message. This is shown in Figure 4.2.1.1.1.3-1, “Structure of A1 or A1p Layer 3 Messages”. The user data field contains a Distribution Data Unit, a Length Indicator, and the actual layer 3 message. The Distribution Data Unit consists of one or two octets depending on whether the message is DTAP or BSMAP. The first octet, Message Discrimination, differentiates the message between these two types.

4.2.1.1.1.2 Transfer of DTAP Messages

For DTAP messages, the Distribution Data Unit consists of two parameters: the Message Discrimination parameter and the Data Link Connection Identifier (DLCI) parameter. Refer to section 4.2.1, Message Discrimination and section 4.2.2, Data Link Connection Identifier (DLCI) for details on the coding of these parameters.

In the Message Discrimination parameter the discrimination bit D is set to the value ‘1’ to indicate DTAP.

The DLCI parameter is used for MSC to BS and BS to MSC messages to indicate the type and treatment of the message being transmitted.

The length indicator (refer to section 4.2.3) is coded in one octet, and is the binary representation of the number of octets of the subsequent layer 3 message parameter.

Messages that are actually DTAP messages are distinguished from those that are BSMAP in the description of Message Type (section 4.2.4).

4.2.1.1.1.3 Transfer of BSMAP Messages

The transfer of BSMAP messages over a specific transport connection allows the BSMAP functions in both the MSC and the BS to identify to which particular MS association the exchanged message (e.g., assign, handoff request, etc.) applies.

The structure of the user data field is given in Figure 4.2.1.1.1.3-1, “Structure of A1 Layer 3 Messages”. The user data field contains a Distribution Data Unit, a Length Indicator, and the actual layer 3 message.

The Distribution Data Unit only consists of the Message Discrimination parameter, and is coded as one octet. The discrimination bit D is set to the value ‘0’ to indicate BSMAP.

The Length Indicator (refer to section 4.2.3) is coded in one octet, and is the binary representation of the number of octets of the subsequent layer 3 message parameter.

The coding of the BSMAP layer 3 messages is specified in this chapter starting in section 3.0.

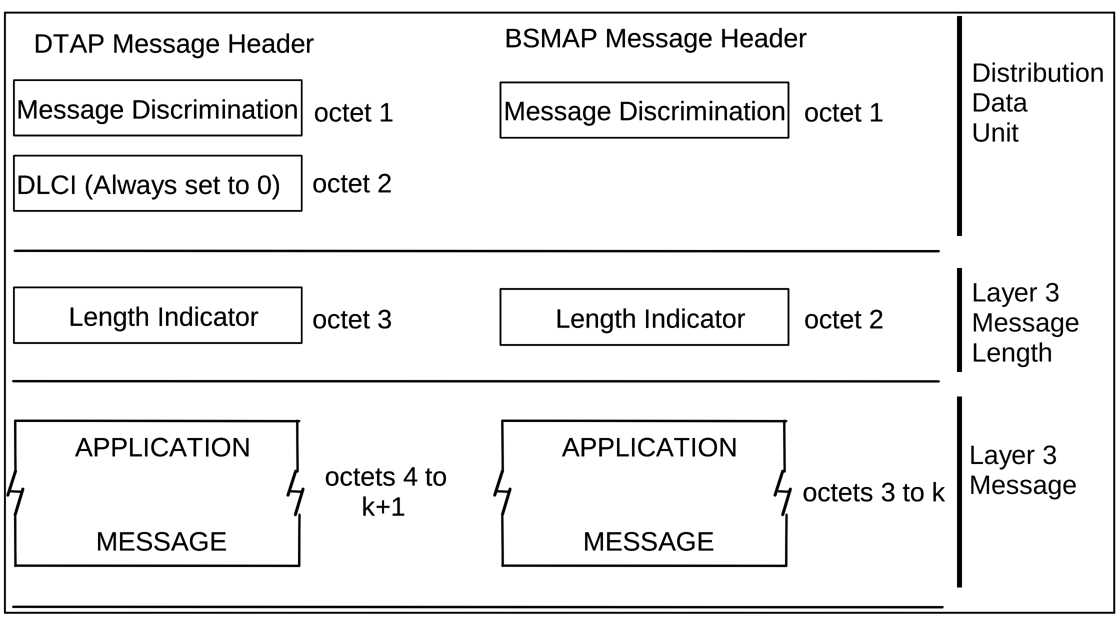

Figure 4.2.1.1.1.3-1 Structure of A1 or A1p Layer 3 Messages

4.2.2 Data Link Connection Identifier (DLCI)

The DLCI is one of the parameters for the distribution data unit that is part of the user data field of every DTAP message. Refer to section 4.2.1.1.1.2 for details on use of this element in the header of all DTAP messages. The DLCI parameter is used for MSC to BS messages to indicate the type of data link connection to be used over the radio interface. In the direction BS to MSC the DLCI parameter is used to indicate the type of originating data parameter and is coded in one octet, as follows:

4.2.2 Data Link Connection Identifier (DLCI)

7	6	5	4	3	2	1	0	Octet
C2	C1	Reserved			S3	S2	S1	1

Bits C2 and C1 are defined as:

C2	C1	Description
0	0	Represents the default for *cdma2000*
All other values		Reserved

Reserved:

These bits are set to '000'.

Bits S3, S2, and S1:

These bits represent the SAPI (Signaling Access Point Identifier) value used on the radio link. The SAPI shall be set to zero for *cdma2000*.

4.2.3 Length Indicator (LI)

The length indicator is coded in one octet, and is used to indicate the length of a message.

4.2.3 Length Indicator (LI)

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
Length Indicator								1

Length Indicator:

This field contains the binary representation of the number of octets in the message following this octet.

4.2.4 Message Type

The Message Type is used to identify a message. Element Format:

4.2.4 Message Type

7	6	5	4	3	2	1	0	Octet
Message Type								1

Message Type:

This octet is coded as shown in Table 4.2.4-1 and Table 4.2.4-2.

The BSMAP messages in Table 4.2.4-1 are used to perform functions at the MSC or BS while DTAP messages in Table 4.2.4-2 carry information primarily used by the MS. For details, refer to [12].

Table 4.2.4-1 BSMAP Messages

BSMAP Message Name	Message Type Value	Message Category	Section Reference
Additional Service Notification	69H	Call Processing	3.1.19
ADDS Page	65H	Supplementary Services	3.6.1
ADDS Page Ack	66H	Supplementary Services	3.6.2
ADDS Transfer	67H	Supplementary Services	3.6.3
ADDS Transfer Ack	68H	Supplementary Services	3.6.4
Assignment Complete	02H	Call Processing	3.1.8
Assignment Failure	03H	Call Processing	3.1.9
Assignment Request	01H	Call Processing	3.1.7
Authentication Request	45H	Mobility Management	3.3.1
Authentication Response	46H	Mobility Management	3.3.2
Base Station Challenge	48H	Mobility Management	3.3.5
Bearer Update Request	58H	Call Processing	3.1.21
Bearer Update Required	5AH	Call Processing	3.1.23
Bearer Update Response	59H	Call Processing	3.1.22
Base Station Challenge Response	49H	Mobility Management	3.3.6
Block	40H	Facilities Management	3.5.1
Block Acknowledge	41H	Facilities Management	3.5.2
BS Security Mode Request	4BH	Mobility Management	3.3.23
BS Service Request	09H	Call Processing	3.1.17
BS Service Response	0AH	Call Processing	3.1.18
Clear Command	20H	Call Processing	3.1.14

Table 4.2.4-1 BSMAP Messages

BSMAP Message Name	Message Type Value	Message Category	Section Reference
Clear Complete	21H	Call Processing	3.1.15
Clear Request	22H	Call Processing	3.1.13
Complete Layer 3 Information	57H	Call Processing	3.1.1
Event Notification	04H	Mobility Management	3.3.28
Event Notification Ack	06H	Mobility Management	3.3.29
Feature Notification	60H	Supplementary Services	3.2.3
Feature Notification Ack	61H	Supplementary Services	3.2.4
Handoff Command	13H	Radio Resource Mgmt.	3.4.4
Handoff Commenced	15H	Radio Resource Mgmt.	3.4.5
Handoff Complete	14H	Radio Resource Mgmt.	3.4.6
Handoff Failure	16H	Radio Resource Mgmt.	3.4.8
Handoff Performed	17H	Radio Resource Mgmt.	3.4.9
Handoff Request	10H	Radio Resource Mgmt.	3.4.2
Handoff Request Acknowledge	12H	Radio Resource Mgmt.	3.4.3
Handoff Required	11H	Radio Resource Mgmt.	3.4.1
Handoff Required Reject	1AH	Radio Resource Mgmt.	3.4.7
PACA Command	6CH	Supplementary Services	3.2.5
PACA Command Ack	6DH	Supplementary Services	3.2.6
PACA Update	6EH	Supplementary Services	3.2.7
PACA Update Ack	6FH	Supplementary Services	3.2.8
Paging Request	52H	Call Processing	3.1.4
Privacy Mode Command	53H	Call Processing	3.3.12
Privacy Mode Complete	55H	Call Processing	3.3.13
Radio Measurements for Position Request	23H	Supplementary Services	3.2.9
Radio Measurements for Position Response	25H	Supplementary Services	3.2.10
Rejection	56H	Call Processing	3.7.1
Registration Request	05H	Mobility Management	3.3.19
Reset	30H	Facilities Management	3.5.7
Reset Acknowledge	31H	Facilities Management	3.5.8
Reset Circuit	34H	Facilities Management	3.5.5
Reset Circuit Acknowledge	35H	Facilities Management	3.5.6

Table 4.2.4-1 BSMAP Messages

BSMAP Message Name	Message Type Value	Message Category	Section Reference
Security Mode Request	4CH	Mobility Management	3.3.24
Security Mode Response	4DH	Mobility Management	3.3.25
Status Request	6AH	Mobility Management	3.3.14
Status Response	6BH	Mobility Management	3.3.15
Transcoder Control Acknowledge	39H	Facilities Management	3.5.10
Transcoder Control Request	38H	Facilities Management	3.5.9
Unblock	42H	Facilities Management	3.5.3
Unblock Acknowledge	43H	Facilities Management	3.5.4
User Zone Reject	0BH	Mobility Management	3.3.18
BS Authentication Request	07H	Mobility Management	3.3.21
BS Authentication Request Ack	08H	Mobility Management	3.3.22

Table 4.2.4-2 DTAP Messages

DTAP Message Name	Message Type Value	Message Category	Section Reference
Additional Service Request	62H	Call Processing	3.1.20
ADDS Deliver	53H	Supplementary Services	3.6.5
ADDS Deliver Ack	54H	Supplementary Services	3.6.6
Alert with Information	26H	Call Processing	3.1.16
Authentication Report	4EH	Mobility Management	3.3.26
Authentication Report Response	4FH	Mobility Management	3.3.27
Authentication Request	45H	Mobility Management	3.3.1
Authentication Response	46H	Mobility Management	3.3.2
Base Station Challenge	48H	Mobility Management	3.3.5
Base Station Challenge Response	49H	Mobility Management	3.3.6
CM Service Request	24H	Call Processing	3.1.2
CM Service Request Continuation	25H	Call Processing	3.1.3
Connect	07H	Call Processing	3.1.10
Flash with Information	10H	Supplementary Services	3.2.1
Flash with Information Ack	50H	Supplementary Services	3.2.2
Location Updating Accept	02H	Mobility Management	3.3.8
Location Updating Reject	04H	Mobility Management	3.3.9
Location Updating Request	08H	Mobility Management	3.3.7
Paging Response	27H	Call Processing	3.1.5
Parameter Update Confirm	2BH	Mobility Management	3.3.11
Parameter Update Request	2CH	Mobility Management	3.3.10

Table 4.2.4-2 DTAP Messages

DTAP Message Name	Message Type Value	Message Category	Section Reference
Progress	03H	Call Processing	3.1.6
Rejection	56H	Call Processing	3.7.1
Security Mode Request	4CH	Mobility Management	3.3.24
Security Mode Response	4DH	Mobility Management	3.3.25
Service Redirection	70H	Mobility Management	3.8.1
Service Release	2EH	Call Processing	3.1.11
Service Release Complete	2FH	Call Processing	3.1.12
SSD Update Request	47H	Mobility Management	3.3.3
SSD Update Response	4AH	Mobility Management	3.3.4
Status Request	6AH	Mobility Management	3.3.14
Status Response	6BH	Mobility Management	3.3.15
User Zone Reject	0BH	Mobility Management	3.3.18
User Zone Update	0CH	Mobility Management	3.3.17
User Zone Update Request	0DH	Mobility Management	3.3.16

4.2.5 Channel Number

This element contains a logical channel number assigned to the equipment providing a traffic channel.

4.2.5 Channel Number

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved					ARFCN High Part (MSB)			2
ARFCN Low Part (LSB)								3

Reserved:

Populate as ‘00000’.

For backward compatibility with versions prior to IOS 4.1, an entity compliant with this version of the standard shall be prepared to receive nonzero bits

ARFCN:

The ARFCN (Absolute RF Channel Number) is an 11-bit number that identifies the Absolute Radio Frequency Channel Number relative to the band class for the call association.

Range of values:

0 – Undefined

1-2047 – ARFCN

For backward compatibility, default value of 0 may be used by manufacturers when this element is not needed for Location Based Services.

4.2.6 Channel Type

This element is being maintained for historical purposes only. The sending entity shall encode the IE as shown in the bitmaps and the receiving entity shall obtain this information from other IEs.

4.2.6 Channel Type

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Speech or Data Indicator								3
Channel Rate and Type								4
Speech Encoding Algorithm/data rate + Transparency Indicator								5

Length:

The Length field is defined as the number of octets following the Length field.

Speech or Data Indicator:

The Speech or Data Indicator octet is coded as follows:

Table 4.2.6-1 Channel Type - Speech or Data Indicator Values

7	6	5	4	3	2	1	0	Speech or Data Indicator setting
0	0	0	0	0	0	0	0	No Alert
0	0	0	0	0	0	0	1	Speech[a]
0	0	0	0	0	0	1	0	Data[a]
0	0	0	0	0	0	1	1	Signaling[b]

a. A dedicated terrestrial resource is also required

b. A dedicated terrestrial resource is not required

Channel Rate and Type:

The Channel Rate and Type is coded as follows:

Table 4.2.6-2 Channel Type - Channel Rate and Type Values

7	6	5	4	3	2	1	0	Channel Rate and Type
0	0	0	0	0	0	0	0	Reserved (invalid)
0	0	0	0	0	0	0	1	DCCH
0	0	0	0	0	0	1	0	Reserved for future use (invalid)
0	0	0	0	1	0	0	0	Full rate TCH channel Bm
0	0	0	0	1	0	0	1	Half rate TCH channel Lm

Speech Encoding Algorithm/data rate + Transparency Indicator:

If the Speech or Data Indicator field in octet 3 indicates that the call is a speech call or signaling (e.g., DCCH) then this field shall be coded as follows:

Table 4.2.6-3 Channel Type - Octet 5 Coding (Voice/Signaling Call)

7	6	5	4	3	2	1	0	Octet 5 coding if speech call or signaling
0	0	0	0	0	0	0	0	No Resources Required (invalid)
0	0	0	0	0	0	0	1	Reserved
0	0	0	0	0	0	1	0	Reserved
0	0	0	0	0	0	1	1	*TIA/EIA/IS-2000* 8 kbps vocoder
0	0	0	0	0	1	0	0	8 kbps enhanced vocoder (EVRC)
0	0	0	0	0	1	0	1	13 kbps vocoder
0	0	0	0	0	1	1	0	Adaptive Differential Pulse Code Modulation
All other values are reserved								

If the Speech or Data Indicator field in octet 3 indicates that the call is a data call, then this field shall be coded as follows:

Table 4.2.6-4 Channel Type - Octet 5 Coding (Data Call)

7	6	5	4	3	2	1	0
ext.[a]	T/ NT[b]	Reserved[c]					

a. reserved for extension.

b. 0-Transparent service, 1-Non-Transparent service.

c. Currently unused and is encoded as 000000

4.2.7 RF Channel Identity

This element specifies the identity of an analog radio channel (refer to [19]).

4.2.7 RF Channel Identity

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td colspan="8">Color Code</td><td>2</td></tr>
<tr><td colspan="6">Reserved</td><td>N-AMPS</td><td>ANSI EIA/ TIA-553</td><td>3</td></tr>
<tr><td colspan="6">Reserved</td><td colspan="2">(Timeslot Number)</td><td>4</td></tr>
<tr><td colspan="5">Reserved</td><td colspan="3">ARFCN (high part)</td><td>5</td></tr>
<tr><td colspan="8">ARFCN (low part)</td><td>6</td></tr>
</table>

Color Code:

The Color Code field in octet 2 identifies the unique code used by an analog signaling system to distinguish the serving cell RF channels from cells reusing this RF channel. For analog cells, this color code corresponds to the 3 possible Supervisory Audio Tones (SAT) used to distinguish this cell's radio channels.

Reserved:

These bits are coded as '000000'.

N-AMPS:

This bit is set to 1, when the signaling type allocated by a target BS in a hard handoff procedure is narrow band analog technology (N-AMPS) based.

ANSI EIA/TIA 553:

This bit is set to 1, when the signaling type allocated by a target BS in a hard handoff procedure is AMPS [19] based.

Timeslot Number:

When the indicated signaling type is narrow band analog technology (N-AMPS), then the Timeslot Number field represents the C12 and C13 narrow band bits which are defined as the narrow band channel offset from the center frequency of the overlaid channel N. It is coded as follows:

Table 4.2.7-1 RF Channel Identity – Timeslot Number

Value	Description
00	Centered on N
01	Channel below N
10	Channel above N
11	Reserved

Reserved:

These bits are coded as '00000'.

ARFCN:

The ARFCN (Absolute RF Channel Number) field in octets 5 and 6 may, depending on the message in which it is included, identify the channel being used in the current mobile connection; for example, to allow a remote site's scan receiver to measure the uplink signal strength relative to the remote site. Alternatively, depending on the message in which it is included, this element may identify a target set channel for a handoff. This ARFCN has a range of 0-2047 to accommodate the Frequency Bands of each signaling system. The frequency bands are shown below for clarification.

The frequency bands reserved for *analog* signaling systems are covered with the following channel numbering schemes:

- initial allocation of 20 MHz for both band A and B representing 1-666 signaling and voice channels and numbered 1-333 for the A band, and 334-666 for the B band.
- extended allocation ([19]) of 5 MHz for A', B', and A'' bands representing 166 voice channels and numbered 667-716 for the A' band, 717-799 for the B' band, and 991-1023 for the A'' band.

4.2.8 SID

This element provides the System Identification used by MSs to determine home/roam status. It is coded as follows:

4.2.8 SID

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td>Reserved</td><td>(MSB)</td><td colspan="6">SID (high order)</td><td>2</td></tr>
<tr><td colspan="7">SID (low order)</td><td>(LSB)</td><td>3</td></tr>
</table>

Reserved:

This bit is coded as ‘0’.

SID:

The SID is a 15 bit unique number assigned to each wireless system coverage area.

4.2.9 *IS-95* Channel Identity

This element specifies identity information for one or more *TIA/EIA/IS-95-B* radio channels.

4.2.9 *IS-95* Channel Identity

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td colspan="8">Length</td><td>2</td></tr>
<tr><td>Hard Handoff</td><td colspan="3">Number of Channels to Add</td><td colspan="4">Frame Offset</td><td>3</td></tr>
<tr><td colspan="8">Walsh Code Channel Index</td><td>n</td></tr>
<tr><td colspan="8">Pilot PN Code (low part)</td><td>n+1</td></tr>
<tr><td>Pilot PN Code (high part)</td><td>Power Combined</td><td>Freq. included</td><td colspan="2">Reserved</td><td colspan="3">ARFCN (high part)</td><td>n+2</td></tr>
<tr><td colspan="8">ARFCN (low part)</td><td>n+3</td></tr>
</table>

Length:

Length is the number of octets that follow this octet. The length of this element is variable because more than one target cell may be requested in a *TIA/EIA/IS-95-B* handoff. Therefore, this element provides the flexibility to specify multiple *TIA/EIA/IS-95-B* channels that the target BS can accommodate.

Hard Handoff to Add:

This field, when set to 1, indicates that a hard handoff is required rather than a soft/softer handoff. This field may be set in a handoff request or response. It shall be set appropriately by the responding target BS to correspond to the action committed by the target Number of Channels:

In this version of the standard, this field shall be set to 001.

Frame Offset:

This field contains the number of 1.25 ms intervals relative to system time that the forward and reverse traffic channels are delayed by the source. If this element is returned to the source with the hard handoff indicator bit set, this field contains the frame offset delay required by the target.

The following four octets may be included multiple times:

Walsh Code Channel Index:

This field (octet n) specifies one of 64 possible Walsh Codes used to channelize the downlink RF bit stream in a *TIA/EIA/IS-95-B* call.

Pilot PN Code:

The Pilot PN Code is one of 511 unique values for the Pilot Channel offset. The offsets are in increments of 64 PN chips.

Power Combined:

This field is a flag that, when set to ‘1’, indicates diversity combining of the power control sub-channel of this *TIA/EIA/IS-95-B* code channel with the previous *TIA/EIA/IS-95-B* code channel listed in this element.

In other words, if this is the second replication of octets n through n+3, then the power control sub-channel of this *TIA/EIA/IS-95-B* code channel is diversity combined with power control sub-channel of the previous replication of octets n through n+3. The first occurrence of this field in the *IS-95* Channel Identity element is set to zero.

Frequency Included:

This is a flag indicating whether the frequency assignment is included. A ‘0’ indicates no frequency assignment is present, a ‘1’ indicates a frequency assignment is present and is specified in the ARFCN field of this element. For code channel assignments that are on the same *TIA/EIA/IS-95-B* channel frequency, this field shall be set to ‘0’.

ARFCN:

This field in octets n+2 and n+3 identifies the *TIA/EIA/IS-95-B* frequency being used in the current mobile connection. This ARFCN has a range of 0-2047 to accommodate the various frequency bands. The frequency bands are shown below for clarification. When the Frequency Included flag is set to zero, the ARFCN field shall be set to all binary zeros.

The Frequency Bands reserved for *TIA/EIA/IS-95-B* signaling system in the North American cellular band class is covered with the following channel numbering scheme:

A band allocation of 311 channels and numbered for TIA/EIA/IS-95-B or TIA/EIA/IS-2000 as 1-311.

B band allocation of 289 channels and numbered for TIA/EIA/IS-95-B or TIA/EIA/IS-2000 as 356-644.

A’ band allocation of 6 channels and numbered for TIA/EIA/IS-95-B or TIA/EIA/IS-2000 as 689-694.

B’ band allocation of 39 channels and numbered for TIA/EIA/IS-95-B or TIA/EIA/IS-2000 as 739-777.

A’’ band allocation of 11 channels and numbered TIA/EIA/IS-95-B or TIA/EIA/IS-2000 as 1013-1023.

The Frequency Bands reserved in the North American PCS band class are covered with the following channel numbering scheme:

A-F band allocation of channels numbered from 25-1175.

4.2.10 Encryption Information

This is a variable length element. It contains necessary information to control encryption devices. This element is used during call setup and handoff.

4.2.10 Encryption Information

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Encryption Info - 1								variable
Encryption Info - 2								variable
…								…
Encryption Info - k								variable

Length:

This field (octet 2) is a binary number indicating the absolute length of the contents after the Length octet.

Encryption Info:

Multiple instances of the Encryption Info field may occur within this element. If no Encryption Info information is available, the Length indicator shall be set to ‘0000 0000’

The Encryption Info field is coded as follows:

Table 4.2.10-1 Encryption Information - Encryption Parameter Coding

7	6	5	4	3	2	1	0	Octet
Ext=1	Encryption Parameter Identifier					Status	Available	3
Encryption Parameter Length								4
(MSB)	Encryption Parameter value - octet 1							5
…								…
Encryption Parameter value - octet m							(LSB)	variable

Encryption Parameter Coding - Octet 1:

Available:

Bit 0 indicates if the encryption algorithm is available (supported). The BS sets this bit appropriately when this element is included in a message being sent by a BS. The MSC always sets this bit to ‘0’ and the BS always ignores it when this element is included in a message being sent by the MSC. Available is coded ‘1’, and not available is coded ‘0’.

Status:

The Status indication, bit 1, is coded ‘1’ to indicate active and ‘0’ to indicate inactive.

Encryption Parameter Identifier:

Bits 2 through 6 contain the Encryption Parameter Identifier; refer to Table 4.2.10-2

Ext:

Bit 7 is an extension bit.

Table 4.2.10-2 Encryption Information - Encryption Parameter Identifier Coding

Encryption Parameter Identifier Value	Encryption Parameter
00000	Not Used - Invalid value.
00001	SME Key: Signaling Message Encryption Key
00010	Reserved (VPM: Voice Privacy Mask)
00011	Reserved
00100	Private longcode
00101	Data Key (ORYX)
00110	Initial RAND
00111	Extended Encryption
All other values	Reserved

A brief description of the parameters and their typical usage is given below for information only, and is not intended to limit the scope of application.

SME Key:

Signaling Message Encryption Key, used for encryption of some signaling messages in [10] and [1]~[6]. Key length is 8 octets.

Private longcode:

Encryption parameter for [10] and [1]~[6]. Key length is 42 bits, encoded in 6 octets, such that the 6 unused bits are set equal to ‘0’, and occupy the high-order positions of the most significant octet.

Data Key (ORYX):

Parameter intended for encryption of user data in [23]. Key length is 4 octets.

Initial RAND:

Parameter used for data encryption in [23]. When data encryption is enabled, this parameter shall be passed to the target BS from the source BS so that the same value of RAND can be used. The key length is 4 octets.

For Extended Encryption, the Encryption Parameter value is formatted as follows:

(MSB)	Encryption Key		5
…			…
		(LSB)	20
Reserved		KEY_ID	21
(MSB)	Crypto-Sync		22
…			23
…			24
		(LSB)	25
Encryption Algorithm in Use			26
Encryption Algorithms Supported			27

Encryption Key:

The 128-bit bit encryption key currently being used. Refer to [5].

KEY_ID:

The 2-bit identifier associated with the encryption key currently being used. Refer to [5].

Crypto-Sync:

The 32-bit crypto-sync value currently being used. Refer to [5].

Encryption Algorithm in Use:

The encryption algorithm currently being used (8-bits). Refer to [5].

Encryption Algorithms Supported:

The encryption algorithm(s) supported by the MS (indicated by the 8-bit SIG_INTEGRITY_SUP). Refer to [5].

Encryption Parameter Coding - Octets 2 and 3 - n:

The second octet indicates the length of the parameter as a binary number. Octets 3 through n contain the parameter value. The length of the parameter may be zero in which case octet 2 is set to a binary value of zero.

4.2.11 Voice Privacy Request

This is a fixed length element with zero octets of content. Only the element identifier is included (type 2). When present, it indicates that the MS has requested Voice Privacy or alternatively in the case of Privacy Mode Complete message, that the MS has requested a change in the Voice Privacy mode setting. Refer to section 4.1.3 for additional information on type 2 IEs.

4.2.11 Voice Privacy Request

7	6	5	4	3	2	1	0	Octet
1	0	1	0	A1 Element Identifier				1

4.2.12 Classmark Information Type 2

The Classmark Information Type 2 defines certain attributes of the MS equipment in use on a particular transaction, thus giving specific information about the MS. It is coded as follows:

4.2.12 Classmark Information Type 2

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
A1 Element Identifier								1
Length								2
MOB_P_REV			Reserved	See List of Entries	RF Power Capability			3
Reserved								4
NAR_ AN_ CAP	*IS-95*	Slotted	Reserved		DTX	Mobile Term	ANSI/EIA/ TIA-553	5
Reserved								6
Reserved						Mobile Term	PSI	7
SCM Length								8
Station Class Mark								9
…								…
Count of Band Class Entries								k
Band Class Entry Length								k+1
Reserved			Band Class 1					k+2
Band Class 1 Air Interfaces Supported								k+3
Band Class 1 MOB_P_REV								k+4
…								…
Reserved			Band Class n					m
Band Class n Air Interfaces Supported								m+1
Band Class n MOB_P_REV								m+2

The A1 Element Identifier is not included when this IE is sent as a mandatory element as part of a DTAP message.

Length:

This field is defined as the number of octets following the Length field.

MOB_P_REV:

The MOB_P_REV field in octet 3 contains the current MS protocol revision level as defined in [1]~[6]. The MOB_P_REV field in octet 3 contains the low order 3 bits of the 8-bit MOB_P_REV. The source BS shall always set this field when sending this element to the MSC in a message. The MSC shall transparently transfer this value when forwarding this element to the target BS. The target BS may choose to ignore the value.

See List of Entries:

This field is an escape mechanism that allows octets 3 through 6 to be ignored by the receiver. When set to ‘1’, the receiver shall ignore the contents of octets 3 through 6 and shall instead use the contents of octets 7 through the end of the element to derive the valid class mark information. When this field is set to ‘0’, the receiver shall process the contents of octets 3 through 6 and ignore any additional data that may be present after these octets. A BS shall be required to populate both portions of this element, i.e. octets 3-6 and 7 through the end-of-element, to provide backward compatibility. The information contained in the first band class entry set (starting in octet k+2) shall be applicable to the current band class of the MS.

RF Power Capability:

This field is coded as follows:

Table 4.2.12-1 Classmark Information Type 2 - RF Power Capability

Binary Values	**Meaning**	***ANSI/EIA/TIA-553***	***TIA/EIA/IS-2000***
000	Class 1, vehicle and portable	4W	1.25 W
001	Class 2, portable	1.6 W	0.5 W
010	Class 3, handheld	0.6 W	0.2 W
011	Class 4, handheld	Unused	
100	Class 5, handheld		
101	Class 6, handheld		
110	Class 7, handheld		
111	Class 8, handheld		

Each MS has an assigned power class capability that needs to be known at the base station to regulate uplink power control. Each power class is unique to the specific signaling system. Power classes can range from 1 to 8. All other values are reserved.

NAR_AN_CAP:

This field in bit 7 of octet 5 is set to ‘1’ for an MS that is capable of supporting narrow band analog technology (N-AMPS), and is set to ‘0’ otherwise.

IS-95:

This field indicates that the MS is capable of supporting the air interfaces defined in [10] and/or [1]~[6].

Slotted:

This field indicates that the MS is operating in slotted paging request mode when set to ‘1’ (*cdma2000* only).

DTX:

This field indicates whether or not the MS is capable of discontinuous transmission. It is set to ‘1’ if the MS is capable of DTX, otherwise it is set to ‘0’.

Mobile Term (octet 5 and 7):

This field is set to ‘1’ for *cdma2000* MSs currently capable of receiving incoming calls, and is set to ‘1’ for all other MS types. It is set to ‘0’ for *cdma2000* MSs incapable of receiving incoming calls.

ANSI/EIA/TIA-553:

This field is set to 1 if the MS supports analog capabilities. It is set to 0 if the MS doesn’t support analog mode.

PSI:

The PACA Supported Indicator (PSI) field in bit 0 of octet 7 indicates the MS’s capability to support PACA. This field is set to ‘1’ if the MS supports PACA; otherwise it is set to ‘0’.

SCM Length:

This field indicates the length of the Station Class Mark field in the following octet(s).

Station Class Mark:

This field shall be coded as specified in [1]~[6].

Count of Band Class Entries:

This field indicates the number of band class information entries that follow. These entries each contain information on the air interface capabilities and protocol level information of the MS with respect to a specific band class. At least one entry for the MS’s current band class is required. The current band class information shall be included in the first band class entry information set. Data pertaining to other band classes supported by the MS may also be included.

Band Class Entry Length:

This field indicates the length of the set of parameters associated with each band class entry set. The length of each band class entry set included in this element shall be the same.

Band Class n (octet k+2 and m):

The coding of this field is defined in [30].

Band Class n Air Interfaces Supported (octet k+3 and m+1):

This field shall be a binary value consisting of subfields indicating which operating modes are supported by the MS in the corresponding band class. The subfields are coded as defined in the *cdma2000* Operating Mode Information record [1]~[6]. The first subfield is OP_MODE0 and it shall correspond to bit 7.

Band Class n MOB_P_REV:

This field contains the MS protocol revision level as defined in [1]~[6]. The source BS shall always set this field when sending this element to the MSC on a message. The MSC shall transparently transfer this value when forwarding this element to the target BS. The target BS may choose to ignore the value.

4.2.13 Mobile Identity

The purpose of the mobile identity IE is to provide the MS Electronic Serial Number (ESN), the International Mobile Subscriber Identity (IMSI), Mobile Equipment Identifier (MEID) or the Broadcast Address for cdma2000.

The IMSI does not exceed 15 digits and the ESN is a 32 bit field separated into a Manufacturer code, the Serial Number and a Reserved field. The MEID consists of 14 hexadecimal digits. The Broadcast Address is used to deliver SMS to groups of subscribers, has the format specified in section 3.4.3.2 of [22] and is mapped to the Mobile Identity element as shown below.

Warning: Prior to IOS v3.0, the length limit for this IE was 10 octets. Care needs to be exercised for interoperability with implementations based on the previous standard.

4.2.13 Mobile Identity – 1

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td colspan="8">Length</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1</td><td>Odd/Even Indicator</td><td colspan="3">Type of Identity</td><td>3</td></tr>
<tr><td colspan="4">Identity Digit 3</td><td colspan="4">Identity Digit 2</td><td>4</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="4">Identity Digit N+1</td><td colspan="4">Identity Digit N</td><td>k</td></tr>
</table>

The A1 Element Identifier is not included when this IE is sent as a mandatory element as part of a DTAP message.

Length:

This field is defined as the number of octets following the Length field.

Type of Identity:

This field is defined as follows:

Table 4.2.13-1 Mobile Identity - Type of Identity Coding

Binary Values	Meaning
000	No Identity Code
001	MEID
010	Broadcast Address
101	ESN
110	IMSI

Odd/Even Indicator (octet 3; bit 3):

This field is set to ‘0’ for an even number of digits and to ‘1’ for an odd number of identity digits.

Identity Digits N(octet 3 etc.):

These fields are coded as follows:

The International Mobile Subscriber Identifier fields are coded using BCD coding format. If the number of identity digits is even then bits 4 to 7 of the last octet shall be filled with an end mark coded as ‘1111’.

The ESN is not separated into digits, and occupies octets 4-7 with the most significant bit in octet 4 bit 7. Identity Digit 1 in octet 3 is unused and coded as ‘0000’.

Note: ESN may be the true ESN, UIM_ID or the pseudo ESN (derived from the MEID or received in a Status Response Message from the MS).

The MEID Identity Digit fields are coded using 14 hexadecimal digits. The Odd/Even Indicator is set to ‘0’ and bits 4 to 7 of the last octet shall be filled with an end mark coded as ‘1111’.

For Broadcast Address (type 010), the Mobile Identity is encoded as specified below based on [22].

4.2.13 Mobile Identity – 2

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved					Type of Identity			3
Priority		Message ID						4
Zone ID								5
(MSB)	Service							6
							(LSB)	7
Language								8

Length:

This field indicates the number of octets in this element following the Length field.

Type of Identity:

This field is defined as shown above.

Priority:

This field indicates the priority level of this broadcast message to the MS.

Message ID:

This field contains a value used by the MS to distinguish between different messages from the same broadcast service transmitted within the time period established for broadcast duplicate detection in the MS.

Zone ID:

This field contains a value used by the MS to distinguish between messages from the same broadcast service transmitted in different geographic regions.

Service:

This field contains the service category. The MS should receive and process the broadcast message or page if the Service field contains a service category that the MS has been configured to receive.

Language:

This field contains a value used by the MS to distinguish the language used in the content of the broadcast message.

4.2.14 Slot Cycle Index

The Slot Cycle Index element is unique to *cdma2000* MSs. It contains a parameter used in computation of the paging timeslot, allowing discontinuous reception in the MS. It is coded as follows:

4.2.14 Slot Cycle Index

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved				SCI Sign	Slot Cycle Index			2

Note that the Classmark Information Type 2 element contains an indication of whether the MS is operating in slotted or non-slotted mode. Also refer to section 4.2.12.

SCI Sign:

This field indicates the sign of the SCI. This field is set to ‘1’ to indicate a negative sign is to be associated with the SCI. Otherwise it is set to ‘0’.

Slot Cycle Index:

This field is coded as specified in [1]~[6].

4.2.15 Priority

This element indicates the PACA priority of the call and is coded as follows:

4.2.15 Priority

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved		Call Priority				Queuing Allowed	Preemption Allowed	3

Length:

This field is defined as the number of octets following the Length field.

Call Priority:

This field allows prioritizing of requests for mobile connections. The priorities are ordered from ‘0000’ (highest priority) to ‘1111’ (lowest priority).

The meaning of the priorities are as follows:

Table 4.2.15-1 Call Priority

Binary Values bits 5-4-3-2	Meaning
0000	Priority Level 0 (highest)
0001	Priority Level 1
0010	Priority Level 2
0011	Priority Level 3
0100	Priority Level 4
0101	Priority Level 5
0110	Priority Level 6
0111	Priority Level 7
1000	Priority Level 8
1001	Priority Level 9
1010	Priority Level 10
1011	Priority Level 11
1100	Priority Level 12
1101	Priority Level 13
1110	Priority Level 14
1111	Priority Level 15 (lowest)

Queuing Allowed:

This field is coded as shown in Table 4.2.15-2.

Table 4.2.15-2 Priority - Queuing Allowed

Binary Values bit 1	Meaning
0	queuing not allowed
1	queuing allowed

Preemption Allowed:

This field is coded as shown in Table 4.2.15-3.

Table 4.2.15-3 Priority - Preemption Allowed

Binary Values bit 0	Meaning
0	preemption not allowed
1	preemption allowed

4.2.16 Cause

This element is used to indicate the reason for occurrence of a particular event and is coded as shown below.

4.2.16 Cause

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
0/1	Cause Value							3

A Cause IE exists for multiple interfaces. The cause values defined in this document are specific to the A1 or A1p interfaces.

Length:

This field is defined as the number of octets following the Length field.

Cause Value:

The Cause Value field is a single octet field if the extension bit (bit 7) is set to ‘0’. If bit 7 of octet 3 is set to ‘1’ then the cause value is a two octet field. If the value of the first octet of the cause field is ‘1XXX 0000’ then the second octet is reserved for national applications, where ‘XXX’ indicates the Cause Class as indicated in the table below.

Table 4.2.16-1 Cause Class Values

Binary Values	Meaning
000	Normal event
001	Normal event
010	Resource unavailable
011	Service or option not available
100	Service or option not implemented
101	Invalid message (e.g., parameter out of range)
110	Protocol error
111	Interworking

Table 4.2.16-2 Cause Values

6	5	4	3	2	1	0	Hex Value	Cause
Normal Event Class (000 xxxx and 001 xxxx)								
0	0	0	0	0	0	0	00	Radio interface message failure
0	0	0	0	0	0	1	01	Radio interface failure
0	0	0	0	0	1	0	02	Uplink quality
0	0	0	0	0	1	1	03	Uplink strength
0	0	0	0	1	0	0	04	Downlink quality
0	0	0	0	1	0	1	05	Downlink strength
0	0	0	0	1	1	0	06	Distance
0	0	0	0	1	1	1	07	OAM&P intervention
0	0	0	1	0	0	0	08	MS busy

Table 4.2.16-2 Cause Values

6	5	4	3	2	1	0	Hex Value	Cause
0	0	0	1	0	0	1	09	Call processing
0	0	0	1	0	1	0	0A	Reversion to old channel
0	0	0	1	0	1	1	0B	Handoff successful
0	0	0	1	1	0	0	0C	No response from MS
0	0	0	1	1	0	1	0D	Timer expired
0	0	0	1	1	1	0	0E	Better cell (power budget)
0	0	0	1	1	1	1	0F	Interference
0	0	1	0	0	0	0	10	Packet call going dormant
0	0	1	0	0	0	1	11	Service option not available
0	0	1	0	1	0	1	15	Short data burst authentication failure
0	0	1	0	1	1	1	17	Time critical relocation/handoff
0	0	1	1	0	0	0	18	Network optimization
0	0	1	1	0	0	1	19	Power down from dormant state
0	0	1	1	0	1	0	1A	Authentication failure
0	0	1	1	0	1	1	1B	Inter-BS soft handoff drop target
0	0	1	1	1	0	1	1D	Intra-BS soft handoff drop target
0	0	1	1	1	1	0	1E	Autonomous Registration by the Network
Resource Unavailable Class (010 xxxx)								
0	1	0	0	0	0	0	20	Equipment failure
0	1	0	0	0	0	1	21	No radio resource available
0	1	0	0	0	1	0	22	Requested terrestrial resource unavailable
0	1	0	0	0	1	1	23	A2p RTP Payload Type not available
0	1	0	0	1	0	0	24	A2p Bearer Format Address Type not available
0	1	0	0	1	0	1	25	BS not equipped
0	1	0	0	1	1	0	26	MS not equipped (or incapable)
0	1	0	0	1	1	1	27	2G only sector
0	1	0	1	0	0	0	28	2G only carrier
0	1	0	1	0	0	1	29	PACA call queued
0	1	0	1	0	1	0	2A	Handoff blocked
0	1	0	1	0	1	1	2B	Alternate signaling type reject
0	1	0	1	1	0	0	2C	A2p Resource not available
0	1	0	1	1	0	1	2D	PACA queue overflow
0	1	0	1	1	1	0	2E	PACA cancel request rejected
Service or Option Not Available Class (011 xxxx)								
0	1	1	0	0	0	0	30	Requested transcoding/rate adaptation unavailable
0	1	1	0	0	0	1	31	Lower priority radio resources not available
0	1	1	0	0	1	0	32	PCF resources are not available
0	1	1	0	0	1	1	33	TFO control request failed
0	1	1	0	1	0	0	34	MS rejected order
Service or Option Not Implemented Class (100 xxxx)								
1	0	0	0	1	0	1	45	PDS-related capability not available or not supported)
Invalid Message Class (101 xxxx)								
1	0	1	0	0	0	0	50	Terrestrial circuit already allocated
Protocol Error (110 xxxx)								
1	1	0	0	0	0	0	60	Protocol error between BS and MSC
Interworking (111 xxxx)								
1	1	1	0	0	0	1	71	ADDS message too long for delivery on the paging channel

Table 4.2.16-2 Cause Values

6	5	4	3	2	1	0	Hex Value	Cause
1	1	1	0	1	1	1	77	PPP session closed by the MS
1	1	1	1	0	0	0	78	Do not notify MS
1	1	1	1	0	0	1	79	PDSN resources are not available
1	1	1	1	0	1	1	7B	Concurrent authentication
1	1	1	1	1	0	0	7C	MS incorrect integrity info
1	1	1	1	1	1	1	7F	Handoff procedure time-out
All other values								Reserved for future use.

4.2.17 Cell Identifier

This element uniquely identifies a particular cell and is of variable length depending on how the cell is identified. The fields of this element are shown below:

4.2.17 Cell Identifier

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Cell Identification Discriminator								3
Cell Identification								variable

Length:

This field indicates the number of octets in this element following the Length field. The length depends on the Cell Identification Discriminator (octet 3).

Cell Identification Discriminator:

The Cell Identification Discriminator is a binary number indicating if all or a part of the Cell Global Identification (e.g., one or more of the following: MCC, MNC, LAC, MSCID, CI) is used for cell identification in octets 4 through n. The Cell Identification Discriminator is coded as follows:

Table 4.2.17-1 Cell Identifier - Cell Identification Discriminator List

Binary Values	Meaning
0000 0010	Cell Identity (CI) is used to identify the cell.
0000 0101	Location Area Code (LAC) is used to identify all cells within a location area.
0000 0111[a]	IS-41 whole Cell Global Identification (ICGI) is used to identify the cell.

a. When the Cell Identifier is used to identify a cell controlled by another MSC, type 0000 0111 is used.

Cell Identification:

This field includes a unique identification number for the cell being referenced. It is coded as indicated below, depending on the value of the Cell Identifier Discriminator. The fields shall be coded as shown in Table 4.2.17-2:

Table 4.2.17-2 Cell Identifier - Cell Identification Discriminator = ‘0000 0010’

7	6	5	4	3	2	1	0	Octet
(MSB)	Cell							4
				Sector			(LSB)	5

Cell/Sector:

In the Cell/Sector value field bit 7 of octet 4 is the most significant bit and bit 0 of octet 5 is the least significant bit. Bits 3 to 0 of octet 5 contain the sector number (0H = omni). The coding of the cell identity is the responsibility of each administrator. Coding using full hexadecimal representation may be used. The cell identity consists of 2 octets maximum. If an administrator has chosen N bits for the cell identity where N <16 then the additional bits up to 16 are coded with a ‘0’ in each in the following way:

If 8 <N<16 the bits N-8 through 7 of octet 5 are coded with a ‘0’ in each.

If N=8 then octet 5 is coded with a ‘0’ in each bit.

If N<8 then octet 5 is coded with a ‘0’ in each bit and bits N through 7 in octet 4 are coded with a ‘0’ in each.

Table 4.2.17-3 Cell Identifier - Cell Identification Discriminator = ‘0000 0101’

7	6	5	4	3	2	1	0	Octet
(MSB)	LAC							4
LAC cont.							(LSB)	5

LAC:

In the LAC field bit 7 of octet 4 is the most significant bit and bit 0 of octet 5 is the least significant bit. The coding of the location area code is the responsibility of each administrator. Location Area Code (LAC) is an operator-defined identifier for a set of cells. LAC is not defined by the IOS for features (i.e., features are not LAC dependent). In this standard the LAC field is supported; however, it may be ignored or filled with zeros at the supplier’s option, and shall not cause a protocol error.

Table 4.2.17-4 Cell Identifier - Cell Identification Discriminator = ‘0000 0111’

7	6	5	4	3	2	1	0	Octet
MSB	MSCID							4
								5
							LSB	6
MSB	Cell							7
				Sector			LSB	8

MSCID:

The MSCID is coded as defined in [9], section 6.5.2.82. MSCID is 3 octets long where the first two octets (octets 4 and 5) represent Market ID and the last octet represents the Switch Number. In the MSCID field, bit 7 of octet 4 is the most significant bit and bit 0 of octet 5 is the least significant bit of the Market ID field. In the MSCID field bit 7 of octet 6 is the most significant bit of the Switch Number field.

Cell/Sector:

In the Cell/Sector value field bit 7 of octet 7 is the most significant bit and bit 0 of octet 8 is the least significant bit. Bits 3 to 0 of octet 8 contain the sector number (0H = omni). The coding of the cell identity is the responsibility of each administrator. Coding using full hexadecimal representation may be used. The cell identity consists of 2 octets maximum. If an administrator has chosen N bits for the cell identity where N <16 then the additional bits up to 16 are coded with a '0' in each in the following way:

If 8 <N<16 the bits N-8 through 7 of octet 8 are coded with a '0' in each.

If N=8 then octet 8 is coded with a '0' in each bit.

If N<8 then octet 8 is coded with a '0' in each bit and bits N through 7 of octet 7 are coded with a '0' in each.

4.2.18 Cell Identifier List

This element uniquely identifies cells and is of variable length containing the following fields:

4.2.18 Cell Identifier List

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Cell Identification Discriminator								3
Cell Identification 1								4
…								…
Cell Identification n								k

Length:

The Length field is a binary value indicating the number of octets following the Length field.

Cell Identification Discriminator:

Refer to section 4.2.17 for a description of this field.

Cell Identification n (octets 4 – k):

Refer to section 4.2.17 for a description of these fields.

4.2.19 Circuit Identity Code (CIC)

This element defines the terrestrial channel over which the call is to pass. It contains the 5 least significant bits of a binary representation of the timeslot assigned to the circuit. The remaining bits in the CIC are used where necessary, to identify one among several systems interconnecting an originating and destination point.

The Circuit Identity Code defines the PCM multiplex and timeslot in use at the MSC. In cases where re-multiplexing takes place between the circuit-switched MSC and BS a translation may be necessary at the BS.

4.2.19 Circuit Identity Code (CIC)

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
a	b	c	d	e	f	g	h	2
i	j	k	x	x	x	x	x	3

Bits a-k:

These bits define the PCM multiplexer in use.

Bits xxxxx:

These bits define the actual timeslot in use.

4.2.20 Circuit Identity Code Extension

This variable length element defines a full rate terrestrial channel.

4.2.20 Circuit Identity Code Extension

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td colspan="8">Length</td><td>2</td></tr>
<tr><td>(MSB)</td><td colspan="7">Circuit Identity Code</td><td>3</td></tr>
<tr><td colspan="7">Circuit Identity Code (cont.)</td><td>(LSB)</td><td>4</td></tr>
<tr><td colspan="4">Reserved</td><td colspan="4">Circuit Mode</td><td>5</td></tr>
</table>

Length:

This field is defined as the number of octets following the Length field.

Circuit Identity Code:

This field is coded as specified in octets 2-3 of section 4.2.19.

Circuit Mode:

This field informs the MSC about the use of this element, and is encoded as follows:

Table 4.2.20-1 Circuit Identity Code Extension - Circuit Mode Field

Binary Value	Name	Meaning
0000	Full-rate	Full-rate circuit operation.
All other values reserved		

4.2.21 Special Service Call Indicator

The presence of this IE in a message indicates to the MSC that the MS has initiated an emergency call. Associated with this emergency call, the MS may also initiate a position determination service without the use of a service option.

4.2.21 Special Service Call Indicator

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved						MOPD	GECI	3

Length:

This field indicates the number of octets in this element following the Length field.

MOPD:

Mobile Originated Position Determination. This field is set to 1 if the GECI field is set to 1 and the MS initiates a position determination service associated with the global emergency call.

GECI:

Global Emergency Call Indication. This field is set to 1 if the user indicated an emergency call in the cdma2000 air interface message.

4.2.22 Downlink Radio Environment

This element includes signal strength measurement information that was made by the MS. It is of variable length and is coded as follows:

4.2.22 Downlink Radio Environment

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Number of cells								3
Cell Identification Discriminator								4
Cell Identification 1								5-k
Reserved		Downlink Signal Strength Raw						k+1
CDMA Target One Way Delay (high part)								k+2
CDMA Target One Way Delay (low part)								k+3
…								…
Cell Identification n								m-n
Reserved		Downlink Signal Strength Raw						n+1
CDMA Target One Way Delay (high part)								n+2
CDMA Target One Way Delay (low part)								n+3

Length:

This field is defined as the number of octets following the Length field.

Number of Cells:

Octet 3 indicates the number of cells represented by this element. For each cell, the Cell Identification, Downlink Signal Strength Raw, and CDMA Target One Way Delay fields are replicated.

Cell Identification Discriminator:

This field is coded per section 4.2.17. It applies to all Cell Identification fields present in this element.

Cell Identification:

This field is coded as per the equivalent octets described in section 4.2.17, and shall uniquely identify one cell. Only one cell can be indicated per replication.

Downlink Signal Measurement Raw:

This field is an average signal level measured by the MS for the specified cell. The method of measurement is unique to the signaling system. The signal level is the last measurement average received from the MS in its raw, not normalized format.

The range of values for this field is 0 to 63 where the units are defined by

$$\lfloor -2 \times 10 \times \log_{10} \mathrm{PS} \rfloor$$

where PS is the strength of this pilot measured as the sum of ratios of received pilot energy per chip to the total received spectral density (noise and signals) of at most k usable multi-path components, where k is the number of demodulating elements supported by the MS.

CDMA Target One Way Delay:

This field shall contain the estimated one-way delay from the MS to the associated target cell, according to the information reported by the MS.

The CDMA Target One Way Delay is specified in units of 100 ns, using two’s complement numbers to represent negative values. The BS calculates the value of the CDMA Target One Way Delay as follows:

$\lfloor$ (Target PN phase measured by the MS - Target pilot offset index $\times$ 64 +

CDMA Serving One Way Delay in PN chips) / 0.12288 $\rfloor$

Where:

The target PN phase is reported by the MS in the Pilot Strength Measurement Message.

The target pilot offset index is derived by the BS from information in the Pilot Strength Measurement Message.

The CDMA serving One Way Delay is the one way propagation delay estimated by the BS in relation to CDMA System Time, refer to [2]. Refer also to section 4.2.57, CDMA Serving One Way Delay.

4.2.23 *IS-2000* Channel Identity 3X

This element specifies identity information for one or more *cdma2000* radio channels operating in 3X mode.

4.2.23 *IS-2000* Channel Identity 3X

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
OTD	Physical Channel Count			Frame Offset				3
Physical Channel Type 1								4
Rev_ FCH_ Gating	Reverse Pilot Gating Rate 1		QOF Mask 1		Walsh Code Channel Index 1 (high part)			5
Walsh Code Channel Index 1 (low part)								6
Pilot PN Code 1 (low part)								7
Pilot PN Code 1 (high part)	Reserved		Power combined 1	Freq. Included 1	ARFCN 1 (high part)			8
ARFCN (low part)								9
Reserved			Lower QOF Mask 1		Lower Walsh Code Channel Index 1 (high part)			10
Lower Walsh Code Channel Index 1 (low part)								11
Reserved			Upper QOF Mask 1		Upper Walsh Code Channel Index 1 (high part)			12
Upper Walsh Code Channel Index 1 (low part)								13
…								…
Physical Channel Type n								k
Rev_ FCH_ Gating	Reverse Pilot Gating Rate n		QOF Mask n		Walsh Code Channel Index n (high part)			k+1
Walsh Code Channel Index n (low part)								k+2
Pilot PN Code n (low part)								k+3
Pilot PN Code n (high part)	Reserved		Power combined n	Freq. Included n	ARFCN n (high part)			k+4
ARFCN n (low part)								k+5
Reserved			Lower QOF Mask n		Lower Walsh Code Channel Index n (high part)			k+6

4.2.23 *IS-2000* Channel Identity 3X

7	6	5	4	3	2	1	0	Octet
Lower Walsh Code Channel Index n (low part)								k+7
Reserved			Upper QOF Mask n		Upper Walsh Code Channel Index n (high part)			k+8
Upper Walsh Code Channel Index n (low part)								k+9

Length:

This field indicates the number of octets in this element following the Length field. The length of this element is variable because more than one target cell may be requested in a hard handoff. Therefore, this element provides the flexibility to specify multiple channels that the target BS can accommodate.

Orthogonal Transmit Diversity (OTD):

This bit shall be set to '1' to indicate that the MS is using OTD. It is set to '0' otherwise.

Physical Channel Count:

Number of *IS-2000* physical channels that are being handed off.

Frame Offset:

This field contains the number of 1.25 ms intervals relative to system time that the forward and reverse traffic channels are delayed by the source.

The remaining fields are repeated once for each physical channel type for each cell.

Physical Channel Type:

This field contains the binary value used to indicate the type of physical channel. Valid values are shown in Table 4.2.23-1.

Table 4.2.23-1 *IS-2000* Channel Identity 3X- Physical Channel Type

Hex Values	Meaning
01H	Fundamental Channel (FCH) *cdma2000*
02H	Dedicated Control Channel (DCCH) *cdma2000*
All other values	Reserved

Rev_FCH_Gating:

This field is used to indicate availability of the reverse FCH gating mode. The field is set to '1' if the BS allows the MS to perform reverse FCH gating mode; otherwise it is set to '0'.

In messages sent from the source BS that contain the IS-2000 Channel Identity 3X IE, this field indicates whether or not the source BS allowed the MS to perform reverse FCH gating.

In messages sent from the target BS that contain the IS-2000 Channel Identity 3X IE, this field indicates whether or not the target BS will allow the MS to perform reverse FCH gating after the handoff.

Reverse Pilot Gating Rate:

This field is used to indicate the gating rate for the Reverse Pilot channel as shown in Table 4.2.23-2.

Table 4.2.23-2 *IS-2000* Channel Identity 3X- Reverse Pilot Gating Rate

Binary Values	Meaning
00	Gating rate 1
01	Gating rate 1/2
10	Gating rate 1/4
11	Reserved

QOF Mask:

This field contains the QOF (Quasi-Orthogonal Function) mask index as specified in [2]. This QOF Mask is used with the center frequency channel.

Walsh Code Channel Index:

This field specifies one of 256 possible Walsh Codes used to channelize the downlink RF bit stream in a *cdma2000* call. The high order 3 bits are reserved for future expansion. This Walsh Code is used with the center frequency channel.

Pilot PN Code:

The Pilot PN Code is one of 511 unique values for the Pilot Channel offset. The offsets are in increments of 64 PN chips.

Power Combined:

The Power Combined field is a flag that, when set to '1', indicates diversity combining of the power control sub-channel of this *TIA/EIA-2000* code channel with the previous *cdma2000* code channel supporting the same physical channel listed in this element. In other words, if this is the second replication of octets k through k+9, then the power control sub-channel of this *cdma2000* code channel is diversity combined with power control sub-channel of the previous replication of octets k through k+9. The first occurrence of this field in the *IS-2000* Channel Identity element is set to zero.

Freq. Included:

The Frequency Included field is a flag indicating whether the frequency assignment is included. A '0' indicates no frequency assignment is present, a '1' indicates a frequency assignment is present and is specified in the ARFCN field of this element.

ARFCN:

This field identifies the Absolute Radio Frequency Channel Number relative to the band class for the call association. This channel number refers to the center frequency channel.

Lower QOF Mask:

This field contains the QOF mask index as specified in [2] that is used with the lower frequency channel in a 3X system.

Lower Walsh Code Channel Index:

This field specifies one of 256 possible Walsh Codes used to channelize the downlink RF bit stream in a *cdma2000* call. The high order 3 bits are reserved for future expansion. This Walsh Code is used with the lower frequency channel.

Upper QOF Mask:

This field contains the QOF mask index as specified in [2] that is used with the upper frequency channel in a 3X system.

Upper Walsh Code Channel Index:

This field specifies one of 256 possible Walsh Codes used to channelize the downlink RF bit stream in a *cdma2000* call. The high order 3 bits are reserved for future expansion. This Walsh Code is used with the upper frequency channel.

4.2.24 Source PDSN Address

This element contains an IPv4 IP Address of the A11 interface for a source PDSN.

4.2.24 Source PDSN Address

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Source PDSN Address							3
								4
								5
							(LSB)	6

Length:

This field indicates the number of octets in this element following the Length field.

Source PDSN Address:

This field contains an IPv4 address of the A11 interface for a source PDSN.

4.2.25 Handoff Power Level

This element contains the desired Handoff Power Level of the MS. This element is applicable when operating in a CDMA system and the target BS is in an analog [19] system.

4.2.25 Handoff Power Level

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Number of Cells								3
Reserved	ID Type		Handoff Power Level					4
Cell Identification 1								5-8
Reserved			Handoff Power Level					9
Cell Identification 2								10-11
…								…
Reserved			Handoff Power Level					j
Cell Identification n								k

Length:

This field is defined as the number of octets following the Length field.

Number of Cells:

Octet 3 indicates the number of cells represented by this element. For each cell, the Handoff Power Level and Cell Identification fields are replicated.

ID Type:

This field specifies the type of Cell Identification. If the ID Type field is set to ‘01’, Cell Identification shall be formatted according to Cell Identification Discriminator ‘0000 0111’. All other ID Type value are reserved.

Handoff Power Level:

This field provides a recommendation of the uplink power level that the MS should use when accessing the target on handoff. Refer to [19].

Cell Identification:

This field is coded as per the Cell Identification field described in section 4.2.17. The first instance of the Cell Identification field in this element shall be formatted according to Cell Identification Discriminator Cell Identification Discriminator ‘0000 0111’. Subsequent instances shall be formatted according to Cell Identification Discriminator ‘0000 0010’.

4.2.26 User Zone ID

This element uniquely identifies a particular User Zone

4.2.26 User Zone ID

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	UZID							3
							(LSB)	4

Length:

This field indicates the number of octets in this element following the Length field.

UZID:

This field contains a User Zone ID value as sent by the MSC or MS. The MSC is responsible for any mapping of this 16-bit value to the 24-bit value defined in [9].

4.2.27 *IS-2000* Channel Identity

This element specifies identity information for one or more *cdma2000* radio channels.

4.2.27 *IS-2000* Channel Identity

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
OTD	Physical Channel Count			Frame Offset				3
Physical Channel Type 1								4
Rev_FCH_ Gating 1	Reverse Pilot Gating Rate 1		QOF Mask 1		Walsh Code Channel Index 1 (high part)			5
Walsh Code Channel Index 1 (low part)								6
Pilot PN Code 1 (low part)								7
Pilot PN Code 1 (high part)	Reserved		Power combined 1	Freq. Included 1	ARFCN 1 (high part)			8
ARFCN 1 (low part)								9
…								…
Physical Channel Type n								k
Rev_FCH_ Gating n	Reverse Pilot Gating Rate n		QOF Mask n		Walsh Code Channel Index n (high part)			k+1
Walsh Code Channel Index n (low part)								k+2
Pilot PN Code n (low part)								k+3
Pilot PN Code n (high part)	Reserved		Power combined n	Freq. Included n	ARFCN n (high part)			k+4
ARFCN n (low part)								k+5
FDC Length								k+6
FDC Band Class					FDC Forward Channel Frequency			k+7
…								k+8
FDC Reverse Channel Frequency								k+9
…			Reserved					k+10

Length:

This field indicates the number of octets in this element following the Length field. The length of this element is variable because more than one target cell may be requested in a hard handoff. Therefore, this element provides the flexibility to specify multiple channels that the target BS can accommodate.

OTD:

This bit shall be set to ‘1’ to indicate that the MS is using OTD. It is set to ‘0’ otherwise.

Physical Channel Count:

Number of *IS-2000* physical channels that are being handed off.

Frame Offset:

This field contains the number of 1.25 ms intervals relative to system time that the forward and reverse traffic channels are delayed by the source.

The remaining fields are repeated once for each physical channel type for each cell.

Physical Channel Type:

This field contains the binary value used to indicate the type of physical channel. Valid values are shown in Table 4.2.27-1.

Table 4.2.27-1 *IS-2000* Channel Identity - Physical Channel Type

Hex Values	Meaning
01H	Fundamental Channel (FCH) *cdma2000*
02H	Dedicated Control Channel (DCCH) *cdma2000*
All other values	Reserved

Rev_FCH_Gating:

This field is used to indicate availability of the reverse FCH gating mode. The field is set to ‘1’ if the BS allows the MS to perform reverse FCH gating mode; otherwise it is set to ‘0’.

In messages sent from the source BS that contain the IS-2000 Channel Identity IE, this field indicates whether or not the source BS allowed the MS to perform reverse FCH gating.

In messages sent from the target BS that contain the IS-2000 Channel Identity IE, this field indicates whether or not the target BS will allow the MS to perform reverse FCH gating after the handoff.

Reverse Pilot Gating Rate:

This field is used to indicate the gating rate for the Reverse Pilot channel as shown in Table 4.2.27-2.

Table 4.2.27-2 *IS-2000* Channel Identity - Reverse Pilot Gating Rate

Binary Values	Meaning
00	Gating rate 1
01	Gating rate ½
10	Gating rate ¼
11	Reserved

QOF Mask:

This field contains the QOF (Quasi-Orthogonal Function) mask index as specified in [2].

Walsh Code Channel Index:

This field specifies one of 256 possible Walsh Codes used to channelize the downlink RF bit stream in a *cdma2000* call. The high order 3 bits are reserved for future expansion.

Pilot PN Code:

The Pilot PN Code is one of 511 unique values for the Pilot Channel offset. The offsets are in increments of 64 PN chips.

Power Combined:

The Power Combined field is a flag that, when set to ‘1’, indicates diversity combining of the power control sub-channel of this cdma2000 code channel with the previous cdma2000 code channel supporting the same physical channel listed in this element. In other words, if this is the second replication of octets k through k+5, then the power control sub-channel of this cdma2000 code channel is diversity combined with power control sub-channel of the previous replication of octets k through k+5. The first occurrence of this field in the *IS-2000* Channel Identity element is set to zero.

Freq. Included:

The Frequency Included field is a flag indicating whether the frequency assignment is included. A ‘0’ indicates no frequency assignment is present, a ‘1’ indicates a frequency assignment is present and is specified in the ARFCN field of this element.

ARFCN:

This field identifies the Absolute Radio Frequency Channel Number relative to the band class for the call association.

FDC Length:

This field contains the number of bytes following this field as a binary number, for the Flex Duplex Channel (FDC) information. If this field is set to zero, then the FDC Band Class, Forward Channel Frequency and Reverse Channel Frequency information are omitted.

FDC Band Class:

This field contains the band class information for the flex duplex channel provided by the target BS. Refer to [5].

FDC Forward Channel Frequency:

This field contains the forward channel information for the flex duplex channel provided by the target BS. Refer to [5].

FDC Reverse Channel Frequency:

This field contains the reverse channel information for the flex duplex channel provided by the target BS. Refer to [5].

4.2.28 Response Request

The presence of this element indicates that a response is required by the sender. The element has a fixed length of one octet. Each procedure that uses this element shall specify the appropriate responses.

4.2.28 Response Request

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1

4.2.29 MS Measured Channel Identity

This element indicates the band class and frequency that has been measured by the MS in preparation for a hard handoff.

Note: This element was formerly called "IS-95 MS Measured Channel Identity" in previous versions of this standard.

4.2.29 MS Measured Channel Identity

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
A1 Element Identifier								1
Length								2
Band Class					(MSB)	ARFCN		3
							(LSB)	4

Length:

This field indicates the number of octets in this element following the Length field.

Band Class:

The BS shall copy the band class from the Candidate Frequency Search Report message received from the MS into this field when this element is included in the Handoff Required message. The MSC shall copy this value to the corresponding field in this same element in the Handoff Request message. The coding of this field is specified in [30].

ARFCN:

The BS shall set this field to the CDMA channel number in the specified CDMA band class corresponding to the CDMA frequency assignment for the candidate frequency.

4.2.30 Layer 3 Information

This element is included in the Complete Layer 3 Information message. It contains either the Location Updating Request message, CM Service Request message or Paging Response message.

4.2.30 Layer 3 Information

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Layer 3 Information								3-n

Length:

This field indicates the number of octets following the Length field.

Layer 3 Information:

The coding of this field follows the DTAP message encoding rules, and accordingly the Protocol Discriminator, Reserved Octet and Message Type elements in octets 3, 4, and 5, respectively do not include an Element Identifier.

4.2.31 Protocol Discriminator

This element distinguishes the messages belonging to the following procedures:

1. Call Processing and Call Related Supplementary Services
2. Mobility Management
3. Radio Resource Management
4. Facilities Management
5. Other Signaling Procedures

The message category of each DTAP message may be determined from Table 4.2.4-2.

4.2.31 Protocol Discriminator

7	6	5	4	3	2	1	0	Octet
Reserved				Protocol Discriminator				1

Reserved:

These bits are coded as '0H'.

Protocol Discriminator:

The coding of this field is shown in Table 4.2.31-1.

Table 4.2.31-1 Protocol Discriminator

3	2	1	0	Description
0	0	1	1	Call Processing and call related Supplementary Services
0	1	0	1	Mobility Management
0	1	1	0	Radio Resource Management
1	0	0	1	Facility Management
1	0	1	1	Other Signaling Procedures
1	1	1	1	reserved for test procedures
All other values reserved				

4.2.32 Reserved-Octet

This element, used in a DTAP message, does not have an element identifier. It uses a single octet and is always coded as zero.

4.2.32 Reserved-Octet

7	6	5	4	3	2	1	0	Octet
0	0	0	0	0	0	0	0	1

4.2.33 Authentication Confirmation Parameter (RANDC)

This element contains the Authentication Confirmation Parameter (RANDC) received from the MS. The RANDC is included for the use of the network.

4.2.33 Authentication Confirmation Parameter (RANDC)

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
RANDC								2

RANDC:

This field contains the Authentication Confirmation Parameter (RANDC) received from the MS.

4.2.34 Reject Cause

This element indicates the reason for rejecting an MS request by the network.

4.2.34 Reject Cause

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reject Cause Value								2

The Reject Cause Value:

This field is coded as follows:

Table 4.2.34-1 Reject Cause Value

Bit Positions								Hex	
7	6	5	4	3	2	1	0	Value	Reject Cause
0	0	0	0	0	0	0	1	01	Reserved
0	0	0	0	0	0	1	0	02	MIN/IMSI unknown in HLR
0	0	0	0	0	0	1	1	03	Illegal MS
0	0	0	0	0	1	0	0	04	TMSI/IMSI/MIN unknown in VLR
0	0	0	0	0	1	0	1	05	Reserved
0	0	0	0	1	0	1	1	0B	Roaming not allowed
0	0	0	0	1	1	0	0	0C	Location area not allowed
0	0	1	0	0	0	0	0	20	Service option not supported
0	0	1	0	0	0	0	1	21	Requested service option not subscribed
0	0	1	0	0	0	1	0	22	Service option temporarily out of order
0	0	1	0	0	1	1	0	26	Call cannot be identified
0	1	0	1	0	0	0	1	51	Network failure
0	1	0	1	0	1	1	0	56	Congestion
0	1	1	0	0	0	1	0	62	Message type non-existent or not implemented
0	1	1	0	0	0	1	1	63	Information element non-existent or not implemented
0	1	1	0	0	1	0	0	64	Invalid information element contents
0	1	1	0	0	1	0	1	65	Message not compatible with the call state
0	1	1	0	0	1	1	0	66	Protocol error, unspecified
0	1	1	0	1	1	1	0	6E	Invalid message, unspecified
0	1	1	0	1	1	1	1	6F	Mandatory information element error
All other values reserved.									

4.2.35 Authentication Challenge Parameter (RAND/RANDU/RANDBS/RANDSSD)

The Authentication Challenge Parameter IE provides a non-predictable number which is used for authentication/SSD update.

4.2.35 Authentication Challenge Parameter (RAND/RANDU/RANDBS/RANDSSD)

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td colspan="8">Length</td><td>2</td></tr>
<tr><td colspan="4">Reserved</td><td colspan="4">Random Number Type</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">RAND/RANDU/RANDBS/RANDSSD Value</td><td>4</td></tr>
<tr><td colspan="8"></td><td>5-m</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>m+1</td></tr>
</table>

Length:

This field indicates the number of octets in this element following the Length field.

Random Number Type:

Table 4.2.35-1 Authentication Challenge Parameter - Random Number Type

Random Number Type Value	Random Number Type	Random Number Length
0001	RAND	32 bits
0010	RANDU	24 bits
0100	RANDSSD	56 bits
1000	RANDBS	32 bits
All other values reserved.		

RAND/RANDU/RANDBS/RANDSSD Value:

This field contains a non-predictable number that is used for authentication/SSD update. Bit 7 of the lowest numbered octet is the most significant bit, while bit 0 of the highest numbered octet is the least significant bit.

4.2.36 Authentication Response Parameter (AUTHR/AUTHU/AUTHBS)

This element provides the authentication response signature calculated by the MS or the network as appropriate.

In *cdma2000* systems the authentication response may be the AUTHR, AUTHU, or AUTHBS.

AUTHU and AUTHR are used in messages which are transmitted from the MS/BS to the HLR/AC. AUTHBS is used in messages which are transmitted from the HLR/AC to the MS/BS.

4.2.36 Authentication Response Parameter (AUTHR/AUTHU/AUTHBS)

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved				Auth Signature Type				3
0	0	0	0	0	0	(MSB)		4
Auth Signature								5
							(LSB)	6

Length:

This field indicates the number of octets in this element following the Length field.

Auth Signature Type:

This field identifies the type of authentication signature included in this element and shall be set as follows:

Table 4.2.36-1 Authentication Response Parameter - Auth Signature Type

Auth Signature Type Value	Auth Signature Type
0001	AUTHR
0010	AUTHU
0100	AUTHBS
All other values are reserved.	

Auth Signature:

This field occupies the lower 18 bits in octets four through six. The higher order bits in octet four are set to ‘0’. Bit seven of octet four is the most significant bit, while bit zero of octet six is the least significant bit. This field contains the authentication signature (AUTHR/AUTHU/AUTHBS).

4.2.37 Authentication Parameter COUNT

This element provides the HLR/AC with the MS's call history parameter.

4.2.37 Authentication Parameter COUNT

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved		Count						2

Count:

This field contains the MS's Call History Parameter (COUNT). Refer to [4].

4.2.38 Signal

This element is used by the circuit-switched MSC to transfer the information required for creating the tone or the alerting signals to the BS for transmission in appropriate messages to the MS. This IE may be repeated in a message. It is the responsibility of the circuit-switched MSC to map any signal values received via [9] or other protocol into the values given below.

4.2.38 Signal

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Signal Value								2
Reserved						Alert Pitch		3

Note: This previously defined IE is no longer used and is maintained here only for backwards compatibility.

Signal Value:

This field is coded as shown in Tables 4.2.38-1 and 4.2.38-2.

Table 4.2.38-1 Signal Value: Tones

Binary Values	Meaning
0000 0000	Dial tone on
0000 0001	Ring back tone on
0000 0010	Intercept tone on
0000 0011	Network congestion (reorder) tone on
0000 0100	Busy tone on
0000 0101	Confirm tone on
0000 0110	Answer tone on
0000 0111	Call waiting tone on
0000 1000	Off-hook warning tone on
0011 1111	Tones off

Table 4.2.38-2 Signal Value: cdma2000 Alerting

Binary Values	Meaning
0100 0000	Normal Alerting
0100 0001	Inter-group Alerting
0100 0010	Special/Priority Alerting
0100 0011	Reserved (ISDN Alerting pattern 3)
0100 0100	Ping Ring (abbreviated alert)
0100 0101	Reserved (ISDN Alerting pattern 5)
0100 0110	Reserved (ISDN Alerting pattern 6)
0100 0111	Reserved (ISDN Alerting pattern 7)
0110 0011	Abbreviated intercept
0110 0101	Abbreviated reorder
0100 1111	Alerting off

Reserved:

These bits are coded as ‘000000’.

Alert Pitch:

This field is coded as shown in Table 4.2.38-3.

Table 4.2.38-3 Signal - Alert Pitch Values

Binary Values	Meaning
00	Medium pitch (standard alert)
01	High pitch
10	Low pitch
11	Reserved

Table 4.2.38-4 provides a mapping between signal values in [9], [1]~[6], and this specification.

Table 4.2.38-4 Signal - Signal Value Mapping: *TIA/EIA-41, cdma-2000, and the IOS*

Tone & Reference	**TONES (Signal Type = ‘00’)**			
Reference	*cdma2000*		*ANSI-41*	*IOS*
	SIGNAL_TYPE	SIGNAL field	Announcement Code Value	
Dial Tone	00	000000	00000000	00000000
Ring Back	00	000001	00000001	00000001
Intercept	00	000010	00000010	00000010
Abbreviated Intercept	00	000011	11000001	01100011
Network Congestion	00	000100	00000011	00000011
Abbreviated Network Congestion	00	000101	11000010	01100101
Busy	00	000110	00000100	00000100
Confirm	00	000111	00000101	00000101
Answer	00	001000	00000110	00000110
Call Waiting	00	001001	00000111	00000111
Tones Off	00	111111	00111111	00111111
No Tone (off)	10	000000	000000	10000000
Long (standard alert)	10	000001	000001	10000001
Short-Short	10	000010	000010	10000010
Short-Short-Long	10	000011	000011	10000011
Short-Short2	10	000100	000100	10000100
Short-Long-Short	10	000101	000101	10000101
Short-Short-Short-Short	10	000110	000110	10000110
PBX Long	10	000111	000111	10000111
PBX Short-Short	10	001000	001000	10001000
PBX Short-Short-Long	10	001001	001001	10001001
PBX Short-Long-Short	10	001010	001010	10001010
PBX Short-Short-Short-Short	10	001011	001011	10001011

Table 4.2.38-4 (Cont.) Signal - Signal Value Mapping: *TIA/EIA-41, cdma-2000, and the IOS*

Alert Type & Reference	**Alerting (Signal Type = '01')**			
Reference	*cdma2000*		*ANSI-41*	*IOS*
	SIGNAL_TYPE	SIGNAL field		
Normal Alerting	01	000000	000001	01000000
Intergroup Alerting	01	000001	NA	01000001
Special/Priority Alerting	01	000010	NA[6]	01000010
Rsvd (pattern 3)	01	000011	NA	01000011
Ping-ring	01	000100	NA	01000100
Rsvd (pattern 5)	01	000101	NA	01000101
Rsvd (pattern 6)	01	000110	NA	01000110
Rsvd (pattern 7)	01	000111	NA	01000111
Alerting Off	01	001111	000000	01001111

6 IS-41C does not support the Alert Codes marked 'NA'.

4.2.39 CM Service Type

This element specifies the type of service requested from the network.

The CM Service Type IE is coded as shown below. It is a type 1 IE.

4.2.39 CM Service Type

7	6	5	4	3	2	1	0	Octet
1	A1 Element Identifier			Service Type				1

Service Type:

This field is coded as shown in Table 4.2.39-1.

Table 4.2.39-1 CM Service Types

Binary Values	Meaning
0001	Mobile originating call establishment
0010	Emergency call establishment
0100	Short Message transfer
1000	Supplementary service activation
All other values reserved	

4.2.40 Called Party BCD Number

The purpose of the Called Party BCD Number IE is to identify the called party.

The Called Party BCD Number IE is coded as shown below. It is a type 4 IE with 19 octets length maximal. The maximum number of number digit(s)/end mark(s) is 32.

4.2.40 Called Party BCD Number

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
1	Type of Number			Numbering Plan Identification				3
Number Digit/End Mark 2				Number Digit/End Mark 1				4
Number Digit/End Mark 4				Number Digit/End Mark 3				5
…								…
Number Digit/End Mark m+1				Number Digit/End Mark m				n

Length:

This field indicates the number of octets following the Length field.

If the Called Party BCD Number IE is included in a Setup message for emergency call establishment, the Length field may be set to 0.

Type of Number:

This field is coded as shown in Table 4.2.40-1. Type of Number field in octet 3 is coded as follows:

Table 4.2.40-1 Called Party BCD Number - Type of Number Values

Binary Values	Meaning
000	Unknown [a]
001	International number [b, d]
010	National number [b]
011	Network specific number [c]
100	Dedicated PAD access, short code
101	Reserved
110	Reserved
111	Reserved for extension

a. The Type of Number “unknown” is used when the user of the network has no knowledge of the Type of Number, e.g., international number, national number, etc. In this case, the number digits/end marks field is organized according to the network dialing plan (e.g., prefix or escape digits might be present).

b. Prefix or escape digits shall not be included.

c. The Type of Number “network specific number” is used to indicate administration/service number specific to the serving network (e.g., used to access an operator).

d. The international format shall also be accepted by the MSC when the call is destined to the same country as the MSC.

Numbering Plan Identification:

This field is coded as follows:

Table 4.2.40-2 Called Party BCD Number - Numbering Plan Identification Values

Binary Values	Meaning
0000	unknown [a]
0001	ISDN/telephony number plan ([35])
0011	data number plan ([38])
0100	telex numbering plan ([36])
1000	national numbering plan
1001	private numbering plan
0111	reserved for extension
All other values reserved.	

a. The numbering plan “unknown” is used when the user or network has no knowledge of the numbering plan. In this case, the number digits/end marks field is organized according to the network dialing plan (e.g., prefix or escape digits might be present).

Number Digits/End Marks:

These fields in octets 4 through n are coded as shown in Table 4.2.40-3. If the Called Party BCD Number element contains an odd number of digits/end marks, bits 4 to 7 of the last octet shall be set to ‘1111’.

Table 4.2.40-3 Called Party BCD Number - Number Digit Values

Binary Values	Meaning
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	*
1011	#
1100	a
1101	b
1110	c
1111	used as end mark in case of odd number information

4.2.41 Quality of Service Parameters

This element identifies the Quality of Service for a given packet service. In this version of this standard the only information carried is non-assured mode packet priority.

4.2.41 Quality of Service Parameters

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved				Non-Assured Mode Packet Priority				3

Length:

This field indicates the number of octets in this element following the Length field.

Non-Assured Mode Packet Priority:

This field indicates the priority of a non-assured packet data service as a binary value. Value ‘0000’ is the lowest priority. Value ‘1101’ is the highest priority. Values ‘1110’ and ‘1111’ are reserved.

4.2.42 Cause Layer 3

This element is included to provide the reason for generating certain messages, to provide diagnostic information in the event of procedural errors and to indicate the location of the cause originator.

The Cause Layer 3 is a type 4 IE.

4.2.42 Cause Layer 3

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
ext=1	Coding Standard		Reserved	Location				3
ext=1	Cause Value							4

Length:

This field indicates the number of octets in this element following the Length field.

Ext:

Refer to section 4.1.4 for the coding of extension bits (bit 7 in octets 3 and 4).

Coding Standard:

This field is coded as shown in Table 4.2.42-1.

Table 4.2.42-1 Cause Layer 3 - Coding Standard

Binary Values	Meaning
00	Standard as described in [37]
01	Reserved for other international standards
10	National standard
11	Reserved for other international standards

Location:

This field is coded as shown in Table 4.2.42-2.

Table 4.2.42-2 Cause Layer 3 - Location

Binary Values	Meaning
0000	User
0001	Private network serving the local user
0010	Public network serving the local user
0011	Transit network
0100	Public network serving the remote user
0101	Private network serving the remote user
0111	International network
1010	Network beyond interworking point
All other values reserved	

Cause Value:

The Cause Value field is divided into two subfields: a Class (bits 4 through 6) and a value within the Class (bits 0 through 3).

The class indicates the general nature of the event, and is coded as shown in Table 4.2.42-3.

Table 4.2.42-3 Cause Layer 3 - Cause (Class) Value

Binary Values	Meaning
Class (000)	Normal event
Class (001)	Normal event
Class (010)	Resource unavailable
Class (011)	Service or option not available
Class (100)	Service or option not implemented
Class (101)	Invalid message (e.g., parameter out of range)
Class (110)	Protocol error (e.g., unknown message)
Class (111)	Interworking

The values for each class are shown in Table 4.2.42-4.

Table 4.2.42-4 Cause Layer 3 Values

Binary Cause Values	Cause Diagnostic Remarks
Class (000) and Class (001) - Normal Event	
000 0001	Unassigned (unallocated) number
000 0011	No route to destination
000 0110	Channel unacceptable
000 1111	Procedure failed
001 0000	Normal Clearing
001 0001	User busy
001 0010	No user responding
001 0011	User alerting, no answer

Table 4.2.42-4 Cause Layer 3 Values

Binary Cause Values	Cause Diagnostic Remarks
001 0101	Call rejected
001 0110	Number changed new destination[a]
001 1010	Non selected user clearing
001 1011	Destination out of order
001 1100	Invalid number format (incomplete number)
001 1101	Facility rejected
001 1111	Normal, unspecified
Class (010) - Resource Unavailable	
010 0010	No circuit/channel available
010 0110	Network out of order
010 1001	Temporary failure
010 1010	Switching equipment congestion
010 1011	Access information discarded information element ids
010 1100	requested circuit/channel not available
010 1111	Resources unavailable, unspecified
Class (011) - Service or Option Not Available	
011 0001	Quality of service unavailable
011 0010	Requested facility not subscribed
011 0011	Request MUX option or rates unavailable
011 1001	Bearer capability not authorized[b]
011 1010	Bearer capability not presently available[b]
011 1011	SSD update rejected
011 1111	Service or option not available, unspecified
Class (100) - Service or Option Not Implemented	
100 0001	Bearer service not implemented[b]
100 0101	Requested facility not implement
100 0110	Only restricted digital information bearer capability is available[b]
100 1111	Service or option not implemented, unspecified
Class (101) - Invalid Message	
101 0001	Reserved
101 1000	Incompatible destination incompatible parameter[c]
101 1011	Invalid transit network selection
101 1111	Invalid message, unspecified
Class (110) - Protocol Error	
110 0000	Mandatory information element error information element identifier(s)
110 0001	Message type nonexistent or not implemented message type

Table 4.2.42-4 Cause Layer 3 Values

Binary Cause Values	Cause Diagnostic Remarks
110 0010	Message not compatible with control state message type or message type nonexistent or not implemented
110 0100	Invalid information element contents information element Identifier(s)
110 0101	Message not compatible with call state message type
110 1111	Protocol error, unspecified
Class (111) - Interworking	
111 1111	Interworking, unspecified
All other values reserved	

a. New destination is formatted as the called party number IE, including IE identifier.

b. These values are being kept for backward compatibility.

c. Incompatible parameter is composed of incompatible IE identifier.

4.2.43 Transcoder Mode

This element specifies the settings of the transcoder in the BS, for one party of the call.

4.2.43 Transcoder Mode

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length = [01H]								2
Reserved							TFO Mode	3

Length:

This field indicates the number of octets in this element following the Length field.

TFO Mode:

This field specifies whether the transcoder should disable the inband signaling mechanism and employ the speech coding algorithm appropriate to the channel type (e.g., 13K Vocoder for *cdma2000*) or enable the inband signaling mechanism and attempt tandem free operation. The bit is set to ‘0’ for tandem mode, ‘1’ for TFO.

4.2.44 Power Down Indicator

The presence of this type 2 element in a message indicates to the MSC that the MS has powered down at the end of a call. Refer to section 4.1.3 for additional information on type 2 IEs.

4.2.44 Power Down Indicator

7	6	5	4	3	2	1	0	Octet
1	0	1	0	A1 Element Identifier				1

4.2.45 Registration Type

This IE indicates the type of registration requested by an MS. An MS registering on an access channel may initiate any of the following types of registration, when enabled. This element shall not be included if the BS cannot determine the registration type, and shall always be present in the case of power down registration.

4.2.45 Registration Type

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Location Registration Type								2

Location Registration Type:

This field in octet 2 is coded as shown in Table 4.2.45-1.

Table 4.2.45-1 Location Registration Type

Binary Values	Meaning
0000 0000	Timer-based
0000 0001	Power-up
0000 0010	Zone-based
0000 0011	Power-down
0000 0100	Parameter-change
0000 0101	Ordered
0000 0110	Distance-based
0000 0111	User Zone-based
0000 1001	BCMC Registration
All other values reserved	

Timer Based Registration

Timer based registration is performed when a timer expires in the MS. This causes the MS to register at regular intervals, allowing deregistration of inactive MSs by the network.

Power Up Registration

Power up registration is performed when power is applied to the MS. This is used to notify the network that the MS is now active.

Zone Based Registration

A mobile service area may be partitioned into smaller regions, called Zones, which is a group of one or more cells. The MS identifies the current zone via parameters on the forward control channel, which are specific to the air interface type. When the MS enters a (SID/NID) zone in which it is not registered, it may initiate zone based registration. Zone based registration allows the network to limit paging to only the zone(s) in which the MS is registered.

Power Down Registration

Power down registration may be performed when the MS is switched off. Power down registration may occur as an independent procedure on the control channel, or an indication of the power down may accompany a release operation on the traffic channel for a call in progress. This latter form of power down registration is described in [13].

Parameter Change Registration

Parameter change registration may be performed when specific operating parameters in the MS are modified.

Ordered Registration

Ordered Registration occurs when the BS orders an MS to register with the network (Network Initiated Registration).

Distance Based Registration

When the distance (computed via control channel parameters) between the current cell and the cell where the MS last registered is exceeded by a threshold, distance based registration may be performed by the MS.

User Zone Registration

User Zone Registration is performed when the MS selects an active User Zone while in the idle state. The active User Zone distinguishes the grade of service for a specific areas where the MS receives tiered services.

BCMC Registration

When an MS is to monitor a BCMCS flow on a designated frequency other than the hash-to frequency, the MS performs a BCMC registration to inform the BS so the BS can determine in which frequency to page the MS. The BCMC registration is also used when the MS decides to monitor a BCMC flow configured for transmission which is currently not being transmitted. Refer to [5].

4.2.46 Tag

This element provides a reference for correlating a response to the original request. If the sender desires a response, then this element is included in the request message. If this element is received, the response message shall contain this element set to the received Tag value. Use of this element allows multiple instances of a request to be outstanding simultaneously. When the Tag element is used by the MSC on a message that causes interaction with the MS on a traffic channel, the MSC shall be prepared to handle call clearing. If call clearing occurs, the MSC is then aware that the MS may not have received the information contained in that message. Unless the call is cleared, the BS shall respond with the appropriate response message when the Tag element is included in the request message.

4.2.46 Tag

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Tag Value								2
…								…
								5

Tag Value:

This field is a 32 bit fixed length field (octets 2 through 5). The value of this field is a manufacturer's concern.

4.2.47 Hard Handoff Parameters

This element is used to deliver information needed by the source BS to perform hard handoff.

4.2.47 Hard Handoff Parameters

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td colspan="3">Reserved</td><td colspan="5">Band Class</td><td>2</td></tr>
<tr><td colspan="3">Number of Preamble Frames</td><td>Reset L2</td><td>Reset FPC</td><td colspan="2">Encryption Mode</td><td>Private LCM</td><td>3</td></tr>
<tr><td>Rev_Pwr_ Cntl_ Delay_ Incl</td><td colspan="2">Rev_Pwr_Cntl_delay</td><td>Nom_ Pwr_Ext</td><td colspan="4">Nom_Pwr</td><td>4</td></tr>
<tr><td colspan="2">Reserved</td><td colspan="5">FPC Subchannel Information</td><td>FPC SubChan Info Included</td><td>5</td></tr>
<tr><td colspan="4">Reserved</td><td colspan="3">Power Control Step</td><td>Power Control Step Included</td><td>6</td></tr>
</table>

Band Class:

The Band Class field corresponds to the CDMA frequency assignment for the CDMA channel. The coding of this field is specified in [30].

Number of Preamble Frames:

This field contains the number of traffic channel preamble frames that the MS has to send when performing a hard handoff. All values ‘000’ through ‘111’ are valid.

Reset L2:

The Reset L2 (Reset Layer 2 Ack) field indicates whether the Layer 2 Ack sequence number is to be maintained or initialized after a hard handoff is performed. The coding of this field is as follows:

‘0’ Do not reset Layer 2 Ack

‘1’ Reset Layer 2 Ack

Reset FPC:

The Reset FPC (Reset Forward Traffic Power Control) field indicates whether the forward traffic channel counters are to be maintained or initialized after a hard handoff is performed. The coding of this field is as follows:

‘0’ Do not reset counters

‘1’ Reset counters

Encryption Mode:

This field indicates whether encryption is to be used for the messages on the CDMA forward and reverse traffic channels. The encoding of this field is as follows:

'00' Encryption disabled

'01' Encryption enabled

Private LCM:

This field indicates whether to use the private long code mask after a hard handoff is performed. The coding of this field is as follows:

'0' Do not use Private Long Code Mask

'1' Use Private Long Code Mask

The Rev_Pwr_Cntl_Delay_Incl:

This field is set to '1' if the Rev_Pwr_Cntl_Delay field contains valid information and is set to '0' if the Rev_Pwr_Cntl_Delay field is to be ignored.

Rev_Pwr_Cntl_Delay:

The Rev_Pwr_Cntl_Delay (Reverse Power Control Delay)[7] field contains the reverse link power control delay required after the handoff. This field is coded per [5] when the target BS allows the MS to perform the reverse FCH gating mode. Otherwise, this field is set to '0 0000'.

Nom_Pwr_Ext:

This field is coded per [1]~[6].

Nom_Pwr:

This field is coded per [1]~[6].

FPC Subchannel Information:

This field contains the Forward power control subchannel relative gain (FPC_SUBCHAN_GAIN) and is coded per [5]. This field shall only be valid when the call is operating per [1]~[6]. Otherwise, this field shall be set to '00000'.

FPC SubChan Info Included:

This field is set to '1' if the FPC Subchannel Information field contains valid information and is set to '0' if the FPC Subchannel Information field is to be ignored.

Power Control Step:

This field is coded per [2]. This field shall only be included when the call is operating per [1]~[6]. Otherwise, this field shall be set to '000'.

Power Control Step Included:

This field is set to '1' if the Power Control Step field contains valid information and is set to '0' if the Power Control Step field is to be ignored.

[7] The base station shall set this field to the closed-loop reverse power control delay minus one (the closed-loop reverse power control delay is the time between the end of a gated-on reverse PCG and the beginning of the reverse PCG where the corresponding feedback is sent on the Forward Power Control Subchannel) used by the MS after handoff, in units of 1.25 ms.

4.2.48 Software Version

This element provides software version information about the sub-system originating the message. Its definition is a BS and MSC manufacturer concern.

4.2.48 Software Version

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
IOS Major Revision Level (X)								3
IOS Minor Revision Level (Y)								4
IOS Point Release Level (Z)								5
Manufacturer/Carrier Software Information								6
…								…
								n

Length:

This field indicates the number of octets in this element following the Length field.

IOS Major/Minor Revision / Point Release Level:

Each version of this standard is published with a version number in the form X.Y.Z. These three values shall be placed in octets 3, 4, and 5 respectively as binary values.

Manufacturer/Carrier Software Information;

Each separate software load from a manufacturer shall have some software load identity. In addition, the carrier may require the exchange of specific information between entities in their network. This information shall be placed in octets 6-n in ASCII format as agreed between the carrier and the manufacturer.

4.2.49 Service Option

This element indicates the service option requested by the MS, or by the network. It is coded as follows:

4.2.49 Service Option

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
(MSB)	Service Option							2
							(LSB)	3

Service Option:

For signaling type *TIA/EIA/IS-2000*, the Service Option field in octets 2 and 3 is coded as defined in [I-3].

The service options supported are given in Table 4.2.49-1.

Table 4.2.49-1 Service Option Values

Service Option Value (hex)	Description
8000H	13K speech
0011H	13K high rate voice service
0003H	EVRC
801FH	13K Markov
0004H	Asynchronous Data rate set 1
0005H	Group 3 Fax rate set 1
0007H[a]	Packet Data Service: Internet or ISO Protocol Stack (Revision 0)
0023H	Position Determination Service (PDS) Rate Set 1
0024H	Position Determination Service (PDS) Rate Set 2
0009H	13K loopback
0038H	Selectable Mode Vocoder (SMV)
000CH	Asynchronous Data rate set 2
000DH	Group 3 Fax rate set 2
0006H	SMS rate set 1
000EH	SMS rate set 2
000FH[a]	Packet Data Service: Internet or ISO Protocol Stack (14.4 kbps)
0012H	OTAPA Rate Set 1
0013H	OTAPA Rate Set 2
0020H	*IS-2000* Test Data
0036H	*IS-2000* Markov
0037H	*IS-2000* Loopback
0016H[a]	High Speed Packet Data Service: Internet or ISO Protocol Stack (RS1 forward, RS1 reverse)
0017H[a]	High Speed Packet Data Service:

Table 4.2.49-1 Service Option Values

Service Option Value (hex)	Description
	Internet or ISO Protocol Stack (RS1 forward, RS2 reverse)
0018H[a]	High Speed Packet Data Service: Internet or ISO Protocol Stack (RS2 forward, RS1 reverse)
0019H[a]	High Speed Packet Data Service: Internet or ISO Protocol Stack (RS2 forward, RS2 reverse)
0021H	(3G High Speed Packet Data)
0025H	(ISDN Interworking Service (64 kbps))
0039H	(32 kbps Circuit Switched Video Conferencing)
003AH	(64 kbps Circuit Switched Video Conferencing)
003CH[b]	Link-Layer Assisted Header Removal
003DH[b]	Link-Layer Assisted Robust Header Compression
003EH	Wideband Speech Codec
0044H	Enhanced Variable Rate Codec rev. B (EVRC-B)
0046H	Enhanced Variable Rate Codec Wide Band (EVRC-WB)
0049H	Enhanced Variable Rate Codec Narrowband-Wideband (EVRC-NW)
1007H[a]	Packet Data Service: Internet or ISO Protocol Stack, Revision 1 (9.6 or 14.4 kbps)

a. These values are only used to indicate intergeneration handoff (refer to [13]). Any other use of these values is outside the scope of this version of the standard.

b. This value can only be assigned to auxiliary services instances (e.g. when an SO33 has been allocated)

4.2.50 ADDS User Part

This element contains the user information portion of an ADDS message. That is, it carries the application data message.

4.2.50 ADDS User Part

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved		Data Burst Type						3
Application Data Message								4
…								…
								n

Length:

This field is defined as the number of octets following the Length field and has a value greater than zero.

Data Burst Type:

This field is coded as follows:

For CDMA: the 6-bit Data Burst Type defined in [I-3] is contained in bits 5 through 0.

For alternate dormant mode packet data handoffs the Data Burst Type field is set to ‘Asynchronous Data Services (00 0001)’. For CCPD Mode, the Data Burst Type field is set to ‘Short Data Burst (00 0110)’.

Application Data Message:

This field has variable length and is encoded as follows:

If the Data Burst Type field is set to ‘Asynchronous Data Services (000001)’, the Application Data Message field is omitted.

If the Data Burst Type field is set to ‘SMS (000011)’, the Application Data Message field is set to the CDMA SMS Transport Layer Message defined in [22].

If the Data Burst Type is set to ‘OTASP (000100)’, the Application Data Message field is set the OTASP Data Message defined in [29]

If the Data Burst Type field is set to ‘PDS (000101)’, the Application Data Message field is set to Position Determination Data Message defined in [24].

If the Data Burst Type field is set to SDB (000110)’, the Application Data Message field contains the SDB formatted as specified by the Short Data Burst Format in [23] if included. Refer to section 3 for cases where this field is or is not included. If this element is used as part of the ADDS Transfer message to support Short Data Burst, it does not include the Short Data Burst application data in the Application Data Message field.

The Application Data Message field is omitted for CCPD mode and alternate dormant mode packet data handoffs.

4.2.51 *IS-2000* Service Configuration Record

This IE contains the service configuration record as defined in [5] when the call is *TIA/EIA/IS-2000*, and as defined in [10] when the call is *TIA/EIA/IS-95*.

4.2.51 *IS-2000* Service Configuration Record

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Bit-Exact Length – Octet Count								2
Reserved					Bit-Exact Length – Fill Bits			3
(MSB)								4
IS-2000 Service Configuration Record Content								…
	Seventh Fill Bit – if needed	Sixth Fill Bit – if needed	Fifth Fill Bit – if needed	Fourth Fill Bit – if needed	Third Fill Bit – if needed	Second Fill Bit – if needed	First Fill Bit – if needed	k

Bit-Exact Length – Octet Count:

This field indicates the number of octets in this element following the Bit-Exact Length – Octet Count field.

Bit-Exact Length – Fill Bits:

This field contains a binary value indicating the number of fill bits contained in the last octet of this element. If this field contains a non-zero value, the indicated number of fill bits are set to ‘0’ and occupy the low order bit positions of the last octet of this element.

IS-2000 Service Configuration Record Content:

This field contains a Service Configuration Record coded according to [5] when the call is *cdma2000*. This field is coded according to [10] when the call is *TIA/EIA/IS-95*. The value begins in the high order bit position of octet 4 of this element and extends into the last octet of this element.

N’th Fill Bit – if needed:

Bit positions in the last octet that are not used, if any, are considered fill bits, are set to ‘0’, and occupy the low order bit positions of the last octet.

4.2.52 *IS-2000* Non-Negotiable Service Configuration Record

This IE contains the non-negotiable service configuration record as defined in [5].

4.2.52 *IS-2000* Non-Negotiable Service Configuration Record

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Bit-Exact Length – Octet Count								2
Reserved					Bit-Exact Length – Fill Bits			3
(MSB)								4
IS-2000 Non-Negotiable Service Configuration Record Content								…
	Seventh Fill Bit – if needed	Sixth Fill Bit – if needed	Fifth Fill Bit – if needed	Fourth Fill Bit – if needed	Third Fill Bit – if needed	Second Fill Bit – if needed	First Fill Bit – if needed	k

Bit-Exact Length – Octet Count:

This field indicates the number of octets in this element following the Bit-Exact Length – Octet Count field.

Bit-Exact Length – Fill Bits:

This field contains a binary value indicating the number of fill bits contained in the last octet of this element. If this field contains a non-zero value, the indicated number of fill bits are set to '0' and occupy the low order bit positions of the last octet of this element.

IS-2000 Non-Negotiable Service Configuration Record Content:

This field contains a Non-Negotiable Service Configuration Record coded according to [5]. The value begins in the high order bit position of octet 4 of this element and extends into the last octet of this element.

N'th Fill Bit – if needed:

Bit positions in the last octet that are not used, if any, are considered fill bits, are set to '0', and occupy the low order bit positions of the last octet.

4.2.53 *IS-2000* Mobile Capabilities

This element contains information about the *IS-2000*-specific capabilities of the MS.

4.2.53 *IS-2000* Mobile Capabilities

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
REV_ PDCH Supported	FOR_ PDCH Supported	ERAM Supported	DCCH Supported	FCH Supported	OTD Supported	Enhanced RC CFG Supported	QPCH Supported	3
FCH Information: Bit-Exact Length – Octet Count								4
Reserved	Geo Location Type			Geo Location Included	FCH Information: Bit-Exact Length – Fill Bits			5
(MSB)								6
FCH Information Content								…
	Seventh Fill Bit – if needed	Sixth Fill Bit – if needed	Fifth Fill Bit – if needed	Fourth Fill Bit – if needed	Third Fill Bit – if needed	Second Fill Bit – if needed	First Fill Bit – if needed	k
DCCH Information: Bit-Exact Length – Octet Count								k+1
Reserved					DCCH Information: Bit-Exact Length – Fill Bits			k+2
(MSB)								k+3
DCCH Information Content								…
	Seventh Fill Bit – if needed	Sixth Fill Bit – if needed	Fifth Fill Bit – if needed	Fourth Fill Bit – if needed	Third Fill Bit – if needed	Second Fill Bit – if needed	First Fill Bit – if needed	m
FOR_PDCH Information: Bit-Exact Length – Octet Count								m+1
Reserved					FOR_PDCH Information: Bit-Exact Length – Fill Bits			m+2
(MSB)								m+3
FOR_PDCH Information Content								…
	Seventh Fill Bit – if needed	Sixth Fill Bit – if needed	Fifth Fill Bit – if needed	Fourth Fill Bit – if needed	Third Fill Bit – if needed	Second Fill Bit – if needed	First Fill Bit – if needed	n
REV_PDCH Information: Bit-Exact Length – Octet Count								n+1
Reserved					REV_PDCH Information: Bit-Exact Length – Fill Bits			n+2
(MSB)								n+3

4.2.53 *IS-2000* Mobile Capabilities

7	6	5	4	3	2	1	0	Octet
REV_PDCH Information Content								…
	Seventh Fill Bit – if needed	Sixth Fill Bit – if needed	Fifth Fill Bit – if needed	Fourth Fill Bit – if needed	Third Fill Bit – if needed	Second Fill Bit – if needed	First Fill Bit – if needed	p
VP Algorithm Supported								q
Additional Geo Location Type Length								q+1
(MSB)	Additional Geo Location Type							q+2
…								…
							(LSB)	r

Length:

This field indicates the number of octets in this element following the Length field.

FOR_PDCH Supported:

This field is set to ‘1’ if the MS indicated that it supports the IS-2000 F-PDCH, otherwise it is set to ‘0’.

ERAM Supported:

This field is set to ‘1’ if MS indicated that it supports Enhanced Rate Adaptation Mode, otherwise it is set to ‘0’.

DCCH Supported:

This field is set to ‘1’ if MS indicated that it supports the *IS-2000* DCCH, otherwise it is set to ‘0’.

FCH Supported:

This field is set to ‘1’ if the MS indicated that it supports the *IS-2000* FCH, otherwise it is set to ‘0’.

OTD Supported:

This field has a value of ‘1’ if the MS supports Orthogonal Transmit Diversity and a value of ‘0’ otherwise.

Enhanced RC CFG Supported:

This field indicates whether the MS supports any radio configuration in radio class 2. A value of ‘1’ indicates support, and a value of ‘0’ indicates no support.

QPCH Supported:

This field indicates whether the MS supports the *IS-2000* Quick Paging Channel (QPCH). A value of ‘1’ indicates support, and a value of ‘0’ indicates no support.

FCH Information: Bit-Exact Length – Octet Count:

This field contains the total number of octets in the FCH Information Content field represented as a binary value.

Geo_Location_Type:

If Geo_Location_Included is set to ‘1’ this field is included and set as follows:

000 – No MS assisted geo-location capabilities

001 – [24] capable (Advanced Forward Link Triangulation only (AFLT))

010 – [24] capable (Advanced Forward Link Triangulation and Global Positioning Systems

011 – Global Positioning Systems Only

All Other values reserved.

If Geo_Location_Included is set to '0' this field is included and set to 000.

Geo_Location_Included:

This field is set to '1' if geo-location capabilities about the MS are included. Geo Location is not supported by MSs with MOB_P_REV less than '7'. This field is set to '0' if no geo-location capabilities are included and the MSC shall ignore the contents of the Geo_Location_Type field.

FCH Information: Bit-Exact Length – Fill Bits:

This field contains a binary value indicating the number of fill bits contained in the last octet used for the FCH Information Content field.

FCH Information Content:

The FCH Capabilities Information field is coded per [5] section 2.7.4.27.1.

N'th Fill Bit – if needed (octet k):

If the 'FCH Information: Bit-Exact Length – Fill Bits' field contains a non-zero value, the indicated number of fill bits are set to '0' and occupy the low order bit positions of the last octet used for the FCH Information Content field.

DCCH Information: Bit-Exact Length – Octet Count:

This field contains the total number of octets in the DCCH Information Content field represented as a binary value.

DCCH Information: Bit-Exact Length – Fill Bits

This field contains a binary value indicating the number of fill bits contained in the last octet of the DCCH Information Content field.

DCCH Information Content:

The DCCH Capabilities Information field is coded per [5] section 2.7.4.27.2.

FOR_PDCH Information: Bit-Exact Length – Octet Count:

This field contains the total number of octets in the FOR_PDCH Information Content field represented as a binary value.

FOR_PDCH Information: Bit-Exact Length – Fill Bits

This field contains a binary value indicating the number of fill bits contained in the last octet of the FOR_PDCH Information Content field. If this field contains a non-zero value, the indicated number of fill bits are set to '0' and occupy the low order bit positions of the last octet of the FOR_PDCH Information Content field.

FOR_PDCH Information Content:

The FOR_PDCH Capabilities Information field is coded per [5] section 2.7.4.27.5.

N’th Fill Bit – if needed (octet m):

If the ‘DCCH Information: Bit-Exact Length – Fill Bits’ field contains a non-zero value, the indicated number of fill bits are set to ‘0’ and occupy the low order bit positions of the last octet used for the DCCH Information Content field.

REV_PDCH Supported:

This field is set to ‘1’ if the MS indicated that it supports the IS-2000 R-PDCH, otherwise it is set to ‘0’.

REV_PDCH Information: Bit-Exact Length – Octet Count:

This field contains the total number of octets in the REV_PDCH Information Content field represented as a binary value.

REV_PDCH Information: Bit-Exact Length – Fill Bits:

This field contains a binary value indicating the number of fill bits contained in the last octet of the REV_PDCH Information Content field. If this field contains a non-zero value, the indicated number of fill bits are set to ‘0’ and occupy the low order bit positions of the last octet of the REV_PDCH Information Content field.

REV_PDCH Information Content:

The REV_PDCH Capabilities Information field is coded per [5] section 2.7.4.27.6.

VP Algorithms Supported:

Bits 0-7 indicate the voice privacy algorithms supported by the MS.

7	6	5	4	3	2	1	0	Octet
ext=1	A7	A6	A5	A4	A3	A2	A1	n

Refer to Table 4.2.53-1 for the definition of bits A7 through A1.

Table 4.2.53-1 Voice Privacy Algorithm

A7	A6	A5	A4	A3	A2	A1	VP Algorithms Supported
0	0	0	0	0	0	0	No voice privacy supported
x	x	x	x	x	x	1	Private long code
x	x	x	x	x	1	x	Advanced Encryption Standard (AES)
All other values							Reserved

Note: Since multiple algorithms may be supported, an ‘x’ represents a “don’t care” condition.

Bit 7 is an extension bit. Refer to section 4.1.4, for an interpretation of the extension bit. In this version of the standard, this bit shall be set to ‘1’ (i.e. no extension).

Additional Geo Location Type Length:

This field indicates the number of octets in the Additional Geo Location Type field and is coded as follows.

Table 4.2.53-2 Additional Geo Location Type Length

Binary Value	Meaning
0000 0000	Additional Geo Location Type field is omitted
0000 0001	Additional Geo Location Type field is 16 bits
0000 0010	Additional Geo Location Type field is 24 bits
All other values are reserved	

Additional Geo Location Type:

Depending on the length defined in Table 4.2.53-2, this field indicates the geo-location capabilities supported by the MS (refer to [5], Additional Geo-Location Capability), where each subfield is set to '1' to correspond to a capability supported by the MS or '0' if the MS does not support the capability.

4.2.54 Protocol Type

This IE contains the Link Layer / Network Layer Protocol Type used by the PDSN.

4.2.54 Protocol Type

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Protocol Type							3
							(LSB)	4

Length:

This field indicates the number of octets in this element following the Length field.

Protocol Type:

This field indicates the protocol type in use at a PDSN for an existing packet connection. This field provides the ability for a target BS/PCF to properly accept a hard handoff of a packet data call. The value is as defined in the [17].

4.2.55 MS Information Records

This IE contains a list of *cdma2000* Information Records. Examples of such information records are signal, display, calling party ASCII number, message waiting indicator, etc. This IE was referred to as *IS-95* Information Records in some previous versions of this standard.

The BS shall transparently transmit the contents from octet 3 to the end of this element without verifying or modifying them.

4.2.55 MS Information Records

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Information Record Type - 1								3
Information Record Length - 1								4
(MSB)	Information Record Content - 1							5
…								…
							(LSB)	j
Information Record Type - 2								j+1
Information Record Length - 2								j+2
(MSB)	Information Record Content – 2							j+3
								…
							(LSB)	k
…								…
Information Record Type - n								m
Information Record Length - n								m+1
(MSB)	Information Record Content - n							m+2
…								…
							(LSB)	n

Length:

This field contains the number of bytes in this element following this field as a binary number.

Information Record Type:

For coding of this field refer to [1]~[6].

Information Record Length:

This field indicates the number of octets in the immediately following Information Record Content field in this element.

Information Record Content:

For coding of this field refer to [1]~[6].

4.2.56 Extended Handoff Direction Parameters

This element is used by a target BS to provide information to the source BS for two purposes. The first purpose is to create the Extended Handoff Direction Message, General Handoff Direction Message or Universal Direction Message to be sent to the MS. The second purpose is to create the *cdma2000* In-Traffic System Parameters message.

4.2.56 Extended Handoff Direction Parameters

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier</td><td>1</td></tr>
<tr><td colspan="8">Length</td><td>2</td></tr>
<tr><td colspan="4">Search Window A Size (Srch_Win_A)</td><td colspan="4">Search Window N Size (Srch_Win_N)</td><td>3</td></tr>
<tr><td colspan="4">Search Window R Size (Srch_Win_R)</td><td colspan="4">Add Pilot Threshold (T_Add) high order bits</td><td>4</td></tr>
<tr><td colspan="2">T_Add low order bits</td><td colspan="6">Drop Pilot Threshold (T_Drop)</td><td>5</td></tr>
<tr><td colspan="4">Compare Threshold (T_Comp)</td><td colspan="4">Drop Timer Value (T_TDrop)</td><td>6</td></tr>
<tr><td colspan="4">Neighbor Max Age (Nghbor_Max_AGE)</td><td colspan="2">Reserved</td><td colspan="2">Target BS Values Included</td><td>7</td></tr>
<tr><td colspan="2">Reserved</td><td colspan="6">SOFT_SLOPE</td><td>8</td></tr>
<tr><td colspan="2">Reserved</td><td colspan="6">ADD_INTERCEPT</td><td>9</td></tr>
<tr><td colspan="2">Reserved</td><td colspan="6">DROP_INTERCEPT</td><td>10</td></tr>
<tr><td colspan="8">Target BS P_REV</td><td>11</td></tr>
</table>

Unless listed below, refer to [1]~[6] for coding of the parameters listed in this element.

Length:

This field contains the number of bytes in this element following this field as a binary number.

Target BS Values Included:

Target BS always codes this field to ‘10’. The source BS uses this field to determine which fields within this element were successfully conveyed from the target BS via the ANSI-41 network [9], [26] and [27]. At the source BS, this field is interpreted as follows:

‘00’ indicates that only Search Window A Size field is valid

‘01’ indicates that Search Window A Size field, Add Pilot Threshold field, Drop Pilot Threshold field, Compare Threshold field, and Drop Timer Value field are valid and

‘10’ indicates that all fields in this IE are valid.

A value of ‘11’ is reserved. The source BS shall ignore the fields that are not valid as determined by this field.

4.2.57 CDMA Serving One Way Delay

This element specifies the estimated one-way delay from the MS to the cell associated with the REF_PN (refer to [1]~[6]). It is coded as follows:

4.2.57 CDMA Serving One Way Delay

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Cell Identifier								3-var
(MSB)	CDMA Serving One Way Delay							m
CDMA Serving One Way Delay							(LSB)	m+1
Reserved						Resolution		m+2
(MSB)	CDMA Serving One Way Delay Time Stamp							m+3
							(LSB)	m+4

Length:

This field contains the number of octets in this element following the Length field.

Cell Identifier:

This field identifies the reference cell. This field is comprised of a Cell Identification Discriminator and a Cell Identification and shall be formatted according to octets 3 through the end of the Cell Identifier element defined in section 4.2.17. The allowable cell discriminator values are ‘0000 0010’, and ‘0000 0111’.

CDMA Serving One Way Delay:

This field is the one-way delay from the MS to the cell associated with the REF_PN (refer to [1]~[6]) as estimated by the BS.

Reserved:

These bits are coded as ‘000000’.

Resolution:

This field indicates the units of the calculated the CDMA Serving One Way Delay. The allowable values are:

00 – 100 ns

01 – 50 ns

10 – 1/16 PN Chip

11 – reserved

CDMA Serving One Way Delay Time Stamp:

This field is a 16-bit binary number derived from the base station’s 64-bit System Time at the time that the One Way Delay was measured. The time stamp is in units of 80 ms.

4.2.58 Radio Environment and Resources

This element indicates the environment and availability of resources for a new call establishment. Four inter-related factors are included: availability of radio resources, pre-allocation of radio resources by the BS, and an evaluation of the forward and reverse radio environments by the BS (interference, power level, etc.)

The BS evaluation of the radio environment is manufacturer-specific, but can be generalized to: acceptable / marginally acceptable / poor.

4.2.58 Radio Environment and Resources

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved	Include Priority	Forward		Reverse		Alloc	Avail	2

Reserved:

This bit is coded as ‘0’.

Include Priority:

This field indicates whether the actual priority of the call is required. This bit is set to ‘1’ to request the MSC to include the actual priority in the Assignment Request message. Otherwise, it is set to ‘0’. Note - The BS should include this field to indicate to the MSC that no lower priority channels are available when PACA service is requested and a channel reservation method is used to support the call.

Forward:

This field is coded as shown in Table 4.2.58-1.

Reverse:

This field is coded as shown in Table 4.2.58-1.

Alloc:

The Alloc field indicates that radio resources have been allocated for the call. This field is coded as shown in Table 4.2.58-1.

Avail:

The Avail field indicates that resources are available and can be allocated for this call. This field is coded as shown in Table 4.2.58-1.

The setting {Alloc = ‘0’, Avail = ‘1’} is used when the BS does not do early traffic channel assignment and it either has resources or does not know whether it has resources.

Table 4.2.58-1 Radio Environment and Resources

Field Values	Description
Forward	
00	Not reported.
01	Forward radio environment is acceptable.
10	Forward radio environment is marginally acceptable.
11	Forward radio environment is poor.
Reverse	
00	Not reported.
01	Reverse radio environment is acceptable.
10	Reverse radio environment is marginally acceptable.
11	Reverse radio environment is poor.
Alloc	
0	Resources are not allocated.
1[a]	Resources are allocated.
Avail	
0[a]	Resources are not available.
1	Resources are available.

a. It is an illegal (and illogical) combination to have the Alloc field set to ‘1’ and the Avail field set to ‘0’.

4.2.59 Called Party ASCII Number

This element contains the called party number in ASCII format. It is coded as shown below.

4.2.59 Called Party ASCII Number

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
ext = 1	Type of Number			Numbering Plan Identification				3
ASCII character 1								4
ASCII character 2								5
…								…
ASCII character n								n

Length:

This field contains the number of octets in this element following the Length field.

For the coding of the Type of Number and Numbering Plan Identification fields refer to [33].

4.2.60 *IS-2000* Cause Value

This IE contains the cause indication sent by a *cdma2000* MS.

4.2.60 *IS-2000* Cause Value

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
IS-2000 Cause Information								variable

Length:

This field contains the number of octets in this element following the Length field.

IS-2000 Cause Information:

The content, values and format of this field are as specified for the ORDQ field of the Reject Order in *cdma2000* systems. Refer to [5].

This IE is referred to as *IS-95* cause value in previous versions of this standard.

4.2.61 Authentication Event

This IE is sent by the BS to the MSC when an unexpected authentication event occurs.

4.2.61 Authentication Event

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Event								3

Length:

This field indicates the number of octets in this element following this Length field.

Event:

The coding of this field is as follows:

01H The BS is operating in "authentication required" mode, but authentication parameters (AUTHR, RANDC and COUNT) were NOT received from the MS.

02H The BS is operating in "authentication required" mode, but the MS provided RANDC did not match the BS provided RAND(s).

03H The BS is operating in "authentication required" mode, but the authentication was recently requested and a new authentication is not required. Refer to section 2.6.3.1 and 3.6.3.

04H The BS is operating in the "authentication required" mode, and a traffic channel was assigned as a part of the paging process.

All other values reserved.

4.2.62 Authentication Data

This element contains the authentication data used as input to the authentication algorithm.

4.2.62 Authentication Data

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Auth-Data							3
								4
							(LSB)	5

Length:

This field indicates the number of octets in this element following the Length field.

Auth-Data:

The value of this field is derived from the last six digits or characters sent by the MS as described in [5].

4.2.63 PSMM Count

This element indicates the number of Pilot Strength Measurement Messages to be sent, or that the geographic location of the MS is to be determined by the BS, if the BS is capable of determining the geographic location.

4.2.63 PSMM Count

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved				PSMM Count				3

Length:

This field indicates the number of octets in this element following the Length field.

PSMM Count:

This 4-bit field contains the Pilot Strength Measurement Message Count. The PSMM Count indicates the number of PSMM Messages and is a value between ‘0000’ and ‘1010’. If the PSMM Count is 0 then the BS shall calculate the MS’s location if it is capable of determining the geographic location. If the PSMM Count is ‘0’, and if the BS is not capable of determining the geographic location , then the BS shall return the CDMA One Way Delay IE in the response.

4.2.64 Geographic Location

This IE contains the geographic location of an MS.

4.2.64 Geographic Location

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Calling Geodetic Location (CGL)							3
…								…
							(LSB)	k

Length:

This field indicates the number of octets in this element following the Length field.

CGL:

Refer to [34] for population of the Calling Geodetic Location (CGL).

4.2.65 Downlink Radio Environment List

This element contains a list of Downlink Radio Environments.

4.2.65 Downlink Radio Environment List

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Downlink Radio Environment List entry 1								3
…								…
Downlink Radio Environment List entry n								k

Length:

This field indicates the number of octets in this element following the Length field.

Downlink Radio Environment List entry:

This field is coded as specified in section 4.2.22 from octet 2 to the end.

4.2.66 Circuit Group

This element contains a list of circuit identities represented by a beginning circuit identity code value, a count, and an optional bitmap. Refer to the details below.

4.2.66 Circuit Group

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved						All Circuits	Inclusive	3
Count								4
(MSB)	First CIC (most significant bits)							5
First CIC (least significant bits)							(LSB)	6
(first unused bit - if any)	(second unused bit - if any)	(third unused bit - if any)	(fourth unused bit - if any)	(fifth unused bit - if any)	(sixth unused bit - if any)	(seventh unused bit - if any)		7
Circuit Bitmap								8
…								…
							(corresp. to value in First CIC field)	k

Length:

This field indicates the number of octets in this element following the Length field.

All Circuits:

This field is used to indicate that all circuits between the MSC and BS are to be affected by the operation specified by the message when this field is set to ‘1’. In this case, only the first three octets of this element are used. If this field is set to ‘0’, the remaining fields of this element specify the affected circuits.

Inclusive:

This field is used to indicate whether all circuits with identifiers in the range [First CIC, First CIC + Count - 1] are represented by this element. If this field is set to ‘1’, then all circuits with identifiers in the range are included and there is no Circuit Bitmap field included in this element. If this field is set to ‘0’, then not all circuits with identifiers in the range are included. In this case, the Circuit Bitmap field identifies the circuits that are included.

NOTE: When this element is used in a message that has a preceding mandatory Circuit Identity Code element, the first value in the range of circuits identified by this element in the message shall be the value contained within the Circuit Identity Code element.

Count:

This is a binary encoded field that represents a count of the number of circuits represented by this element including the given Circuit Identity Code value in octets 5 and 6.

First CIC:

This field contains a Circuit Identity Code value formatted as shown in octets 2 and 3 of 4.2.19.

Circuit Bitmap:

This variable sized field contains an integral number of octets sufficiently large to contain (Count) bits. That is, the number of octets in this field is equal to:

$$\lceil (Count)/8 \rceil$$

Any unused bits occur in octet 7, beginning in bit position 7, and are set to ‘0’. Bit 0 in the highest numbered octet in the Circuit Bitmap field corresponds to the circuit represented by the value in the First CIC field. Bit 1 in that octet corresponds to the circuit represented by the (value in the First CIC field) + 1, etc.

A bit in the Circuit Bitmap field that has a value of ‘1’ indicates that the corresponding circuit is included in the set of circuits referenced by this element. A value of ‘0’ indicates that the corresponding circuit is not included in the set of circuits referenced by this element.

4.2.67 PACA Timestamp

PACA Timestamp indicates the time when the PACA call was originally queued.

4.2.67 PACA Timestamp

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	PACA Queuing Time							3
								4
								5
							(LSB)	6

Length:

This field indicates the number of octets in this element following the Length field.

PACA Queuing Time:

This field is 32-bit binary number derived from the CDMA System Time at the time of the service request. The time stamp is in units of 80 ms.

4.2.68 PACA Order

The purpose of this element is to allow the sender to instruct the receiver to take appropriate action upon receiving the PACA Update message.

4.2.68 PACA Order

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved					PACA Action Required			3

Length:

This field indicates the number of octets in this element following the Length field.

PACA Action Required:

This field is coded as follows:

Table 4.2.68-1 PACA Order - PACA Action Required

PACA Action Required Value (binary)	Description
000	Reserved
001	Update Queue Position and notify MS
010	Remove MS from the queue and release MS
011	Remove MS from the queue
100	MS Requested PACA Cancel
101	BS Requested PACA Cancel
All other values reserved	

4.2.69 PACA Reorigination Indicator

This element indicates whether the access attempt is a user directed origination or a PACA re-origination. This element is present only when the MS sends a priority service request.

4.2.69 PACA Reorigination Indicator

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved							PRI	3

Length:

This field indicates the number of octets in this element following the Length field.

PRI:

(PACA Reorigination Indicator) This field is set to '1' to indicate that this is a PACA reorigination; otherwise it is set to '0'.

4.2.70 Access Network Identifiers

The Access Network Identifiers (ANID), consisting of PZID, SID and NID, uniquely identify the PCF. The Previous and Current ANIDs (PANID and CANID) are used by the PDSN to determine if it currently owns the call. If so, the PDSN does not need to send agent advertisements. If not, then the PDSN may need to trigger a MIP Registration Request so the Foreign Agent / Home Agent tunnel is set up properly.

4.2.70 Access Network Identifiers

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved	(MSB)	SID						3
							(LSB)	4
(MSB)	NID							5
							(LSB)	6
PZID								7

Length:

This field indicates the number of octets in this element following the Length field.

SID:

This 15-bit field is coded to the value that uniquely identifies the cellular or PCS system.

NID:

This two octet field is coded to the value that uniquely identifies the network within a cellular or PCS system.

PZID:

This one octet field is coded to the value that uniquely identifies the Packet Control Function (PCF) coverage area within a particular SID/NID area. The combined SID/NID/PZID triplet is unique to a PCF.

4.2.71 Source RNC to Target RNC Transparent Container

This IE is used to contain DS radio parameters to be passed from the source BS to the target BS in the Handoff Required and Handoff Request messages. The information in this element is transparent to the MSC.

4.2.71 Source RNC to Target RNC Transparent Container

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Container							3
								…
							(LSB)	k

Length:

This field indicates the number of octets in this element following the Length field.

Container:

This field contains the Source RNC to Target RNC Transparent Container element as defined in [39].

4.2.72 Target RNC to Source RNC Transparent Container

This IE is used to contain DS radio parameters to be passed from the target BS to the source BS in the Handoff Request Acknowledge and Handoff Command messages. The information in this element is transparent to the MSC.

4.2.72 Target RNC to Source RNC Transparent Container

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Container							3
								…
							(LSB)	k

Length:

This field indicates the number of octets in this element following the Length field.

Container:

This field contains the Target RNC to Source RNC Transparent Container element as defined in [39].

4.2.73 Service Option Connection Identifier (SOCI)

The purpose of the Service Option Connection Identifier is to distinguish multiple parallel service option connections within one MS between BS and MSC. It is coded as follows:

4.2.73 Service Option Connection Identifier (SOCI)

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved					Service Option Connection Identifier			3

Length:

This field indicates the number of octets in this element following the Length field.

Service Option Connection Identifier :

SOCI values are always assigned by the BS. At the beginning of a circuit-based service option connection between the BS and the MSC, an unused SOCI value is chosen and assigned to this service option connection. It then remains fixed for the lifetime of the service option connection. After a service option connection ends, the associated SOCI value is freed and may be re-used.

For packet data sessions, an unused SOCI value for the MS is chosen and assigned to the packet data session when it transitions to the Active State. It then remains fixed for as long as the packet data session is active. After a packet data session transitions out of Active State, the associated SOCI value for the MS is freed and may be re-used.

This field has a range of ‘001’ to ‘110’ and all other values are reserved.

4.2.74 Service Option List

This element indicates a list of the service option instances requested by the MS, or by the network. It is coded as follows:

4.2.74 Service Option List

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Number of Service Option instances								3
Reserved		SR_ID - 1			SOCI - 1			4
(MSB)	Service Option – 1							5
							(LSB)	6
…								…
Reserved		SR_ID - n			SOCI - n			k
(MSB)	Service Option - n							k+1
							(LSB)	k+2

Length:

This field indicates the number of octets in this element following the Length field.

Number of Service Option Instances:

This field contains the number of service options included in this element.

SR_ID:

This 3-bit field is used to uniquely identify a packet data service instance in the MS. This field contains the MN Service Reference Identifier value as defined in ([1]~[6]).

Service Option Connection Identifier (SOCI):

If concurrent services are supported this 3-bit field is used to distinguish multiple parallel service option connections within one MS between BS and MSC. It shall be formatted according to Service Option Connection Identifier element defined in section 4.2.73. When this IE contains multiple packet data service instances, this field shall have the same value for all packet data service instances. If concurrent services are not supported this shall be set to any valid value.

Service Option:

This field contains the Service Option value associated with the service option instance identified in the corresponding Service Option Connection Identifier and SR_ID fields. It shall be formatted according to octets 2 through the end of the Service Option element defined in section 4.2.49.

4.2.75 AMPS Hard Handoff Parameters

This element is used to deliver information needed by the source BS to perform hard handoff to an AMPS system.

4.2.75 AMPS Hard Handoff Parameters

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved						Encryption Mode		3

Length:

This field indicates the number of octets in this element following the Length field.

Encryption Mode:

The Encryption Mode indicates whether encryption is to be used for the messages on the forward and reverse traffic channels. The encoding of this field is as follows:

‘00’ Encryption disabled

‘01’ Encryption enabled.

4.2.76 Band Class

This IE specifies the frequency band.

4.2.76 Band Class

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved			Band Class					3

Length:

This field contains the number of octets in this element following the Length field.

Band Class:

The coding of this field is defined in [30].

4.2.77 Information Record Requested

This IE contains the Status Information Record Type(s) that the MSC includes in the Status Request message to the BS. Examples of such Information Record Types are: Call mode, terminal information, roaming information, security status, mobile identity, etc.

4.2.77 Information Record Requested

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Information Record Type 1								3
…								…
Information Record Type n								variable

Length:

This field contains the number of octets in this element following the Length field.

Information Record Type:

For coding of the Information Record Type refer to [5].

4.2.78 Anchor PDSN Address

This element is used to deliver the IPv4 address of the A11 interface of the anchor PDSN for fast handoff.

4.2.78 Anchor PDSN Address

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Anchor PDSN Address							3
								4
								5
							(LSB)	6

Length:

This field indicates the number of octets in this element following the Length field.

Anchor PDSN Address:

This field contains an IPv4 address for an anchor PDSN.

4.2.79 Protocol Revision

This Protocol Revision element contains the protocol revision supported by the MS (MOB_P_REV). The BS uses this information to determine the P_REV_IN_USE so that the PD (Protocol Discriminator) field in the associated air interface message can be set correctly. The coding of the PD field is specified in [4].

4.2.79 Protocol Revision

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
MOB_P_REV								3

Length:

This field indicates the number of octets in this element following the Length field.

MOB_P_REV:

This field contains the MS's protocol revision (MOB_P_REV) as defined in [1]~[6].

4.2.80 Anchor P-P Address

This element is used to deliver the IPv4 address of the P-P interface of the anchor PDSN for fast handoff.

4.2.80 Anchor P-P Address

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Anchor P-P Address							3
								4
								5
							(LSB)	6

Length:

This field indicates the number of octets in this element following the Length field.

Anchor P-P Address:

This field contains an IPv4 address of the P-P interface for an anchor PDSN.

4.2.81 Origination Continuation Indicator

This type 2 IE is used to inform the MSC that the CM Service Request message is to be followed by a CM Service Request Continuation message. Refer to section 4.1.3 for additional information on type 2 IEs. Refer to section 4.1.2 for a listing of type 2 IEs.

4.2.81 Origination Continuation Indicator

7	6	5	4	3	2	1	0	Octet
1	0	1	0	A1 Element Identifier				1

4.2.82 IS-2000 Redirection Record

This IE contains information to allow an MS to be redirected to a CDMA network.

4.2.82 IS-2000 Redirection Record

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Redirection Record Type								3
Redirection Record Length								4
(MSB)	Redirection Record Content (first octet)							5
…								…
Redirection Record Content (last octet)							(LSB)	j

Length:

This field indicates the number of octets in this element following the Length field.

Redirection Record Type

For the coding of this field, refer to [1]~[6].

Redirection Record Length:

For the coding of this field, refer to [1]~[6].

Redirection Record Content:

For the coding of this field, refer to [1]~[6].

4.2.83 Return Cause

This IE is included upon MS registration or origination following a service redirection failure, and it indicates the reason for the failure.

4.2.83 Return Cause

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved				Return_Cause				2

Return_Cause:

Reason of the MS registration or origination. The BS shall set this field to the Return cause value shown in Table 4.2.83-1 corresponding to the service redirection failure condition.

Table 4.2.83-1 Return Cause

Binary Values	Meaning
0000	Normal access.
0001	Service redirection failed as a result of system not found.
0010	Service redirection failed as a result of protocol mismatch.
0011	Service redirection failed as a result of registration rejection.
0100	Service redirection failed as a result of wrong SID.
0101	Service redirection failed as a result of wrong NID.
All other values reserved	

4.2.84 Service Redirection Info

This IE contains information to redirect an MS in the event it cannot obtain service on the system to which it was directed.

4.2.84 Service Redirection Info

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved			Excl_P_ REV_ Ind	Redirect_ P_REV_ Incl	Redirect Type	Reserved	Return If Fail	3
(MSB)	REDIRECT_P_MIN						(LSB)	4
(MSB)	REDIRECT_P_MAX						(LSB)	5

Length:

This field indicates the number of octets in this element following the Length field.

Excl_P_REV_Ind:

Excluding mobile protocol revision indicator.

'0' = all MSs with a protocol revision in the range [REDIRECT_P_MIN, REDIRECT_P_MAX] are included in Global Service Redirection.
'1' = all MSs with a protocol revision in the range [REDIRECT_P_MIN, REDIRECT_P_MAX] are excluded from Global Service Redirection.

Redirect_P_REV_Incl:

Redirection mobile protocol revision included

'0' = this redirection applies to all MSs,
'1' = this redirection applies to all MSs of some specific protocol revisions

If this field set to 0, then the fields 'Excl_P_REV_Ind', 'REDIRECT_P_MIN', and REDIRECT_P_MAX are ignored.

Redirect Type:

Redirection type indicator:

'0' = Normal redirection.
'1' = NDSS redirection.

Return If Fail:

Return if fail indicator:

'0' = The MS is not required to return to this system upon failure to obtain service from the redirected system.

'1' = The MS should return to this system upon failure to obtain service from the redirected system.

REDIRECT_P_MIN:

Minimum redirection protocol revision.

This field indicates the minimum protocol revision of which MSs are subjected to as specified by the action contained in

EXCL_P_REV_IND (i.e., to be redirected or excluded from redirection). The value is equal to or greater than six.

REDIRECT_P_MAX:

Maximum redirection protocol revision.

This field indicates the maximum protocol revision of which MSs are subjected to as specified by the action contained in EXCL_P_REV_IND (i.e., to be redirected or excluded from redirection). The value is equal to or greater than REDIRECT_P_MIN.

4.2.85 Packet Session Parameters

This variable length element contains an MS's packet data session parameters.

4.2.85 Packet Session Parameters

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved					SR_ID			k
Data Length								k+1
Parameter Identifier 1								k+2
Parameter 1 Length								k+3
Parameter Value 1								k+4
…								…
Parameter Identifier n								m
Parameter n Length								m+1
Parameter Value n								m+2
…								
Reserved					SR_ID			n
Data Length								n+1
Parameter Identifier 1								n+2
Parameter 1 Length								n+3
Parameter Value 1								n+4
…								…
Parameter Identifier n								p
Parameter n Length								p+1
Parameter Value n								p+2

Length:

This field indicates the number of octets in this element following the Length field.

SR_ID:

This field indicates the type of data included. If parameters specific to a PDSI are included, this field is set to the SR_ID of the PDSI (001-110). If parameters specific to the packet data session are included, this field is set to 111.

Data Length:

This field indicates the number of octets of data for the specified SR_ID that follow, where the data consists of the Parameter Identifier 1 octet through the last octet of Parameter Value n.

Parameter Identifier:

This field uniquely identifies the parameter in the Parameter field associated with the packet data service instance or packet data session indicated by the preceding SR_ID and is coded as follows:

01H: RN-PDIT [17]

02H-FFH: Reserved

Parameter Length:

This field specifies the length of the Parameter Value field in octets.

Parameter Value:

This field contains the value of the parameter associated with the packet data session or packet data service instance identified by the Parameter Identifier field. This field is coded as specified in [17].

4.2.86 Service Reference Identifier (SR_ID)

This IE contains the SR_ID for a service instance. The purpose of the SR_ID is to distinguish between multiple service instances within one MS.

4.2.86 Service Reference Identifier (SR_ID)

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved					SR_ID			3

Length:

This field indicates the number of octets in this element following the Length field.

SR_ID:

This field contains the SR_ID of a service instance. Refer to [3]. Up to six service instances are supported.

4.2.87 Public Long Code Mask Identifier

When sent from source BS to target BS, this element conveys the Public Long Code Mask type and value in use at the source BS. When sent from target BS to source BS, this element conveys the Public Long Code Mask type and value that will be used by the target BS after handoff. It is coded as follows:

4.2.87 Public Long Code Mask Identifier

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
PLCM_TYPE				Reserved		(MSB)		3
PLCM_42								4
								5
								6
								7
							(LSB)	8

Length:

The length field is defined as the number of octets following the Length field.

PLCM_TYPE:

The Public Long Code Mask Type indicator.

The base station shall set this field to the corresponding Public Long Code Mask type as specified in [5].

PLCM_42:

The 42 bits of the Public Long Code Mask (refer to [5]).

4.2.88 MS Designated Frequency

This element indicates the band class and frequency that is reported as designated frequency from the MS. It is used when the MS is not residing on its hash-to frequency.

4.2.88 MS Designated Frequency

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
A1 Element Identifier								1
Length								2
Band Class					(MSB)			3
CDMA Channel							(LSB)	4

Length:

The length field is defined as the number of octets following the Length field.

Band Class:

The coding of this field is defined in [30].

CDMA Channel:

This field shall be set to the CDMA channel number in the specified Band Class corresponding to the CDMA frequency assignment for the designated frequency. Refer to section 4.2.5.

4.2.89 A2p Bearer Session-Level Parameters

This IE is used to provide session level information for establishing or modifying an A2p bearer session.

4.2.89 A2p Bearer Session-Level Parameters

7	6	5	4	3	2	1	0	Octet
A1p Element Identifier								1
Length								2
Reserved		Max Frames			Session IP Address Type		Session Addr Flag	3
(MSB)	Session IP Address							i
…								…
							(LSB)	j
(MSB)	Session UDP Port							j+1
							(LSB)	j+2

Length:

This field indicates the number of octets in this element following the Length field.

Session Addr Flag:

The value of this field determines whether or not the Session IP Address and Session UDP port fields are present. If Session Addr Flag equals one, then Session IP Address and Session UDP Port shall be present; otherwise, if Session Addr Flag equals zero, then the Session IP Address and Session UDP Port octets shall not be present.

Session IP Address Type:

The value of this field (as given in Table 4.2.89-1) determines the format and length of the sender's Session IP Address that should be used by default for receiving the RTP session and all bearer formats.

Table 4.2.89-1 Session IP Address Type, Format and Length

Type	Format	Length
0	Internet Protocol IPv4	4 octets
1	Internet Protocol IPv6	16 octets
All other values reserved		

Max Frames:

One plus the unsigned binary value in this field, represents the maximum number of 20 ms voice frames that can be bundled in an RTP packet for this RTP session. One plus the unsigned binary value in this field, multiplied by 20 ms, corresponds to the maxptime value as specified in Internet Assigned Number Authority (IANA) registration for applicable media types, and is in the range 20 ms to 160 ms.

Session IP Address:

This optional field contains the IP address to which the sending party requests bearer packets be delivered for the RTP session. This field has a length and format that depends on the IP Address Type field (refer to Table 4.2.89-1).

Session UDP Port:

This optional field contains the UDP port to which the sending party requests bearer packets be delivered for the RTP session. RTP data shall be carried on an even UDP port number and the corresponding RTCP packets shall be carried on the next higher (odd) port number, unless agreed to otherwise. Refer to [43].

4.2.90 A2p Bearer Format-Specific Parameters

This IE is used to provide individual bearer format information for establishing or modifying an A2p bearer session.

4.2.90 A2p Bearer Format-Specific Parameters

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1p Element Identifier</td><td>1</td></tr>
<tr><td colspan="8">Length</td><td>2</td></tr>
<tr><td colspan="6">Number of Bearer Formats</td><td colspan="2">Bearer IP Address Type</td><td>3</td></tr>
<tr><td colspan="8">Bearer Format Length</td><td>m</td></tr>
<tr><td>Ext</td><td colspan="3">Bearer Format Tag Type</td><td colspan="4">Bearer Format ID</td><td>m+1</td></tr>
<tr><td colspan="7">RTP Payload Type</td><td>Bearer Addr Flag</td><td>m+2</td></tr>
<tr><td>(MSB)</td><td colspan="7">Bearer IP Address</td><td>i</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j</td></tr>
<tr><td>(MSB)</td><td colspan="7">Bearer UDP Port</td><td>j+1</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j+2</td></tr>
<tr><td colspan="4">Extension Length</td><td colspan="4">Extension ID</td><td>k</td></tr>
<tr><td colspan="8">Extension Parameters</td><td>k+1</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
</table>

Length:

This field indicates the number of octets in this element following the Length field.

Bearer IP Address Type:

The value of this field (as given in Table 4.2.90-1) determines the format and length of the Bearer IP Address that should be used for this bearer format.

Table 4.2.90-1 Bearer IP Address Type, Format and Length

Type	Format	Length
0	Internet Protocol IPv4	4 octets
1	Internet Protocol IPv6	16 octets
All other values reserved		

Number of Bearer Formats:

This field contains the number of Bearer Formats that may be supported by this RTP session, one or more, where the specification of each Bearer Format is comprised of all of the fields in the octets which follow, and these octets are repeated the number of times specified by the value of the Number of Bearer Formats field.

Bearer Format Length:

This field contains the number of octets following this octet, containing all the parameters pertaining to a Bearer Format.

Bearer Format ID:

This field contains an identifier which represents a bearer format encoding name. The mapping of the Bearer Format Type IDs to Encoding Names is shown in Table 4.2.90-3.

Bearer Format Tag Type:

This field indicates the tag type associated with the specified RTP Payload Type. Bearer Format Tag Types are prioritized as indicated in Table 4.2.90-2.

Table 4.2.90-2 Bearer Format Tag Types

Bearer Format Tag Type	Meaning	Priority[8]	Definition
0	Unknown	N/A	Used when the Bearer Format Tag types are not available.
1	In-band signaling[9]	Highest	Reserved for Bearer Formats for which the other tag types do not apply, e.g., DTMF digit events or tones.
2	Assigned		The bearer format corresponding to the Service Option currently assigned to the originating or terminating MS.
3	Unassigned		The bearer format(s) corresponding to the Service Option(s) currently not assigned to the originating or terminating MS, that are mutually supported by the BS and MS without transcoding.
4	Transcoded	Lowest	The bearer format(s) that are supported by the base station via transcoding. Note that 'supported' in this context means that the base station is capable of transcoding between any format(s) that are tagged with this category and *at least one* of the formats tagged in the Assigned or Unassigned categories.
All other values reserved			

Ext:

If this bit-field is equal to *one*, then the Extension ID, Extension Length and Extension Parameters fields *shall be* present for this RTP Payload Type; *otherwise*, these octets *shall not be* present.

Bearer Addr Flag:

The value of this field determines whether or not the Bearer IP Address and Bearer UDP port fields are present. If Bearer Addr Flag equals *one*, then Bearer IP Address and Bearer UDP Port shall be present and shall override any information that may have been present in the A2p Bearer Session-level Parameters IE.; otherwise, if Bearer Addr Flag equals

8 This column indicates the priority that the MSC should assign to passed formats.

9 It is required that such in-band signaling events as DTMF digits be supported for interactive call features.

zero, then the Bearer IP Address and Bearer UDP Port octets shall not be present.

RTP Payload Type:

This field contains the RTP Payload Type associated with the Bearer Format ID (refer to Table 4.2.90-3).

The following rules shall apply.

1. The inherent priority of each payload type is determined by the Bearer Format Tag Type, as shown in Table 4.2.90-2.
2. Payload types having the same Bearer Format Tag Type, are prioritized according to their order of appearance within the IE.
3. At least one 'telephone-event' payload type (refer to Table 4.2.90-3.) *shall be* included when this IE is sent, since its support is mandatory (refer to Table 4.2.90-2). The Bearer IP Address and Bearer UDP Port for this Bearer Format *shall not* be included in the Bearer Format Parameters and shall be defaulted to the same IP address and UDP port as the Bearer Format(s) selected by the MSCe.
4. If both a header-full Bearer Format and the corresponding header-free Bearer Format appear in the Bearer Format list, then each of these bearer formats shall have the same IP address and UDP port.

Table 4.2.90-3 Bearer Format IDs & RTP Payload Types

Bearer Format ID	Encoding Name[10]	RTP Payload Type Value[11]	Meaning
0	PCMU	00H – Static	Mu-law (G.711) per [43], limited to multiples of 10 ms (e.g. 10, 20, and 30 ms).
1	PCMA	08H – Static	A-law (G.711) per [43], limited to multiples of 10 ms (e.g. 10, 20, and 30 ms).
2	13K Vocoder	0CH – Static	Header-full 13K Vocoder [IS-733] per [40]
3	EVRC	60H - 7FH – Dynamic[12]	Header-full EVRC per [45]
4	EVRC0	60H - 7FH – Dynamic	Header-free EVRC per [45]
5	SMV	60H - 7FH – Dynamic	Header-full SMV per [44]
6	SMV0	60H - 7FH – Dynamic	Header-free SMV per [44]

[10] Approved Encoding Names are Protocol Number Assignments for Media Type audio by IANA.

[11] Approved RTP Payload Type values are Protocol Number Assignments for RTP Parameters by IANA.

[12] The entity sourcing the A2p parameters picks a payload type in the indicated range on a call-by-call basis.

Bearer Format ID	Encoding Name[10]	RTP Payload Type Value[11]	Meaning
7	telephone-event	60H - 7FH – Dynamic	DTMF digit & tone events per [41]
8	EVRCB	60H-7FH – Dynamic	Header-full EVRC-B per [45]
9	EVRCB0	60H-7FH – Dynamic	Header-free EVRC-B per [45]
A	EVRCWB	60H-7FH – Dynamic	Header-full EVRC-WB per [46]
B	EVRCWB0	60H-7FH – Dynamic	Header-free EVRC-WB per [46]
C	EVRCNW	60H-7FH – Dynamic	Header-full EVRC-NW per [47]
D	EVRCNW0	60H-7FH – Dynamic	Header-free EVRC-NW per [47]
All other values reserved			

Bearer IP Address:

This optional field contains the IP address to which the sending party requests bearer packets be delivered for the Bearer Format. This field has a length and format that depends on the IP Address Type field (refer to Table 4.2.90-1).

Bearer UDP Port:

This optional field contains the UDP port to which the sending party requests bearer packets be delivered for the Bearer Format. RTP data shall be carried on an even UDP port number and the corresponding RTCP packets shall be carried on the next higher (odd) port number, unless agreed to otherwise. Refer to [43].

Extension ID:

This field contains a unique identifier of the payload type extension parameters that follow this octet. Defined extensions are shown in Table 4.2.90-4.

Extension Length:

This field indicates the number of octets of the payload type extension parameters that follow this octet for the particular set of extension parameters.

Extension Parameters:

These payload type extension parameters are dependent on the Extension ID, as shown in Table 4.2.90-4.

Table 4.2.90-4 Payload Type Extension Parameters

Extension ID	Extension Length	Name	Extension Parameters	Applicability
0	1	Voice Frame Interleaving	Refer to Table 4.2.90-5	Applies only to header-full payload types, e.g., SMV [44]
1	4	EVRC and EVRCB extension	Refer to Table 4.2.90-6	Applies to EVRC and EVRCB payloads [45], [46]
2	4	EVRC0 and EVRCB0 extension	Refer to Table 4.2.90-7	Applies to EVRC0 and EVRCB0 payloads [45], [46]
3	4	EVRCWB, and EVRCNW extension	Refer to Table 4.2.90-8	Applies to EVRCWB and EVRCNW payloads [46], [47]
4	4	EVRCWB0 and EVRCNW0 extension	Refer to Table 4.2.90-9	Applies to EVRCWB0 and EVRCNW0 payloads [46], [47]
All other values reserved				

Table 4.2.90-5 Voice Frame Interleaving Extension Parameters

7	6	5	4	3	2	1	0	Octet
Reserved					Max Interleave			q+1

Max Interleave:

This field indicates the maximum voice frame interleaving length. The value in this field is equivalent to the *maxinterleave* value (i.e., the LLL field) as specified in the IANA registration for applicable payload types, and is an integer in the range 0-7. A value of *zero* indicates that there is no interleaving among bundled frames[13].

Table 4.2.90-6 EVRC and EVRCB Extension Parameters

7	6	5	4	3	2	1	0	Octet
silencesupp	Reserved				Max Interleave			q+1
dtxmax								q+2
dtxmin								q+3
hangover								q+4

13 Note, if this extension is not present, i.e., ext = 0, then Max Interleave is assumed to be *zero* for the relevant payload types.

Max Interleave:

Refer to the definition in Table 4.2.90-5.

silencesupp:

Refer to [45], [46]. Refer to [32] for default value.

dtxmax:

Refer to [45], [46]. Refer to [32] for default value.

dtxmin:

Refer to [45], [46]. Refer to [32] for default value.

hangover:

Refer to [45], [46]. Refer to [32] for default value.

Table 4.2.90-7 EVRC0 and EVRCB0 Extension Parameters

7	6	5	4	3	2	1	0	Octet
silencesupp	Reserved				Mode			q+1
dtxmax								q+2
dtxmin								q+3
hangover								q+4

Mode:

Refer to [45], [46]. Refer to [32] for default value.

silencesupp:

Refer to [45], [46]. Refer to [32] for default value.

dtxmax:

Refer to [45], [46]. Refer to [32] for default value.

dtxmin:

Refer to [45], [46]. Refer to [32] for default value.

hangover:

Refer to [45], [46]. Refer to [32] for default value.

Table 4.2.90-8 EVRCWB and EVRCNW Extension Parameters

7	6	5	4	3	2	1	0	Octet
silencesupp	Reserved				Max Interleave			q+1
dtxmax								q+2
dtxmin								q+3
hangover								q+4
mode-set-recv-7	mode-set-recv-6	mode-set-recv-5	mode-set-recv-4	mode-set-recv-3	mode-set-recv-2	mode-set-recv-1	mode-set-recv-0	q+5
sendmode			ptime					q+6
ptime (continued)					maxptime			q+7

Table 4.2.90-8 EVRCWB and EVRCNW Extension Parameters

7	6	5	4	3	2	1	0	Octet
maxptime (continued)							Reserved	q+8

Max Interleave:

Refer to the definition in Table 4.2.90-5.

silencesupp:

Refer to [46], [47]. Refer to [32] for default value.

dtxmax:

Refer to [46], [47]. Refer to [32] for default value.

dtxmin:

Refer to [46], [47]. Refer to [32] for default value.

hangover:

Refer to [46], [47]. Refer to [32] for default value.

mode-set-recv:

Refer to [46], [47]. Refer to [32] for default value.

sendmode:

Refer to [46], [47]. Refer to [32] for default value.

ptime:

Refer to [46], [47]. Refer to [32] for default value.

maxptime:

Refer to [46], [47]. Refer to [32] for default value.

Table 4.2.90-9 EVRCWB and EVRCNW Extension Parameters

7	6	5	4	3	2	1	0	Octet
silencesupp	Reserved				Max Interleave			q+1
dtxmax								q+2
dtxmin								q+3
hangover								q+4
mode-set-recv-7	mode-set-recv-6	mode-set-recv-5	mode-set-recv-4	mode-set-recv-3	mode-set-recv-2	mode-set-recv-1	mode-set-recv-0	q+5
sendmode			ptime					q+6

Mode:

Refer to [46], [47]. Refer to [32] for default value.

silencesupp:

Refer to [46], [47]. Refer to [32] for default value.

dtxmax:

Refer to [46], [47]. Refer to [32] for default value.

dtxmin:

Refer to [46], [47]. Refer to [32] for default value.

hangover:

Refer to [46], [47]. Refer to [32] for default value.

mode-set-recv:

Refer to [46], [47]. Refer to [32] for default value.

sendmode:

Refer to [46], [47]. Refer to [32] for default value.

ptime:

Refer to [46], [47]. Refer to [32] for default value.

Procedures for the BS and MSCe to assemble the A2p Bearer Format-Specific Parameters IE are as follows:

- When the BS offers supported bearer formats to the MSCe it includes the corresponding Bearer Format Tag Type, as defined in Table 4.2.90-2. It may also include the Bearer IP Address and UDP Port if they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters IE.

- When an MSCe selects one or more of the bearer formats offered by a BS it may send to the BS the selected bearer format(s) with the corresponding Bearer Tag Type that was originally affixed by the BS. The MSCe selects only one voice bearer format. The MSCe may also send the Bearer IP Address and UDP Port if they override the Session IP Address and UDP Port that may have been sent in an A2p Bearer Session-Level Parameters IE.

4.2.91 Mobile Subscription Information

This IE includes mobile subscription information records and may be sent from the MSC to the BS, or the BS to the MSC.

4.2.91 Mobile Subscription Information

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Record Identifier - 1								3
Record Length - 1								4
(MSB)	Record Content - 1							5
…								…
…							(LSB)	j
Record Identifier - 2								j+1
Record Length - 2								j+2
(MSB)	Record Content – 2							j+3
…								…
							(LSB)	k
…								…
Record Identifier - n								m+1
Record Length - n								m+2
(MSB)	Record Content - n							m+3
…								…
							(LSB)	n

Length:

This field contains the number of octets in this element following the Length field.

Record Identifier:

This field identifies the included record type. The field is coded as shown in Table 4.2.91-1.

Table 4.2.91-1 Record Identifier Values

Hex Values	Meaning
00H	Band Class/Band Subclass Record
All other values reserved	

Record Length:

This field indicates the number of octets in the immediately following Record Content field.

Record Content:

The coding of this field is determined by the Record Identifier field and is coded as follows:

Table 4.2.91-2 Band Class/Band Subclass Record (Record Identifier = 00H)

7	6	5	4	3	2	1	0	Octet
All Band Classes Included	Current Band Subclass							5
Band Class 1								6
All Band Subclasses Included	Reserved			Band Class 1 Subclass Length				7
SC7	SC6	SC5	SC4	SC3	SC2	SC1	SC0	i
…								…
SCn	SCn-1	SCn-2	SCn-3	SCn-4	SCn-5	SCn-6	SCn-7	j
…								…
Band Class n								k
All Band Subclasses Included	Reserved			Band Class n Subclass Length				k+1
SC7	SC6	SC5	SC4	SC3	SC2	SC1	SC0	k+2
…								…
SCn	SCn-1	SCn-2	SCn-3	SCn-4	SCn-5	SCn-6	SCn-7	m

All Band Classes Included:

This field indicates whether the band class values included represent all of the MS’s band class capabilities or just a subset of supported band classes. The field is set to ‘1’ when all of the MS’s band class capabilities have been included. Otherwise, the field is set to ‘0’.

Current Band Subclass:

This field specifies the current band subclass in use or the last known band subclass for the MS and is encoded as specified in [30]. The Current Band Subclass field is associated with the current or last known band class specified in the first Band Class field in this record. If band subclasses are not defined for the current band class, this field is set to ‘0’.

Band Class:

This field specifies the band classes supported by the MS and is encoded as specified in [30]. At least one instance of this field shall be included; where, the first instance corresponds to the current band class or last known band class for the MS. Additional Band Class fields indicate additional band classes supported by the MS.

All Band Subclasses Included:

This field indicates whether all of the MS's band subclass capabilities are included in this record for the associated band class or just a subset of band subclasses. The field is set to '1' when all of the MS's band subclass capabilities have been included for the associated band class. Otherwise, the field is set to '0'.

Band Subclass Length:

This field indicates the number of band subclass octets that follow the SC Length field. This field indicates whether any band subclasses are supported for the previous band class entry field. At least one instance of this field is included. If no band subclasses are supported for the associated band class, this field is set to '0'.

SCn:

The SCn fields represent the band subclasses supported by the MS. The SCn field is set to '1' if the associated band subclass (e.g., SC3 = band subclass 3) is supported by the MS. The field is set to '0' if the associated band subclass is not supported by the MS, the subclass capability is unknown or the band subclass is undefined for the corresponding band class.

4.2.92 Event

The element is included by the MSC to indicate an event associated with the MS.

4.2.92 Event

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th><th>Octet</th></tr>
<tr><td colspan="8">A1 Element Identifier = [7EH]</td><td>1</td></tr>
<tr><td colspan="8">Length</td><td>2</td></tr>
<tr><td colspan="8">Event Identifier</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">Event Time</td><td>3</td></tr>
<tr><td colspan="8"></td><td>4</td></tr>
<tr><td colspan="8"></td><td>5</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>6</td></tr>
</table>

Length:

This field indicates the number of octets in this element following the Length field.

Event Identifier:

This field is coded as follow:

Binary Values	**Meaning**
0000 0010	1x Power Down*
0000 0011	1x Service Rejected*
0000 0100	Cease call processing
All other values are reserved	

*these values are used for High Rate Packet Data (HRPD) systems. Refer to [I-1] and [I-2].

Event Time:

This field indicates the system time associated with the event. This field is 32-bit binary number derived from the CDMA System Time. The Event Time is in units of 80 ms.

4.2.93 Page Indicator

This element is used by HRPD. Refer to [I-1] and [I-2].

4.2.94 Mobile Supported Service Options

This element indicates service options that are supported by the MS for all service option groups. It is primarily used by the target BS to facilitate a target BS initiated service option change during hard handoff. The coding of this element is as follows:

4.2.94 Mobile Supported Service Options

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Number of Service Option Groups								3
Service Option Group Number					Reserved	Service Option Bitmap Indicator		4
(MSB)	Service Option Bitmap							4
Service Option Bitmap (LSB)	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	6
…								…
Service Option Group Number					Reserved	Service Option Bitmap Indicator		k
(MSB)	Service Option Bitmap							k+1
Service Option Bitmap (LSB)	Seventh Fill Bit – if needed = [0 (if used as a fill bit)]	Sixth Fill Bit – if needed = [0 (if used as a fill bit)]	Fifth Fill Bit – if needed = [0 (if used as a fill bit)]	Fourth Fill Bit – if needed = [0 (if used as a fill bit)]	Third Fill Bit – if needed = [0 (if used as a fill bit)]	Second Fill Bit – if needed = [0 (if used as a fill bit)]	First Fill Bit – if needed = [0 (if used as a fill bit)]	k+2
Ordered = [0, 1]	Number of Service Option Values							m
(MSB)	Service Option							m+1
							(LSB)	m+2
…								…
(MSB)	Service Option							n
							(LSB)	n+1

Length:

The Length field is a binary value indicating the number of octets following the Length field.

Number of Service Option Groups:

This field specifies the number of service option groups included in this element.

Service Option Group Number:

This field specifies the service option group number associated with the included service option bitmap. The service option group number shall conform to [I-3].

Service Option Bitmap Indicator:

This field encodes the number of valid bits, of the service option bitmap as specified in [5].

Service Option Bitmap:

This field specifies the service options known to be supported by the MS for the service option group. Each bit in the bitmap corresponds to one service option. For every service option supported by the MS, the appropriate bit is set to '1'. The bits for unsupported service options are set to '0'. The service option group bitmap shall conform to [I-3].

Ordered:

This field, if set to '1', indicates that subsequent occurrences of the Service Option field is ranked in decreasing order of preference. If this field is set to '0', subsequent occurrences of the Service Option field has no preference.

Number of Service Option Values:

This field specifies the number of service option values included in this element.

Service Option:

If not indicated by the preceding Service Option Bitmap fields, this field specifies the service options known to be supported by the MS. Note that this field may indicate proprietary service options. Refer to [I-3].

4.2.95 Integrity Info

When present, this element contains information necessary for the target BS to perform message integrity. This element is used during handoff.

4.2.95 Integrity Info

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Integrity Key							3
…								…
							(LSB)	18
Reserved						KEY_ID		19
(MSB)	Crypto-Sync							20
…								21
…								22
							(LSB)	23
Integrity Algorithm in Use								24
Integrity Algorithms Supported								25

Length:

This field indicates the number of octets in this element following the Length field.

Integrity Key:

The 128-bit bit integrity key currently being used. Refer to [5].

KEY_ID:

The 2-bit identifier associated with the integrity key currently being used. Refer to [5].

Crypto-Sync:

The 32-bit crypto-sync value currently being used. Refer to [5].

Integrity Algorithm in Use:

The integrity algorithm currently being used (8-bits). Refer to [5].

Integrity Algorithms Supported:

The integrity algorithm(s) supported by the MS (indicated by the 8-bit SIG_INTEGRITY_SUP). Refer to [5].

4.2.96 Authentication Vector Info

When present, this variable length element contains information necessary to perform authentication and message integrity. This element is used during call setup and handoff.

4.2.96 Authentication Vector

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
AKA Authentication Type								3
AKA Authentication Information								variable

Length:

This field indicates the number of octets in this element following the Length field.

AKA Authentication Type:

This field identifies the type of AKA information being passed from the MSC to the BS and is coded as follows.

Table 4.2.96-1 AKA Authentication Information Type

Hex Value	Meaning
00H	Reserved
01H	RANDA and AUTN
All other values	Reserved

When the AKA Authentication Type is set to 01H, the AKA Authentication Information field is coded as follows.

(MSB)	RANDA		4
…			…
		(LSB)	19
(MSB)	AUTN		20
…			…
		(LSB)	35

RANDA:

This is the 128-bit RANDA value from the AKA Authentication vector. Refer to [31].

AUTN:

This is the 128-bit AUTN value from the AKA Authentication vector. Refer to [31].

4.2.97 AKA Report

This information element indicates the AKA results between the MS and the BS.

4.2.97 AKA Report

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
AKA Code								3
(MSB)	RES							4
…								…
							(LSB)	19
(MSB)	AUTS							20
…								…
							(LSB)	33

Length:

This field indicates the number of octets in this element following the Length field.

AKA Code:

Indicates the outcome of an AKA authentication operation; refer to Table 4.2.97-1.

Table 4.2.97-1 AKA Code

Binary Value	Code	Meaning
0000 0000	Not used	Not used
0000 0001	Success.	The AKA operation was successful.
0000 0010	Reject	The MS sent an authentication reject.
0000 0011	Reserved	Reserved
0000 0100	Loss of radio contact.	The Serving MSC lost radio contact with the MS being authenticated.
0000 0101	Synchronization failure.	The sequence number received by the MS was outside the expected range.
0000 0101	Unresolved synchronization failure.	Synchronization failure remains unresolved.
All other values	Reserved	

RES:

This is the 128 bit response (RES) from the MS. Refer to [31].

AUTS:

This is the 112 bit authentication token AUTS for reporting a synchronization failure. Refer to [31].

4.2.98 Enhanced Voice Privacy Request

When present, this IE indicates that the MS has requested Voice Privacy or alternatively, in the case of Privacy Mode Complete message, that the MS has requested a change in the Voice Privacy mode setting.

4.2.98 Enhanced Voice Privacy Request

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
VP Algorithm Requested								3
VP Algorithms Supported								4

Length:

This field indicates the number of octets in this element following the Length field.

VP Algorithm Requested:

Bits 0-7 indicate the voice privacy algorithm requested by the MS.

7	6	5	4	3	2	1	0	Octet
ext=1	A7	A6	A5	A4	A3	A2	A1	3

Refer to Table 4.2.98-1 for the definition of bits A7 through A1

Table 4.2.98-1 Voice Privacy Algorithm

A7	A6	A5	A4	A3	A2	A1	VP Algorithm Requested
0	0	0	0	0	0	0	No voice privacy
0	0	0	0	0	0	1	Private long code
0	0	0	0	0	1	0	Advanced Encryption Standard (AES)
All other values							Reserved

Bit 7 is an extension bit. Refer to section 4.1.4, for an interpretation of the extension bit. In this version of the standard, this bit shall be set to ‘1’ (i.e. no extension).

VP Algorithms Supported:

Refer to section 4.2.53, VP Algorithms Supported, for the format of this field.

4.2.99 Encryption and Integrity Info

This IE is used to carry MS identified encryption and integrity related information to the MSC.

4.2.99 Encryption and Integrity Info

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved						KEY_ID		3
(MSB)	Crypto-Sync							4
…								5
…								6
							(LSB)	7
Encryption Algorithms Supported								8
Integrity Algorithms Supported								9

Length:

This field indicates the number of octets in this element following the Length field.

KEY_ID:

The 2-bit identifier associated with the integrity key currently being used. Refer to [5].

Crypto-Sync:

The 32-bit crypto-sync value currently being used. Refer to [5].

Encryption Algorithms Supported:

The encryption algorithm(s) supported by the MS (indicated by the 8-bit SIG_INTEGRITY_SUP). Refer to [5].

Integrity Algorithms Supported:

The integrity algorithm(s) supported by the MS (indicated by the 8-bit SIG_INTEGRITY_SUP). Refer to [5].

4.2.100 UIM Authentication Info

This element contains information to be used for UIM authentication.

4.2.100 UIM Authentication Info

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	UIM Authentication Key							3
…								…
							(LSB)	18

Length:

This field indicates the number of octets in this element following the Length field.

UIM Authentication Key:

The 128-bit UIM authentication key (UAK) that the UIM uses to calculate UMAC using the MAC calculated by the MS's integrity algorithm. Refer to [5].

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5.0 Timer Definitions

5.1 Timer Values

Table 5.1-1 Timer Values and Ranges Sorted by Name

Timer Name	Default Value (seconds)	Range of Values (seconds)	Granularity (seconds)	Section Reference	Classification
T_1	55	0 – 255	1	5.2.5.1	Facilities Management
T_2	60	0 – 255	1	5.2.5.2	Facilities Management
T_4	60	0 – 255	1	5.2.5.3	Facilities Management
T_7	10	0 – 255	1	5.2.4.1	Handoff
T_8	Refer to section 5.2.4.2.			5.2.4.2	Handoff
T_9	10	0 – 255	1	5.2.4.3	Handoff
T_{10}	5	0 – 99	1	5.2.1.1	Call Processing
T_{11}	5	0 – 99	1	5.2.4.4	Handoff
T_{12}	60	0 – 255	1	5.2.5.4	Facilities Management
T_{13}	55	0 – 255	1	5.2.5.5	Facilities Management
T_{16}	60	0 – 255	1	5.2.5.6	Facilities Management
T_{20}	5	0 – 99	1	5.2.1.2	Call Processing
T_{60}	5	0 – 99	1	5.2.2.4	Supplementary Services
T_{62}	5	0 – 99	1	5.2.2.2	Supplementary Services
T_{63}	5	0 – 170	1	5.2.2.3	Supplementary Services
T_{300}	1.5	0 – 99	0.1	5.2.1.3	Call Processing
T_{301}	30	0 – 60	1	5.2.1.4	Call Processing
T_{303}	6	0 – 99	1	5.2.1.5	Call Processing
T_{306}	5	0 – 99	1	5.2.1.6	Call Processing
T_{308}	5	0 – 99	1	5.2.1.7	Call Processing
T_{309}	5	0 – 90	1	5.2.5.7	Facilities Management
T_{311}	1	0 – 5	0.1	5.2.1.8	Call Processing
T_{312}	5	0 – 99	1	5.2.1.18	Call Processing
T_{314}	5	0 – 99	1	5.2.1.9	Call Processing
T_{315}	5	0 – 99	1	5.2.1.10	Call Processing
T_{3113}	5	0 – 170	1	5.2.1.14	Call Processing

Table 5.1-1 Timer Values and Ranges Sorted by Name

Timer Name	Default Value (seconds)	Range of Values (seconds)	Granularity (seconds)	Section Reference	Classification
T_{3210}	30	0 – 99	1	5.2.3.1	Mobility Management
T_{3220}	10	0 – 99	1	5.2.3.2	Mobility Management
T_{3230}	5	0 – 99	1	5.2.1.15	Call Processing
T_{3231}	5	0 – 99	1	5.2.1.13	Call Processing
T_{3260}	30	0 – 99	1	5.2.3.3	Mobility Management
T_{3270}	5	0 – 99	1	5.2.3.4	Mobility Management
T_{3271}	15	0 – 99	1	5.2.3.5	Mobility Management
T_{3272}	5	0 – 99	1	5.2.3.6	Mobility Management
T_{3273}	1.5	0 – 99	0.1	5.2.3.8	Mobility Management
T_{3280}	15	0 – 99	1	5.2.1.16	Call Processing
T_{ar}	1.5	0 – 99	1	5.2.3.10	Mobility Management
T_{event}	55	0 – 255	1	5.2.1.21	Call Processing
T_{ordreg}	10	0 – 99	1	5.2.3.7	Mobility Management
T_{paca1}	5	0 – 99	1	5.2.1.11	Call Processing
T_{paca2}	5	0 – 99	1	5.2.1.12	Call Processing
T_{sm}	30	0 – 99	1	5.2.3.9	Mobility Management
$T_{softpos}$	10	0 – 99	1	5.2.2.1	Supplementary Services
T_{waitho}	Refer to section 5.2.4.5			5.2.4.5	Handoff
T_{yyp}	10	0 – 170	1	5.2.1.18	Call Processing
T_{xxp}	6	0 – 99	1	5.2.1.19	Call Processing
T_{zzp}	6	0 – 99	1	5.2.1.20	Call Processing

5.2 Timer Definitions

5.2.1 Call Processing Timers

5.2.1.1 T_{10}

This MSC timer is started when the Assignment Request message is sent, and stopped when the Assignment Complete message or Assignment Failure message is received.

5.2.1.2 T_{20}

This BS timer is started when the Assignment Failure message is sent, and stopped when the Assignment Request message (retry) or Service Release message is received or when the MSC initiates call clearing.

5.2.1.3 T_{300}

This BS timer is started when a Clear Request message is sent. It is stopped when a Clear Command message is received.

5.2.1.4 T_{301}

This MSC timer is started when the Assignment Complete message is received, and stopped when the Connect or a Flash with Information message is received (ring time-out, max. 60 seconds). This timer is only set for mobile terminated voice calls.

5.2.1.5 T_{303}

BS timer T_{303} for MS origination is started when the CM Service Request message is sent. For MS termination, the timer is started when the Paging Response message is sent. In both cases, the timer is stopped when the Assignment Request message, Clear Command message, PACA Command message or Service Redirection message is received, or the SCCP connection is refused or released by the MSC.

This timer is also started when the Additional Service Request message is sent. In this case, it is stopped when the BS receives an Assignment Request message or Service Release message from the MSC.

5.2.1.6 T_{306}

This BS timer is started when the Handoff Commenced message is sent and stopped when the Clear Command message is received.

This timer is also started when the target BS sends the Handoff Failure message on an SCCP connection and is stopped when the target BS receives the Clear Command message.

5.2.1.7 T_{308}

This MSC or BS timer is started when the Service Release message is sent, and stopped when the Service Release Complete message is received.

5.2.1.8 T_{311}

This BS timer is started when the BS Service Request message is sent, and stopped when the BS Service Response message is received.

5.2.1.9 T_{314}

This MSC timer is started when the Additional Service Notification message is sent, and stopped when the Additional Service Request message is received.

5.2.1.10 T_{315}

This MSC timer is started when the Clear Command message is sent, and stopped when the Clear Complete message is received.

5.2.1.11 T_{paca1}

This MSC timer is started when the PACA Command message is sent and is stopped when a PACA Command Ack Message is received.

5.2.1.12 T_{paca2}

This MSC or BS timer is started when the PACA Update message is sent and is stopped when a PACA Update Ack Message is received.

5.2.1.13 T_{3231}

This MSC timer is started when the SCCP Connection Request primitive is sent, and is stopped when an SCCP Connection Confirm primitive or an SCCP Connection Refused primitive is received. For use of these timers, refer to [12].

5.2.1.14 T_{3113}

This MSC timer is started when the Paging Request message or an ADDS Page message is sent, and is stopped when the Page Response message or an ADDS Page Ack message is received. The value of this timer should be set based on BS needs. Typically it is larger than the sum of the slot cycle length and the maximum access attempt duration.

5.2.1.15 T_{3230}

This BS timer is started when any message contained in the Complete Layer 3 information message is sent, and is stopped when an SCCP Connection Confirm primitive or an SCCP Connection Refused primitive is received. For use of these timers, refer to [12].

5.2.1.16 T_{3280}

This MSC timer is started when the Privacy Mode Command message is sent, and stopped when the Privacy Mode Complete message is received.

5.2.1.17 T_{312}

This MSC timer is started when a CM Service Request message containing an Origination Continuation Indicator is received, and stopped when a CM Service Request Continuation message is received.

5.2.1.18 T_{yyp}

This MSC timer is started when a Bearer Update Request message is sent and is stopped when a Bearer Update Response message is received.

5.2.1.19 T_{xxp}

This BS timer is started when an Assignment Complete message is sent and the bearer format and transport address to be used have not yet received and is stopped when a Bearer Update Request message is received.

5.2.1.20 T_{zzp}

This BS timer is started when a Bearer Update Required message is sent and is stopped when a Bearer Update Request message is received.

5.2.1.21 T_{event}

This BS timer is started when an Event Notification message is sent and is stopped when an Event Notification Ack message is received.

5.2.2 Supplementary Services Timers

5.2.2.1 $T_{softpos}$

This MSC timer is started when the Radio Measurements for Position Request message is sent and stopped when the Radio Measurements for Position Response message is received.

5.2.2.2 T_{62}

This MSC timer is started when the Flash with Information message is sent and stopped when the Flash with Information Ack message is received.

5.2.2.3 T_{63}

This MSC timer is started when the a Feature Notification message is sent containing a Tag element and stopped when the Feature Notification Ack message is received. The value of this timer should be set based on BS needs. Typically it will be larger than the sum of the slot cycle length plus the maximum access attempt duration.

5.2.2.4 T_{60}

This BS timer is started when an ADDS Transfer message is sent to the MSC with the ADDS User Part element Data Burst Type field set equal to SDB or Asynchronous Data Services to authenticate an MS for a SDB, CCPD Mode, or a dormant mode handoff. The BS stops this timer when an ADDS Transfer Ack message is received from the MSC with the authentication results for the MS. In the event that a traffic channel is required during a dormant mode handoff, this timer shall be stopped when the BS sends a CM Service Request message to the MSC.

5.2.3 Mobility Management Timers

5.2.3.1 T_{3210}

This BS timer is started when the Location Updating Request message is sent, and is stopped when a Location Updating Accept message a Location Updating Reject message or a Service Redirection message is received.

5.2.3.2 T_{3220}

This BS timer is started when the Parameter Update Request message is sent, and is stopped when the Parameter Update Confirm message is received.

5.2.3.3 T_{3260}

This MSC timer is started when the Authentication Request message is sent, and is stopped when the Authentication Response message is received.

5.2.3.4 T_{3270}

This MSC timer is started when the SSD Update Request message is sent, and is stopped when the Base Station Challenge message is received.

5.2.3.5 T_{3271}

This MSC timer is started when the Base Station Challenge Response message is sent, and is stopped when the SSD Update Response message is received.

5.2.3.6 T_{3272}

This MSC timer is started when the Status Request message is sent and is stopped when the Status Response message is received.

5.2.3.7 T_{ordreg}

This MSC timer is started when the Registration Request message for an MS is sent to the BS and is stopped when the Location Updating Request message for the MS is received from the BS. The value of this timer should be set based on BS needs. Typically it will be larger than the sum of the slot cycle length plus the maximum access attempt duration.

For MSs not operating in slotted mode, the default value, or operator configured value of this timer if set, shall be used.

5.2.3.8 T_{3273}

This BS timer is started when the BS Authentication Request message is sent, and is stopped when the BS Authentication Request Ack or Authentication Request message is received.

5.2.3.9 T_{sm}

This MSC timer is started when the Security Mode Request message is sent to the BS, and is stopped when the Security Mode Response message is received.

5.2.3.10 T_{ar}

This BS timer is started when the Authentication Report message is sent, and is stopped when the Authentication Report Response message is received.

5.2.4 Handoff Timers

5.2.4.1 T_7

The source BS starts this timer when sending the Handoff Required message to the MSC. If strength measurements are being performed, then the timer is started at the time that the Strength Measurement Request message is sent to the MSC. Therefore, the timer represents the time between successive handoff attempts for the same mobile connection. It is recommended that this timer value be long enough to cover all message exchanges with potential targets as well as the maximum time to transmit all transmissions of the Handoff Command message (refer to timer T_8), and handoff queuing time, if supported. Timer T_7 is stopped when a Handoff Command message or a Handoff Required Reject message is received.

5.2.4.2 T_8

The source BS starts this timer when sending the handoff instruction to the MS. It is recommended that this timer value include all the time necessary to successfully complete handoff execution (i.e., time to send all transmissions of a handoff instruction plus the time to access the target or detect that the MS has not left the source BS). The BS stops this timer when it receives an acknowledgement from the MS.

5.2.4.3 T_9

The target BS starts this timer when sending the Handoff Request Acknowledge message to the MSC. It is stopped when the MS is acquired or when the MSC sends a Clear Command message to the BS. It represents the time to reserve the target channel while waiting for the MS to arrive on the target channel. This should be at least as long as T_8.

5.2.4.4 T_{11}

This MSC timer is started when the Handoff Request message is send to the BS and is stopped when the Handoff Request Acknowledge message or the Handoff Failure message is received.

5.2.4.5 T_{waitho}

This BS timer is started when the source BS sends a General Handoff Direction Message to the MS with an indication that the MS is allowed to return to the source BS if it cannot acquire the target BS. This timer is stopped if the source BS receives a Candidate Frequency (CF) Search Report Message, or upon receipt of a Clear Command message from the MSC. The source BS shall wait until this timer expires (if the timer is started) before sending the Handoff Commenced message to the MSC.

5.2.5 Facility Management Timers

5.2.5.1 T_1

This BS timer is started when a Block or Unblock message is sent and stopped when a Block Acknowledge or Unblock Acknowledge message is received.

5.2.5.2 T_2

Timer T_2 represents the Reset guard period in the MSC. To avoid a "deadlock" situation during a BS triggered global reset procedure, timer T_2 (MSC) should always be less than timer T_4 (BS).

5.2.5.3 T_4

This BS timer is started when a Reset message is sent is stopped when a Reset Acknowledge message is received. To avoid a "deadlock" situation during a BS triggered global reset procedure, timer T_2 (MSC) should always be less than timer T_4 (BS).

5.2.5.4 T_{12}

This MSC or BS timer is started when a Reset Circuit message is sent and stopped when a Reset Acknowledge message is received. At the MSC, this timer is also stopped when a Block message is received from the BS.

5.2.5.5 T_{13}

Timer T_{13} represents a Reset guard period at the BS. To avoid a "deadlock" situation during an MSC triggered global reset procedure, timer T_{13} (BS) should always be less than timer T_{16} (MSC).

5.2.5.6 T_{16}

This MSC timer is started when a Reset message is sent and stopped when a Reset Acknowledge message is received. To avoid a "deadlock" situation during an MSC triggered global reset procedure, timer T_{13} (BS) should always be less than timer T_{16} (MSC).

5.2.5.7 T_{309}

This MSC timer is started when a Transcoder Control Request message is sent, and stopped it when the Transcoder Control Acknowledge message is received.