3GPP2 A.S0014-0

Version 1.0

Date: November 16, 2001

3RD GENERATION PARTNERSHIP PROJECT 2 "3GPP2"

Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces — Part 4 (A1, A2, and A5 Interfaces)

Revision 0 (3G IOSv4.2)

(SDO Ballot Version)

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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 interfaces for the A Reference Point.

1.1.1 Purpose

TBD

1.1.2 Scope

TBD

1.2 References

[1] TIA/EIA/*IS-2000*.1-A, *Introduction to CDMA 2000 Standards for Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0001-0.

[2] TIA/EIA/*IS-2000*.2-A, *Physical Layer Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0002-0.

[3] TIA/EIA/*IS-2000*.3-A, *Medium Access Control (MAC) Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0003-0.

[4] TIA/EIA/*IS-2000*.4-A, *Signaling Link Access Control (LAC) Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0004-0.

[5] TIA/EIA/*IS-2000*.5-A, *Upper Layer (Layer 3) Signaling Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0005-0.

[6] TIA/EIA/*IS-2000*.6-A, *Analog Signaling Standard for CDMA 2000 Spread Spectrum Systems*, March 2000. Refer also to 3GPP2 C.S0006-0.

[11] A.S0011-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 1 Overview*, October 2001. Refer also to TIA/EIA-2001.1-B.

[12] A.S0012-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 2 Transport*, October 2001. Refer also to TIA/EIA-2001.2-B.

[13] A.S0013-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 3 Features*, October 2001. Refer also to TIA/EIA-2001.3-B.

[14] A.S0014-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 4 (A1, A2, and A5 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.4-B.

[15] A.S0015-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 5 (A3 and A7 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.5-B.

[16] A.S0016-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 6 (A8 and A9 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.6-B.

[17] A.S0017-0, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)*, October 2001. Refer also to TIA/EIA-2001.7-B.

1.2.1 Telecommunications Industry Association (TIA) / Electronics Industry Association (EIA)

[18] TIA/EIA-41-D, Cellular Radio-Telecommunications Intersystem Operations; December, 1997.

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

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

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

[22] TIA/EIA-664, Cellular Features Description Rev A; December 1999.

[23] TIA/EIA-829, Interoperability Specification for Tandem Free Operation, June, 2000. Refer also to 3GPP2 A.S0004.

[24] TIA/EIA-2001.1-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 1 Overview*, October 2001. Refer also to A.S0011-0.

[25] TIA/EIA-2001.2-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 2 Transport*, October 2001. Refer also to A.S0012-0.

[26] TIA/EIA-2001.3-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 3 Features*, October 2001. Refer also to A.S0013-0.

[27] TIA/EIA-2001.4-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 4 (A1, A2, and A5 Interfaces)*, October 2001. Refer also to A.S0014-0.

[28] TIA/EIA-2001.5-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 5 (A3 and A7 Interfaces)*, October 2001. Refer also to A.S0015-0.

[29] TIA/EIA-2001.6-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 6 (A8 and A9 Interfaces)*, October 2001. Refer also to A.S0016-0.

[30] TIA/EIA-2001.7-B, *Interoperability Specification (IOS) for CDMA 2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)*, October 2001. Refer also to A.S0017-0.

[31] TIA/EIA/IS-637-A, Short Message Service for Spread Spectrum Systems, September, 1999.

[32] TIA/EIA/IS-707-A-1, Data Services Option Standard for Spread Spectrum Systems - Addendum 1, December 1999.

[33] TIA/EIA/IS-707-A-2, Data Services Option Standard for Spread Spectrum Systems - Addendum 2, June 2000. Refer also to 3GPP2 C.S0017-0-2.

[34] TIA/EIA/IS-801, Position Determination Service Standard for Dual Mode Spread Spectrum Systems, November 1999.

[35] TIA/EIA/TSB58-D, Administration of Parameter Value Assignments for TIA/EIA Spread Spectrum Standards; December, 2000. Refer also to 3GPP2 C.R1001-A.

1.2.2 3GPP and 3GPP2

[36] 3GPP TS 25.413 V3.3.0 (Release 1999), Technical Specification Universal Mobile Telecommunications System (UMTS); UTRAN Iu Interface RANAP Signalling, September, 2000. Refer also to ETSI TS 125.413 V3.3.0.

[37] 3GPP2 A.S0001-A, *3GPP2 Access Network Interfaces Interoperability Specification,* November 2000.

[38] 3GPP2 A.S0004, 3GPP2 Tandem Free Operation Specification, June, 2000. Refer also to TIA/EIA-829.

[39] 3GPP2 C.R1001-A, Administration of Parameter Value Assignments for cdma2000 Spread Spectrum Standards, Release A, July 14, 2000. Refer also to TIA/EIA/TSB58-C.

[40] 3GPP2 C.S0001-0, *Introduction to CDMA 2000 Standards for Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/*IS-2000*.1-A.

[41] 3GPP2 C.S0002-0, *Physical Layer Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/*IS-2000*.2-A.

[42] 3GPP2 C.S0003-0, *Medium Access Control (MAC) Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/*IS-2000*.3-A.

[43] 3GPP2 C.S0004-0, *Signaling Link Access Control (LAC) Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/*IS-2000*.4-A.

[44] 3GPP2 C.S0005-0, *Upper Layer (Layer 3) Signaling Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/*IS-2000*.5-A.

[45] 3GPP2 C.S0006-0, *Analog Signaling Standard for CDMA 2000 Spread Spectrum Systems*, June 2000. Refer also to TIA/EIA/*IS-2000*.6-A.

[46] 3GPP2 C.S0005-A, *Upper Layer (Layer 3) Signaling Standard for CDMA 2000 Spread Spectrum Systems*, July 2000. Refer also to TIA/EIA/*IS-2000*.5-A.

[47] 3GPP2 C.S0017-0-2, Data Service Options for Spread Spectrum Systems Addendum 2, January 14, 2000. Refer also to TIA/EIA/IS-707-A-2.

1.2.3 Standards Committee T1

[48] ANSI T1.607, ISDN - Layer 3 Signaling Specification for Circuit Switched Bearer Service, July, 1990.

[49] ANSI T1.628, Routing, Bridging and Transfer of Emergency Service Calls, May 1993.

1.2.4 International Telecommunications Union - Telecommunications Sector (ITU-T)

[50] ITU-T Recommendation E.164, The International Public Telecommunication Numbering Plan, May, 1997.

[51] ITU-T Recommendation E.212, *Identification Plan for Land Mobile Stations*, 1993.

[52] ITU-T Recommendation F.69, The International Telex Service - Service and Operational Provisions Of Telex Destination Codes and Telex Network Identification Codes, June, 1994.

[53] ITU-T Recommendation X.121, International Numbering Plan for Public Data Networks, October, 1996.

[54] ITU-T Recommendation Q.931, *ISDN User-Network Interface Layer 3 Specification for Basic Call Control*, May, 1998.

1.2.5 Other

[55] 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.

1.3 Terminology

1.3.1 Acronyms

Acronym	Meaning
AC	Authentication Center
ADDS	Application Data Delivery Service
ADPCM	Adaptive Differential Pulse Code Modulation
AMPS	Advanced Mobile Phone System
ANID	Access Network Identifiers
ANSI	American National Standards Institute
ARFCN	Absolute Radio Frequency Channel Number
AUTHR	Authentication Response
AUTHU	Unique Challenge Authentication Response
BCD	Binary Coded Decimal
B-ISDN	
BS	Base Station
BSAP	Base Station Application Part

Acronym	Meaning
BSC	Base Station Controller
BSMAP	Base Station Management Application Part
CCPD	Common Channel Packet Data
CDG	CDMA Development Group
CDMA	Code Division Multiple Access
CIE	Content Information Element
CM	Connection Management
CNIP	Calling Number Identification Presentation
CNIR	Calling Number Identification Restriction
COUNT	Call History Count
DCCH	Dedicated Control Channel
DLCI	Data Link Connection Identifier
DS	Direct Spread
DS0	Digital Signal Level 0
DS-41	An operational mode in which the BS and MS operate with the direct spread (DS) radio layers of the UMTS system defined by 3GPP, and the upper layers defined in *IS-2000* that conform to and interoperate with ANSI-41 based networks.
DSS2	
DTAP	Direct Transfer Application Part
DTX	Discontinuous Transmission
EIA	Electronics Industry Association
ESN	Electronic Serial Number
ETSI	
EVRC	Enhanced Variable Rate Codec
FA	Foreign Agent
HLR	Home Location Register
IEI	Information Element Identifier
IMSI	International Mobile Subscriber Identity
IOS	Interoperability Specification
ITU	International Telecommunications Union
IWF	Interworking Function
kb	kilo bits
LAC	Location Area Code
LI	Length Indicator
LSB	Least Significant Bit
MC-41	An operational mode in which the BS and MS operate with the multi-carrier (MC) radio layers and the upper layers defined in *IS-2000* that conform to and interoperate with ANSI-41 based networks.
MIN	Mobile Identification Number

Acronym	Meaning
MS	Mobile Station
MSB	Most Significant Bit
MSC	Mobile Switching Center
N-AMPS	Narrow band AMPS
OAM&P	Operations, Administration, Maintenance, and Provisioning
OTD	Orthogonal Transmit Diversity
PACA	Priority Access and Channel Assignment
PCM	Pulse Code Modulation
PLD	Position Location Data
PLMN	Public Land Mobile Network
P-P	PDSN-PDSN
QCELP	Q Code Excited Linear Prediction
QoS	Quality of Service
QPCH	Quick Paging Channel
RAND	Random Variable
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)
SCCP	Signaling Connection Control Part
SCH	Supplemental Channel
SDB	Short Data Burst
SDU	Selection/Distribution Unit
SID	System Identification
SME	Signaling Message Encryption
SMS	Short Message Service
SMS-MO	SMS Mobile Originated
SMS-MT	SMS Mobile Terminated
SOCI	Service Option Connection Identifier
SRNC-ID	Source Radio Network Controller Identifier
S-RNTI	Source Radio Access Network Temporary Identifier
SSD	Shared Secret Data
TIA	Telecommunications Industry Association
TMSI	Temporary Mobile Station Identity
TSB	Telecommunications Systems Bulletin
VP	Voice Privacy

1.3.2 Definitions

Base Station

An entity in the public radio telecommunications system used for radio telecommunications with mobile stations.

Cell

The unit of a base station having the ability to radiate in a given geographic area. In this standard, a Cell ID refers to a particular cell and sector.

Handoff

Handoff is the process by which an air interface circuit between a mobile station and a base station is transferred from the current base station equipment and air interface channel to either a different base station equipment and air interface channel or a different air interface channel on the current base station. The following types of handoff are supported:

1. Hard Handoff: A handoff that requires the mobile station to tune its radio equipment or to reestablish synchronization.

2. Soft Handoff: A handoff that does not require the mobile station to tune its radio equipment or to reestablish synchronization and that uses the same frame selection function (and voice transcoding function, if this is a voice call) in the network for both the old and new air interface channels.

3. Soft Handoff with Pre-Selection: The configuration achieved when a BS internally splits a single forward flow of coded user information from the frame selector to send it to two or more cells controlled by that BS. In the reverse direction, the BS joins the flows of coded user information frames from those cells, selects the best quality frame (preselection), and forwards only that selected frame to the frame selector.

4. Softer Handoff: A handoff involving two or more traffic channels on a call such that in the forward direction the BS splits a single flow of traffic channel frames into two or more forward flows to be sent to the mobile station with the power control combined bit set to indicate that the same reverse power control information is to be used. In the reverse direction the BS combines the traffic channel frames that are received from two or more cells/sectors and forms a single reverse flow from this combination.

Interworking Function

The Interworking Function (IWF), used in the context of this standard, provides a translation of the user traffic on a circuit data call between the fixed network and the air interface.

Logical Channel

A logical path that can carry signaling, user traffic, or a combination of the two between two entities such as the network and the mobile station. A logical channel can be instantiated over one or more physical channels. Logical channels may also share physical channels.

Mobile Switching Center

The MSC switches MS-originated or MS-terminated traffic. An MSC is usually connected to at least one base station. It may connect to other public networks PSTN, ISDN, etc., other MSCs in the same network, or MSCs in different networks. (It has been referred to as Mobile Telephone Switching Office, MTSO.) It provides the interface for user traffic between the wireless network and other public switched networks, or other MSCs.

Physical Channel

A physical path between the SDU function and the mobile station that consists of any connecting A3 traffic channel(s) and radio channel(s). Depending on the radio technology in use, a physical channel may be in soft handoff between the mobile station and the SDU function.

Sector

A face of a of physical radio equipment implementation

Service Instance

An instance of a higher level communication service between the mobile station user and various other endpoints.

Service Provider Network

A network operated by either the home service provider or the visited service provider. The home service provider maintains the customer business relationship with the user. The visited service provider provides access services through the establishment of a service agreement with the home service provider.

Serving Network

The network that provides access services to the user.

Signaling Connection

A connection intended to provide a path for signaling traffic.

Source Base Station

The BS that is in control of the call is designated the source BS and remains the source BS until it is removed from control of the call.

System Identification

The System Identification (SID) is a number that uniquely identifies a network within a cellular or PCS system.

Target Base Station

Any BS that supports the call other than the source BS is designated

1.4 Message Body, Coding, and Ordering of Elements

For each A1 (BSAP) Interface message there are a number of information elements that are individually defined in section 5.2. Each information element in a given message is tagged with a reference in section 5.2, 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). (See below.) 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 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 BS

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

M	information elements which are <u>mandatory</u> for the message.
O	information elements which are <u>optional</u> for the message.
R	<u>Required</u> in the message whenever the message is sent.
C	<u>Conditionally required</u>. The conditions for inclusion of this element are defined in the operation(s) where the message is used (see [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.

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 very well be mandatory for some messages and optional for other messages.

The bitmap tables in the message subsections of 4.0 are patterned after the format for the information elements of section 5.2 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 • • • ssss ssss	= Variable length field.

1.5 Forward Compatibility Guidelines

This standard will evolve to accommodate new features and capabilities. To ensure that equipment implemented to one revision level will interoperate 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 version 4.0 of the IOS or greater, 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 message tables in section 4.0.

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. See also message processing guidelines 9 and 10 below.
4. If a message is received that contains an Information Element 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 information element is received, that information element shall be ignored. The message and all other information elements shall be processed.
6. If a message is received without an expected optional information element the message shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.
7. No value of an information element that is indicated as “reserved” for the revision level implemented shall be sent. If a valid information element contains a value which is specified as “reserved” or is otherwise not defined in the revision level implemented then this field 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.
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 was never previously used.
2. Information Element 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 Information Elements 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 Information Elements within a message shall not change.
6. Mandatory Information elements shall be sent in the order specified in section 4.0.
7. New optional Information Elements in a message shall be defined after all previously defined optional Information Elements.
8. All new Information Elements shall be defined with a length field.
9. New information may be added to the end of an existing Information Element, provided that the Information Element is defined with a length field.

1.8 IOS Upgrade Guidelines

For supporting backward compatibility on the A1 interface:

When two nodes communicate on the A1 interface no element 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 information element is sent in a manner that violates the above principle, or if an unexpected or unknown element is sent in the middle of a message, or if an element 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 OA&M logs as required.

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

2.0 Protocol Definition

2.1 MSC – BS Functional Partitioning

The functions provided by the network elements on either side of the MSC-BS Interface define the functions that the MSC-BS Interface supports. Figure 2.1-1 below depicts a model of the MSC-BS Interface functional planes. The four functional planes embody all of the functions that the MSC-BS Interface supports.

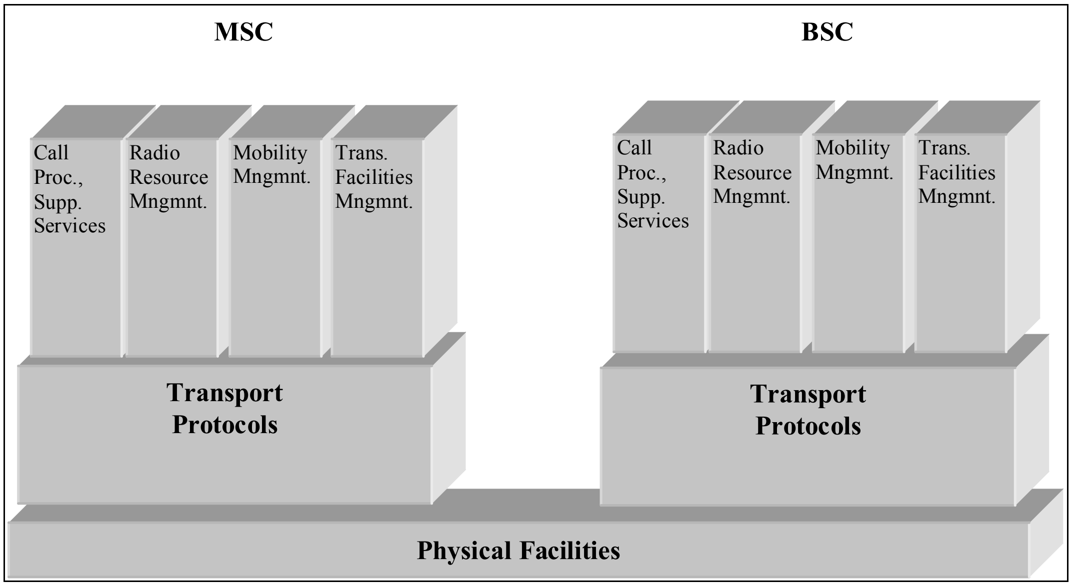

Figure 2.1-1 MSC-BS Interface Functional Planes

The transmission facilities management plane is the basis for the MSC-BS 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. 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 call processing plane manages call control and telecommunications services for the subscribers.

2.2 Protocol Reference Model

2.2.1 MSC-BS Interface Channel Types

The MSC-BS interface consists of user traffic channels and signaling channels. In general, user traffic channels are independent of signaling channels. Different paths and different underlying transport technologies can be employed for each.

2.2.2 Transport Protocols

The MSC-BS interface referred to within this specification is designed to support a wide range of implementations.

2.2.3 Layer 1

The physical interface is based on the layer 1 interfaces defined in [12].

2.2.4 Layer 2 - Transport Protocols

This standard specifies multiple protocols for the transport of signaling and user information. See [12].

2.2.4.1 SS7 Signaling Transport

When SS7 is used to provide signaling transport, the underlying transport mechanism defined to carry signaling information between the BS and the MSC is the Message Transfer Part (MTP), and the Signaling Connection Control Part (SCCP) of Signaling System No. 7 (SS7).

The MTP and SCCP are used to transport the application layer signaling protocol which is defined as the BS Application Part (BSAP).

2.2.5 Layer 3 - A1 Interface: Base Station Application Part

The Base Station Application Part (BSAP) is the application layer signaling protocol that provides messaging to accomplish the functions of the A1 Interface component of the MSC - BS Interface. BSAP is split into two sub-application parts; the BS Management Application Part (BSMAP), and the Direct Transfer Application Part (DTAP). Please refer to Figure 5.2.3-1 "A1 Interface Signaling Protocol Reference Model" for an illustration of this structure.

The BS Management Application Part (BSMAP) supports all Radio Resource Management and Facility Management procedures between the MSC and the BS, or to a cell(s) within the BS. BSMAP messages are not passed to the MS, but are used only to perform functions at the MSC or the BS. A BSMAP message (Complete Layer 3 Information) is also used together with a DTAP message to establish a connection for a MS between the BS and the MSC, in response to the first layer 3 air interface message sent by the MS to the BS for each MS system request. The description of the layer 3 protocol for the BSMAP information exchange is contained within this specification.

The Direct Transfer Application Part (DTAP) messages are used to transfer call processing and mobility management messages between the MSC and BS. DTAP messages carry information that is primarily used by the MS. The BS shall map the DTAP messages going to and coming from the MSC from/into the appropriate air interface signaling protocol.

See [14] for a list of BSMAP and DTAP messages.

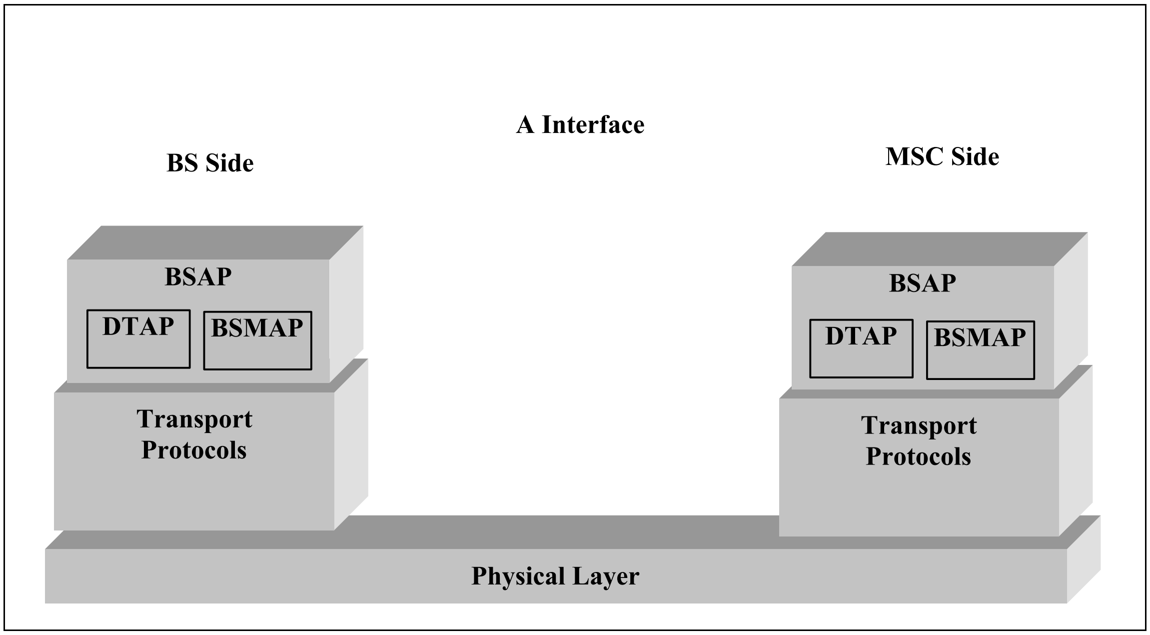

Figure 2.2.5-1 A1 Interface Signaling Protocol Reference Model

Abbreviations used in Figure 2.2.5-1:

BS	Base Station
BSAP	Base Station Application Part
BSMAP	Base Station Management Application Part
DTAP	Direct Transfer Application Part
MSC	Mobile Switching Center

2.3 Generic Message Formats

2.3.1 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.

In order to distinguish between the DTAP messages and BSMAP messages, a header is prefixed on each A1 interface message transferred between the BS and MSC. See Figure 2.4.1-1.

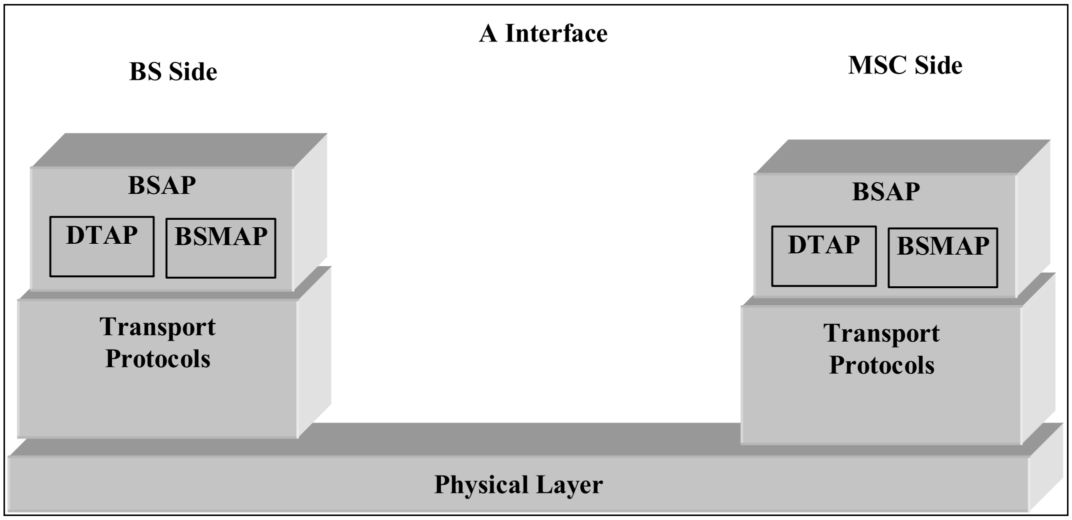

Figure 2.3.1-1 Signaling Protocol Reference Model MSC-BS Interface

BS	Base Station
BSAP	Base Station Application Part
BSMAP	Base Station Management Application Part
DTAP	Direct Transfer Application Part
MSC	Mobile Switching Center

2.3.1.1 Transfer of DTAP and BSMAP Messages

See [12] for information on the transfer of DTAP and BSMAP messages on the A1 interface.

2.3.1.1.1 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 2.4.1.1.3-1, “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 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.

2.3.1.1.2 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. Please refer to section 5.2.1, “Message Discrimination” and section 5.2.2, “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 (see section 5.2.3) 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 5.2.4).

2.3.1.1.3 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 Mobile Station association the exchanged message (e.g., assign, handoff request, etc.) applies.

The structure of the user data field is given in Figure 2.4.1.1.3-1, “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 on one octet. The discrimination bit D is set to the value ‘0’ to indicate BSMAP.

The Length Indicator (see section 5.2.3) 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 4.0.

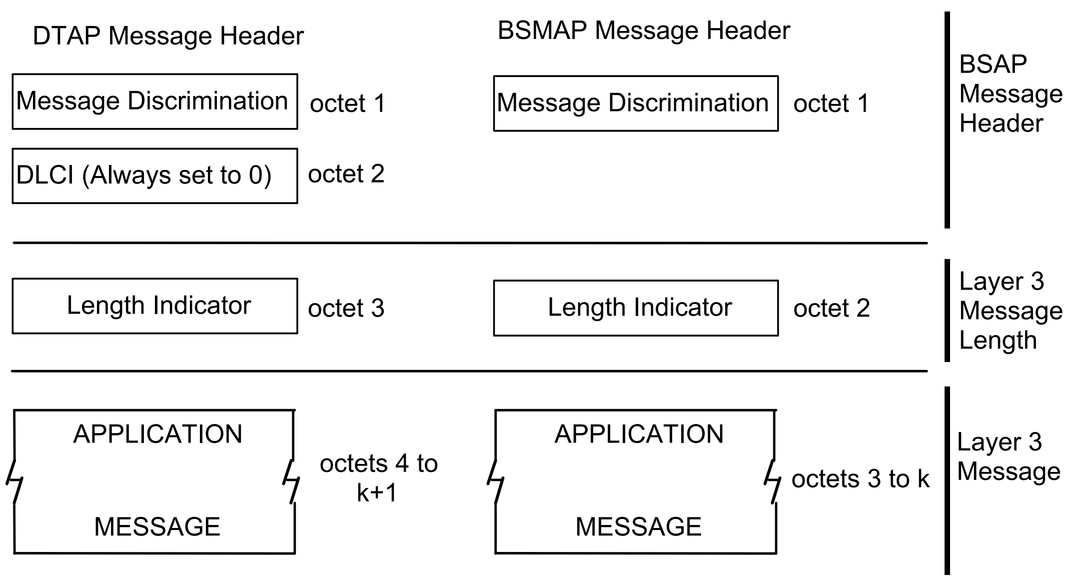

Figure 2.3.1.1.3-1 Structure of A1 Layer 3 Messages

3.0 Message Procedures

3.1 Call Processing Message Procedures

3.1.1 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.

3.1.1.1 Successful Operation

Please refer to section 3.1.2.1, "Successful Operation," when this message is used in conjunction with the CM Service Request message. Please refer to section 3.1.8.1 when this message is used in conjunction with the Paging Response message. Please refer to section 3.3.1.1 when this message is used in conjunction with the Location Updating Request message.

3.1.1.2 Failure Operation

Please refer to section 3.1.2.2, "Failure Operation," when this message is used in conjunction with the CM Service Request message. Please refer to section 3.1.8.2 when this message is used in conjunction with the Paging Response message. Please refer to section 3.3.1.2 when this message is used in conjunction with the Location Updating Request message.

3.1.2 Connection Management (CM) Service Request

When the mobile'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.

3.1.2.1 Successful Operation

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

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 mobile 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 mobile, and may chose to send a second CM Service Request message to the MSC. The MSC shall be able to handle a CM Service Request for a mobile 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 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 mobile's capabilities, and assign the MS to that channel at any time following the receipt of the mobile's originating access.

For information on the Authentication and Privacy procedures refer to [13].

3.1.2.2 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), 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.

3.1.2.3 Abnormal Operation

If the MSC wishes to clear the call in response to the CM Service Request, it may refuse the connection request via the primitive appropriate to the underlying transport layer.

3.1.3 Assignment Request

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

3.1.3.1 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} upon receipt of the Assignment Request message, selects a traffic channel, sends the Channel Assignment Message to the MS, and waits for the confirmation from the MS that the MS reached the assigned traffic channel.

3.1.3.2 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.

3.1.4 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 will henceforth be responsible for providing in-band treatment of the call if required.

3.1.4.1 Successful Operation

When the MS has successfully reached the assigned traffic channel, the BS sends this message to the MSC. At this point, the BS considers the call in conversation state.

When the MSC receives this message, it stops timer T_{10}. At this point the MSC considers the call in conversation state.

Note that for mobile terminated calls, the BS (MSC) considers the call stable and in the conversation state after sending (receiving) the Connect message.

3.1.4.2 Failure Operation

None.

3.1.5 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.

3.1.5.1 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.

3.1.5.2 Failure Operation

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

3.1.6 Progress

This DTAP message may be sent by the MSC during any Call Control session to specify local tone generation or removal.

3.1.6.1 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.

3.1.6.2 Failure Operation

None.

3.1.7 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.

3.1.7.1 Successful Operation

The MSC determines that an incoming call (either land or mobile originated) terminates to an MS within its serving region 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 Paging Response message.

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.

3.1.7.2 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}.

3.1.8 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. The Paging Response and the subsequent MSC response are used for connection establishment.

3.1.8.1 Successful Operation

When the MS recognizes a page message containing its identity, it will send a response message to the BS. The BS will construct the Paging Response message using the information received from the MS, append it to the Complete Layer 3 Information message (please refer to section 3.1.1, "Complete Layer 3 Information"), and send this combined message to the MSC. The BS will start timer T_{303} and await reception of the Assignment 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 mobile 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 a mobile 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 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 mobile's capabilities, and assign the MS to that channel at any time following the receipt of a Page Response Message from the MS.

3.1.8.2 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.

3.1.8.3 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.

3.1.9 Connect

This DTAP message informs the MSC that the called MS has answered (gone off-hook).

3.1.9.1 Successful Operation

When the BS receives the indication that the called MS has answered, it sends the Connect message to the MSC.

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

3.1.9.2 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.

3.1.10 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.

3.1.10.1 Successful Operation

The MSC sends this message 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 other 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.

3.1.10.2 Failure Operation

None.

3.1.11 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 procedure to deliver a short data burst to a mobile. For short data bursts, the message is used to transport the data to the MSC for delivery to a mobile.

3.1.11.1 Successful Operation

In order to initiate a call setup, the BS sends a BS Service Request message to the MSC containing the identity of the mobile station that needs to be paged. When the BS/PCF receives data from the PDSN destined for a mobile with a dormant packet data service instance, and the BS wishes to deliver the data as a short data burst via the ADDS Page procedure, the BS sends 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.

3.1.11.2 Failure Operation

If a BS Service Response message is not received at the BS before the expiration of timer T_{311}, then the BS may resend the BS Service Request message. For short data burst delivery to a mobile, if the BS times out waiting for a BS Service Response message from the MSC, the data shall be discarded.

3.1.12 BS Service Response

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

3.1.12.1 Successful Operation

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

3.1.12.2 Failure Operation

None.

3.1.13 Service Release

3.1.13.1 Base Station Initiated

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

3.1.13.1.1 Successful Operation

Upon receiving one of the SRQM, RRRM, or RRRMM from the MS, the BS shall send a Service Release message to the MSC. The BS sets timer T_{308} and waits for a Service Release Complete message from the MSC.

3.1.13.1.2 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.

3.1.13.2 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.

3.1.13.2.1 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. The MSC sets timer T_{308} and waits for a Service Release Complete message from the BS.

3.1.13.2.2 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.

3.1.14 Service Release Complete

3.1.14.1 MSC Initiated

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

3.1.14.1.1 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} if it is active, and performs the appropriate procedure to release the dedicated resources associated with the service.

3.1.14.1.2 Failure Operation

None.

3.1.14.2 BS Initiated

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

3.1.14.2.1 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} if it is active, and performs the appropriate procedure to release the dedicated resources associated with the service.

3.1.14.2.2 Failure Operation

None.

3.1.15 Clear Request

Upon failure of a radio channel, or when the MS sends a Release Order to clear the call, the BS shall send a Clear Request message to the MSC.

3.1.15.1 Successful Operation

The BS, after sending the Clear Request message, sets 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.

3.1.15.2 Failure Operation

If a Clear Command message is not received from the MSC while timer T_{300} is active, the BS may resend a 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.

3.1.16 Clear Command

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 receiving a clear indication from the network, the MSC shall send the Clear Command message to the BS to clear the call.

3.1.16.1 Successful Operation

After sending the Clear Command 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 MSC. The MSC will stop timer T_{315} upon receipt of the Clear Complete message.

When the BS receives a Clear Command message, it stops timer T_{300} if it is 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.

3.1.16.2 Failure Operation

If the MSC fails to receive the Clear Complete message before the expiration of timer T_{315}, the MSC may resend the Clear Command message and restart timer T_{315}. If the MSC does not receive the Clear Complete message the second time, the MSC shall release the underlying transport connection to clear the MSC-BS signaling connection.

3.1.17 Clear Complete

Upon receipt of the Clear Command the BS sends a Clear Complete message to the MSC.

3.1.17.1 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.

3.1.17.2 Failure Operation

None.

3.1.18 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 mobile is already active with another service.

3.1.18.1 Successful Operation

After sending this message to the MSC, the BS starts timer T_{303} and waits for the Assignment Request message.

3.1.18.2 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 reset 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”.

3.1.19 Additional Service Notification

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

3.1.19.1 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. It starts timer T_{314}, sends the Additional Service Notification message to the BS, and waits for the Additional Service Request message.

3.1.19.2 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}.

3.2 Supplementary Services Message Procedures

3.2.1 Flash with Information

The Flash with Information 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.

3.2.1.1 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. For example, to perform the Message Waiting Indication feature, the MSC shall send a Flash with Information message including a Message Waiting Indication element. If a Tag element is included in the Flash with Information message, the BS will request the MS to 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 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.

3.2.1.2 Failure Operation

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

3.2.2 Flash with Information Ack

The BS uses this message to send the acknowledgment of the Flash with Information message to the MSC.

3.2.2.1 Successful Operation

This DTAP 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}.

3.2.2.2 Failure Operation

None.

3.2.3 Feature Notification

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

3.2.3.1 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 will send an Order or Feature Notification message (depending upon the applicable air interface protocol) to the MS on a Paging channel. If the MSC needs an acknowledgment to the Feature Notification message, it indicates that by including a Tag element in the Feature Notification message. The MSC then expects that a Feature Notification Ack message, including this Tag element, will be sent back when the BS receives a Layer 2 Ack from the MS.

3.2.3.2 Failure Operation

The MSC may send the Feature Notification message again after timer T_{63} expires.

3.2.4 Feature Notification Ack

The BS uses this message to send the acknowledgment of the Feature Notification to the MSC.

3.2.4.1 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.

3.2.4.2 Failure Operation

None.

3.2.5 PACA Command

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

3.2.5.1 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 will send 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 will queue the call for PACA service and may send the air interface PACA Message to notify the MS that the call was queued and to provide the queue position. See [13] for more explanation on this feature.

3.2.5.2 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.

3.2.6 PACA Command Ack

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

3.2.6.1 Successful Operation

Upon receipt of the PACA Command message from the MSC, if radio resources are not available for the call the BS will queue the request and send the PACA Command Ack message to notify the MSC that the call has been queued.

3.2.6.2 Failure Operation

None.

3.2.7 PACA Update

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

3.2.7.1 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 information element 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. See [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 sends 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.

3.2.7.2 Failure Operation

If timer T_{paca2} expires before the sender (MSC or BS) receives the PACA Update Ack message, then it may re-send the PACA Update message again.

3.2.8 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.

3.2.8.1 Successful Operation

The MSC (BS) sends the PACA Update Ack message to inform the MSC (BS) of the result of the action taken in response to the PACA Update.

3.2.8.2 Failure Operation

None.

3.2.9 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 mobile station's position

3.2.9.1 Successful Operation

When the MPC determines that position determination by means of software calculation is to take place for a given mobile station that is on a traffic channel, the MSC sends a Radio Measurements for Position Request message to the BS. This message indicates the mobile station 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.

3.2.9.2 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.

3.2.10 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 mobile station whose position is to be determined or it contains the requested geographic location of the mobile.

3.2.10.1 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 instead of the requested measurements to the MSC. When the MSC receives this message, it stops timer $T_{softpos}$.

3.2.10.2 Failure Operation

None.

3.3 Mobility Management Message Procedures

3.3.1 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 mobile moves to a new location from its previous location.

3.3.1.1 Successful Operation

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

The MSC responds with a Location Updating Accept message.

3.3.1.2 Failure Operation

If timer T_{3210} expires before the receipt of a Location Updating Accept message or a Location Updating Reject message the BS may re-send the Location Updating Request message. The total number of retransmissions is operator determined.

3.3.2 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.

3.3.2.1 Successful Operation

The MSC will send 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) over the control channel in use.

3.3.2.2 Failure Operation

None.

3.3.3 Location Updating Reject

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

3.3.3.1 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 clears timer T_{3210} and may send the appropriate response to the MS (a Registration Reject Order) over the control channel in use.

3.3.3.2 Failure Operation

None.

3.3.4 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 is a DTAP when message used to perform SSD update on a traffic channel.

3.3.4.1 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 RANDSSD as input to the algorithm to generate the new SSD. The MS will then select a 32 bit random number (RANDBS) and shall send it to the BS in a Base Station Challenge Order message.

3.3.4.2 Failure Operation

If timer T_{3270} expires prior to receipt of a BS Challenge message, the MSC may choose to retransmit this message.

3.3.5 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 is a DTAP message when used to perform the SSD update on a traffic channel.

3.3.5.1 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 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.

3.3.5.2 Failure Operation

None.

3.3.6 Base Station Challenge Response

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

3.3.6.1 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 message to the MS. The MS checks the validity of the response and sends an SSD Update Confirmation/Rejection Order to the BS.

3.3.6.2 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.

3.3.7 SSD Update Response

This message is sent from the BS to the MSC 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 is a DTAP message when used to perform SSD updates on a traffic channel.

3.3.7.1 Successful Operation

When the MS receives the Base Station Challenge Confirmation Order message 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 will not update the SSD if the AUTHBS value is not considered valid. Further error handling at the HLR/AC is an HLR/AC matter and will not be detailed in this specification.

3.3.7.2 Failure Operation

None.

3.3.8 Authentication Request

The Authentication Request message is sent from the MSC to the BS to initiate an authentication check on a specified MS. This is a DTAP message when used to perform authentication on a traffic channel and a BSMAP message otherwise.

3.3.8.1 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.

When the MS receives the Authentication Challenge message it uses the RANDU as input to the algorithm to generate the response parameter (AUTHU).

3.3.8.2 Failure Operation

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

3.3.9 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 and a BSMAP message otherwise.

3.3.9.1 Successful Operation

When a BS receives an Authentication Challenge Response message from the MS it sends the Authentication Response message to the MSC. The MSC stops timer T_{3260}.

3.3.9.2 Failure Operation

None.

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 mobile station.

3.3.10.1 Successful Operation

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

3.3.10.2 Failure Operation

If timer T_{3220} expires without receiving a response from the BS, the MSC shall not increment the call history count and may re-send this message.

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.

3.3.11.1 Successful Operation

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

3.3.11.2 Failure Operation

If the BS fails to receive a response from the MS indicating that the call history count has been successfully incremented in the MS, the BS shall do nothing.

3.3.12 Privacy Mode Command

This optional BSMAP message may be sent by the MSC to the BS after receipt of the Assignment Complete message 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 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. Please refer to section 4.1.7, “Assignment Request” for details on inclusion of the Encryption Information element 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 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.

3.3.12.1 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.

3.3.12.2 Failure Operation

In the case where the MSC initiated the Privacy Mode procedure, if the MSC does not receive the Privacy Mode Complete message before T3280 expires, then the MSC will initiate call clearing.

3.3.13 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.

3.3.13.1 Successful Operation

When the MSC receives this message from the BS in response to the Privacy Mode Command message or autonomously, 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.

3.3.13.2 Failure Operation

None.

3.3.14 Status Request

The Status Request message is sent from the MSC to the BS to request certain information from the MS like 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.

3.3.14.1 Successful Operation

The MSC sends the Status Request to the BS and may start the optional 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.

3.3.14.2 Failure Operation

None.

3.3.15 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.

3.3.15.1 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 optional timer T_{3272} if running.

3.3.15.2 Failure Operation

None.

3.4 Handoff Message Procedures

3.4.1 Handoff Required

This 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 in order to determine a target with an available radio channel.

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

3.4.1.1 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.

3.4.1.2 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.

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.

3.4.2 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.

3.4.2.1 Successful Operation

This message is sent by the MSC to candidate target cell(s). Using the candidate target cell list generated per section 3.4.1 (Handoff Required), the MSC determines a target cell that has available resources which match the mobile'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. The MSC starts timer T_{11}.

See section 3.4.1.1 for the use of IS-95 Channel Identity elements to indicate hard handoff for TIA/EIA-95-B systems and the use of *IS-2000* Channel Identity elements to indicate handoff for TIA/EIA/*IS-2000* systems.

Upon receipt of this message, the candidate target BS shall choose suitable idle radio resources. If available, the BS will respond to the MSC with 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.

3.4.2.2 Failure Operation

Receipt of a Handoff Failure message at the MSC or expiration of T11 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 T11, 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. Please refer to section 3.4.7 (Handoff Required Reject) and section 3.4.8, (Handoff Failure) for more information.

3.4.3 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 setup 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 will be treated as the designated cell by the MSC.

3.4.3.1 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 and land 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 the sending of the Handoff Request Acknowledge message, the target BS shall start timer T_9.

3.4.3.2 Failure Operation

See section 3.4.8 (Handoff Failure) for actions to be taken upon the expiration of timer T_9.

3.4.4 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.

3.4.4.1 Successful Operation

Essentially, the Handoff Command message is used to convey information about the target BS to the source BS (and on to the mobile station) regarding layer 1 access information at the target.

If the source BS elects not to honor 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 will transmit the handoff instructions to the mobile to execute a handoff and will start timer T_8 if an acknowledgment is requested.

The source BS will typically receive confirmation that the mobile has received the command and is acting accordingly. Timer T_8 is stopped when this confirmation is received if timer T8 is running. The source BS may optionally send the handoff direction message [1]to the MS using quick repeats and may not request an acknowledgement from the mobile. 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 will start timer T_{waitho}.

[1] 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.

Information contained in the elements of this message are identical to the information contained in the corresponding elements of the Handoff Request Acknowledge (See section 3.4.3).

3.4.4.2 Failure Operation

If the mobile station fails to acknowledge the handoff instruction (i.e., timer T_8 expires) and the mobile 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. See [13] for additional call clearing requirements

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 mobile, then the source BS will send a Clear Request message (See section 4.1.12, 'Clear Request') to the MSC regarding the source channel with the cause field set to 'Radio Interface failure'. The channel and terrestrial resource will be released after a Clear Command is received from the MSC.

If timer T_{waitho} expires, the source BS will consider this a normal event and will send a Handoff Commenced message to the MSC. See section 3.4.5 (Handoff Commenced) below.

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 resume servicing the MS and send a Handoff Failure to the MSC with cause value "Reversion to old channel."

The following applies 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 resource will be released after a Clear Command 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."

3.4.5 Handoff Commenced

The Handoff Commenced message is used for TIA/EIA-553, TIA/EIA-95, and for TIA/EIA/*IS-2000* hard handoffs. It is sent by the source BS to the MSC to indicate that the handoff command has been sent to the mobile station, and that the mobile station is not expected to return to the source BS.

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

3.4.5.1 Successful Operation

When 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 mobile. In this case, the source BS will send the Handoff Commenced message after all the quick repeats have been transmitted to the mobile station 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} will have been started and the source BS must wait until timer T_{waitho} expires before sending the Handoff Commenced message to the MSC. Upon reception of the Handoff Commenced message, the MSC then starts Timer T_{306}.

3.4.5.2 Failure Operation

If timer T_{306} expires, then the BS follows the call clearing procedures defined in section.3.1.15 (i.e., send a Clear Request message to the MSC).

3.4.6 Handoff Complete

The Handoff Complete message allows the target BS to signal to the MSC that a mobile station has successfully accessed the target cell.

3.4.6.1 Successful Operation

In the successful scenario, the MSC receives the Handoff Complete message from the target BS. The MSC shall send a Clear Command (see section 3.1.16) to the source. If the Handoff Complete is the result of a hard handoff then any terrestrial circuit 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

3.4.6.2 Failure Operation

None.

3.4.7 Handoff Required Reject

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

3.4.7.1 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.

3.4.7.2 Failure Operation

None.

3.4.8 Handoff Failure

The Handoff Failure 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.

3.4.8.1 Successful Operation

After receiving a Handoff Failure message the MSC sends a Clear Command to the target BS, which shall then deallocate radio and terrestrial resources.

In the event that timer T_9 expires and no mobile station is 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[2] that the MS is allowed to return if it cannot acquire the target BS, the possibility exists that the MS will return to the source BS. If this happens prior to the expiration of timer T_{waitho}, the source BS will send a Handoff Failure message to the MSC indicating the return of the MS.

3.4.8.2 Failure Operation

None.

3.4.9 Handoff Performed

The BS uses the Handoff Performed message to inform the MSC of handoff operations.

3.4.9.1 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.

3.4.9.2 Failure Operation

None.

3.5 Facility Management Message Procedures

3.5.1 Block

The Block message is sent from the BS to the MSC to indicate that one or more terrestrial circuits shall be blocked at the MSC and therefore cannot be used for traffic.

[2] 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.

3.5.1.1 Successful Operation

The BS sends a Block Message to the MSC and starts timer T_1. The value of T_1 shall be set to a value to allow sufficient time for the 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 MSC or BS, or an unblock procedure (from the BS). More than one circuit may be blocked using a single Block message. The MSC 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 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 MSC, it remains blocked and the MSC sends the Block Acknowledge message.

3.5.1.2 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.”

3.5.2 Block Acknowledge

The MSC sends this message to the BS to acknowledge receipt of the Block message and to indicate that appropriate action has been taken.

3.5.2.1 Successful Operation

After the MSC blocks all of the circuits specified in the Block message, the MSC sends a Block Acknowledge message to the BS. 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 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.

3.5.2.2 Failure Operation

None.

3.5.3 Unblock

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

3.5.3.1 Successful Operation

If the BS wishes to unblock blocked circuits, an Unblock message is sent to the MSC. The BS sends the Unblock message, and starts timer T_1. The value of T_1 shall be set to a value to allow sufficient time for the MSC to unblock all circuits indicated in this message. Upon receipt of the Unblock message from the BS, the 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 MSC, it remains unblocked and the MSC sends the Unblock Acknowledge message.

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

3.5.3.2 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.

3.5.4 Unblock Acknowledge

The MSC responds to the BS request to unblock circuits by sending an Unblock Acknowledge message. The MSC marks such circuits as available at the BS before it sends the Unblock Acknowledge message to the BS.

3.5.4.1 Successful Operation

Please refer to Section 3.5.3.1.

3.5.4.2 Failure Operation

None.

3.5.5 A1 Reset Circuit

3.5.5.1 A1 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 MSC indicating the Circuit Identity Code(s) which the MSC is to idle and the reason (Cause) of the circuit reset.

3.5.5.1.1 Successful Operation

The BS sends a Reset Circuit message and starts timer T_{12}. The value of T_{12} shall be set to a value to allow sufficient time for the MSC to reset all circuits indicated in this message. When the MSC receives the Reset Circuit message, it clears the possible calls, marks the indicated circuits as idle, and returns a Reset Circuit Acknowledge message to the BS.

3.5.5.1.2 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 MSC) shall be resolved internally in the BS or by OAM&P procedures.

3.5.5.2 A1 Reset Circuit Acknowledge (from MSC)

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

3.5.5.2.1 Successful Operation

When the 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}.

3.5.5.2.2 Failure Operation

None.

3.5.5.3 A1 Reset Circuit (at the MSC)

If the MSC detects that one or more circuits have to be put to idle 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.

3.5.5.3.1 Successful Operation

To idle circuits, the MSC sends a Reset Circuit message to the BS and starts timer T_{12}. The value of T12 shall be set to a 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 put to idle. If all of the circuits are blocked at the BS at reception of the Reset Circuit message, one or more Block messages will be returned to the 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 will be returned to the MSC indicating those blocked circuits. The 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.

3.5.5.3.2 Failure Operation

If the 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.

3.5.5.4 A1 Reset Circuit Acknowledge (from BS)

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

3.5.5.4.1 Successful Operation

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

3.5.5.4.2 Failure Operation

None.

3.5.6 A1 Reset

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 interface to the counterpart of the equipment that is resetting to indicate the reason for the reset.

3.5.6.1 Successful Operation

If the BS send 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 and erases all affected references, and 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 to the each affected BS, the MSC starts timer T_{16} upon receipt of a Reset message from the MSC, 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 2.2.2.1 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.

3.5.6.2 Failure Operation

If the BS sends a Reset message to the MSC and receives no Reset Acknowledge message within period T_4, then it shall repeat the entire reset procedure.

If the MSC sends a Reset message to the BS and receives no Reset Acknowledge message within period T_{16} then it shall repeat the reset procedure with respect to that BS.

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

3.5.7 A1 Reset Acknowledge

The Reset Acknowledge message is sent in response to a Reset message.

3.5.7.1 Successful Operation

When the MSC has received a Reset message from a BS, the MSC, after a guard period of T2 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 if it is running 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 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 timer T_{16} if it is running and begins normal operation.

3.5.7.2 Failure Operation

None.

3.5.8 Transcoder Control Request

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

3.5.8.1 Successful Operation

The MSC sends the Transcoder Control Request to the BS and starts timer T_{309}.

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 TFO Operation state) and the BS responds with a Transcoder Control Acknowledge if tandem free operation is successful.

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.

3.5.8.2 Failure Operation

If the request failed or the Transcoder Control Acknowledge message was not received before timer T_{309} expired, then the MSC invokes appropriate follow-up processing. MSC may peg the error counters associated with the TFO feature and the call.

3.5.9 Transcoder Control Acknowledge

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

3.5.9.1 Successful Operation

When the MSC receives this message, it stops timer T_{309} and examines the message to determine whether its request was successful.

3.5.9.2 Failure Operation

When timer T_{309} expired in the MSC, see 3.5.8.2.

3.6 Application Data Delivery Service (ADDS) Message Procedures

3.6.1 ADDS Page

This BSMAP message is sent from the MSC to the BS to transport an application data message. For the purposes of the Short Message Service, the ADDS Page message is used to transport the short message from the MSC to the BS to be delivered on the paging channel(s).

3.6.1.1 Successful Operation

When the MSC determines that it needs to deliver an SMS message to a specific idle mobile station, and a Layer 2 acknowledgment notification, is required from the MS the MSC sends the ADDS Page message containing a Tag information element 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 mobile station, and the MSC does not require a Layer 2 acknowledgment notification, the MSC sends the ADDS Page message, without a Tag information element, to the BS.

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

3.6.1.2 Failure Operation

If the Tag information element 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}.

3.6.2 ADDS Transfer

This BSMAP message is sent from the MS to the MSC to deliver an application data message. In the case of the Short Message Service, the ADDS Transfer message is used to transfer Short Messages from the BS to the MSC. The BS sends an ADDS Transfer message containing the mobile's authentication parameters and the ADDS user part element with the data burst type field set to Short Data Burst. For Short Data Burst applications, BS shall not include the SDB data in the ADDS user part element. The data shall be buffered at the BS. The ADDS Transfer Ack message is used to transport the results of this authentication back to the BS.

3.6.2.1 Successful Operation

When the BS receives an application data message from the MS on the access channel, it sends it to the MSC in an ADDS Transfer message.

When the MSC receives authentication parameters for a mobile originating a Short Data Burst or requesting CCPD Mode, it responds with an ADDS Transfer Ack message containing the results of the authentication.

3.6.2.2 Failure Operation

None.

3.6.3 ADDS Transfer Ack

This message is sent in response to an ADDS Transfer message to transfer the authentication results from the MSC to the BS for a mobile originating a Short Data Burst or CCPD Mode Request. This BSMAP message is sent in response to an ADDS Transfer Message from the MSC to the BS to indicate the result of the authentication for a mobile originating a Short Data Burst or requesting CCPD Mode from the network.

3.6.3.1 Successful Operation

If the mobile is successfully authenticated for a mobile originated Short Data Burst, the buffered SDB data shall be sent to the PDSN. If the cause value indicates authentication failure, the buffered data shall be discarded.

If a mobile requesting common channel packet data service is successfully authenticated, a CCPD call setup shall proceed. If the cause value indicates authentication failure for a mobile requesting CCPD Mode, the BS shall not respond to the mobile with a Short Data Burst Acknowledgement, and the CCPD call setup fails.

3.6.3.2 Failure Operation

If the BS times out waiting for the ADDS Transfer Ack message for a mobile originated Short Data Burst, the buffered data at the BS for the packet data service instance shall be discarded.

If the BS times out waiting for the ADDS Transfer Ack message for a mobile requesting CCPD Mode, the CCPD call fails, however, the BS may retry the authentication request for the CCPD mobile.

3.6.4 ADDS Page Ack

This BSMAP message is sent from the BS to the MSC when the BS receives a Layer 2 acknowledgment 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 wishes to indicate an error situation resulting from an ADDS Page message that contains a Tag element.

3.6.4.1 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 when it receives a Layer 2 acknowledgment from the MS.

For SMS Broadcast messages, if the MSC included the Tag element in the ADDS Page message, the BS sends this message to indicate that it has processed the ADDS Page message. The BS is not required to solicit Layer 2 Acknowledgements from the mobile stations.

3.6.4.2 Failure Operation

None.

3.6.5 ADDS Deliver

This DTAP message is sent from the MSC to the BS or from the BS to the MSC for transferring an application data message exchanged over the traffic channel. In the case of OTASP, this message is sent from the MSC to the BS or from the BS to the MSC to encapsulate and transfer OTASP data on a traffic channel.

3.6.5.1 Successful Operation

When the MSC or BS needs to deliver an application data message while a traffic channel exists, the sender will include that application data message in an ADDS Deliver message and send it across the A1 interface.

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

3.6.5.2 Failure Operation

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

3.6.6 ADDS Deliver Ack

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

3.6.6.1 Successful Operation

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

3.6.6.2 Failure Operation

None.

3.7 Error Handling Message Procedures

3.7.1 Rejection

The Rejection message is used by the BS to indicate to the MSC that the mobile station 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.

3.7.1.1 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).

3.7.1.2 Failure Operation

None.

4.0 Message Formats

4.1 Call Processing Messages

4.1.1 Complete Layer 3 Information

This BSMAP message is sent from the BS to the MSC upon receipt of the first message from the mobile station. This message contains a CM Service Request message, a Paging Response message, or a Location Updating Request message.

Information Element	**Section Reference**	**Element Direction**	**Type**
Message Type	5.2.4	BS -> MSC	M
Cell Identifier	5.2.17	BS -> MSC	M[a]
Layer 3 Information	5.2.31	BS -> MSC	M

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

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

<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">⇒ 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="3"></td><td>(LSB)</td><td colspan="4">Sector = [0H-FH] (0H = Omni)</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>3</td></tr>
<tr><td colspan="8">• • •</td><td>• • •</td></tr>
<tr><td colspan="8"></td><td>n</td></tr>
</table>

4.1.2 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 connection establishment and activation of supplementary services.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	BS -> MSC	M[m]	
Reserved – Octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
CM Service Type	5.2.43	BS -> MSC	M[m]	
Classmark Information Type 2	5.2.12	BS -> MSC	M[a, m,q]	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	M[m]	
Called Party BCD Number	5.2.44	BS -> MSC	O[b]	C
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[m]	R
Slot Cycle Index	5.2.14	BS -> MSC	O[c,r]	C
Authentication Response Parameter (AUTHR)	5.2.38	BS -> MSC	O[d]	C
Authentication Confirmation Parameter (RANDC)	5.2.35	BS -> MSC	O[e]	C
Authentication Parameter COUNT	5.2.39	BS -> MSC	O	C
Authentication Challenge Parameter (RAND)	5.2.37	BS -> MSC	O[f]	C
Service Option	5.2.53	BS -> MSC	O[g, m]	R
Voice Privacy Request	5.2.11	BS -> MSC	O	C
Radio Environment and Resources	5.2.62	BS -> MSC	O[h]	R
Called Party ASCII Number	5.2.63	BS -> MSC	O[i]	C
Circuit Identity Code	5.2.19	BS -> MSC	O[j]	C
Authentication Event	5.2.65	BS -> MSC	O[k]	C
Authentication Data	5.2.66	BS -> MSC	O[l]	C
PACA Reorigination Indicator	5.2.73	BS -> MSC	O[n]	C
User Zone ID	5.2.26	BS -> MSC	O	C
IS-2000 Mobile Capabilities	5.2.57	BS -> MSC	O[o,r]	C
CDMA Serving One Way Delay	5.2.61	BS ->MSC	O[p]	C
Special Service Call Indicator	5.2.21	BS -> MSC	O[s]	C
Service Option Connection Identifier (SOCI)	5.2.77	BS -> MSC	O[t]	C

a. If an MS is capable of multiple band classes, this shall be indicated in the band class entry field as shown in section 5.2.12.

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

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

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.

c. This optional element applies only to mobiles operating in slotted mode (discontinuous reception). It contains an index value used in paging channel slot computation. 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 mobile station when broadcast authentication is active.

e. This optional element contains the RANDC received from the MS.

RANDC shall be included whenever it is received from the MS and authentication is enabled.

f. 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 mobile, the Service Option element is set to 0001H (8K speech).

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 mobile. 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 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

j. Included when the BS wishes to request a preferred terrestrial circuit.

k. 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

l. This optional information element is required when the service option is Async Data or Group 3 Fax. It may be optionally included for other calls. If this element is absent and the Service Option element indicates an Async Data or Group 3 Fax 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 mobile station operates at revision level 6 or greater as defined by [1] to [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 Information element shall be considered valid by the MSC: Mobile_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.

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 wishes to initiate an emergency call and/or requested Mobile Originated Position Determination. Along with this information element, user dialed digits, if present, are included.

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

The following message layout contains the Complete Layer 3 Info message encapsulating the CM Service Request Message.

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
			(LSB)	Sector = [0H-FH] (0H = Omni)				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
-- Continued on next page --								

<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="8">⇒ Classmark Information Type 2: Length = <variable></td><td>1</td></tr>
<tr><td colspan="3">Mobile P_REV
= [000 – 111]</td><td>Reserved
= [0]</td><td>See List of Entries
= [0,1]</td><td colspan="3">RF Power Capability = [000]
(Class 1, vehicle & portable)</td><td>2</td></tr>
<tr><td colspan="8">Reserved = [00H]</td><td>3</td></tr>
<tr><td>NAR_AN_CAP
= [0,1]</td><td>IS-95
= [1]</td><td>Slotted
= [0,1]</td><td colspan="2">Reserved = [00]</td><td>DTX
= [0,1]</td><td>Mobile Term
= [0,1]</td><td>TIA/EIA-553
= [0,1]</td><td>4</td></tr>
<tr><td colspan="8">Reserved = [00H]</td><td>5</td></tr>
<tr><td colspan="6">Reserved = [000000]</td><td>Mobile Term
= [0,1]</td><td>PSI
= [0,1]</td><td>6</td></tr>
<tr><td colspan="8">SCM Length = [01H]</td><td>7</td></tr>
<tr><td colspan="8">Station Class Mark = [00H – FFH]</td><td>8</td></tr>
<tr><td colspan="8">Count of Band Class Entries = [01H-20H]</td><td>9</td></tr>
<tr><td colspan="8">Band Class Entry Length = [03H]</td><td>10</td></tr>
<tr><td colspan="9">Mobile Band Class Capability Entry {1+:</td></tr>
<tr><td colspan="3">Reserved = [000]</td><td colspan="5">Band Class n = [00000-11111]</td><td>k</td></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 MS Protocol Level = [00H-FFH]</td><td>k+2</td></tr>
<tr><td colspan="9">} Mobile Band Class Capability Entry</td></tr>
<tr><td colspan="8">-- Continued on next page --</td><td></td></tr>
</table>

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⇒ **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+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)								4
ESN = <any value>								5
								6
							(LSB)	7
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [00000]					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
-- Continued on next page --								

<table>
<tr><td colspan="7">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="7">⇒ Authentication Confirmation Parameter (RANDC): A1 Element Identifier = [28H]</td><td>1</td></tr>
<tr><td colspan="7">RANDC = [00H-FFH]</td><td>2</td></tr>
<tr><td colspan="7">⇒ Authentication Parameter COUNT: A1 Element Identifier = [40H]</td><td>1</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="5">Count = [000000-111111]</td><td>2</td></tr>
<tr><td colspan="7">⇒ Authentication Challenge Parameter (RAND): A1 Element Identifier = [41H]</td><td>1</td></tr>
<tr><td colspan="7">Length = [05H]</td><td>2</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="3">Random Number Type = [0001] (RAND)</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="6"></td><td>4</td></tr>
<tr><td colspan="7">RAND = <any value></td><td>5</td></tr>
<tr><td colspan="7"></td><td>6</td></tr>
<tr><td colspan="6"></td><td>(LSB)</td><td>7</td></tr>
<tr><td colspan="7">⇒ Service Option: A1 Element Identifier = [03H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="6">Service Option = <any value></td><td>2</td></tr>
<tr><td colspan="6"></td><td>(LSB)</td><td>3</td></tr>
<tr><td colspan="7">⇒ Voice Privacy Request: A1 Element Identifier = [A1H]</td><td>1</td></tr>
<tr><td colspan="7">⇒ Radio Environment and Resources: A1 Element Identifier = [1DH]</td><td>1</td></tr>
<tr><td>Reserved = [0]</td><td>Include Priority = [0,1]</td><td colspan="2">Forward = [00]</td><td>Reverse = [00]</td><td>Alloc = [0,1]</td><td>Avail = [0,1]</td><td>2</td></tr>
<tr><td colspan="7">⇒ Called Party ASCII Number: A1 Element Identifier = [5BH]</td><td>1</td></tr>
<tr><td colspan="7">Length = <variable></td><td>2</td></tr>
<tr><td>ext = [1]</td><td colspan="3">Type of Number = [000-111]
(as in T1,607 sec 4.5.9)</td><td colspan="3">Numbering Plan Identification = [0000-1111]
(as in T1,607 sec 4.5.9)</td><td>3</td></tr>
<tr><td colspan="7">ASCII character 1</td><td>4</td></tr>
<tr><td colspan="7">ASCII character 2</td><td>5</td></tr>
<tr><td colspan="7">• • •</td><td>• • •</td></tr>
<tr><td colspan="7">ASCII character n</td><td>n</td></tr>
<tr><td colspan="7">⇒ Circuit Identity Code: A1 Element Identifier = [01H]</td><td>1</td></tr>
<tr><td>(MSB)</td><td colspan="6">PCM Multiplexer = <any value></td><td>2</td></tr>
<tr><td colspan="2"></td><td>(LSB)</td><td colspan="4">Timeslot = [00000-11111]</td><td>3</td></tr>
<tr><td colspan="7">⇒ Authentication Event: A1 Element Identifier = [4AH]</td><td>1</td></tr>
<tr><td colspan="7">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="7">Event = [01H,02H]
(Parameters not received, RANDC/RAND mismatch)</td><td>3</td></tr>
<tr><td colspan="7">-- Continued on next page --</td><td></td></tr>
</table>

-- Continued from previous page --								
⇒ **Authentication Data:** A1 Element Identifier = [59H]								1
Length = [03H]								2
(MSB)								3
Auth-Data = <any value>								4
							(LSB)	5
⇒ **PACA Reorigination Indicator:** A1 Element Identifier = [60H]								1
Length = [01H]								2
Reserved = [0000 000]							PRI = [0,1]	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
Reserved = [00]		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
-- Continued on next page --								

-- Continued from previous page --								
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
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [06H, 09H]								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							j
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)								j
MSCID = <any value>								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
⇒ **Special Service Call Indicator:** A1 Element Identifier = [5AH]								1
Length = [01H]								2
Reserved = [0000 00]						MOPD = [0,1]	GECI = [0,1]	3
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

4.1.3 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	5.2.4	MSC -> BS	M	
Mobile Identity (IMSI/ESN)	5.2.13	MSC -> BS	M[a]	
Tag	5.2.50	MSC -> BS	O	C
Cell Identifier List	5.2.18	MSC -> BS	O[b]	C
Slot Cycle Index	5.2.14	MSC -> BS	O[c,f]	C
Service Option	5.2.53	MSC -> BS	O[d]	R
IS-2000 Mobile Capabilities	5.2.57	MSC -> BS	O[e,f]	C
Protocol Revision	5.2.84	MSC -> BS	O	C

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

b. Only required for 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 optional 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 mobile 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.

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

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)								4
ESN = <any value>								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+2 = [0H-9H] (BCD)				n+1
} Type of Identity								
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								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
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:								
(MSB)	LAC = [0001H-FFFFH]							j
							(LSB)	j+1
} Cell Identification								
-- Continued on next page --								

-- Continued from previous page --								
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [00000]				Slot Cycle Index = [000-111]				2
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 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), 0022H (Test Data), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback)]							(LSB)	3
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
Reserved = [00]	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
-- Continued on next page --								

-- Continued from previous page --								
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
⇒ : A1 Element Identifier = [3BH]								1
Length = <01H>								2
PREV_IN_USE = [0H-08H]								3

4.1.4 Paging Response

This DTAP message is sent from the BS to the MSC when the BS receives a page response message from an MS.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	BS -> MSC	M[j]	
Reserved – Octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
Classmark Information Type 2	5.2.12	BS -> MSC	M[a, j, l]	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	M[j]	
Tag	5.2.50	BS -> MSC	O	C
Mobile Identity (ESN)	5.2.13	BS -> MSC	O	R
Slot Cycle Index	5.2.14	BS -> MSC	O[b,m]	C
Authentication Response Parameter (AUTHR)	5.2.38	BS -> MSC	O[c]	C
Authentication Confirmation Parameter (RANDC)	5.2.35	BS -> MSC	O[d]	C
Authentication Parameter COUNT	5.2.39	BS -> MSC	O	C
Authentication Challenge Parameter (RAND)	5.2.37	BS -> MSC	O[e]	C
Service Option	5.2.53	BS -> MSC	O[f, j]	R
Voice Privacy Request	5.2.11	BS -> MSC	O	C
Circuit Identity Code	5.2.19	BS -> MSC	O[g]	C
Authentication Event	5.2.65	BS -> MSC	O[h]	C
Radio Environment and Resources	5.2.62	BS -> MSC	O[i]	R
User Zone ID	5.2.26	BS -> MSC	O	C
IS-2000 Mobile Capabilities	5.2.57	BS -> MSC	O[k,m]	C
CDMA Serving One Way Delay	5.2.61	BS->MSC	O[n,m]	C
Service Option Connection Identifier (SOCI)	5.2.77	BS -> MSC	O[m,o]	C

a. If an MS is capable of supporting multiple band classes, this shall be indicated in the Band Class Entry field as shown in section 5.2.12.

b. This optional element applies only to mobiles operating in slotted mode (discontinuous reception). It contains an index value used in paging channel slot computation. 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 *TIA/EIA/IS-2000* paging channel slots monitored by the MS.

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

d. Contains the RANDC received from the MS**.** RANDC shall be included whenever it is received from the MS and authentication is enabled.

e. 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.

f. If no service option is received from the mobile, the Service Option element is set to 0001H (8K speech).

g. Included when the BS wishes to request a preferred terrestrial circuit.

h. 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 mobile station operates at revision level 6 or greater as defined by [1] to [6].

l. When the BS is operating in DS-41 mode, only the following fields in the Classmark Type 2 Information element shall be considered valid by the MSC: Mobile_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.

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.

The following message layout contains the Complete Layer 3 Info message encapsulating the Paging Response Message.

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
			(LSB)	Sector = [0H-FH] (0H = Omni)				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
Mobile P_REV = [000 – 111]			Reserved = [0]	See List of Entries = [0,1]	RF Power Capability = [000] (Class 1, vehicle & portable)			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 = [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
-- Continued on next page --								

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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 MS Protocol Level = [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+2 = [0H-9H] (BCD)		n+1
⇒ **Tag:** A1 Element Identifier = [33H]			1
(MSB)			2
Tag Value = <any value>			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)			4
ESN = <any value>			5
			6
		(LSB)	7
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]			1
Reserved = [00000]	Slot Cycle Index = [000-111]		2
-- Continued on next page --			

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⇒ **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)								4
RAND Value = <any value>								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
Length = [01H]								2
Event = [01H,02H] (Parameters not received, RANDC/RAND mismatch)								3
-- Continued on next page --								

<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="8">⇒ Radio Environment and Resources: A1 Element Identifier = [1DH]</td><td>1</td></tr>
<tr><td>Reserved = [0]</td><td>Include Priority = [0,1]</td><td colspan="2">Forward = [00]</td><td colspan="2">Reverse = [00]</td><td>Alloc = [0,1]</td><td>Avail = [0,1]</td><td>2</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 colspan="2">Reserved = [00]</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]
(Ignored)</td><td>Geo Location Included = [0]
(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">-- Continued on next page --</td><td></td></tr>
</table>

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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
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]								1
Length = [06H, 09H]								2
Cell Identification Discriminator = [02H,07H]								3
IF (Discriminator = 02H), Cell Identification {1:								
(MSB)	Cell = [001H-FFFH]							j
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+1
} OR IF (Discriminator = 07H), Cell Identification {1:								
(MSB)								j
MSCID = <any value>								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
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]								1
Length = [01H]								2
Reserved = [0000 0]					Service Option Connection Identifier = [001 - 110]			3

4.1.5 Connect

This DTAP message is sent by the called BS to the MSC for mobile termination to indicate that the call has been accepted by the called user.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	BS -> MSC	M	
Reserved - Octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
Service Option Connection Identifier (SOCI)	5.2.77	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.

<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>

4.1.6 Progress

This DTAP message is sent from the MSC to the BS to indicate the progress of a call in the event of interworking or in connection with the provision of in-band information/patterns.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	MSC -> BS	M	
Reserved - octet	5.2.33	MSC -> BS	M	
Message Type	5.2.4	MSC -> BS	M	
Signal	5.2.42	MSC -> BS	O[b]	C
MS Information Records	5.2.59	MSC -> BS	O[a,b]	C
Service Option Connection Identifier (SOCI)	5.2.77	MSC -> BS	O[c]	C

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

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

The Signal element is retained in this message in this version of the standards for the purpose of backward compatibility.

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

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

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 (reorder)]								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
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

4.1.7 Assignment Request

This BSMAP message is sent from the MSC to the BS in order to request the BS to 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	5.2.4	MSC -> BS	M	
Channel Type	5.2.5	MSC -> BS	M[a]	
Circuit Identity Code	5.2.19	MSC -> BS	O[b]	C
Encryption Information	5.2.10	MSC -> BS	O[c]	C
Service Option	5.2.53	MSC -> BS	O[d]	R
Signal	5.2.42	MSC -> BS	O[e, g]	C
Calling Party ASCII Number	5.2.30	MSC -> BS	O[f, g]	C
MS Information Records	5.2.59	MSC -> BS	O[h]	C
Priority	5.2.15	MSC -> BS	O[k]	C
PACA Timestamp	5.2.71	MSC -> BS	O[i]	C
Quality of Service Parameters	5.2.45	MSC -> BS	O[j]	C
Service Option Connection Identifier (SOCI)	5.2.77	MSC -> BS	O[l]	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, short message, Test Data, *IS-2000* Markov, *IS-2000* Loopback}, this element is not included in the message.

c. This optional 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. Carries instructions for 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. This optional element is not used for mobile originating calls.

g. The Signal and Calling Party ASCII Number elements will be retained in this message for the purpose of backward compatibility.

h. This optional element carries the MS Information Records. It shall not redundantly carry information present in other elements such as Signal, Calling Party ASCII Number.

The Signal information record may be set to “Alerting Off” if included when used for setting up an SMS delivery on the traffic channel. The Signal and

Calling Party ASCII Number information records are not included for mobile originated calls.

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

j. 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.

k. 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.

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

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

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 kb/s vocoder - speech)								5
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3
-- Continued on next page --								

<table>
<tr><td colspan="5">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="5">⇒ Encryption Information: A1 Element Identifier = [0AH]</td><td>1</td></tr>
<tr><td colspan="5">Length = [08H,0AH,12H]</td><td>2</td></tr>
<tr><td colspan="6">Encryption Info {1..2:
IF (Encryption Parameter Identifier = 00001, 00101, or 00110) {1:</td></tr>
<tr><td>ext = [1]</td><td colspan="2">Encryption Parameter Identifier =
[00001 (SME),
00101 (Datakey (ORYX)),
00110 (Initial RAND)]</td><td>Status
= [0,1]</td><td>Available
= [0]</td><td>j</td></tr>
<tr><td colspan="5">Encryption Parameter Length = [08H]</td><td>j+1</td></tr>
<tr><td>(MSB)</td><td colspan="4"></td><td>j+2</td></tr>
<tr><td colspan="5"></td><td>j+3</td></tr>
<tr><td colspan="5"></td><td>j+4</td></tr>
<tr><td colspan="5">Encryption Parameter value (SME)</td><td>j+5</td></tr>
<tr><td colspan="5"></td><td>j+6</td></tr>
<tr><td colspan="5"></td><td>j+7</td></tr>
<tr><td colspan="5"></td><td>j+8</td></tr>
<tr><td colspan="4"></td><td>(LSB)</td><td>j+9</td></tr>
<tr><td colspan="6">} OR IF (Encryption Parameter Identifier = 00100) {1:</td></tr>
<tr><td>ext = [1]</td><td colspan="2">Encryption Parameter Identifier = [00100]
(Private Longcode)</td><td>Status
= [0,1]</td><td>Available
= [0,1]</td><td>j</td></tr>
<tr><td colspan="5">Encryption Parameter Length = [06H]</td><td>j+1</td></tr>
<tr><td colspan="3">Reserved = [00 0000]</td><td>(MSB)</td><td></td><td>j+2</td></tr>
<tr><td colspan="5"></td><td>j+3</td></tr>
<tr><td colspan="5">Encryption Parameter value (Private Long Code)</td><td>j+4</td></tr>
<tr><td colspan="5"></td><td>j+5</td></tr>
<tr><td colspan="5"></td><td>j+6</td></tr>
<tr><td colspan="4"></td><td>(LSB)</td><td>j+7</td></tr>
<tr><td colspan="6">} Encryption Parameter Identifier
} Encryption Info</td></tr>
<tr><td colspan="6">-- Continued on next page --</td></tr>
</table>

-- Continued from previous page --			
⇒ **Service Option:** A1 Element Identifier = [03H]			1
(MSB)	Service Option		2
= [8000H (13K speech), 0011H (13K high rate voice service), 0001H (8K Speech), 0003H (EVRC), 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), 0022H (Test Data), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback)]		(LSB)	3
-- Continued on next page --			

<table>
<tr><td colspan="5">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="5">⇒ Signal: A1 Element Identifier = [34H]</td><td>1</td></tr>
<tr><td colspan="5">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)]</td><td>2</td></tr>
<tr><td colspan="4">Reserved = [00 0000]</td><td>Alert Pitch = [00,01,10]
(med, high, low)</td><td>3</td></tr>
<tr><td colspan="5">⇒ Calling Party ASCII Number: A1 Element Identifier = [4BH]</td><td>1</td></tr>
<tr><td colspan="5">Length = [01H-FFH]</td><td>2</td></tr>
<tr><td>ext = [0]</td><td colspan="2">Type of Number
= [as in T1.607 Sec 4.5.9 except 5 and 7]</td><td colspan="2">Numbering Plan Identification
= [as in T1.607 Sec 4.5.9]</td><td>3</td></tr>
<tr><td>ext = [1]</td><td>Presentation Indicator
= [as in T1.607 Sec 4.5.9]</td><td colspan="2">Reserved = [000]</td><td>Screening Indicator
= [as in T1.607 Sec 4.5.9]</td><td>4</td></tr>
<tr><td colspan="5">Printable ASCII Character 1 =[00H-FFH]</td><td>5</td></tr>
<tr><td colspan="5">Printable ASCII Character 2</td><td>6</td></tr>
<tr><td colspan="5">• • •</td><td>• • •</td></tr>
<tr><td colspan="5">Printable ASCII Character m</td><td>n</td></tr>
<tr><td colspan="5">-- Continued on next page --</td><td></td></tr>
</table>

-- Continued from previous page --				
⇒ **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)				3
PACA Queuing Time = <any value>				4
				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

4.1.8 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	5.2.4	BS -> MSC	M	
Channel Number	5.2.5	BS -> MSC	M[c]	
Encryption Information	5.2.10	BS -> MSC	O[a]	C
Service Option	5.2.53	BS -> MSC	O[b]	R
Service Option Connection Identifier (SOCI)	5.2.77	BS -> MSC	O[d]	C

a. Present when either VP or SME parameters were provided by the MSC in the Privacy Mode Command or Assignment Request messages. It contains the Algorithm Info which indicates current settings of Voice Privacy (VP) and Signaling Message Encryption (SME) and no keys are included in this case.

b. If the service option value included in the Assignment Request message was 8000H, 0011H, or 0003H (13K speech, 13K high rate speech, or EVRC), then the only allowable values that may be sent on this message are those same three 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 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 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.

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

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
(MSB)	Channel Number = [00 00H-FF FFH]							2
							(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
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), 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), 0022H (Test Data), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback)]							(LSB)	3
-- Continued on next page --								

-- Continued from previous page --		
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]		1
Length = [01H]		2
Reserved = [0000 0]	Service Option Connection Identifier = [001 - 110]	3

4.1.9 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	5.2.4	BS -> MSC	M
Cause	5.2.16	BS -> MSC	M[a]

a. Allowable values: radio interface message failure, radio interface failure, OAM&P intervention, equipment failure, no radio resource available, requested terrestrial resource unavailable, BS not equipped, requested transcoding/rate adaptation unavailable, terrestrial circuit already allocated, protocol error between BS and MSC, Mobile Station not equipped (or incapable), PACA call queued, lower priority radio resources not available, packet call going dormant, PDSN Resource Unavailable.

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								2
⇒ **Message Type** = [03H]								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), 10H (packet call going dormant), 20H (equipment failure), 21H (no radio resource available), 22H (requested terrestrial resource unavailable), 25H (BS not equipped), 26H (Mobile Station not equipped (or incapable), 29H (PACA call queued), 30H (requested transcoding/rate adaptation unavailable), 31H (lower priority radio resources not available), 50H (terrestrial circuit already allocated), 60H (protocol error between BS and MSC), 79H (PDSN Resource Unavailable)]							3

4.1.10 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 MS, and that the receiving equipment should release the corresponding service option connection after sending Service Release Complete.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	BS <-> MSC	M	
Reserved - octet	5.2.33	BS <-> MSC	M	
Message Type	5.2.4	BS <-> MSC	M	
Service Option Connection Identifier (SOCI)	5.2.77	BS <-> MSC	O[c]	C
Cause	5.2.16	BS <-> MSC	O[a]	R
Cause Layer 3	5.2.46	BS <-> MSC	O[b]	C

a. Allowable values: radio interface message failure, OAM&P intervention, equipment failure, protocol error between BS and MSC, radio interface failure, call processing, packet call going dormant, timer expired, PPP session closed by the MS**.** 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 information element.

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

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

The following message layout contains Service Release Message.

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** = [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
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
-- Continued on next page --								

<table>
<tr><th colspan="4">-- Continued from previous page --</th><th></th></tr>
<tr><td colspan="4">⇒ Cause Layer 3: A1 Element Identifier = [08H]</td><td>1</td></tr>
<tr><td colspan="4">Length = [02H]</td><td>2</td></tr>
<tr><td>ext = [1]</td><td>Coding Standard = [00] (Q.931)</td><td>Reserved = [0]</td><td>Location = [0100]
(Public network serving the remote user)</td><td>3</td></tr>
<tr><td>ext = [1]</td><td colspan="3">Cause Value = [10H (normal clearing),
11H (user busy),
13H (user alerting – no answer),
1FH (normal unspecified)]</td><td>4</td></tr>
</table>

4.1.11 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	5.2.32	BS <-> MSC	M	
Reserved - octet	5.2.33	BS <-> MSC	M	
Message Type	5.2.4	BS <-> MSC	M	
Service Option Connection Identifier (SOCI)	5.2.77	BS <-> MSC	O[a]	C

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

The following message layout contains Service Release Complete Message.

<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) = <variable></td><td>3</td></tr>
<tr><td colspan="4">Reserved = [0000]</td><td colspan="4">⇒ Protocol Discriminator = [0011]
(Call Processing & Supplementary Services)</td><td>1</td></tr>
<tr><td colspan="8">⇒ Reserved - Octet = [00H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Message Type = [2FH]</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>

4.1.12 Clear Request

The BS sends this BSMAP message to the MSC to indicate that the BS wishes to release all service option connections to the mobile station and the associated dedicated resource. This message is sent via the BSMAP SCCP connection associated with the dedicated resource.

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	BS -> MSC	M	
Cause	5.2.16	BS -> MSC	M[a]	
Cause Layer 3	5.2.46	BS -> MSC	O[b]	C

a. Allowable values: radio interface message failure, OAM&P intervention, equipment failure, protocol error between BS and MSC, radio interface failure, call processing, packet call going dormant, timer expired, PPP session closed by the MS**.** 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 information element.

   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 optional information 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.

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
	-- Continued on next page --							

-- Continued from previous page --

⇒ **Cause Layer 3:** A1 Element Identifier = [08H]				1
Length = [02H]				2
ext = [1]	Coding Standard = [00] (Q.931)	Reserved = [0]	Location = [0100] (Public network serving the remote user)	3
ext = [1]	Cause Value = [10H (normal clearing), 1FH (normal unspecified)]			4

4.1.13 Clear Command

This BSMAP message is sent from MSC to BS to instruct the BS to release all service option connections to the mobile station and the associated dedicated resource. This message is sent via the BSMAP SCCP connection associated with the dedicated resource.

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	MSC -> BS	M	
Cause	5.2.16	MSC -> BS	M[a]	
Cause Layer 3	5.2.46	MSC -> BS	O[b]	C

a. This mandatory element indicates the reason for sending the Clear Command message to the BS. Allowable values: call processing, OAM&P intervention, equipment failure, handoff successful, protocol error between BS and MSC, reversion to old channel, do not notify MS, Authentication Failure.

   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." Allowable Cause Layer 3 values are: Normal clearing, User busy, User alerting no answer, and Normal unspecified.

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H,08H]								2

-- Continued on next page --

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⇒ **Message Type** = [20H]				1
⇒ **Cause:** A1 Element Identifier = [04H]				1
Length = [01H]				2
ext = [0]	Cause Value = [07H (OAM&P intervention), 09H (call processing), 0AH (reversion to old channel), 0BH (handoff successful), 1AH (Authentication Failure), 20H (equipment failure), 60H (protocol error between BS and MSC), 78H (Do not notify MS)			3
⇒ **Cause Layer 3:** A1 Element Identifier = [08H]				1
Length = [02H]				2
ext = [1]	Coding Standard = [00] (Q.931)	Reserved = [0]	Location = [0100] (Public network serving the remote user)	3
ext = [1]	Cause Value = [10H (normal clearing), 11H (user busy), 13H (user alerting - no answer), 1FH (normal unspecified)]			4

4.1.14 Clear Complete

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

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	BS -> MSC	M	
Power Down Indicator	5.2.48	BS -> MSC	O[a]	C

a. Used to indicate that the mobile powered down at the end of the call.

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

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

4.1.15 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	5.2.32	MSC -> BS	M	
Reserved Octet	5.2.33	MSC -> BS	M	
Message Type	5.2.4	MSC -> BS	M	
MS Information Records	5.2.59	MSC -> BS	O[a]	C
Service Option Connection Identifier (SOCI)	5.2.77	MSC -> BS	O[b]	C

a. This optional 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.

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
-- Continued on next page --								

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⇒ **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	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

4.1.16 BS Service Request

This BSMAP message is sent from the BS to the MSC to request a BS initiated mobile terminated call setup.

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	M	
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[a]	C
Service Option	5.2.53	BS -> MSC	O[b]	R
Tag	5.2.50	BS -> MSC	O[c]	C
ADDS User Part	5.2.54	BS -> MSC	O[d]	C

a. This element is present when the ESN is available at the BS.

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 if one is sent in response to this message.

d. Contains the data received from the PDSN in SDB format as specified in [33].

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [09H]								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+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)								4
ESN = <any value>								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)								2
Tag Value = <any value>								3
								4
							(LSB)	5
-- Continued on next page --								

-- Continued from previous page --			
⇒ **ADDS User Part:** A1 Element Identifier = [3DH]			1
Length = <variable>			2
Data Burst Type = [06H (Short Data Burst)]			3
(MSB)	Application Data Message = <any value>		4
• • •			• • •
		(LSB)	n

4.1.17 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.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	5.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	5.2.13	MSC -> BS	M	
Mobile Identity (ESN)	5.2.13	MSC -> BS	O[a]	C
Tag	5.2.50	MSC -> BS	O[c]	C
Cause	5.2.16	MSC -> BS	O[b]	C

a. This element is present when the ESN value is available at the MSC.

b. This element shall only be included if the MSC does not grant the BS service request. The allowable cause values are “Service option not available” and “MS busy”.

c. If a Tag element is included in a BS Service Request message sent from the BS to the MSC, then the MSC must send a BS Service Response message to the BS. The Tag value sent by the BS must be used in the Tag element in this message.

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [0AH]								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+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)								4
ESN = <any value>								5
								6
							(LSB)	7
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								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

4.1.18 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	5.2.32	BS -> MSC	M[a]	
Reserved - Octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
Service Option Connection Identifier (SOCI)	5.2.77	BS -> MSC	O[g]	C
Called Party BCD Number	5.2.44	BS -> MSC	O[b]	C
Service Option	5.2.53	BS -> MSC	O[c,a]	R
Voice Privacy Request	5.2.11	BS -> MSC	O	C
Called Party ASCII Number	5.2.63	BS -> MSC	O[d]	C
Circuit Identity Code	5.2.19	BS -> MSC	O[e]	C
Special Service Call Indicator	5.2.21	BS -> MSC	O[f]	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 mobile.

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 mobile, the Service Option element is set to 0001H (8K speech).

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 mobile.

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. Included when the BS wishes to request a preferred terrestrial circuit.

f. This element is included if the air interface Enhanced Origination message indicates that the user wishes to initiate an emergency call and/or requested Mobile Originated Position Determination. Along with this information element, user dialed digits, if present, are included.

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

The following message layout contains Additional Service Request Message.

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
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
-- Continued on next page --								

-- Continued from previous page --				
⇒ **Service Option:** A1 Element Identifier = [03H]				1
Service Option				2
(MSB)	Service Option			2
= [8000H (13K speech), 0003H (EVRC), 0011H (13K high rate voice service), 0001H (8K speech), 0021H (3G High Speed Packet Data)]			(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] (as in T1,607 sec 4.5.9)	Numbering Plan Identification = [0000-1111] (as in T1,607 sec 4.5.9)		3
ASCII character 1				4
ASCII character 2				5
• • •				• • •
ASCII character n				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 = [0,1]	3

4.1.19 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	5.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	5.2.13	MSC -> BS	O	C
Service Option	5.2.53	MSC -> BS	O[a]	R

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

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [69H]								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+2 = [0H-9H] (BCD)				n+1
⇒ **Service Option:** A1 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [8000H (13K speech), 0003H (EVRC), 0011H (13K high rate voice service), 0001H (8K speech), 0021H (3G High Speed Packet Data)]							(LSB)	3

4.2 Supplementary Services Message Formats

4.2.1 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 features associated with *TIA/EIA/IS-95-B*.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	BS <-> MSC	M	
Reserved - Octet	5.2.33	BS <-> MSC	M	
Message Type	5.2.4	BS <-> MSC	M	
Called Party BCD Number	5.2.44	BS -> MSC	O[a]	C
Signal	5.2.42	MSC -> BS	O[b]	C
Message Waiting Indication	5.2.40	MSC -> BS	O[c, b]	C
Calling Party ASCII Number	5.2.30	MSC -> BS	O[b]	C
Tag	5.2.50	MSC -> BS	O	C
MS Information Records	5.2.59	MSC <-> BS	O[d]	C
Special Service Call Indicator	5.2.21	BS -> MSC	O[e]	C
Service Option Connection Identifier (SOCI)	5.2.77	BS <-> MSC	O[f]	C

a. Contains the digits received by the BS from the mobile station. These digits may or may not be valid dialed digits.

b. The Signal, Message Waiting Indication and Calling Party ASCII Number elements will only be retained in this message in this version of this standard for the purpose of backward compatibility. They will not be supported in future IOS versions. The Signal, Message Waiting Indication and Calling Party ASCII Number elements shall only be sent to an IOS v2.x BS.

c. Contains a count of the number of messages waiting at the Message Center. All values, including zero, are valid.

d. This optional element carries the MS Information Records. It shall not redundantly carry information present in other elements such as Signal, Message Waiting Indication, and Calling Party ASCII Number.

e. This element is included if the air interface Flash With Information message indicates that the user wishes to initiate an emergency call and/or requested Mobile Originated Position Determination. Along with this information element, user dialed digits, if present, are included.

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

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

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] (see 5.2.42)								2
Reserved = [000000]						Alert Pitch = [00,01,10] (med, high, low)		3
⇒ **Message Waiting Indication:** A1 Element Identifier = [38H]								1
Number of Messages = [00H-FFH]								2
⇒ **Calling Party ASCII Number:** A1 Element Identifier = [4BH]								1
Length = [01H-FFH]								2
ext = [0]	Type of Number = [as in T1.607 Sec 4.5.9 except 5 and 7]			Numbering Plan Identification = [as in T1.607 Sec 4.5.9]				3
ext = [1]	Presentation Indicator = [as in T1.607 Sec 4.5.9]		Reserved = [000]			Screening Indicator = [as in T1.607 Sec 4.5.9]		4
Printable ASCII Character 1 =[00H-FFH]								5
Printable ASCII Character 2								6
• • •								• • •
Printable ASCII Character m								n
-- Continued on next page --								

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⇒ **Tag: A1 Element Identifier = [33H]**			1
(MSB)			2
Tag Value = <any value>			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
Length = [01H]			2
Reserved = [0000 00]	MOPD = [0,1]	GECI = [0,1]	3
⇒ **Service Option Connection Identifier (SOCI):** A1 Element Identifier = [1EH]			1
Length = [01H]			2
Reserved = [0000 0]	Service Option Connection Identifier = [001 - 110]		3

4.2.2 Flash with Information Ack

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

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	BS -> MSC	M	
Reserved - Octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
Tag	5.2.50	BS -> MSC	O[a]	C
Service Option Connection Identifier (SOCI)	5.2.77	BS -> MSC	O[b]	C

a. If a Tag element is included in a Flash with Information message sent from the MSC to the BS, then the BS must send a Flash with Information Ack message to the MSC when it receives a Layer 2 acknowledgment from the MS to the Flash with Information air interface message. The Tag value sent by the MSC must be used in the Tag element in this 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.

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** = [0011]				1
⇒ **Reserved - Octet** = [00H]								1
⇒ **Message Type** = [50H]								1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								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

4.2.3 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	5.2.4	MSC -> BS	M	
Mobile Identity (IMSI)	5.2.13	MSC -> BS	M[a]	
Tag	5.2.50	MSC -> BS	O	C
Cell Identifier List	5.2.18	MSC -> BS	O[b]	C
Slot Cycle Index	5.2.14	MSC -> BS	O[c,g]	C
Signal	5.2.42	MSC -> BS	O[d,g]	C
Message Waiting Indication	5.2.40	MSC -> BS	O[e, d]	C
Calling Party ASCII Number	5.2.30	MSC -> BS	O[d]	C
MS Information Records	5.2.59	MSC -> BS	O[f]	C
IS-2000 Mobile Capabilities	5.2.57	MSC -> BS	O[g]	C
Protocol Revision	5.2.84	MSC -> BS	O	C

a. This element will contain an IMSI.

b. 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.

c. This optional 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 in the *TIA/EIA/IS-2000* system. If this element is absent, then it is assumed that the MS is operating in non-slotted mode.

d. The Signal, Message Waiting Indication and Calling Party ASCII Number elements will only be retained in this message in this version of this standard for the purpose of backward compatibility. They will not be supported in future IOS versions. The Signal, Message Waiting Indication and Calling Party ASCII Number elements shall only be sent to an IOS v2.x BS.

e. Used by the MSC to send message waiting information. It specifies the number of messages waiting for the mobile. All values, including zero, are valid.

f. This optional element carries MS Information Records. It shall not redundantly carry information present in other elements such as Signal, Message Waiting Indication, and Calling Party ASCII Number.

g. This element 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 Feature Notification message.

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+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								3
								4
							(LSB)	5
-- Continued on next page --								

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⇒ **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
		(LSB)	Sector = [0H-FH] (0H = Omni)	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 = [00000]			Slot Cycle Index = [000-111]	2
⇒ **Signal:** A1 Element Identifier = [34H]				1
Signal value = [00H-FFH] (see 5.2.42)				2
Reserved = [000000]			Alert Pitch = [00,01,10] (med, high, low)	3
⇒ **Message Waiting Indication: A1 Element Identifier = [38H]**				1
Number of Messages = [00H-FFH]				2
⇒ **Calling Party ASCII Number: A1 Element Identifier = [4BH]**				1
Length = [01H-FFH]				2
ext = [0]	Type of Number = [‘000’,’001’,’010’,’011’,’100’]	Numbering Plan Identification = [‘0000’,’0001’,’0011’,’0100’,’1000’,’1001’]		3
ext = [1]	Presentation Indicator = [‘00’,’01’,’10’]	Reserved = [000]	Screening Indicator = [‘00’,’01’,’10’,’11’]	4
Printable ASCII Character 1 =[00H-FFH]				5
Printable ASCII Character 2				6
• • •				• • •
Printable ASCII Character m				n
-- Continued on next page --				

<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></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 colspan="2">Reserved = [00]</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">-- Continued on next page --</td><td></td></tr>
</table>

<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></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">⇒ : A1 Element Identifier = [3BH]</td><td>1</td></tr>
<tr><td colspan="8">Length = <01H></td><td>2</td></tr>
<tr><td colspan="8">PREV_IN_USE = [0H-08H]</td><td>3</td></tr>
</table>

4.2.4 Feature Notification Ack

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

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	5.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	M[a]	
Tag	5.2.50	BS -> MSC	O	C

a. This element will contain an IMSI.

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [61H]								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+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								3
								4
							(LSB)	5

4.2.5 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	5.2.4	MSC -> BS	M	
Priority	5.2.15	MSC -> BS	O	R
PACA Timestamp	5.2.71	MSC -> BS	O	R

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

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)								3
PACA Queuing Time = <any value>								4
								5
							(LSB)	6

4.2.6 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	5.2.4	BS -> MSC	M	
Cause	5.2.16	BS -> MSC	O[b]	C

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

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

4.2.7 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 old 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	5.2.4	BS <-> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS <-> MSC	O	R
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[a]	C
PACA Order	5.2.72	BS <-> MSC	O	R
Priority	5.2.15	BS <- MSC	O[b]	C
Authentication Response Parameter (AUTHR)	5.2.38	BS -> MSC	O[c]	C
Authentication Confirmation Parameter (RANDC)	5.2.35	BS -> MSC	O[c]	C
Authentication Parameter COUNT	5.2.39	BS -> MSC	O[c]	C
Authentication Challenge Parameter (RAND)	5.2.37	BS -> MSC	O[d]	C
Authentication Event	5.2.65	BS -> MSC	O[e]	C

a. This element is included in the message if it is received from the MS and is not included in the first instance of the Mobile Identity element.

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

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

d. 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.

e. 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

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

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+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)								4
ESN = <any value>								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
-- Continued on next page --								

-- Continued from previous page --								
⇒ **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)								4
RAND = <any value>								5
								6
							(LSB)	7
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1
Length = [01H]								2
Event = [01H,02H] (Parameters not received, RANDC/RAND mismatch)								3

4.2.8 PACA Update Ack

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

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	BS <-> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS <-> MSC	O	R
Priority	5.2.15	BS <- MSC	O[a]	C
Cause	5.2.16	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. Allowable cause values are: “PACA Cancel Request Rejected”, “No Response from the MS”, “PACA Queue Overflow”.

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

<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 = [6FH]</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)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="8">⇒ Priority: A1 Element Identifier = [06H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="4">Call Priority = [0000 – 1111]</td><td>Queuing Allowed = [0,1]</td><td>Preemption Allowed = [0,1]</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 = [0CH (No response from MS),
2DH (PACA queue overflow),
2EH (PACA cancel request rejected)]</td><td>3</td></tr>
</table>

4.2.9 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 mobile station that is on a traffic channel.

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	MSC->BS	M	
PSMM Count	5.2.67	MSC->BS	O[a]	C

a. This is the number of PSMMs the PDE is requesting the BS to send. 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.

<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 = [0H]</td><td colspan="4">PSMM Count = [0000-1010]</td><td>3</td></tr>
</table>

4.2.10 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 mobile station that is on a traffic channel. These measurements will be input to position determination calculations.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	5.2.4	BS -> MSC	M	
CDMA Serving One Way Delay	5.2.61	BS -> MSC	O[a,e]	C
Downlink Radio Environment List	5.2.69	BS -> MSC	O[b,e]	C
Cause	5.2.16	BS -> MSC	O[c]	C
Geographic Location	5.2.68	BS -> MSC	O[d,e]	C

a. The CDMA Serving One Way Delay is included at most once. This information element is only included if there are no PSMMs received.

b. The Downlink Radio Environment list is repeated for each PSMM received. All pilots from the active and candidate list are included. All occurrences of the Downlink Radio Environment List are populated in a time order

c. When present, this element indicates some level of failure to provide one or more of the requested radio interface measurements. Allowable cause value is "MS rejected order". This element is not included when the Geographic Location IE is present.

d. This information element is only present when there is LPDE at the BS

e. Only one of these elements shall be present.

The following table shows the bitmap layout for the Radio Measurements for Position Response message.

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [25H]								1
-- Continued on next page --								

-- Continued from previous page --			
⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]			1
Length = [09H]			2
Cell Identification Discriminator = [07H]			3
(MSB)			4
MSCID = <any value>			5
		(LSB)	6
(MSB)	Cell = [001H-FFFH]		7
	(LSB)	Sector = [0H-FH] (0H = Omni)	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 {1+:			
Length = <variable>			i
Number of Cells = <variable>			i+1
Cell Identification Discriminator = [02H,07H]			i+2
Downlink Radio Environment {1+:			
IF (Discriminator = 02H), Cell Identification {1			
(MSB)	Cell = [001H-FFFH]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:			
(MSB)			j
MSCID = <any value>			j+1
		(LSB)	j+2
(MSB)	Cell = [001H-FFFH]		j+3
	(LSB)	Sector = [0H-FH] (0H = Omni)	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			
} Downlink Radio Environment List			
-- Continued on next page --			

-- Continued from previous page --		
⇒ **Cause:** A1 Element Identifier = [04H]		1
Length = [01H]		2
ext = [0]	Cause Value = [34H (MS rejected order)]	3
⇒: **Geographic Location:** A1 Element Identifier = [2CH]		1
Length = <variable>		2
(MSB)		3
Calling Geodetic Location (CGL) = <any value>		…
	(LSB)	k

4.3 Mobility Management Message Formats

4.3.1 Authentication Request

This message is sent from the MSC to the BS and it is used to make an authentication check on the mobile station. This is a DTAP message when used to perform authentication on a voice/traffic channel and a BSMAP message otherwise. The RANDU information element of this message is used by the MS to generate the AUTHU.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	MSC -> BS	M[a]	
Reserved - Octet	5.2.33	MSC -> BS	M[a]	
Message Type	5.2.4	MSC -> BS	M	
Authentication Challenge Parameter (RANDU)	5.2.37	MSC -> BS	M	
Mobile Identity (IMSI)	5.2.13	MSC -> BS	O[b,c]	C
Tag	5.2.50	MSC -> BS	O[c,d]	C
Cell Identifier List	5.2.18	MSC -> BS	O[c,e]	C
Slot Cycle Index	5.2.14	MSC -> BS	O[c,f,g]	C
IS-2000 Mobile Capabilities	5.2.57	MSC -> BS	O[c,g]	C
Protocol Revision	5.2.84	MSC -> BS	O	C

a. 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). This element will contain an IMSI.

c. 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 optional element is included where slotted paging is performed on *TIA/EIA/IS-2000* paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. In *TIA/EIA/IS-2000* 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.

When the Authentication Request message is sent as a BSMAP message, the following format applies.

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)								4
RANDU Value = <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+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								3
								4
							(LSB)	5
-- Continued on next page --								

-- Continued from previous page --							
⇒ **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
			(LSB)	Sector = [0H-FH] (0H = Omni)			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
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]							1
Length = <variable>							2
Reserved = [000]	ERAM Supported = [0,1]	DCCH Supported = [0,1] (Ignored)	FCH Supported = [0,1] (Ignored)	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
⇒ **:** A1 Element Identifier = [3BH]							1
Length = <01H>							2
PREV_IN_USE = [0H-08H]							3

When the Authentication Request message is sent as a DTAP message, the following format applies.

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)								3
RANDU Value = <any value>								4
							(LSB)	5

4.3.2 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	5.2.32	BS -> MSC	M[a]	
Reserved - Octet	5.2.33	BS -> MSC	M[a]	
Message Type	5.2.4	BS -> MSC	M	
Authentication Response Parameter (AUTHU)	5.2.38	BS -> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	O[b,c]	C
Tag	5.2.50	BS -> MSC	O[c]	C
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[c]	C

a. 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. This element will contain an IMSI.

c. Not used when the Authentication Response message is sent as a DTAP message.

When the Authentication Response message is sent as a BSMAP message, the following format applies.

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [46H]								1
⇒ **Authentication Response Parameter (AUTHU):** A1 Element Identifier = [42H]								1
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+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								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)								4
ESN = <any value>								5
								6
							(LSB)	7

When the Authentication Response message is sent as a DTAP message, the following format applies.

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

4.3.3 SSD Update Request

This message is sent from the MSC to the BS and is used to initiate the Shared Secret Data update procedure at the MS. This is a DTAP message when used to perform the SSD Update on a voice/traffic channel. The Authentication Challenge Parameter (RANDSSD) information element of this message is used to generate the new SSD at the MS.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	MSC -> BS	M	
Reserved - Octet	5.2.33	MSC -> BS	M	
Message Type	5.2.4	MSC -> BS	M	
Authentication Challenge Parameter (RANDSSD)	5.2.37	MSC -> BS	M	
Protocol Revision	5.2.84	MSC -> BS	O	C

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

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) = [0CH]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved - Octet** = [00H]								1
⇒ **Message Type** = [47H]								1
-- Continued on next page --								

-- Continued from previous page --		
⇒ **Authentication Challenge Parameter (RANDSSD):** Length = [08H]		1
Reserved = [0000]	Random Number Type = [0100] (RANDSSD)	2
(MSB)		3
		4
		5
RANDSSD Value = <any value>		6
		7
		8
	(LSB)	9
⇒ **:** A1 Element Identifier = [3BH]		1
Length = <01H>		2
PREV_IN_USE = [0H-08H]		3

4.3.4 Base Station Challenge

This message is in response to the SSD Update Request message and is sent from the BS to the MSC. This is a DTAP message when used to perform the SSD Update on a voice/traffic channel. The authentication parameter RANDBS information element of this message contains the RANDBS and will be 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	5.2.32	BS -> MSC	M
Reserved - Octet	5.2.33	BS -> MSC	M
Message Type	5.2.4	BS -> MSC	M
Authentication Challenge Parameter (RANDBS)	5.2.37	BS -> MSC	M

The following table shows the bitmap layout for the Base Station Challenge message.

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]								3
Reserved = [0000]				⇒ **Protocol Discriminator** = [0101]				1
⇒ **Reserved - Octet** = [00H]								1
⇒ **Message Type** = [48H]								1
⇒ **Authentication Challenge Parameter (RANDBS):** Length = [05H]								1
Reserved = [0000]				Random Number Type = [1000] (RANDBS)				2
(MSB)								3
RANDBS Value = <any value>								…

	(LSB)	m

4.3.5 Base Station Challenge Response

This message is in response to the Base Station Challenge message and is sent from the MSC to the BS. This is a DTAP message when 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	5.2.32	MSC -> BS	M	
Reserved - Octet	5.2.33	MSC -> BS	M	
Message Type	5.2.4	MSC -> BS	M	
Authentication Response Parameter (AUTHBS)	5.2.38	MSC -> BS	M	
Protocol Revision	5.2.84	MSC -> BS	O	C

The following table shows the bitmap layout for the Base Station Challenge Response message.

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
⇒ **:** A1 Element Identifier = [3BH]								1
Length = <01H>								2
PREV_IN_USE = [0H-08H]								3

4.3.6 SSD Update Response

This message is used to terminate 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 is a DTAP message when used to perform the SSD Update on a voice/traffic channel.

Information Element	**Section Reference**	**Element Direction**	**Type**
Protocol Discriminator	5.2.32	BS -> MSC	M
Reserved - Octet	5.2.33	BS -> MSC	M

Message Type	5.2.4	BS -> MSC	M	
Cause Layer 3	5.2.46	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. Allowable cause values are: Procedure failed, SSD update rejected. If the BS receives an SSD Update Reject Order from the mobile, 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.

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] (Q.931)		Reserved = [0]	Location = [0100] (Public network serving the remote user)				3
ext = [1]	Cause Value = [0FH (procedure failed), 3BH (SSD Update Rejected)]							4

4.3.7 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 mobile moves to a new location from its previous location.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	5.2.32	BS -> MSC	M[i]	
Reserved - Octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	M[a,i]	
Classmark Information Type 2	5.2.12	BS -> MSC	O[b,i,k]	R
Registration Type	5.2.49	BS -> MSC	O[i]	R
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[c]	C
Slot Cycle Index	5.2.14	BS -> MSC	O[d,l]	C
Authentication Response Parameter (AUTHR)	5.2.38	BS -> MSC	O[e]	C
Authentication Confirmation Parameter (RANDC)	5.2.35	BS -> MSC	O[f]	C
Authentication Parameter COUNT	5.2.39	BS -> MSC	O	C
Authentication Challenge Parameter (RAND)	5.2.37	BS -> MSC	O[g]	C
Authentication Event	5.2.65	BS -> MSC	O[h]	C

User Zone ID	5.2.26	BS -> MSC	O	C
IS-2000 Mobile Capabilities	5.2.57	BS -> MSC	O[j,l]	C

a. This element will contain an IMSI.

b. If an MS is capable of supporting multiple band classes, this shall be indicated in the Band Class Entry field as shown in section 5.2.12.

c. Present in *TIA/EIA/IS-2000* systems when the serial number is received from the MS.

d. The slot cycle index is included when provided by the MS.

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

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

g. 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.

h. 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 mobile station operates at revision level 6 or greater as defined by [1] to [6].

k. When the BS is operating in DS-41 mode, only the following fields in the Classmark Type 2 Information element shall be considered valid by the MSC: Mobile_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.

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

The following message layout contains the Complete Layer 3 Info message encapsulating the Location Updating Request Message.

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
			(LSB)	Sector = [0H-FH] (0H = Omni)				5
⇒ **Layer 3 Information:** A1 Element Identifier = [17H]								1
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+2 = [0H-9H] (BCD)				n+1
-- Continued on next page --								

<table>
<tr><td colspan="8" align="center">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="8" align="center">⇒ Classmark Information Type 2: A1 Element Identifier = [12H]</td><td>1</td></tr>
<tr><td colspan="8" align="center">Length = <variable></td><td>2</td></tr>
<tr><td colspan="3" align="center">Mobile P_REV
= [000 – 111]</td><td>Reserved
= [0]</td><td>See List of Entries =
[0, 1]</td><td colspan="3" align="center">RF Power Capability = [000]
(Class 1, vehicle & portable)</td><td>3</td></tr>
<tr><td colspan="8" align="center">Reserved = [00H]</td><td>4</td></tr>
<tr><td>NAR_
AN_
CAP
= [0,1]</td><td>IS-95
= [1]</td><td>Slotted
= [0,1]</td><td colspan="2" align="center">Reserved = [00]</td><td>DTX
= [0]</td><td>Mobile Term
= [0,1]</td><td>TIA/EIA-553
= [0,1]</td><td>5</td></tr>
<tr><td colspan="8" align="center">Reserved = [00H]</td><td>6</td></tr>
<tr><td colspan="6" align="center">Reserved = [0000 00]</td><td>Mobile Term
= [0,1]</td><td>PSI
= [0,1]</td><td>7</td></tr>
<tr><td colspan="8" align="center">SCM Length = [01H]</td><td>8</td></tr>
<tr><td colspan="8" align="center">Station Class Mark = [00H – FFH]</td><td>9</td></tr>
<tr><td colspan="8" align="center">Count of Band Class Entries = [01H-20H]</td><td>10</td></tr>
<tr><td colspan="8" align="center">Band Class Entry Length = [03H]</td><td>11</td></tr>
<tr><td colspan="9">Mobile Band Class Capability Entry {1+:</td></tr>
<tr><td colspan="4" align="center">Reserved = [000]</td><td colspan="4" align="center">Band Class n = [00000-11111]</td><td>k</td></tr>
<tr><td colspan="8" align="center">Band Class n Air Interfaces Supported = [00H-FFH]</td><td>k+1</td></tr>
<tr><td colspan="8" align="center">Band Class n MS Protocol Level = [00H-FFH]</td><td>k+2</td></tr>
<tr><td colspan="9">} Mobile Band Class Capability Entry</td></tr>
<tr><td colspan="8" align="center">⇒ Registration Type: A1 Element Identifier = [1FH]</td><td>1</td></tr>
<tr><td colspan="8" align="center">Location Registration Type =
[00H (timer-based),
01H (power-up),
02H (zone-based),
03H (power-down),
04H (parameter change),
06H (distance-based)]</td><td>2</td></tr>
<tr><td colspan="8" align="center">-- Continued on next page --</td><td></td></tr>
</table>

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⇒ **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)								4
ESN = <any value>								5
								6
							(LSB)	7
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [00000]					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 = [000000-111111]						2
⇒ **Authentication Challenge Parameter (RAND):** A1 Element Identifier = [41H]								1
Length = [05H]								2
Reserved = [0000]				Random Number Type = [0001] (RAND)				3
(MSB)								4
RAND = <any value>								5
								6
							(LSB)	7
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1
Length = [01H]								2
Event = [01H (Parameters not received), 02H (RANDC/RAND mismatch)]								3
-- Continued on next page --								

<table>
<tr><td colspan="7">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="7">⇒ User Zone ID: A1 Element Identifier = [02H]</td><td>1</td></tr>
<tr><td colspan="7">Length = [02H]</td><td>2</td></tr>
<tr><td>(MSB)</td><td colspan="6">UZID = <any value></td><td>3</td></tr>
<tr><td colspan="6"></td><td>(LSB)</td><td>4</td></tr>
<tr><td colspan="7">⇒ IS-2000 Mobile Capabilities: A1 Element Identifier = [11H]</td><td>1</td></tr>
<tr><td colspan="7">Length = <variable></td><td>2</td></tr>
<tr><td>Reserved
= [00]</td><td>ERAM
Supported =
[0,1]</td><td>DCCH
Supported
= [0,1]
(Ignored)</td><td>FCH
Supported
= [0,1]
(Ignored)</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="7">FCH Information: Bit-Exact Length – Octet Count
= [00H]</td><td>4</td></tr>
<tr><td>Reserved
= [0]</td><td colspan="2">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]</td><td>5</td></tr>
<tr><td colspan="7">DCCH Information: Bit-Exact Length – Octet Count
= [00H]</td><td>6</td></tr>
<tr><td colspan="4">Reserved
= [0000 0]</td><td colspan="3">DCCH Information:
Bit-Exact Length – Fill Bits
= [000]</td><td>7</td></tr>
</table>

4.3.8 Location Updating Accept

This DTAP message is sent from MSC to BS to acknowledge that the MSC received and accepted the location registration request from the BS.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Protocol Discriminator	5.2.32	MSC -> BS	M	
Reserved - Octet	5.2.33	MSC -> BS	M	
Message Type	5.2.4	MSC -> BS	M	
Cause	5.2.16	MSC -> BS	O[a]	C

a. This element is included in this message when a mobile hosting a dormant packet data session powers down. Allowable value: “power down from dormant state”.

The following table shows the bitmap layout for the Location Updating Accept message.

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 or 09H]								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

4.3.9 Location Updating Reject

This DTAP message is sent by the MSC to the BS to indicate that updating has failed. This message is optional.

Information Element	Section Reference	Element Direction	Type
Protocol Discriminator	5.2.32	MSC -> BS	M
Reserved - Octet	5.2.33	MSC -> BS	M
Message Type	5.2.4	MSC -> BS	M
Reject Cause	5.2.36	MSC -> BS	M[a]

a. Valid reject cause reasons are: Roaming not allowed, Network failure, Congestion, Illegal MS.

The following table shows the bitmap layout for the Location Updating Reject message.

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]								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

4.3.10 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	5.2.32	MSC-> BS	M
Reserved - Octet	5.2.33	MSC-> BS	M
Message Type	5.2.4	MSC-> BS	M

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

<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 = [0101]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Reserved - Octet = [00H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Message Type = [2CH]</td><td>1</td></tr>
</table>

4.3.11 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	5.2.32	BS-> MSC	M
Reserved - Octet	5.2.33	BS-> MSC	M
Message Type	5.2.4	BS-> MSC	M

The following table shows the bitmap layout for the Base Parameter Update Confirm message.

<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 = [0101]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Reserved - Octet = [00H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Message Type = [2BH]</td><td>1</td></tr>
</table>

4.3.12 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	5.2.4	MSC -> BS	M
Encryption Information	5.2.10	MSC -> BS	M

The following table shows the bitmap layout for the Privacy Mode Command message.

<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 = [53H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Encryption Information: A1 Element Identifier = [0AH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [08H,0AH,12H]</td><td>2</td></tr>
<tr><td colspan="9">Encryption Info {1..2:
IF (Encryption Parameter Identifier = 00001, 00101, or 00110), Encryption Info {1:</td></tr>
<tr><td>ext = [1]</td><td colspan="5">Encryption Parameter Identifier =
[00001 (SME),
00101 (Datakey (ORYX)),
00110 (Initial RAND)]</td><td>Status
= [0,1]</td><td>Available
= [0]</td><td>j</td></tr>
<tr><td colspan="8">Encryption Parameter Length = [08H]</td><td>j+1</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>j+2</td></tr>
<tr><td colspan="8"></td><td>j+3</td></tr>
<tr><td colspan="8"></td><td>j+4</td></tr>
<tr><td colspan="8">Encryption Parameter value</td><td>j+5</td></tr>
<tr><td colspan="8"></td><td>j+6</td></tr>
<tr><td colspan="8"></td><td>j+7</td></tr>
<tr><td colspan="8"></td><td>j+8</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j+9</td></tr>
<tr><td colspan="9">} OR IF (Encryption Parameter Identifier = 00100), Encryption Info {1:</td></tr>
<tr><td>ext = [1]</td><td colspan="5">Encryption Parameter Identifier = [00100]
(Private Longcode)</td><td>Status
= [0,1]</td><td>Available
= [0]</td><td>j</td></tr>
<tr><td colspan="8">Encryption Parameter Length = [06H]</td><td>j+1</td></tr>
<tr><td colspan="6">Unused = [000000]</td><td>(MSB)</td><td></td><td>j+2</td></tr>
<tr><td colspan="8"></td><td>j+3</td></tr>
<tr><td colspan="8">Encryption Parameter value</td><td>j+4</td></tr>
<tr><td colspan="8"></td><td>j+5</td></tr>
<tr><td colspan="8"></td><td>j+6</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>j+7</td></tr>
<tr><td colspan="9">} Encryption Parameter Identifier
} Encryption Info</td></tr>
</table>

4.3.13 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	5.2.4	BS -> MSC	M	
Encryption Information	5.2.10	BS -> MSC	O[a]	C
Voice Privacy Request	5.2.11	BS -> MSC	O[b]	C

a. Used to indicate Voice Privacy mode changes when this message is sent autonomously by the BS.

b. Used to indicate that Voice Privacy was requested by the MS, but could not be provided by the BS.

Note: Encryption Information and voice privacy elements are mutually exclusive. The Encryption Information element is used to indicate a change in Encryption Information at the BS. The Voice Privacy Request element is used by the BS to request the encryption keys.

The following table shows the bitmap layout for the Privacy Mode Complete message.

<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 = [55H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Encryption Information: A1 Element Identifier = [0AH]</td><td>1</td></tr>
<tr><td colspan="8">Length = [02H,04H]</td><td>2</td></tr>
<tr><td colspan="9">Encryption Info {1..2:</td></tr>
<tr><td>ext = [1]</td><td colspan="5">Encryption Parameter Identifier = [00001,00100]
(SME, Private Longcode)</td><td>Status
= [0,1]</td><td>Available
= [0,1]</td><td>j</td></tr>
<tr><td colspan="8">Encryption Parameter Length = [00H]</td><td>j+1</td></tr>
<tr><td colspan="9">} Encryption Info</td></tr>
<tr><td colspan="8">⇒ Voice Privacy Request: A1 Element Identifier = [A1H]</td><td>1</td></tr>
</table>

4.3.14 Status Request

This message is sent from the MSC to the BS to request the mobile station to 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	5.2.32	MSC -> BS	M[a]	
Reserved – Octet	5.2.33	MSC -> BS	M[a]	
Message Type	5.2.4	MSC -> BS	M	
Information Record Requested	5.2.81	MSC -> BS	M	
Mobile Identity (IMSI)	5.2.13	MSC -> BS	O[b]	C
Mobile Identity (ESN)	5.2.13	MSC -> BS	O[b]	C
Slot Cycle Index	5.2.14	MSC -> BS	O[b,c]	C
Cell Identifier List	5.2.17	MSC -> BS	O[b]	C
IS-2000 Mobile Capabilities	5.2.57	MSC -> BS	O[b]	C
Classmark Information Type 2	5.2.12	MSC -> BS	O[b,d]	C

a. Not used when the Status Request message is sent as a BSMAP message.

b. These elements are used only in BSMAP messages.

c. This optional element is included where slotted paging is performed on C.S0005-A paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. In CDMA systems, if this element is absent, then it is assumed that the MS is operating in non-slotted mode.

d. This element provides the mobile protocol revision, signaling types and band classes that the mobile is permitted to use. More than one is permitted. If an MS is capable of multiple band classes, this shall be indicated in the band class entry field as shown in section 5.2.12.

When the Status Request message is sent as a BSMAP message, the following format applies.

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 = [01H]								2
Information Record Types = [0DH (ESN)]								3
⇒ **Classmark Information Type 2:** A1 Element Identifier = [12H]								1
Length = <variable>								2
Mobile P_REV =[000 – 111]			Reserved = [0]	See List of Entries = [0, 1]	RF Power Capability = [000] (Class 1, vehicle & portable)			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 MS Protocol Level = [00H-FFH]								k+2
} Mobile Band Class Capability Entry								
-- Continued on next page --								

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⇒ **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+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)	4
ESN = <any value>	5
	6
(LSB)	7
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]	1
Reserved = [0 0000] | 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
(LSB) | Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 05H), Cell Identification {1+:	
(MSB) | LAC = [0001H-FFFFH]	j
(LSB)	j+1
} Cell Identification	
-- Continued on next page --	

<table>
<tr><th colspan="8">-- Continued from previous page --</th><th></th></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 colspan="2">Reserved = [00]</td><td>ERAM Supported = [0,1]</td><td>DCCH Supported = [0,1] (Ignored)</td><td>FCH Supported = [0,1] (Ignored)</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 = [000, 001, 010, 011]</td><td>Geo Location Included = [0,1]</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>
</table>

When the Status Request message is sent as a DTAP message, the following format applies.

<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) = <variable></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 = [6AH]</td><td>1</td></tr>
<tr><td colspan="8">⇒ Information Record Requested: Length = [01H]</td><td>1</td></tr>
<tr><td colspan="8">Information Record Types = [0DH (ESN)]</td><td>2</td></tr>
</table>

4.3.15 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 message shall not be used for DS-41 operation.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	MSC -> BS	M[a]	
Reserved - Octet	5.2.33	MSC -> BS	M[a]	
Message Type	5.2.4	BS -> MSC	M	
MS Information Records	5.2.59	BS -> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	O	C
Mobile Identity (ESN)	5.2.13	BS -> MSC	O	C

a. Not used when the Status Request message is sent as a BSMAP message.

When the Status Response message is sent as a BSMAP message, the following format applies.

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
• • •								• • •
							(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+2 = [0H-9H] (BCD)				n+1
-- Continued on next page --								

-- Continued from previous page --			
⇒ **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)			4
ESN = <any value>			5
			6
		(LSB)	7

When the Status Response message is sent as a DTAP message, the following format applies.

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								

4.3.16 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	5.2.32	BS -> MSC	M	
Reserved - octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
User Zone ID	5.2.26	BS -> MSC	O[a]	R

a. Indicates the User Zone proposed by the MS.

The following table shows the bitmap layout for the User Zone Update Request message:

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:** Length = [02H]								1
(MSB)	UZID = <any value>							2
							(LSB)	3

4.3.17 User Zone Update

This DTAP message is sent from the MSC to the BS when the MSC wishes to update the User Zone being used by the MS.

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	MSC -> BS	M	
Reserved - octet	5.2.33	MSC-> BS	M	
Message Type	5.2.4	MSC -> BS	M	
User Zone ID	5.2.26	MSC -> BS	O[a]	R

a. Indicates the User Zone proposed by the MSC.

The following table shows the bitmap layout for the User Zone Update message:

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** = [0CH]								1
⇒ **User Zone ID:** Length = [02H]								1
(MSB)	UZID = <any value>							2
							(LSB)	3

4.3.18 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	5.2.32	MSC -> BS	M[a]	
Reserved -– Octet	5.2.33	MSC -> BS	M[a]	
Message Type	5.2.4	MSC -> BS	M	
User Zone ID	5.2.26	MSC -> BS	O[f]	C
Mobile Identity (IMSI)	5.2.13	MSC -> BS	O[b,c]	C
Cell Identifier List	5.2.18	MSC -> BS	O[c,d]	C
Slot Cycle Index	5.2.14	MSC -> BS	O[c,e,g]	C
IS-2000 Mobile Capabilities	5.2.57	MSC -> BS	O[c,g]	C
Protocol Revision	5.2.84	MSC -> BS	O[h]	C

a. 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). This element will contain an IMSI.

c. Not used when the Authentication Request is sent as a DTAP message.

d. Only required for multi-cell BSs. Uniquely identifies cells within a BS.

e. This optional element is included where 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 is only included when the User Zone Reject message is sent as a BSMAP message.

When the User Zone Reject message is sent as a BSMAP message, the following format applies.

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+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
			(LSB)	Sector = [0H-FH] (0H = Omni)				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 = [00000]					Slot Cycle Index = [000-111]			2
-- Continued on next page --								

-- Continued from previous page --								
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
Reserved = [00]		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
(MSB)								6
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
⇒ **Protocol Revision:** A1 Element Identifier = [3BH]								1
Length = [01H]								2
PREV_IN_USE = [01H-08H]								3

When the User Zone Reject message is sent as a DTAP message, the following format applies.

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

4.4 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 see Sections 5.2.18, “Cell Identifier List” and 5.2.17, “Cell Identifier.”

4.4.1 Handoff Required

This BSMAP message is sent from the 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	5.2.4	BS -> MSC	M	
Cause	5.2.16	BS -> MSC	M[a]	
Cell Identifier List (Target)	5.2.18	BS -> MSC	M[b]	
Classmark Information Type 2	5.2.12	BS -> MSC	O[c, h,q]	R
Response Request	5.2.28	BS -> MSC	O	R
Encryption Information	5.2.10	BS -> MSC	O[d]	R
IS-95 Channel Identity	5.2.9	BS -> MSC	O[e, i,p,r]	C
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[f]	R
Downlink Radio Environment	5.2.22	BS -> MSC	O[g, i,s]	C
Service Option	5.2.53	BS -> MSC	O[u]	C
CDMA Serving One Way Delay	5.2.61	BS -> MSC	O[i,s]	C
IS-95 MS Measured Channel Identity	5.2.29	BS -> MSC	O[j,s]	C
IS-2000 Channel Identity	5.2.27	BS -> MSC	O[i,k,w, r]	C
Quality of Service Parameters	5.2.45	BS -> MSC	O[l]	C
IS-2000 Mobile Capabilities	5.2.57	BS -> MSC	O[i]	C
IS-2000 Service Configuration Record	5.2.55	BS -> MSC	O[i,s]	C
Serving PDSN IP Address	5.2.24	BS -> MSC	O[m]	C
Protocol Type	5.2.58	BS -> MSC	O[n]	C
Source RNC to Target RNC Transparent Container	5.2.75	BS -> MSC	O[o]	C
Slot Cycle Index	5.2.14	BS -> MSC	O[s]	C
Access Network Identifiers	5.2.74	BS->MSC	O[t]	C
Service Option List	5.2.78	BS -> MSC	O[v]	C
IS-2000 Channel Identity 3X	5.2.23	BS -> MSC	O[i,k,w, r, p]	C
Anchor PDSN IP Address	5.2.83	BS->MSC	O[x]	C

a. Allowable cause values are: Interference; Better cell (i.e., Power budget). Timer expiration; Time Critical Relocation/Handoff; OAM&P intervention; Network optimization.

b. This element contains the preferred list of target cells in order of predicted best performance.

c. This element indicates the signaling modes and band classes the mobile is capable of operating in. If an MS is capable of multiple band classes, this shall be indicated in the band class entry field as shown in section 5.2.12.

d. Conveys current Voice/Data Privacy and Signaling Message Encryption modes, as well as the Voice/Data Privacy and Signaling Message Encryption Keys, if applicable.

e. Specifies 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.

f. This element is required for *TIA/EIA/IS-95-B* and *TIA/EIA/IS-2000* handoff and must contain the mobile's ESN, so that the target BS can calculate the Public Long Code Mask.

g. This element provides information for each cell in the Cell Identifier List element.

h. The fields in octets 4 and 5 shall be coded as shown in the bitmap below. The MSC shall ignore all fields except IS-95, Slotted, and Mobile_Term.

i. These elements are not required for a CDMA to AMPS handoff.

j. This element specifies the target IS-95 Channel for CDMA to CDMA Hard Handoff based on the MS measurement. It is required if the value is provided by the MS.

k. 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.

l. 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.

m. This element is only used for packet data calls in case of an Inter-PCF hard handoff. It carries the IP Address of the PDSN currently connected to the PCF.

n. This element is only used for packet data calls in case of an Inter-PCF hard handoff. It identifies the Link Layer protocol used at the Mobile Station and at the PDSN.

o. This element is only used when the target BS is operating in DS-41 mode.

p. This element is used for 3X systems. It is not present if either the *IS-2000* Channel Identity of *IS-95* Channel Identity elements are present.

q. 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 Information element shall be considered valid: Mobile_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

   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.

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

s. These elements shall be included by the DS-41 source BS when the target BS will be operating in MC-41 mode.

t. This element is only used for packet data calls. The Access Network Identifiers are those of the source PCF.

u. This element is being kept in this revision of this standard for backward compatibility with IOS versions less than 3GPP2 A.S0001-A. This element is not present if the Service Option List element is present.

v. This element specifies the information of the current service option connections. This element is not present if the Service Option element is present.

w. Hard handoff of the Supplemental Channel is not supported in this version of the standard. Allowed values for the Physical Channel Type in the *IS-2000* Channel Identity IE are: Fundamental Channel or Dedicated Control Channel.

x. This is the IP address of the serving PDSNon which PDSN-PDSN (P-P) interface is present. This element is present only if fast handoff is supported.

The following table shows the bitmap layout for the Handoff Required message.

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 expiration), 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+:								
(MSB)	Cell = [001H-FFFH]							j
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+1
} OR IF (Discriminator = 07H), Cell Identification {1+:								
(MSB)								j
MSCID = <any value>								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+4
} Cell Identification								
-- Continued on next page --								

<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="8">⇒ Classmark Information Type 2: A1 Element Identifier = [12H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="3">Mobile P_REV = [000 – 111]</td><td>Reserved = [0]</td><td>See List of Entries = [0, 1]</td><td colspan="3">RF Power Capability = [000] (Class 1, vehicle & portable)</td><td>3</td></tr>
<tr><td colspan="8">Reserved = [00H]</td><td>4</td></tr>
<tr><td>NAR_ AN_ CAP = [0,1]</td><td>IS-95 = [1]</td><td>Slotted = [0,1]</td><td colspan="2">Reserved = [00]</td><td>DTX = [0,1]</td><td>Mobile Term = [0,1]</td><td>TIA/EIA-553 = [0,1]</td><td>5</td></tr>
<tr><td colspan="8">Reserved = [00H]</td><td>6</td></tr>
<tr><td colspan="6">Reserved = [0000 00]</td><td>Mobile Term = [0,1]</td><td>PSI = [0,1]</td><td>7</td></tr>
<tr><td colspan="8">SCM Length = [01H]</td><td>8</td></tr>
<tr><td colspan="8">Station Class Mark = [00H – FFH]</td><td>8</td></tr>
<tr><td colspan="8">Count of Band Class Entries = [01H-20H]</td><td>9</td></tr>
<tr><td colspan="8">Band Class Entry Length = [03H]</td><td>11</td></tr>
<tr><td colspan="9">Mobile Band Class Capability Entry {1+:</td></tr>
<tr><td colspan="3">Reserved = [000]</td><td colspan="5">Band Class n = [00000-11111]</td><td>k</td></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 MS Protocol Level = [00H-FFH]</td><td>k+2</td></tr>
<tr><td colspan="9">} Mobile Band Class Capability Entry</td></tr>
<tr><td colspan="8">⇒ Response Request: A1 Element Identifier = [1BH]</td><td>1</td></tr>
<tr><td colspan="8">-- Continued on next page --</td><td></td></tr>
</table>

-- Continued from previous page --				
⇒ **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 = [0,1]	j
Encryption Parameter Length = <variable>				j+1
(MSB)				j+2
Encryption Parameter value = <any value>				…
			(LSB)	k
} OR IF (Encryption Parameter Identifier = 00100) {1:				
ext = [1]	Encryption Parameter Identifier = [00100] (Private Longcode)	Status = [0,1]	Available = [0,1]	m
Encryption Parameter Length = [06H]				m+1
Unused = [000000]		(MSB)		m+2
				m+3
Encryption Parameter value = <any value>				m+4
				m+5
				m+6
			(LSB)	m+7
} Encryption Parameter Identifier				
} Encryption Info				
-- Continued on next page --				

<table>
<tr><td colspan="7">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="7">⇒ IS-95 Channel Identity: A1 Element Identifier = [22H]</td><td>1</td></tr>
<tr><td colspan="7">Length = <variable> (see footnote e above)</td><td>2</td></tr>
<tr><td>Hard Handoff = [1]</td><td colspan="3">Number of Channels to Add = [001]</td><td colspan="3">Frame Offset = [0H-FH]</td><td>3</td></tr>
<tr><td colspan="8">(see footnote e above) {1+:</td></tr>
<tr><td colspan="7">Walsh Code Channel Index = <any value> (Ignored)</td><td>k</td></tr>
<tr><td colspan="7">Pilot PN Code (low part) = <any value> (Ignored)</td><td>k+1</td></tr>
<tr><td>Pilot PN Code (high part)
= <any value> (Ignored)</td><td>Power Combined
= [0]</td><td>Freq. included
= [1]</td><td colspan="2">Reserved = [00]</td><td colspan="2">ARFCN (high part)
= [000-111]</td><td>k+2</td></tr>
<tr><td colspan="7">ARFCN (low part) = [00H-FFH]</td><td>k+3</td></tr>
<tr><td colspan="8">}(see footnote e above)</td></tr>
<tr><td colspan="7">⇒ Mobile Identity (ESN): A1 Element Identifier = [0DH]</td><td>1</td></tr>
<tr><td colspan="7">Length = [05H]</td><td>2</td></tr>
<tr><td colspan="4">Identity Digit 1 = [0000]</td><td>Odd/even Indicator
= [0]</td><td colspan="2">Type of Identity
= [101] (ESN)</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="6"></td><td>4</td></tr>
<tr><td colspan="7">ESN = <any value></td><td>5</td></tr>
<tr><td colspan="7"></td><td>6</td></tr>
<tr><td colspan="6"></td><td>(LSB)</td><td>7</td></tr>
<tr><td colspan="7">-- Continued on next page --</td><td></td></tr>
</table>

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⇒ **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 {1+:			
IF (Discriminator = 02H), Cell Identification {1			
(MSB)	Cell = [001H-FFFH]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:			
(MSB)			j
MSCID = <any value>			j+1
		(LSB)	j+2
(MSB)	Cell = [001H-FFFH]		j+3
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+4
} 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			
-- Continued on next page --			

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⇒ **Service Option: A1 Element Identifier = [03H]**			1
(MSB)	Service Option		2
	= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 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), 0022H (Test Data), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback)]	(LSB)	3
-- Continued on next page --			

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⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]			1
Length = [06H, 09H]			2
Cell Identification Discriminator = [02H,07H]			3
IF (Discriminator = 02H), Cell Identification {1:			
(MSB)	Cell = [001H-FFFH]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:			
(MSB)			j
MSCID = <any value>			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
⇒ ***IS-95*** **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
-- Continued on next page --			

<table>
<tr><td colspan="5">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="5">⇒ IS-2000 Channel Identity: A1 Element Identifier = [09H]</td><td>1</td></tr>
<tr><td colspan="5">Length = <variable></td><td>2</td></tr>
<tr><td>OTD= [0] (Ignored)</td><td colspan="2">Physical Channel Count = [001, 010]</td><td colspan="2">Frame Offset = [0H-FH]</td><td>3</td></tr>
<tr><td colspan="6">The following 6 octets are repeated once for each physical channel {1..2:</td></tr>
<tr><td colspan="5">Physical Channel Type =
[01H (Fundamental Channel – FCH – IS-2000),
02H (Dedicated Control Channel – DCCH – IS-2000)]</td><td>n</td></tr>
<tr><td>Reserved = [0]</td><td>Pilot Gating Rate = [00, 01, 10]</td><td colspan="2">QOF Mask = <any value> (ignored)</td><td>Walsh Code Channel Index (high part) = <any value> (Ignored)</td><td>n+1</td></tr>
<tr><td colspan="5">Walsh Code Channel Index (low part) = <any value> (Ignored)</td><td>n+2</td></tr>
<tr><td colspan="5">Pilot PN Code (low part) = <any value> (Ignored)</td><td>n+3</td></tr>
<tr><td>Pilot PN Code (high part) = <any value> (Ignored)</td><td>Reserved = [00]</td><td>Power Combined = [0]</td><td>Freq. included = [1]</td><td>ARFCN (high part) = [000-111]</td><td>n+4</td></tr>
<tr><td colspan="5">ARFCN (low part) = [00H-FFH]</td><td>n+5</td></tr>
<tr><td colspan="6">} Channel Information</td></tr>
<tr><td colspan="5">⇒ Quality of Service Parameters: A1 Element Identifier = [07H]</td><td>1</td></tr>
<tr><td colspan="5">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="2">Reserved = [0000]</td><td colspan="3">Non-Assured Mode Packet Priority = [0000 – 1101]</td><td>3</td></tr>
<tr><td colspan="5">-- Continued on next page --</td><td></td></tr>
</table>

<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></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 colspan="2">Reserved
= [00]</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">-- Continued on next page --</td><td></td></tr>
</table>

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⇒ ***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
⇒ **Serving PDSN IP Address:** A1 Element Identifier = [14H]								1
Length = [04H]								2
(MSB)								3
Serving PDSN IP Address = <any value>								4
								5
							(LSB)	6
⇒ **Protocol Type:** A1 Element Identifier = [18H]								1
Length = [02H]								2
(MSB)	Protocol Type = [88 0BH, 88 81H] (PPP, Unstructured Byte Stream)							3
							(LSB)	4
⇒ **Source RNC to Target RNC Transparent Container:** A1 Element Identifier = [39H]								1
Length = [01H – FFH]								2
(MSB)								3
Container = <any value>								…
							(LSB)	k
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [00000]					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
-- Continued on next page --								

-- Continued from previous page --				
⇒ **Service Option List:** A1 Element Identifier = [2AH]				1
Length = <variable>				2
Number of Service Options = [01H-02H]				3
Service Option Connection {1..2:				
Reserved = [0000 0]			Service Option Connection Identifier = [001 - 110]	i
(MSB)	Service Option			i+1
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 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), 0022H (Test Data), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback)]			(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
-- Continued on next page --				

<table>
<tr><td colspan="6">-- Continued from previous page --</td></tr>
<tr><td colspan="6">The following 10 octets are repeated once for each physical channel {1..2:</td></tr>
<tr><td colspan="5">Physical Channel Type =
[01H (Fundamental Channel – FCH – IS-2000),
02H (Dedicated Control Channel – DCCH – IS-2000)]</td><td>n</td></tr>
<tr><td>Reserved = [0]</td><td>Pilot Gating Rate = [00, 01, 10]</td><td colspan="2">QOF Mask = <any value> (ignored)</td><td>Walsh Code Channel Index (high part) = <any value> (Ignored)</td><td>n+1</td></tr>
<tr><td colspan="5">Walsh Code Channel Index (low part) = <any value> (Ignored)</td><td>n+2</td></tr>
<tr><td colspan="5">Pilot PN Code (low part) = <any value> (Ignored)</td><td>n+3</td></tr>
<tr><td>Pilot PN Code (high part) = <any value> (Ignored)</td><td>Reserved = [00]</td><td>Power Combined = [0]</td><td>Freq. included = [1]</td><td>ARFCN (high part) = [000-111]</td><td>n+4</td></tr>
<tr><td colspan="5">ARFCN (low part) = [00H-FFH]</td><td>n+5</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td colspan="2">Lower QOF Mask = <any value> (ignored)</td><td>Lower Walsh Code Channel Index (high part) = <any value>(Ignored)</td><td>n+6</td></tr>
<tr><td colspan="5">Lower Walsh Code Channel Index (low part) = <any value> (Ignored)</td><td>n+7</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td colspan="2">Upper QOF Mask = <any value> (ignored)</td><td>Upper Walsh Code Channel Index (high part) = <any value>(Ignored)</td><td>n+8</td></tr>
<tr><td colspan="5">Upper Walsh Code Channel Index (low part) = <any value> (Ignored)</td><td>n+9</td></tr>
<tr><td colspan="6">} Channel Information</td></tr>
<tr><td colspan="5">⇒ Anchor PDSN IP Address: A1 Element Identifier = [30H]</td><td>1</td></tr>
<tr><td colspan="5">Length = [04H]</td><td>2</td></tr>
<tr><td>MSB</td><td colspan="4"></td><td>3</td></tr>
<tr><td colspan="5">Anchor PDSN IP Address = <any value></td><td>4</td></tr>
<tr><td colspan="5"></td><td>5</td></tr>
<tr><td colspan="4"></td><td>LSB</td><td>6</td></tr>
</table>

4.4.2 Handoff Request

The BSMAP Handoff Request message is sent from the MSC to the BS to indicate that a mobile is to be handed off to that BS.

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	MSC -> BS	M	
Channel Type	5.2.5	MSC -> BS	M[a]	
Encryption Information	5.2.10	MSC -> BS	M[b]	
Classmark Information Type 2	5.2.12	MSC -> BS	M[c,p]	
Cell Identifier List (Target)	5.2.18	MSC -> BS	M[d]	
Circuit Identity Code Extension	5.2.20	MSC -> BS	O[e]	C
IS-95 Channel Identity	5.2.9	MSC -> BS	O[f,q]	C
Mobile Identity (IMSI)	5.2.13	MSC -> BS	O[g]	R
Mobile Identity (ESN)	5.2.13	MSC -> BS	O[g]	R
Downlink Radio Environment	5.2.22	MSC -> BS	O[h,r]	R
Service Option	5.2.53	MSC -> BS	O[u]	C
CDMA Serving One Way Delay	5.2.61	MSC -> BS	O[r]	R
IS-95 MS Measured Channel Identity	5.2.29	MSC -> BS	O[i,r]	C
IS-2000 Channel Identity	5.2.27	MSC -> BS	O[j,q]	C
Quality of Service Parameters	5.2.45	MSC -> BS	O[k]	C
IS-2000 Mobile Capabilities	5.2.57	MSC -> BS	O[t]	C
IS-2000 Service Configuration Record	5.2.55	MSC -> BS	O[r]	C
Serving PDSN IP Address	5.2.24	MSC -> BS	O[m]	C
Protocol Type	5.2.58	MSC -> BS	O[n]	C
Source RNC to Target RNC Transparent Container	5.2.75	MSC -> BS	O[s]	C
Slot Cycle Index	5.2.14	BS -> MSC	O[r]	C
Access Network Identifiers	5.2.74	MSC->BS	O[o]	C
Service Option List	5.2.78	MSC -> BS	O[v]	C
IS-2000 Channel Identity 3X	5.2.23	MSC -> BS	O[q,w]	C
Anchor PDSN IP Address	5.2.83	MSC->BS	O[x]	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. Conveys 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 on the Handoff Required message is sent to the target BS on the Handoff Request message.

c. This element provides the signaling types and band classes that the mobile is permitted to use. More than one is permitted. If an MS is capable of multiple band classes, this shall be indicated in the band class entry field as shown in section 5.2.12.

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 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), or OTAPA delivery on a traffic channel, this element shall not be included.

f. Specifies 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.

g. This element is required for CDMA to CDMA handoffs. The first instance shall contain the IMSI, and the second shall contain the mobile's ESN, so that the target BS can calculate the Public Long Code Mask.

h. This element provides information for each cell in the Cell Identifier List (target) element.

i. If the *IS-95* 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. Not applicable.

m. This element is only used for packet data calls in case of an Inter-PCF hard handoff. It carries the IP Address of the PDSN currently connected to the PCF.

n. This element is only used for packet data calls in case of an Inter-PCF hard handoff. It identifies the Link Layer protocol used at the Mobile Node and at the PDSN.

o. This element is only used for packet data calls. The Access Network Identifiers are those of the source PCF.

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 Information element shall be considered valid: Mobile_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.

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.

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 will be operating in MC-41 mode.

s. This element is only used when the target BS is operating in DS-41 mode.

t. This element is included for CDMA to CDMA handoffs.

u. This element is being kept in this revision of this standard for backward compatibility with IOS version less than V4.1. This element is not present if the Service Option List element is present.

v. This element specifies the information of the current service option connections. This element is not present if the Service Option element is present.

w. 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.

x. This is the IP address of serving PDSN for the interface on which P-P is present. This element is present only if fast handoff is supported.

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

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 kb/s 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)								j+2
Encryption Parameter value = <any value>								…
							(LSB)	k
} OR IF (Encryption Parameter Identifier = 00100) {1:								
ext = [1]	Encryption Parameter Identifier = [00100] (Private Longcode)					Status = [0,1]	Available = [0]	m
Encryption Parameter Length = [06H]								m+1
Unused = [000000]						(MSB)		m+2
								m+3
Encryption Parameter value = <any value>								m+4
								m+5
								m+6
							(LSB)	m+7
} Encryption Parameter Identifier ***} Encryption Info***								
-- Continued on next page --								

<table>
<tr><td colspan="8">**-- Continued from previous page --**</td><td></td></tr>
<tr><td colspan="8">⇒ **Classmark Information Type 2:** A1 Element Identifier = [12H]</td><td>1</td></tr>
<tr><td colspan="8">Length = <variable></td><td>2</td></tr>
<tr><td colspan="3">Mobile P_REV =[000 – 111]</td><td>Reserved = [0]</td><td>See List of Entries = [0, 1]</td><td colspan="3">RF Power Capability = [000] (Class 1, vehicle & portable)</td><td>3</td></tr>
<tr><td colspan="8">Reserved = [00H]</td><td>4</td></tr>
<tr><td>NAR_ AN_ CAP = [0,1]</td><td>IS-95 = [1]</td><td>Slotted = [0,1]</td><td colspan="2">Reserved = [00]</td><td>DTX = [0,1]</td><td>Mobile Term = [1]</td><td>TIA/EIA-553 = [0,1]</td><td>5</td></tr>
<tr><td colspan="8">Reserved = [00H]</td><td>6</td></tr>
<tr><td colspan="6">Reserved = [0000 00]</td><td>Mobile Term = [0,1]</td><td>PSI = [0,1]</td><td>7</td></tr>
<tr><td colspan="8">SCM Length = [01H]</td><td>8</td></tr>
<tr><td colspan="8">Station Class Mark = [00H – FFH]</td><td>9</td></tr>
<tr><td colspan="8">Count of Band Class Entries = [01H-20H]</td><td>10</td></tr>
<tr><td colspan="8">Band Class Entry Length = [03H]</td><td>11</td></tr>
<tr><td colspan="9">***Mobile Band Class Capability Entry {1+:***</td></tr>
<tr><td colspan="4">Reserved = [000]</td><td colspan="4">Band Class n = [00000-11111]</td><td>k</td></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 MS Protocol Level = [00H-FFH]</td><td>k+2</td></tr>
<tr><td colspan="9">***} Mobile Band Class Capability Entry***</td></tr>
<tr><td colspan="8">**-- Continued on next page --**</td><td></td></tr>
</table>

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⇒ **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
	(LSB)	Sector = [0H-FH] (0H = Omni)			j+1
} OR IF (Discriminator = 07H), Cell Identification {1+:					
(MSB)					j
MSCID = <any value>					j+1
	(LSB)				j+2
(MSB)	Cell = [001H-FFFH]				j+3
	(LSB)	Sector = [0H-FH] (0H = Omni)			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> (see footnote e above)					2
Hard Handoff = [1]	Number of Channels to Add = [001]	Frame Offset = [0H-FH]			3
(see footnote e above) {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
}(see footnote e above)					
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⇒ **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+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)			4
ESN = <any value>			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 {1+:			
IF (Discriminator = 02H), Cell Identification {1:			
(MSB)	Cell = [001H-FFFH]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:			
(MSB)			j
MSCID = <any value>			j+1
		(LSB)	j+2
(MSB)	Cell = [001H-FFFH]		j+3
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+4
} Cell Identification			
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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			
⇒ **Service Option:** A1 Element Identifier = [03H]			1
(MSB)	Service Option		2
	= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 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), 0025H (ISDN Interworking Service)]	(LSB)	3
-- Continued on next page --			

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⇒ **CDMA Serving One Way Delay:** A1 Element Identifier = [0CH]			1
Length = [06H,09H]			2
Cell Identification Discriminator = [02H,07H]			3
IF (Discriminator = 02H), Cell Identification {1:			
(MSB)	Cell = [001H-FFFH]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:			
(MSB)			j
MSCID = <any value>			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
⇒ ***IS-95*** **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
-- Continued on next page --			

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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
Reserved = [0]	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
} Channel Information					
⇒ **Quality of Service Parameters:** A1 Element Identifier = [07H]					1
Length = [01H]					2
Reserved = [0000]		Non-Assured Mode Packet Priority = [0000 – 1101]			3
-- Continued on next page --					

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⇒ ***IS-2000*** **Mobile Capabilities:** A1 Element Identifier = [11H]								1
Length = <variable>								2
Reserved = [00]		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
-- Continued on next page --								

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⇒ ***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
⇒ **Serving PDSN IP Address: A1 Element Identifier = [14H]**								1
Length = [04H]								2
(MSB)								3
Serving PDSN IP Address = <any value>								4
								5
							(LSB)	6
⇒ **Protocol Type:** A1 Element Identifier = [18H]								1
Length = [02H]								2
(MSB)	Protocol Type = [88 0BH, 8881H] (PPP, Unstructured Byte Stream)							3
							(LSB)	4
⇒ **Source RNC to Target RNC Transparent Container:** A1 Element Identifier = [39H]								1
Length = [01H – FFH]								2
(MSB)								3
Container = <any value>								…
							(LSB)	k
⇒ **Slot Cycle Index:** A1 Element Identifier = [35H]								1
Reserved = [00000]					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
-- Continued on next page --								

<table>
<tr><td colspan="4">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="4">⇒ Service Option List: A1 Element Identifier = [2AH]</td><td>1</td></tr>
<tr><td colspan="4">Length = <variable></td><td>2</td></tr>
<tr><td colspan="4">Number of Service Options = [01H-02H]</td><td>3</td></tr>
<tr><td colspan="5">Service Option Connection {1..2:</td></tr>
<tr><td colspan="3">Reserved = [0000 0]</td><td>Service Option Connection Identifier = [001 - 110]</td><td>i</td></tr>
<tr><td>(MSB)</td><td colspan="3">Service Option</td><td>i+1</td></tr>
<tr><td colspan="3">= [8000H (13K speech),
0011H (13K high rate voice service),
0003H (EVRC),
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),
0022H (Test Data),
0036H (IS-2000 Markov),
0037H (IS-2000 Loopback)]</td><td>(LSB)</td><td>i+2</td></tr>
<tr><td colspan="5">} Service Option Connection</td></tr>
<tr><td colspan="4">⇒ IS-2000 Channel Identity 3X: A1 Element Identifier = [27H]</td><td>1</td></tr>
<tr><td colspan="4">Length = <variable></td><td>2</td></tr>
<tr><td>OTD = [0] (Ignored)</td><td>Physical Channel Count = [001, 010]</td><td colspan="2">Frame Offset = [0H-FH]</td><td>3</td></tr>
<tr><td colspan="4">-- Continued on next page --</td><td></td></tr>
</table>

<table>
<tr><td colspan="6">-- Continued from previous page --</td></tr>
<tr><td colspan="6">The following 10 octets are repeated once for each physical channel {1..2:</td></tr>
<tr><td colspan="5">Physical Channel Type =
[01H (Fundamental Channel – FCH – IS-2000),
02H (Dedicated Control Channel – DCCH – IS-2000)]]</td><td>n</td></tr>
<tr><td>Reserved = [0]</td><td>Pilot Gating Rate = [00, 01, 10]</td><td colspan="2">QOF Mask = <any value> (Ignored)</td><td>Walsh Code Channel Index (high part) = <any value> (Ignored)</td><td>n+1</td></tr>
<tr><td colspan="5">Walsh Code Channel Index (low part) = <any value> (Ignored)</td><td>n+2</td></tr>
<tr><td colspan="5">Pilot PN Code (low part) = <any value> (Ignored)</td><td>n+3</td></tr>
<tr><td>Pilot PN Code (high part)
= <any value> (Ignored)</td><td>Reserved = [00]</td><td>Power Combined = [0]</td><td>Freq. included
= [1]</td><td>ARFCN (high part)
= [000-111]</td><td>n+4</td></tr>
<tr><td colspan="5">ARFCN (low part) = [00H-FFH]</td><td>n+5</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td colspan="2">Lower QOF Mask = <any value> (Ignored)</td><td>Lower Walsh Code Channel Index (high part) = <any value> (Ignored)</td><td>n+6</td></tr>
<tr><td colspan="5">Lower Walsh Code Channel Index (low part) = <any value> (Ignored)</td><td>n+7</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td colspan="2">Upper QOF Mask = <any value> (Ignored)</td><td>Upper Walsh Code Channel Index (high part) = <any value> (Ignored)</td><td>n+8</td></tr>
<tr><td colspan="5">Upper Walsh Code Channel Index (low part) = <any value> (Ignored)</td><td>n+9</td></tr>
<tr><td colspan="6">} Channel Information</td></tr>
<tr><td colspan="5">⇒ Anchor PDSN IP Address: A1 Element Identifier = [30H]</td><td>1</td></tr>
<tr><td colspan="5">Length = [04H]</td><td>2</td></tr>
<tr><td>MSB</td><td colspan="4"></td><td>3</td></tr>
<tr><td colspan="5">Anchor PDSN IP Address = <any value></td><td>4</td></tr>
<tr><td colspan="5"></td><td>5</td></tr>
<tr><td colspan="4"></td><td>LSB</td><td>6</td></tr>
</table>

4.4.3 Handoff Request Acknowledge

This BSMAP message is sent from the 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	5.2.4	BS -> MSC	M	
IS-95 Channel Identity	5.2.9	BS -> MSC	O[a]	C
Cell Identifier List	5.2.18	BS -> MSC	O[b]	R
Extended Handoff Direction Parameters	5.2.60	BS -> MSC	O[f]	C
Hard Handoff Parameters	5.2.51	BS -> MSC	O[f,k]	C
IS-2000 Channel Identity	5.2.27	BS -> MSC	O[c,f]	C
IS-2000 Service Configuration Record	5.2.55	BS -> MSC	O[d,f]	C
IS-2000 Non-Negotiable Service Configuration Record	5.2.56	BS -> MSC	O[e,f]	C
Target RNC to Source RNC Transparent Container	5.2.76	BS -> MSC	O[g]	C
Service Option List	5.2.78	BS -> MSC	O[h]	C
Cause	5.2.16	BS -> MSC	O[i]	C
IS-2000 Channel Identity 3X	5.2.23	BS -> MSC	O[f,j]	C

a. 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 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 setup by the target BS.

c. Included if the air interface channel allocated by the target is *TIA/EIA/IS-2000*. It lists the *TIA/EIA/IS-2000* 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 wishes to indicate a desired configuration different from that currently being used at the source BS.

e. This element contains the *TIA/EIA/IS-2000* 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 wishes to provide the source BS with non-negotiable service configuration parameter values that may be sent to the mobile station. 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 mobile station.

f. These elements shall only be included when the target BS will be operating in MC-41 mode or in TIA/EIA/IS-95-B mode for this call.

g. This element is only included when the target RNC is operating in DS-41 mode.

h. This element is used when the partial successful service transfer condition occurs. In this case, this element has only service option successfully transferred.

i. This element is used to indicate the reason for the occurrence of the partial successful service transfer condition. In this case, this element is associated with the failed service option connection.

j. Included if the air interface channel allocated by the target is *TIA/EIA/IS-2000* 3X. It lists the *TIA/EIA/IS-2000* 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.

The following table shows the bitmap layout for the Handoff Request Acknowledge message.

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
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+1
} OR IF (Discriminator = 07H), Cell Identification {1..6:								
(MSB)								j
MSCID = <any value>								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+4
} Cell Identification								
-- Continued on next page --								

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⇒ **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
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 = [0000]			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
Reserved = [000]	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

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<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="8">⇒ IS-2000 Channel Identity: A1 Element Identifier = [09H]</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 6 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>Reserved = [0]</td><td colspan="2">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="9">} Channel Information</td></tr>
<tr><td colspan="8">⇒ IS-2000 Service Configuration Record: A1 Element Identifier = [0EH]</td><td>1</td></tr>
<tr><td colspan="8">Bit-Exact Length – Octet Count = [00H to FFH]</td><td>2</td></tr>
<tr><td colspan="5">Reserved = [0000 0]</td><td colspan="3">Bit-Exact Length – Fill Bits = [000 to 111]</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>4</td></tr>
<tr><td colspan="8">IS-2000 Service Configuration Record 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">-- Continued on next page --</td><td></td></tr>
</table>

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⇒ ***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
⇒ **Target RNC to Source RNC Transparent Container:** A1 Element Identifier = [3AH]								1
Length = [01H – FFH]								2
(MSB)								3
Container = <any value>								…
							(LSB)	k
⇒ **Service Option List:** A1 Element Identifier = [2AH]								1
Length = <variable>								2
Number of Service Options = [01H-02H]								3
-- Continued on next page --								

-- Continued from previous page --			
Service Option Connection {1..2:			
Reserved = [0000 0]		Service Option Connection Identifier = [001 - 110]	i
(MSB)	Service Option		i+1
= [8000H (13K speech), 0011H (13K high rate voice service), 0003H (EVRC), 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), 0022H (Test Data), 0036H (*IS-2000* Markov), 0037H (*IS-2000* Loopback)]		(LSB)	i+2
} Service Option Connection			
-- Continued on next page --			

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					Octet
⇒ **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), 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 timeout)]				3
⇒ ***IS-2000* Channel Identity 3X:** A1 Element Identifier = [27H]					1
Length = <variable>					2
OTD= [0,1]	Physical Channel Count = [001, 010]	Frame Offset = [0H-FH]			3
The following 10 octets are included once for each physical channel in each cell listed in the Cell Identifier List {1..12:					
Physical Channel Type = [01H (Fundamental Channel – FCH – *IS-2000*), 02H (Dedicated Control Channel – DCCH – *IS-2000*)]					n
Reserved = [0]	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

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ARFCN (low part) = [00H-FFH]			n+5
Reserved = [000]	Lower QOF Mask = [00,01,10,11]	Lower Walsh Code Channel Index (high part) = <any value>	n+6
Lower Walsh Code Channel Index (low part) = <any value>			n+7
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			

4.4.4 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	5.2.4	BS -> MSC	M
Cause	5.2.16	BS -> MSC	M[a]

a. Allowable Values: Alternate signaling type reject; Handoff procedure time-out; OAM&P intervention; Equipment failure; No radio resource available; BS not equipped; Requested transcoding/rate adaptation unavailable; Requested terrestrial resource unavailable; Reversion to old channel; Radio interface failure; Mobile station not equipped (or incapable); Terrestrial circuit already allocated.

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

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 timeout)]							3

4.4.5 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	5.2.4	MSC -> BS	M	
RF Channel Identity	5.2.7	MSC -> BS	O[a]	C
IS-95 Channel Identity	5.2.9	MSC -> BS	O[b]	C
Cell Identifier List	5.2.18	MSC -> BS	O[i]	C
Handoff Power Level	5.2.25	MSC -> BS	O[a,j]	C
SID	5.2.8	MSC -> BS	O[a,d]	C
Extended Handoff Direction Parameters	5.2.60	MSC -> BS	O[c,e,j]	C
Hard Handoff Parameters	5.2.51	MSC -> BS	O [c,j,o]	C
IS-2000 Channel Identity	5.2.27	MSC -> BS	O[f,j]	C
IS-2000 Service Configuration Record	5.2.55	MSC -> BS	O[g,j]	C
IS-2000 Non-negotiable Service Configuration Record	5.2.56	MSC -> BS	O[h,j]	C
Target RNC to Source RNC Transparent Container	5.2.76	MSC -> BS	O[k]	C
Service Option List	5.2.78	MSC -> BS	O[l]	C
Cause	5.2.16	MSC -> BS	O[m]	C
AMPS Hard Handoff Parameters	5.2.79	MSC -> BS	O[a]	C
IS-2000 Channel Identity 3X	5.2.23	MSC -> BS	O[j,n]	C

a. Included if the air interface channel allocated by the target is *TIA/EIA-553*.

b. 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 is present.

c. Included if the air interface channel allocated by the target is *TIA/EIA/IS-95-B* or *TIA/EIA/IS-2000*.

d. This element is only provided for TIA/EIA-553 handoffs. In the event that an *TIA/EIA/IS-2000* channel cannot be allocated but an TIA/EIA-553 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

   Since *TIA/EIA-41-D* only supports Search Window A, for inter-MSC handoffs, the source BS shall ignore all fields of the Extended Handoff Direction Parameters element, except for Search Window A.

f. Included if the air interface channel allocated by the target is *TIA/EIA/IS-2000*. It lists the *TIA/EIA/IS-2000* 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 *TIA/EIA/IS-2000* 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 wishes to provide the source BS with non-negotiable service configuration parameter values that may be sent to the mobile station. 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 mobile station.

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 shall only be included when the target BS will be operating in MC-41 mode or in *TIA/EIA/IS-95-B* mode for this call.

k. This element is only included when the target BS is operating in DS-41 mode.

l. This element is used when the partial successful service transfer condition occurs. In this case, this element has only service option successfully transferred.

m. This element is used to indicate the reason for the occurrence of the partial successful service transfer condition. In this case, this element is associated with the failed service option connection.

n. Included if the air interface channel allocated by the target is *TIA/EIA/IS-2000* 3X. It lists the *TIA/EIA/IS-2000* 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.

The coding of the Handoff Command for **CDMA – CDMA** and **DS-41** hard handoff is as follows.

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
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+1
} OR IF (Discriminator = 07H), Cell Identification {1..6:								
(MSB)								j
MSCID = <any value>								j+1
							(LSB)	j+2
(MSB)	Cell = [001H-FFFH]							j+3
			(LSB)	Sector = [0H-FH] (0H = Omni)				j+4
} Cell Identification								
-- Continued on next page --								

<table>
<tr><td colspan="6">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="6">⇒ SID: A1 Element Identifier = [32H]</td><td>1</td></tr>
<tr><td>Reserved = [0]</td><td>(MSB)</td><td colspan="4">SID (high order) = [000-111]</td><td>2</td></tr>
<tr><td colspan="5">SID (low order) = [00H-FFH]</td><td>(LSB)</td><td>3</td></tr>
<tr><td colspan="6">⇒ Extended Handoff Direction Parameters: A1 Element Identifier = [10H]</td><td>1</td></tr>
<tr><td colspan="6">Length = [09H]</td><td>2</td></tr>
<tr><td colspan="3">Search Window A Size (Srch_Win_A) = [0H-FH]</td><td colspan="3">Search Window N Size (Srch_Win_N) (Ignored)</td><td>3</td></tr>
<tr><td colspan="3">Search Window R Size (Srch_Win_R) (Ignored)</td><td colspan="3">Add Pilot Threshold (T_Add) high order (Ignored)</td><td>4</td></tr>
<tr><td colspan="2">T_Add (low order) (Ignored)</td><td colspan="4">Drop Pilot Threshold (T_Drop) (Ignored)</td><td>5</td></tr>
<tr><td colspan="3">Compare Threshold (T_Comp) (Ignored)</td><td colspan="3">Drop Timer Value (T_TDrop) (Ignored)</td><td>6</td></tr>
<tr><td colspan="3">Neighbor Max Age (Nghbor_Max_AGE) (Ignored)</td><td colspan="3">Reserved = [0000]</td><td>7</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="4">SOFT_SLOPE = [00 0000 - 11 1111]</td><td>8</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="4">ADD_INTERCEPT = [00 0000 - 11 1111]</td><td>9</td></tr>
<tr><td colspan="2">Reserved = [00]</td><td colspan="4">DROP_INTERCEPT = [00 0000 - 11 1111]</td><td>10</td></tr>
<tr><td colspan="6">Target BS P_REV = [00H – FFH]</td><td>11</td></tr>
<tr><td colspan="6">⇒ Hard Handoff Parameters: A1 Element Identifier = [16H]</td><td>1</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td colspan="4">Band Class = [00000-11111]</td><td>2</td></tr>
<tr><td colspan="2">Number of Preamble Frames = [000-111]</td><td>Reset L2 = [1]</td><td>Reset FPC = [1]</td><td>Encryption Mode = [00,01]</td><td>Private LCM = [0,1]</td><td>3</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td>Nom_Pwr_Ext = [0,1]</td><td colspan="3">Nom_Pwr = [0000-1111]</td><td>4</td></tr>
<tr><td>Reserved = [00]</td><td colspan="4">FPC Subchannel Information = <any value></td><td>FPC SubChan Info Included = [0,1]</td><td>5</td></tr>
<tr><td colspan="3">Reserved = [0000]</td><td colspan="2">Power Control Step = <any value></td><td>Power Control Step Included = [0,1]</td><td>6</td></tr>
<tr><td colspan="6">-- Continued on next page --</td><td></td></tr>
</table>

<table>
<tr><td colspan="8">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="8">⇒ IS-2000 Channel Identity: A1 Element Identifier = [09H]</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 6 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>Reserved = [0]</td><td colspan="2">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="9">} Channel Information</td></tr>
<tr><td colspan="8">⇒ IS-2000 Service Configuration Record: A1 Element Identifier = [0EH]</td><td>1</td></tr>
<tr><td colspan="8">Bit-Exact Length – Octet Count
= [00H to FFH]</td><td>2</td></tr>
<tr><td colspan="5">Reserved
= [0000 0]</td><td colspan="3">Bit-Exact Length – Fill Bits
= [000 to 111]</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>4</td></tr>
<tr><td colspan="8">IS-2000 Service Configuration Record 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">-- Continued on next page --</td><td></td></tr>
</table>

-- Continued from previous page --								
⇒ ***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
⇒ **Target RNC to Source RNC Transparent Container:** A1 Element Identifier = [3AH]								1
Length = [01H – FFH]								2
(MSB)								3
Container = <any value>								…
							(LSB)	k
⇒ **Service Option List:** A1 Element Identifier = [2AH]								1
Length = <variable>								2
Number of Service Options = [01H-02H]								3
-- Continued on next page --								

<table>
<tr><td colspan="4">-- Continued from previous page --</td><td></td></tr>
<tr><td colspan="5">Service Option Connection {1..2:</td></tr>
<tr><td colspan="2">Reserved = [0000 0]</td><td colspan="2">Service Option Connection Identifier = [001 - 110]</td><td>i</td></tr>
<tr><td>(MSB)</td><td colspan="3">Service Option</td><td>i+1</td></tr>
<tr><td colspan="3">= [8000H (13K speech),
0011H (13K high rate voice service),
0003H (EVRC),
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),
0016H (High Speed Packet Data Service),
0017H (High Speed Packet Data Service),
0018H (High Speed Packet Data Service),
0019H (High Speed Packet Data Service),
0021H (3G High Speed Packet Data),
0012H (OTAPA Rate Set 1),
0013H (OTAPA Rate Set 2),
0022H (Test Data),
0036H (IS-2000 Markov),
0037H (IS-2000 Loopback)]</td><td>(LSB)</td><td>i+2</td></tr>
<tr><td colspan="5">} Service Option Connection</td></tr>
<tr><td colspan="4">-- Continued on next page --</td><td></td></tr>
</table>

-- Continued from previous page --			
⇒ **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), 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 timeout)]		3
⇒ ***IS-2000* Channel Identity 3X:** A1 Element Identifier = [27H]			1
Length = <variable>			2
OTD = [0,1]	Physical Channel Count = [001 - 010]	Frame Offset = [0H-FH]	3
-- Continued on next page --			

<table>
<tr><th colspan="5">-- Continued from previous page --</th><th></th></tr>
<tr><td colspan="6">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="5">Physical Channel Type =
[01H (Fundamental Channel – FCH – IS-2000),
02H (Dedicated Control Channel – DCCH – IS-2000)]</td><td>n</td></tr>
<tr><td>Reserved = [0]</td><td>Pilot Gating Rate = [00, 01, 10]</td><td colspan="2">QOF Mask = [00,01,10,11]</td><td>Walsh Code Channel Index (high part) = <any value></td><td>n+1</td></tr>
<tr><td colspan="5">Walsh Code Channel Index (low part) = <any value></td><td>n+2</td></tr>
<tr><td colspan="5">Pilot PN Code (low part) = <any value></td><td>n+3</td></tr>
<tr><td>Pilot PN Code (high part)
= [0,1]</td><td>Reserved = [00]</td><td>Power Combined = [0,1]</td><td>Freq. included
= [1]</td><td>ARFCN (high part)
= [000-111]</td><td>n+4</td></tr>
<tr><td colspan="5">ARFCN (low part) = [00H-FFH]</td><td>n+5</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td colspan="2">Lower QOF Mask = [00,01,10,11]</td><td>Lower Walsh Code Channel Index (high part) = <any value></td><td>n+6</td></tr>
<tr><td colspan="5">Lower Walsh Code Channel Index (low part) = <any value></td><td>n+7</td></tr>
<tr><td colspan="2">Reserved = [000]</td><td colspan="2">Upper QOF Mask = [00,01,10,11]</td><td>Upper Walsh Code Channel Index (high part) = <any value></td><td>n+8</td></tr>
<tr><td colspan="5">Upper Walsh Code Channel Index (low part) = <any value></td><td>n+9</td></tr>
<tr><td colspan="6">} Channel Information</td></tr>
</table>

The coding of the Handoff Command for **CDMA – AMPS** hard handoff is as follows.

<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 = [13H]</td><td>1</td></tr>
<tr><td colspan="8">⇒ RF Channel Identity: A1 Element Identifier = [21H]</td><td>1</td></tr>
<tr><td colspan="8">Color Code = [00H-FFH]</td><td>2</td></tr>
<tr><td colspan="6">Reserved = [0000 00]</td><td>N-AMPS
= [0,1]</td><td>TIA/EIA-553
= [0,1]</td><td>3</td></tr>
<tr><td colspan="6">Reserved = [000000]</td><td colspan="2">Timeslot Number
= [00-11]</td><td>4</td></tr>
<tr><td colspan="5">Reserved = [00000]</td><td colspan="3">ARFCN (high part) = [000-111]</td><td>5</td></tr>
<tr><td colspan="8">ARFCN (low part) = [00H-FFH]</td><td>6</td></tr>
<tr><td colspan="8">⇒ Handoff Power Level: A1 Element Identifier = [26H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [06H]</td><td>2</td></tr>
<tr><td colspan="8">Number of Cells = [01H]</td><td>3</td></tr>
<tr><td>Reserved
= [0]</td><td colspan="2">ID Type = [00,01,10]
(Discriminator 1,7,8)</td><td colspan="5">Handoff Power Level = [00000-11111]</td><td>4</td></tr>
<tr><td>(MSB)</td><td colspan="7">LAC = [0001H-FFFFH]</td><td>5</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>6</td></tr>
<tr><td>(MSB)</td><td colspan="7">Cell = [001H-FFFH]</td><td>7</td></tr>
<tr><td colspan="3"></td><td>(LSB)</td><td colspan="4">Sector = [0H-FH] (0H = Omni)</td><td>8</td></tr>
<tr><td colspan="8">⇒ SID: A1 Element Identifier = [32H]</td><td>1</td></tr>
<tr><td>Reserved
= [0]</td><td>(MSB)</td><td colspan="6">SID (high order) = [000-111]</td><td>2</td></tr>
<tr><td colspan="7">SID (low order) = [00H-FFH]</td><td>(LSB)</td><td>3</td></tr>
<tr><td colspan="8">⇒ AMPS Hard Handoff Parameters: A1 Element Identifier = [25H]</td><td>1</td></tr>
<tr><td colspan="8">Length = [01H]</td><td>2</td></tr>
<tr><td colspan="6">Reserved = [0000 00]</td><td colspan="2">Encryption Mode = [00, 01]</td><td>3</td></tr>
<tr><td colspan="8">-- Continued on next page --</td><td></td></tr>
</table>

4.4.6 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	5.2.4	MSC -> BS	M
Cause	5.2.16	MSC -> BS	M[a]

a. Allowable Cause Values: OAM&P Intervention; Equipment failure; No radio resource available; Requested terrestrial resource unavailable; Requested transcoding/rate adaptation unavailable; Handoff blocked; Handoff procedure timeout, BS not equipped.

The following table shows the bitmap layout for the Handoff Required Reject message.

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 timeout)]							3

4.4.7 Handoff Commenced

This BSMAP message is used for *TIA/EIA/IS-2000* hard handoffs. It is sent by the source BS to the MSC to indicate that the handoff command has been sent to the mobile station, and that an acknowledgment has been received from the mobile station. For *TIA/EIA/IS-2000*, if the handoff command is sent using quick repeats, the source BS may not request an acknowledgment from the mobile. In this case, the source BS will send the Handoff Commenced after all the quick repeats have been transmitted to the mobile station.

Information Element	Section Reference	Element Direction	Type
Message Type	5.2.4	BS -> MSC	M

The following table shows the bitmap layout for the Handoff Commenced message.

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [01H]								2
⇒ **Message Type** = [15H]								1

4.4.8 Handoff Complete

This BSMAP message is sent from the target BS to the MSC to inform the MSC that the mobile station has arrived on the new channel and has completed all (if any) required connection procedures.

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	BS -> MSC	M	
Service Option	5.2.53	BS -> MSC	O[a]	C

a. This information element is included only during intergeneration handoff.

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [01H]								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

4.4.9 Handoff Performed

This BSMAP message is sent from the BS to the MSC in order to indicate that the BS has performed an internal handoff. 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	5.2.4	BS -> MSC	M	
Cause	5.2.16	BS -> MSC	M[a]	
Cell Identifier List	5.2.18	BS -> MSC	O[b]	R

a. Allowable cause values are: Uplink quality, Uplink strength, Downlink quality, Downlink strength, Distance, Interference, Better cell (i.e., Power budget), OAM&P intervention. For *TIA/EIA/IS-2000* soft handoff procedures: Inter-BS soft handoff drop target; Intra-BS soft handoff drop target.

b. The MSC shall consider the first cell in the Cell Identifier List to be the "designated cell."

The following table shows the bitmap layout for the Handoff Performed message.

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
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
-- Continued on next page --								

-- Continued from previous page --				
⇒ **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
		(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H)), Cell Identification {1..6:				
(MSB)				j
MSCID = <any value>				j+1
			(LSB)	j+2
(MSB)	Cell = [001H-FFFH]			j+3
		(LSB)	Sector = [0H-FH] (0H = Omni)	j+4
} Cell Identification				

4.5 Facility Management Message Formats

4.5.1 Block

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

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	5.2.4	BS -> MSC	M	
Circuit Identity Code	5.2.19	BS -> MSC	M	
Cause	5.2.16	BS -> MSC	M[a]	
Circuit Group	5.2.70	BS -> MSC	O[b]	C

a. This cause value applies to all circuits identified in this message. Allowable cause values: OAM&P intervention, Equipment failure, No radio resource available.

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.

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
(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
								…
							(correspto value in First CIC field)	k

4.5.2 Block Acknowledge

The 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	5.2.4	MSC -> BS	M
Circuit Identity Code	5.2.19	MSC -> 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.

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [41H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3

4.5.3 Unblock

This BSMAP message is sent from the BS to the MSC to indicate that one or more terrestrial resources may be returned to service at the MSC, and can therefore be used for traffic.

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	5.2.4	BS -> MSC	M	
Circuit Identity Code	5.2.19	BS -> MSC	M	
Circuit Group	5.2.70	BS -> MSC	O[a,b]	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.

b. 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 Unblock message.

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
-- Continued on next page --								

-- Continued from previous page --								
⇒ **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
								…
							(correspto value in First CIC field)	k

4.5.4 Unblock Acknowledge

The 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	5.2.4	MSC -> BS	M
Circuit Identity Code	5.2.19	MSC -> BS	M

The following table shows the bitmap layout for the Unblock Acknowledge message.

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [43H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3

4.5.5 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	5.2.4	BS <-> MSC	M	
Cause	5.2.16	BS <-> MSC	M[a]	
Software Version	5.2.52	BS <-> MSC	O	R

a. Allowable cause values: OAM&P intervention, Equipment failure.

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

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								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) = [04H]								3
IOS Minor Revision Level (Y) = [02H]								4
IOS Point Release Level (Z) = [00H]								5
Manufacturer/Carrier Software Information = <printable ASCII character>								6
…								…
Manufacturer/Carrier Software Information = <printable ASCII character>								n

4.5.6 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	5.2.4	BS <-> MSC	M	
Software Version	5.2.52	BS <-> MSC	O[a]	R

a. This element shall not be sent to an entity implemented to a prior version of this specification.

The following table shows the bitmap layout for the Reset Acknowledge message.

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [01H]								2
⇒ **Message Type** = [31H]								1
⇒ **Software Version:** A1 Element Identifier = [31H]								1
Length = <variable>								2
IOS Major Revision Level (X) = [04H]								3
IOS Minor Revision Level (Y) = [02H]								4
IOS Point Release Level (Z) = [00H]								5
Manufacturer/Carrier Software Information = <printable ASCII character>								6
…								…
Manufacturer/Carrier Software Information = <printable ASCII character>								n

4.5.7 Reset Circuit

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 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	5.2.4	BS <-> MSC	M	
Circuit Identity Code	5.2.19	BS <-> MSC	M	
Cause	5.2.16	BS <-> MSC	M[a]	
Circuit Group	5.2.70	BS <-> MSC	O[b,c]	C

a. This cause value applies to all circuits identified in this message. Allowable cause values: OAM&P intervention, Call Processing, Equipment failure.

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.

<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>
<tr><td>(MSB)</td><td colspan="7">First CIC: PCM Multiplexer = <any value></td><td>5</td></tr>
<tr><td colspan="2"></td><td>(LSB)</td><td colspan="5">Timeslot = [00000-11111]</td><td>6</td></tr>
<tr><td>(first unused bit - if any)</td><td>(second unused bit - if any)</td><td>(third unused bit - if any)</td><td>(fourth unused bit - if any)</td><td>(fifth unused bit - if any)</td><td>(sixth unused bit - if any)</td><td>(seventh unused bit - if any)</td><td></td><td>7</td></tr>
<tr><td colspan="8">Circuit Bitmap = <any value></td><td>8</td></tr>
<tr><td colspan="8"></td><td>…</td></tr>
<tr><td colspan="7"></td><td>(corresp to value in First CIC field)</td><td>k</td></tr>
</table>

4.5.8 Reset Circuit 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 any possible calls using the specified circuits (i.e., the circuits are idled).

Information Element	Section Reference	Element Direction	Type
Message Type	5.2.4	BS <-> MSC	M
Circuit Identity Code	5.2.19	BS <-> MSC	M

The following table shows the bitmap layout for the Reset Circuit Acknowledge message.

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [35H]								1
⇒ **Circuit Identity Code:** A1 Element Identifier = [01H]								1
(MSB)	PCM Multiplexer = <any value>							2
		(LSB)	Timeslot = [00000-11111]					3

4.5.9 Transcoder Control Request

This BSMAP message is sent from the MSC to the BS to change the state of the inband signaling mechanism at the BS. A "disable" directive will also result in the BS reverting to tandem vocoding mode if already in tandem free mode.

Information Element	Section Reference	Element Direction	Type
Message Type	5.2.4	MSC->BS	M
Transcoder Mode	5.2.47	MSC->BS	M

The following table shows the bitmap layout for the Transcoder Control Request message.

7	6	5	4	3	2	1	0	Octet
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								2
⇒ **Message Type** = [38H]								1
⇒ **Transcoder Mode:** A1 Element Identifier = [36H]								1
Length = [01H]								2
Reserved = [0000 000]							TFO Mode =[0,1]	3

4.5.10 Transcoder Control Acknowledge

This BSMAP message is sent from the BS to the MSC to acknowledge whether tandem free operation was successfully enabled or disabled in response to the MSC's mode setting request.

Information Element	Section Reference	Element Direction	Type
Message Type	5.2.4	BS->MSC	M
Cause	5.2.16	BS->MSC	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 MSC). If the element is present, its only allowable value is TFO Control Request Failed. This value is used when the MSC directive received in the Transcoder Control Request could not be honored.

The following table shows the bitmap layout for the Transcoder Control Request message.

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

4.6 Application Data Delivery Service (ADDS) Message Formats

4.6.1 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	5.2.4	MSC -> BS	M	
Mobile Identity (IMSI/Broadcast Address)	5.2.13	MSC -> BS	M[a]	
ADDS User Part	5.2.54	MSC -> BS	M[b]	
Tag	5.2.50	MSC -> BS	O[c]	C
Cell Identifier List	5.2.18	MSC -> BS	O[d]	C
Slot Cycle Index	5.2.14	MSC -> BS	O[e,f]	C
IS-2000 Mobile Capabilities	5.2.57	MSC -> BS	O[f]	C

a. This element will contain IMSI or Broadcast Address.

b. 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. In the case of the Short Message Service, the ADDS User Part contains an application type field indicating "Short Message Service." In the case of the Position Location Data, the ADDS User Part contains an application type field indicating "Position Location Data." In the case of the Short Data Burst, the ADDS User Part contains an application type field indicating "Short Data Burst."

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 information element is absent, the BS shall attempt delivery in all cells controlled by the BS.

e. This optional element is included where slotted paging is performed on *TIA/EIA/IS-2000* paging channels. It is used by the BS to compute the correct paging channel slot on each paging channel. In *TIA/EIA/IS-2000* 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.

The following table shows the bitmap layout for the ADDS Page message.

<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 = [65H]</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="9">IF (Type of Identity in octet 3 = ‘110’), Mobile Identity {1:</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)</td><td colspan="4">Identity Digit N+2 = [0H-9H] (BCD)</td><td>n+1</td></tr>
<tr><td colspan="9">} OR IF (Type of Identity in octet 3 = ‘010’), Mobile Identity {1:</td></tr>
<tr><td colspan="5">Reserved = [0000 0]</td><td colspan="3">Type of Identity =
[010 Broadcast Identifier]</td><td>3</td></tr>
<tr><td colspan="2">Priority = [00 – 11]</td><td colspan="6">Message ID = [00 0000 – 11 1111]</td><td>4</td></tr>
<tr><td colspan="8">Zone ID = [00H – FFH]</td><td>5</td></tr>
<tr><td>(MSB)</td><td colspan="7">Service = [0000H – FFFFH]</td><td>6</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>7</td></tr>
<tr><td colspan="8">Language = [00H – FFH]</td><td>8</td></tr>
<tr><td colspan="9">} Mobile Identity</td></tr>
<tr><td colspan="8">⇒ ADDS User Part: A1 Element Identifier = [3DH]</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="6">Data Burst Type =
[03H (SMS),
04H (OTA),
05H (PLD),
06H (Short Data Burst)]</td><td>3</td></tr>
<tr><td>(MSB)</td><td colspan="7">Application Data Message = <any value></td><td>4</td></tr>
<tr><td colspan="8">• • •</td><td>• • •</td></tr>
<tr><td colspan="7"></td><td>(LSB)</td><td>n</td></tr>
<tr><td colspan="8">-- Continued on next page --</td><td></td></tr>
</table>

-- Continued from previous page --							
⇒ **Tag:** A1 Element Identifier = [33H]							1
(MSB)							2
Tag Value = <any value>							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
		(LSB)	Sector = [0H-FH] (0H = Omni)				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 = [00000]				Slot Cycle Index = [000-111]			2
⇒ ***IS-2000* Mobile Capabilities:** A1 Element Identifier = [11H]							1
Length = <variable>							2
Reserved = [00]	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
-- Continued on next page --							

-- Continued from previous page --								
(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

4.6.2 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 a mobile originates a Short Data Burst or requests CCPD Mode from the network.

Information Element	Section Reference	Element Direction	Type	
Message Type	5.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	M	
ADDS User Part	5.2.54	BS -> MSC	M[a]	
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[b]	C
Authentication Response Parameter AUTHR	5.2.38	BS -> MSC	O[c]	C
Authentication Confirmation Parameter RANDC	5.2.35	BS -> MSC	O[d]	C
Authentication Parameter COUNT	5.2.39	BS -> MSC	O[e]	C
Authentication Challenge Parameter RAND	5.2.37	BS -> MSC	O[f]	C
Authentication Event	5.2.65	BS -> MSC	O[g]	C
Cell Identifier	5.2.17	BS -> MSC	O[h]	R
CDMA Serving One Way Delay	5.2.61	BS->MSC	O[i]	C
Authentication Data	5.2.66	BS -> MSC	O[j]	C
Tag	5.2.50	MSC -> BS	O[k]	C

a. Contains the application data information that was received from the MS. In the case of the Short Message Service, the application data information the Short Message. In the case of the Position Location Data, the application data information is the Position Location Data. An application type field in this element is used to distinguish the application, e.g., "Short Message" or "Position Location Data." or "Short Data Burst." In the case of Short Data Burst, the application data message field is not included but the burst type field is included and set to short data burst.

b. The second occurrence of the Mobile Identity element contains the ESN, if it is available at the base station.

c. Included where broadcast authentication is performed, and contains the Authentication Response Parameter, AUTHR, as computed by the MS.

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

e. Included where broadcast authentication is performed, and contains the mobile's call history count for authentication operations.

f. 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 RAND used by the MS in its authentication computation.

g. 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. 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 5.2.17.

i. This IE is included if the data burst type = “PLD” (05H), if applicable to the geo-location technology, and if this technology is supported at the base station.

j. This optional information element is included if the BS determines that authentication should be applied.

k. This optional information element is required when the ADDS user part element data burst type field is set to Short Data Burst and this information element is used to differentiate between multiple short data bursts from the same mobile station.

The following table shows the bitmap layout for the ADDS Transfer message.

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+2 = [0H-9H] (BCD)				n+1
⇒ **ADDS User Part:** A1 Element Identifier = [3DH]								1
Length = <variable>								2
Reserved = [00]		Data Burst Type = [03H (SMS), 04H (OTA), 05H (PLD), 06H (Short Data Burst)]						3
(MSB)	Application Data Message = <any value>							4
• • •								• • •
							(LSB)	n
-- Continued on next page --								

-- Continued from previous page --								
⇒ **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)								4
ESN = <any value>								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
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)								4
RAND = <any value>								5
								6
							(LSB)	7
⇒ **Authentication Event:** A1 Element Identifier = [4AH]								1
Length = [01H]								2
Event = [01H,02H] (Parameters not received, RANDC/RAND mismatch)								3
-- Continued on next page --								

-- Continued from previous page --			
⇒ **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]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} Cell Identification			
⇒ **CDMA Serving One Way Delay: A1 Element Identifier = [0CH]**			1
Length = [06H, 09H]			2
Cell Identification Discriminator = [02H,07H]			3
IF (Discriminator = 02H), Cell Identification {1:			
(MSB)	Cell = [001H-FFFH]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:			
(MSB)			j
MSCID = <any value>			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
⇒ **Authentication Data:** A1 Element Identifier = [59H]			1
Length = [03H]			2
(MSB)			3
Auth-Data = <any value>			4
		(LSB)	5
⇒ **Tag:** A1 Element Identifier = [33H]			1
(MSB)			2
Tag Value = <any value>			3
			4
		(LSB)	5

4.6.3 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	5.2.32	MSC <-> BS	M	
Reserved Octet	5.2.33	MSC <-> BS	M	
Message Type	5.2.4	MSC <-> BS	M	
ADDS User Part	5.2.54	MSC <-> BS	M[a]	
Tag	5.2.50	MSC -> BS	O[b]	C
CDMA Serving One Way Delay	5.2.61	BS->MSC	O[c]	C

a. Contains the application data information that was received from the MS. In the case of the Short Message Service, the application data information is the Short Message. In the case of the Position Location Data, the application data information is the Position Location Data. In the case of the Short Data Burst, the application data information is the Short Data Burst. An application type field in this element is used to distinguish the application, e.g., "Short Message" or "Position Location Data."

b. This element is optional in this message. If used in this message, it shall be returned to the MSC in the ADDS Deliver Ack.

c. This IE is included if the data burst type = "PLD" (05H), if applicable to the geo-location technology, and if this technology is supported at the base station.

The following table shows the bitmap layout for the ADDS Deliver message.

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
-- Continued on next page --								

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⇒ **ADDS User Part:** Length = <variable>			1
Reserved = [00]	Data Burst Type = [03H (SMS), 04H (OTA), 05H (PLD), 06H (Short Data Burst)]		2
(MSB)	Application Data Message = <any value>		3
• • •			• • •
		(LSB)	n
⇒ **Tag:** A1 Element Identifier = [33H]			1
(MSB)			2
Tag Value = <any value>			3
			4
		(LSB)	5
⇒ **CDMA Serving One Way Delay: A1 Element Identifier = [0CH]**			1
Length = [06H, 09H]			2
Cell Identification Discriminator = [02H,07H]			3
IF (Discriminator = 02H), Cell Identification {1:			
(MSB)	Cell = [001H-FFFH]		j
	(LSB)	Sector = [0H-FH] (0H = Omni)	j+1
} OR IF (Discriminator = 07H), Cell Identification {1:			
(MSB)			j
MSCID = <any value>			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

4.6.4 ADDS Page Ack

This BSMAP message is sent from the BS to the MSC to indicate that the BS received a Layer 2 acknowledgment 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	5.2.4	BS -> MSC	M	
Mobile Identity (IMSI/Broadcast Address)	5.2.13	BS -> MSC	M[a]	
Tag	5.2.50	BS -> MSC	O	C
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[b]	C
Cause	5.2.16	BS -> MSC	O[c]	C
Cell Identifier	5.2.17	BS -> MSC	O[d]	C

a. This element will contain an IMSI.

b. The second occurrence of the Mobile Identity element contains the ESN.

c. 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. Allowable cause values are: ADDS message too long for delivery on the paging channel, equipment failure. This element is required if the ESN is received from the MS.

d. 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.

The following table shows the bitmap layout for the ADDS Page Ack message.

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
• • •								• • •
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even 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 0f 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)								2
Tag Value = <any value>								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)								4
ESN = <any value>								5
								6
							(LSB)	7
-- Continued on next page --								

-- Continued from previous page --			
⇒ **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
(MSB)	Cell = [001H-FFFH]		4
	(LSB)	Sector = [0H-FH] (0H = Omni)	5

4.6.5 ADDS Deliver Ack

This DTAP message shall be sent from the BS to the MSC when a Layer 2 acknowledgment from the MS has been received at the BS for an ADDS Deliver message that contains a Tag element.

(Note: If the BS does not receive an acknowledgment after transmitting the CDMA Data Burst message, it shall retransmit the message. The BS shall not exceed a maximum number of re-transmissions, to be selected by the BS manufacturer. When the BS reaches the maximum number of re-transmissions, it shall clear the call.)

Information Element	Section Reference	Element Direction	Type	
Protocol Discriminator	5.2.32	BS -> MSC	M	
Reserved Octet	5.2.33	BS -> MSC	M	
Message Type	5.2.4	BS -> MSC	M	
Tag	5.2.50	BS -> MSC	O	C
Cause	5.2.16	BS -> MSC	O[a]	C

a. Used to indicate an error situation. Allowable cause value: Reject Indication from Mobile Station.

The following table shows the bitmap layout for the ADDS Deliver Ack message.

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
-- Continued on next page --								

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⇒ **Message Type** = [54H]			1
⇒ **Tag:** A1 Element Identifier = [33H]			1
(MSB)			2
Tag Value = <any value>			3
			4
		(LSB)	5
⇒ **Cause:** A1 Element Identifier = [04H]			1
Length = [01H]			2
ext = [0]	Cause Value = [70H (rejection indication from mobile station)]		3

4.6.6 ADDS Transfer Ack

This BSMAP message is sent from the MSC to the BS to indicate the result of the authentication for a mobile which has sent a Short Data Burst or requested CCPD Mode from the network..

Information Element	**Section Reference**	**Element Direction**	**Type**	
Message Type	5.2.4	MSC -> BS	M	
Mobile Identity	5.2.13	MSC -> BS	M	
Tag	5.2.50	MSC -> BS	O[a]	C
Cause	5.2.16	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. Allowable values: Short Data Burst Authentication Failure. If the element is not present in the response, the short data burst authentication was successful.

The following table shows the bitmap layout for the ADDS Transfer Ack message.

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = [04H]								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+2 = [0H-9H] (BCD)				n+1
⇒ **Tag:** A1 Element Identifier = [33H]								1
(MSB)								2
Tag Value = <any value>								3
								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)]							3

4.7 Error Handling Messages

This section contains messages used for general error handling.

4.7.1 Rejection

The Rejection message is used by the BS to indicate to the MSC that the mobile station 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	5.2.32	BS -> MSC	M[a]	
Reserved - Octet	5.2.33	BS -> MSC	M[a]	
Message Type	5.2.4	BS -> MSC	M	
Mobile Identity (IMSI)	5.2.13	BS -> MSC	O[b, c]	C
Mobile Identity (ESN)	5.2.13	BS -> MSC	O[b, d]	C
IS-2000 Cause Value	5.2.64	BS -> MSC	O[e]	R
Service Option Connection Identifier (SOCI)	5.2.77	BS -> MSC	O[f]	C

a. These elements are not used in BSMAP messages and shall be included in DTAP messages.

b. These elements are not used in DTAP messages and shall be included in BSMAP messages.

c. This element shall be set to IMSI.

d. The second occurrence of the Mobile Identity element contains the ESN.

e. Contains the cause indication sent by a mobile station in a Mobile Station Reject Order.

f. This element is required if concurrent services are supported. This is only included when the message is sent as DTAP.

When the Rejection message is sent as a BSMAP message, the following format applies.

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
⇒ **BSMAP Header:** Message Discrimination = [00H]								1
Length Indicator (LI) = <variable>								2
⇒ **Message Type** = [56H]								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+2 = [0H-9H] (BCD)				n+1
-- Continued on next page --								

-- Continued from previous page --			
⇒ **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)			4
ESN = <any value>			5
			6
		(LSB)	7
⇒ ***IS-2000* Cause Value:** A1 Element Identifier = [62H]			1
Length = [01H]			2
IS-2000 Cause Information = <any value>			3

When the Rejection message is sent as a DTAP message, the following format applies.

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

5.0 Information Element Definitions

This section contains the coding of the signaling elements used in the messages defined in Section 4.0.

The definitions in the following subsections are for informational purposes only. 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 4.0.

5.1 Generic Information Element Encoding

5.1.1 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 information element is mandatory or optional is specified in Section 4.0.

All information elements of BSMAP messages shall include their information element identifier (IEI). Mandatory information elements of DTAP messages, except as noted for Type 1 elements (see 5.1.3), shall not include their IEI. Optional information elements of DTAP messages shall include their IEI. Exceptions are explicitly identified in the message definitions. In all other cases of signaling messages on the A1 Interface the Information Element Identifier is included.

All spare and reserved bits are set to 0, unless otherwise indicated.

For future expansion purposes, some of these information elements have fields within them that have been reserved.

5.1.2 Information Element Identifiers

The following tables contain lists of all elements that make up the messages defined in Section 4.0. The tables include the Information Element Identifier (IEI) coding which distinguishes one element from another. The tables also include a section and page reference where the element coding can be found.

Elements used in messages on the A1 interface are contained in Table 5.1.2-1 sorted by name and in Table 5.1.2-2 sorted by identifier value.

Table 5.1.2-1 A1 Information Element Identifiers Sorted by Name

Element Name	Identifier (Hex)	Identifier (Binary)	Reference
Access Network Identifiers	20H	0010 0000	5.2.74
ADDS User Part	3DH	0011 1101	5.2.54
AMPS Hard Handoff Parameters	25H	0010 0101	5.2.79
Anchor PDSN IP Address	30H	0011 0000	5.2.82
Authentication Challenge Parameter	41H	0100 0001	5.2.37
Authentication Confirmation Parameter (RANDC)	28H	0010 1000	5.2.35
Authentication Data	59H	0101 1001	5.2.66
Authentication Event	4AH	0100 1010	5.2.65
Authentication Parameter COUNT	40H	0100 0000	5.2.39
Authentication Response Parameter	42H	0100 0010	5.2.38
Called Party ASCII Number	5BH	0101 1011	5.2.63
Called Party BCD Number	5EH	0101 1110	5.2.44
Calling Party ASCII Number	4BH	0100 1011	5.2.30
Cause	04H	0000 0100	5.2.16
Cause Layer 3	08H	0000 1000	5.2.46
CDMA Serving One Way Delay	0CH	0000 1100	5.2.61
Cell Commitment Info List	65H	0110 0101	6.2.2.195
Cell Identifier	05H	0000 0101	5.2.17
Cell Identifier List	1AH	0001 1010	5.2.18
Channel Number	23H	0010 0011	5.2.5
Channel Type	0BH	0000 1011	5.2.6
Circuit Group	19H	0001 1001	5.2.70
Circuit Identity Code	01H	0000 0001	5.2.19
Circuit Identity Code Extension	24H	0010 0100	5.2.20
Classmark Information Type 2	12H	0001 0010	5.2.12
CM Service Type	9XH[a]	1001 xxxx[a]	5.2.43
Data Link Connection Identifier (DLCI)	none[b]	none[b]	5.2.2
Downlink Radio Environment	29H	0010 1001	5.2.22
Downlink Radio Environment List	2BH	0010-1011	5.2.69
Encryption Information	0AH	0000 1010	5.2.10
Extended Handoff Direction Parameters	10H	0001 0000	5.2.60
Extended Neighbor List	66H	0110 0110	6.2.2.196

Table 5.1.2-1 (Cont.) A1 Information Element Identifiers Sorted by Name

Element Name	Identifier (Hex)	Identifier (Binary)	Reference
Geographic Location	2CH	0010-1100	5.2.68
Special Service Call Indicator	5AH	0101 1010	5.2.21
Handoff Power Level	26H	0010 0110	5.2.25
Hard Handoff Parameters	16H	0001 0110	5.2.51
Information Element Requested	2EH	0010 1110	5.2.81
IS-2000 Channel Identity	09H	0000 1001	5.2.27
IS-2000 Channel Identity 3X	27H	0010 0111	5.2.23
IS-2000 Mobile Capabilities	11H	0001 0001	5.2.57
IS-2000 Non-Negotiable Service Configuration Record	0FH	0000 1111	5.2.56
IS-2000 Service Configuration Record	0EH	0000 1110	5.2.55
IS-2000 Cause Value	62H	0110 0010	5.2.64
IS-95 Channel Identity	22H	0010 0010	5.2.9
IS-95 MS Measured Channel Identity	64H	0110 0100	5.2.29
Layer 3 Information	17H	0001 0111	5.2.31
Message Discrimination	none	none	5.2.1
Message Type	none	none	5.2.4
Message Waiting Indication	38H	0011 1000	5.2.40
Mobile Identity	0DH	0000 1101	5.2.13
MS Information Records	15H	0001 0101	5.2.59
PACA Order	5FH	0101 1111	5.2.72
PACA Reorigination Indicator	60H	0110 000	5.2.73
PACA Timestamp	4EH	0100 1110	5.2.71
Power Down Indicator	A2H	1010 0010	5.2.48
Priority	06H	0000 0110	5.2.15
Protocol Discriminator	none[b]	none[b]	5.2.32
Protocol Type	18H	0001 1000	5.2.58
PSMM Count	2DH	0010-1101	5.2.67
Quality of Service Parameters	07H	0000 0111	5.2.45
Radio Environment and Resources	1DH	0001 1101	5.2.62
Registration Type	1FH	0001 1111	5.2.49
Reject Cause	44H	0100 0100	5.2.36
Reserved - Octet	none[b]	none[b]	5.2.33
Response Request	1BH	0001 1011	5.2.28
RF Channel Identity	21H	0010 0001	5.2.7

Table 5.1.2-1 (Cont.) A1 Information Element Identifiers Sorted by Name

Element Name	**Identifier (Hex)**	**Identifier (Binary)**	**Reference**
Service Option	03H	0000 0011	5.2.53
Service Option Connection Identifier (SOCI)	1EH	0001 1110	5.2.77
Service Option List	2AH	0010-1010	5.2.78
Serving PDSN IP Address	14H	0001 0100	5.2.24
SID	32H	0011 0010	5.2.8
Signal	34H	0011 0100	5.2.42
Slot Cycle Index	35H	0011 0101	5.2.14
Software Version	31H	0011 0001	5.2.52
Source RNC to Target RNC Transparent Container	39H	0011 1001	5.2.75
Tag	33H	0011 0011	5.2.50
Target RNC to Source RNC Transparent Container	3AH	0011 1011	5.2.76
Transcoder Mode	36H	0001 1100	5.2.47
User Zone ID	02H	0000 0010	5.2.26
Voice Privacy Request	A1H	1010 0001	5.2.11

a. This is a type 1 information element (see section 5.1.3). The xxxx (X under the hex identifier column) is data.

b. This is a type 3 information element (see section 5.1.3) that is contained as a mandatory element in a DTAP message.

Table 5.1.2-2 A1 Information Element Identifiers Sorted by Identifier Value

Element Name	**Identifier (Hex)**	**Identifier (Binary)**	**Reference**
Circuit Identity Code	01H	0000 0001	5.2.19
User Zone ID	02H	0000 0010	5.2.26
Service Option	03H	0000 0011	5.2.53
Cause	04H	0000 0100	5.2.16
Cell Identifier	05H	0000 0101	5.2.17
Priority	06H	0000 0110	5.2.15
Quality of Service Parameters	07H	0000 0111	5.2.45
Cause Layer 3	08H	0000 1000	5.2.46
IS-2000 Channel Identity	09H	0000 1001	5.2.27
Encryption Information	0AH	0000 1010	5.2.10
Channel Type	0BH	0000 1011	5.2.6
CDMA Serving One Way Delay	0CH	0000 1100	5.2.61
Mobile Identity	0DH	0000 1101	5.2.13

Table 5.1.2-2 (Cont.) A1 Information Element Identifiers Sorted by Identifier Value

Element Name	Identifier (Hex)	Identifier (Binary)	Reference
IS-2000 Service Configuration Record	0EH	0000 1110	5.2.55
IS-2000 Non-Negotiable Service Configuration Record	0FH	0000 1111	5.2.56
Extended Handoff Direction Parameters	10H	0001 0000	5.2.60
IS-2000 Mobile Capabilities	11H	0001 0001	5.2.57
Classmark Information Type 2	12H	0001 0010	5.2.12
Reserved (This value is used to identify Location Area Identification in [21]).	13H	0001 0011	
Serving PDSN IP Address	14H	0001 0100	5.2.24
MS Information Records	15H	0001 0101	5.2.59
Hard Handoff Parameters	16H	0001 0110	5.2.51
Layer 3 Information	17H	0001 0111	5.2.31
Protocol Type	18H	0001 1000	5.2.58
Circuit Group	19H	0001 1001	5.2.70
Cell Identifier List	1AH	0001 1010	5.2.18
Response Request	1BH	0001 1011	5.2.28
Radio Environment and Resources	1DH	0001 1101	5.2.62
Service Option Connection Identifier (SOCI)	1EH	0001 1110	5.2.77
Registration Type	1FH	0001 1111	5.2.49
Access Network Identifiers	20H	0010 0000	5.2.74
RF Channel Identity	21H	0010 0001	5.2.7
IS-95 Channel Identity	22H	0010 0010	5.2.9
Channel Number	23H	0010 0011	5.2.5
Circuit Identity Code Extension	24H	0010 0100	5.2.20
AMPS Hard Handoff Parameters	25H	0010 0101	5.2.79
Handoff Power Level	26H	0010 0110	5.2.25
IS-2000 Channel Identity 3X	27H	0010 0111	5.2.23
Authentication Confirmation Parameter (RANDC)	28H	0010 1000	5.2.35
Downlink Radio Environment	29H	0010 1001	5.2.22
Service Option List	2AH	0010 1010	5.2.78
Downlink Radio Environment List	2BH	0010 1011	5.2.69
Geographic Location	2CH	0010 1100	5.2.68
PSMM Count	2DH	0010 1101	5.2.67

Table 5.1.2-2 (Cont.) A1 Information Element Identifiers Sorted by Identifier Value

Element Name	Identifier (Hex)	Identifier (Binary)	Reference
Information Element Requested	2EH	0010 1110	5.2.81
Anchor PDSN IP Address	30H	0011 0000	5.2.82
Software Version	31H	0011 0001	5.2.52
SID	32H	0011 0010	5.2.8
Tag	33H	0011 0011	5.2.50
Signal	34H	0011 0100	5.2.42
Slot Cycle Index	35H	0011 0101	5.2.14
Transcoder Mode	36H	0011 0110	5.2.47
(unused – available element identifier value)	37H	0011 0111	
Message Waiting Indication	38H	0011 1000	5.2.40
Source RNC to Target RNC Transparent Container	39H	0011 1001	5.2.75
Target RNC to Source RNC Transparent Container	3AH	0011 1011	5.2.76
(unused – available element identifier values)	3BH – 3CH	0011 1011 - 0011 1100	
ADDS User Part	3DH	0011 1101	5.2.54
(unused – available element identifier value)	3EH	0011 1110	
(unused – available element identifier value)	3FH	0011 1111	
Authentication Parameter COUNT	40H	0100 0000	5.2.39
Authentication Challenge Parameter	41H	0100 0001	5.2.37
Authentication Response Parameter	42H	0100 0010	5.2.38
Reserved (this value is used by the Private Parameters Information Element in [21])	43H	0100 0011	
Reject Cause	44H	0100 0100	5.2.36
(unused - available element identifier value)	45H – 47H	0100 0101 - 0100 0111	
(unused – available element identifier value)	48H	0100 1000	
(unused – available element identifier value)	49H	0100 1001	
Authentication Event	4AH	0100 1010	5.2.65
Calling Party ASCII Number	4BH	0100 1011	5.2.30
(unused – available element identifier value)	4CH	0100 1100	

Table 5.1.2-2 (Cont.) A1 Information Element Identifiers Sorted by Identifier Value

Element Name	**Identifier (Hex)**	**Identifier (Binary)**	**Reference**
(unused - available element identifier value)	4DH	0100 1101	
PACA Timestamp	4EH	0100 1110	5.2.71
(unused - available element identifier values)	4FH – 58H	0100 1111 - 0101 1000	
Authentication Data	59H	0101 1001	5.2.66
Special Service Call Indicator	5AH	0101 1010	5.2.21
Called Party ASCII Number	5BH	0101 1011	5.2.63
Reserved (this value is used by the Calling Party BCD Information Element in [21])	5CH	0101 1100	
(unused – available element identifier value)	5DH	0101 1101	
Called Party BCD Number	5EH	0101 1110	5.2.44
PACA Order	5FH	0101 1111	5.2.72
PACA Reorigination Indicator	60H	0110 0000	5.2.73
(unused – available element identifier value)	61H	0110 0001	
IS-2000 Cause Value	62H	0110 0010	5.2.64
(unused – available element identifier value)	63H	0110 0011	
IS-95 MS Measured Channel Identity	64H	0110 0100	5.2.29
Cell Commitment Info List	65H	0110 0101	6.2.2.195
Extended Neighbor List	66H	0110 0110	6.2.2.196
(unused – available element identifier values)	67H – 7FH	0110 0111 - 0111 1111	
Type 1 Information Elements			
(unused - available element identifier value)	8XH[a]	1000 xxxx[a]	
CM Service Type	9XH[a]	1001 xxxx[a]	5.2.43
Type 2 Information Elements			
(unused - available element identifier value)	A0H	1010 0000	
Voice Privacy Request	A1H	1010 0001	5.2.11
Power Down Indicator	A2H	1010 0010	5.2.48
(unused - available type 2 element identifier values)	A3H - AFH	1010 0011 - 1101 1111	
Additional Type 1 Information Elements			
(unused - available type 1 element identifier value)	EXH[a] - FXH[a]	1110 xxxx[a] - 1111 xxxx[a]	

Table 5.1.2-2 (Cont.) A1 Information Element Identifiers Sorted by Identifier Value

Element Name	Identifier (Hex)	Identifier (Binary)	Reference
Information Elements without Identifiers			
Message Discrimination	none	none	5.2.1
Message Type	none	none	5.2.4
Data Link Connection Identifier (DLCI)	none[b]	none[b]	5.2.2
Protocol Discriminator	none[b]	none[b]	5.2.32
Reserved - Octet	none[b]	none[b]	5.2.33
Service Option List	2AH	0010-1010	5.2.78

a. This is a type 1 information element (see section 5.1.3). The xxxx (X under the hex identifier column) is data.

b. This is a type 3 information element (see section 5.1.3) that is contained as a mandatory element in a DTAP message.

5.1.3 A1 Interface Information Element Types

This section describes the four information element types used on the A1 Interface.

Two main categories of information elements are defined:

- Information elements with fixed length
- Information elements 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 information elements are defined:

- Information elements with 1/2 octet of content (Type 1)
- Information elements with 0 octets of content (Type 2)
- Information elements with fixed length and at least one octet of content (Type 3)
- Information elements with variable length (Type 4).

Information element Response Request (1BH) is an exception to the rules specified in this section.

Type 1 Information Element

Type 1 information elements provide the information element identifier in bit positions 6, 5, 4. The value '0 1 0' in these bit positions is reserved for Type 2 information elements which together with this provide the information element identifier in bit positions 3,2,1,0. Type 3 and 4 information elements provide the information element identifier in the first octet.

These information elements are shown in the figures below for both the case where the information element is optional in a message and mandatory in a message.

In the figures below, IEI is used as an abbreviation for Information Element Identifier. CIE as an abbreviation for Content of Information Element and LI as an abbreviation for Length Indicator

Type 1 information elements with 1/2 octet of content:

7	6	5	4	3	2	1	0	Octet
1	IEI			CIE				1

Type 1 information elements may be either optional or mandatory in a BSMAP or a DTAP message. When a Type 1 element is included as a mandatory information element in a DTAP message, the information element identifier field shall be coded appropriately by the sender, but may be ignored by the receiver.

Type 2 Information Element

Type 2 information elements with 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 information element cannot be mandatory in a DTAP message.

Type 3 Information Element

Type 3 information elements with fixed length and at least one octet of content are shown below. The first instance includes the information element 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 information elements with variable length are shown below. The first instance includes the information element 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

5.1.4 Additional Coding and Interpretation Rules for Information Elements

Information elements shall always use the same Information Element Identifier for all occurrences on a specific A1 Interface. Insofar as possible, the same Information Element Identifier shall be used for a given information element when it is used on more than one of the A1 Interface.

The order of appearance for each information element which is mandatory or optional in a message is laid down in the definition of the message.

Where the description of the information element in this standard contains spare bits, these bits are indicated as being set to ‘0’. In order to allow compatibility with future implementation, messages shall not be rejected simply because a spare bit is set to ‘1’.

An optional variable length information element may be present, but empty. For example, a Setup message may contain a Called Party BCD Number information element, the content of which is zero length. This shall be interpreted by the receiver as equivalent to that information element being absent.

On the A1 interface, all new information elements shall be defined with a length field.

Some existing elements make use of an extension bit mechanism that allows the size of the information element 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 information element 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.

5.1.5 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.

Table 5.1.5-1 Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Access Network Identifiers	5.2.74	Handoff Request	4.4.2
		Handoff Required	4.4.1
ADDS User Part	5.2.54	BS Service Request	4.1.16
		ADDS Deliver	4.6.3
		ADDS Page	4.6.1
		ADDS Transfer	4.6.2
AMPS Hard Handoff Parameters	5.2.79	Handoff Command	4.4.5
Anchor PDSN IP Address	5.2.82	Handoff Required	4.4.1
		Handoff Request	4.4.2
Authentication Challenge Parameter (RAND/RANDU/RANDBS/RANDSSD)	5.2.37	CM Service Request	4.1.2
		Location Updating Request	4.3.7
		Paging Response	4.1.4
		Base Station Challenge	4.3.4
		PACA Update	4.2.7
		SSD Update Request	4.3.3
		Authentication Request	4.3.1
		ADDS Transfer	4.6.2
Authentication Confirmation Parameter (RANDC)	5.2.35	CM Service Request	4.1.2
		Location Updating Request	4.3.7
		Paging Response	4.1.4
		PACA Update	4.2.7
		ADDS Transfer	4.6.2
Authentication Data	5.2.66	ADDS Transfer	4.6.2
		CM Service Request	4.1.2
Authentication Event	5.2.65	ADDS Transfer	4.6.2
		CM Service Request	4.1.2
		Location Updating Request	4.3.7
		Paging Response	4.1.4

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Authentication Parameter COUNT	5.2.39	PACA Update	4.2.7
		ADDS Transfer	4.6.2
		CM Service Request	4.1.2
		Location Updating Request	4.3.7
		PACA Update	4.2.7
		Paging Response	4.1.4
Authentication Response Parameter (AUTHBS/AUTHR/AUTHU)	5.2.38	Base Station Challenge Response	4.3.5
		CM Service Request	4.1.2
		Paging Response	4.1.4
		Location Updating Request	4.3.7
		Authentication Response	4.3.5
		PACA Update	4.2.7
		ADDS Transfer	4.6.2
Called Party ASCII Number	5.2.63	Additional Service Request	4.1.18
		CM Service Request	4.1.2
Called Party BCD Number	5.2.44	Additional Service Request	4.1.18
		CM Service Request	4.1.2
		Flash with Information	4.2.1
Calling Party ASCII Number	5.2.30	Assignment Request	4.1.7
		Flash with Information	4.2.1
		Feature Notification	4.2.3

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Cause	5.2.16	Service Release	4.1.10
		ADDS Deliver Ack	4.6.5
		ADDS Page Ack	4.6.4
		Assignment Failure	4.1.9
		Block	4.5.1
		BS Service Response	4.1.17
		Clear Command	4.1.13
		Clear Request	4.1.12
		Handoff Command	4.4.5
		Handoff Failure	4.4.4
		Handoff Performed	4.4.9
		Handoff Request Acknowledge	4.4.3
		Handoff Required	4.4.1
		Handoff Required Reject	4.4.6
		Location Updating Accept	4.3.8
		PACA Command Ack	4.2.6
		PACA Update Ack	4.2.8
		Radio Measurements for Position Response	4.2.10
		Reset	4.5.5
		Reset Circuit	4.5.7
Cause Layer 3	5.2.46	Clear Command	4.1.13
		Clear Request	4.1.12
		Service Release	4.1.10
		SSD Update Response	4.3.6
CDMA Serving One Way Delay	5.2.61	Radio Measurements for Position Response	4.2.10
		ADDS Deliver	4.6.3
		ADDS Transfer	4.6.2
		CM Service Request	4.1.2
		Handoff Required	4.4.1
		Handoff Request	4.4.2
		Paging Response	4.1.4
Cell Identifier	5.2.17	Complete Layer 3 Information	4.1.1
		ADDS Page Ack	4.6.4
		ADDS Transfer	4.6.2

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Cell Identifier List	5.2.18	Status Request	4.3.14
		ADDS Page	4.6.1
		Authentication Request	4.3.1
		Feature Notification	4.2.3
		Handoff Command	4.4.5
		Handoff Performed	4.4.9
		Handoff Request Acknowledge	4.4.3
		Paging Request	4.1.3
		User Zone Reject	4.3.18
Cell Identifier List	5.2.18	Handoff Required	4.4.1
		Handoff Request	4.4.2
Channel Number	5.2.5	Assignment Complete	4.1.8
Channel Type	5.2.6	Assignment Request	4.1.7
		Handoff Request	4.4.2
Circuit Group	5.2.70	Block	4.5.1
		Reset Circuit	4.5.7
		Unblock	4.5.3
Circuit Identity Code	5.2.19	Additional Service Request	4.1.18
		Assignment Request	4.1.7
		Block	4.5.1
		Block Acknowledge	4.5.2
		CM Service Request	4.1.2
		Paging Response	4.1.4
		Reset Circuit	4.5.7
		Reset Circuit Acknowledge	4.5.8
		Unblock	4.5.3
		Unblock Acknowledge	4.5.4
Circuit Identity Code Extension	5.2.20	Handoff Request	4.4.2

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Classmark Information Type 2	5.2.12	CM Service Request	4.1.2
		Handoff Request	4.4.2
		Handoff Required	4.4.1
		Location Updating Request	4.3.7
		Status Request	4.3.14
		Paging Response	4.1.4
CM Service Type	5.2.43	CM Service Request	4.1.2
Downlink Radio Environment	5.2.22	Handoff Request	4.4.2
		Handoff Required	4.4.1
Downlink Radio Environment List	5.2.69	Radio Measurements for Position Response	4.2.10
Encryption Information	5.2.10	Assignment Complete	4.1.8
		Assignment Request	4.1.7
		Handoff Request	4.4.2
		Handoff Required	4.4.1
		Privacy Mode Command	4.3.12
		Privacy Mode Complete	4.3.13
Extended Handoff Direction Parameters	5.2.60	Handoff Command	4.4.5
		Handoff Request Acknowledge	4.4.3
		Handoff Command	4.4.5
Geographic Location	5.2.68	Radio Measurements for Position Response	4.2.10
Special Service Call Indicator	5.2.21	CM Service Request	4.1.2
		Flash with Information	4.2.1
Handoff Power Level	5.2.25	Handoff Command	4.4.5
Hard Handoff Parameters	5.2.51	Handoff Command	4.4.5
		Handoff Request Acknowledge	4.4.3
Information Record Requested	5.2.81	Status Request	4.3.14
IS-2000 Channel Identity	5.2.27	Handoff Command	4.4.5
		Handoff Request	4.4.2
		Handoff Request Acknowledge	4.4.3
		Handoff Required	4.4.1

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		**Used in These Messages**	
IS-2000 Channel Identity 3X	5.2.23	Handoff Command	4.4.5
		Handoff Request	4.4.2
		Handoff Request Acknowledge	4.4.3
		Handoff Required	4.4.1
IS-2000 Mobile Capabilities	5.2.57	CM Service Request	4.1.2
		Paging Request	4.1.3
		Paging Response	4.1.4
		Feature Notification	4.2.3
		Authentication Request	4.3.1
		Location Updating Request	4.3.7
		Handoff Required	4.4.1
		Handoff Request	4.4.2
		Status Request	4.3.14
		ADDS Page	4.6.1
		User Zone Reject	4.3.18
IS-2000 Non-Negotiable Service Configuration Record	5.2.56	Handoff Request Acknowledge	4.4.3
		Handoff Command	4.4.5
IS-2000 Service Configuration Record	5.2.55	Handoff Required	4.4.1
		Handoff Request	4.4.2
		Handoff Request Acknowledge	4.4.3
		Handoff Command	4.4.5
IS-2000 Cause Value	5.2.64	Rejection	4.7.1
IS-95 Channel Identity	5.2.9	Handoff Required	4.4.1
		Handoff Command	4.4.5
		Handoff Request	4.4.2
		Handoff Request Acknowledge	4.4.3
IS-95 MS Measured Channel Identity	5.2.29	Handoff Request	4.4.2
		Handoff Required	4.4.1
Layer 3 Information	5.2.31	Complete Layer 3 Information	4.1.1

1 **Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages**

Information Element		Used in These Messages	
Message Type	5.2.4	Additional Service Notification	4.1.19
		Additional Service Request	4.1.18
		ADDS Deliver	4.6.3
		ADDS Deliver Ack	4.6.5
		ADDS Page	4.6.1
		ADDS Page Ack	4.6.4
		ADDS Transfer	4.6.2
		ADDS Transfer Ack	4.6.6
		Alert With Information	4.1.15
		Assignment Complete	4.1.8
		Assignment Failure	4.1.9
		Assignment Request	4.1.7
		Authentication Request	4.3.1
		Authentication Response	4.3.5
		Base Station Challenge	4.3.4
		Base Station Challenge Response	4.3.5
		Block	4.5.1
		Block Acknowledge	4.5.2
		BS Service Response	4.1.17
		BS Service Request	4.1.16
		Clear Command	4.1.13
		Clear Complete	4.1.14
		Clear Request	4.1.12
		CM Service Request	4.1.2
		Complete Layer 3 Information	4.1.1
		Connect	4.1.5
		Feature Notification	4.2.3
		Feature Notification Ack	4.2.4
		Flash with Information	4.2.1
		Flash with Information Ack	4.2.2
		Handoff Command	4.4.5
		Handoff Commenced	4.4.7
		Handoff Complete	4.4.8
		Handoff Failure	4.4.4

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Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Message Type (Continued)	5.2.4	Handoff Performed	4.4.9
		Handoff Request	4.4.2
		Handoff Request Acknowledge	4.4.3
		Handoff Required	4.4.1
		Handoff Required Reject	4.4.6
		Location Updating Accept	4.3.8
		Location Updating Reject	4.3.9
		Location Updating Request	4.3.7
		PACA Command	4.2.5
		PACA Command Ack	4.2.6
		PACA Update	4.2.7
		PACA Update Ack	4.2.8
		Paging Request	4.1.3
		Paging Response	4.1.4
		Parameter Update Confirm	4.3.11
		Parameter Update Request	4.3.10
		Privacy Mode Command	4.3.12
		Privacy Mode Complete	4.3.13
		Progress	4.1.6
		Radio Measurements for Position Request	4.2.9
		Radio Measurements for Position Response	4.2.10
		Rejection	4.7.1
		Reset	4.5.5
		Reset Acknowledge	4.5.6
		Reset Circuit	4.5.7
		Reset Circuit Acknowledge	4.5.8
		Service Release	4.1.10
		Service Release Complete	4.1.11
		SSD Update Request	4.3.3
		SSD Update Response	4.3.6
		Status Response	4.3.14
		Status Request	4.3.15

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Message Type (Continued)	5.2.4	Unblock	4.5.3
		Unblock Acknowledge	4.5.4
		User Zone Update Request	4.3.16
		User Zone Update	4.3.17
		User Zone Reject	4.3.18
Message Waiting Indication	5.2.40	Flash with Information	4.2.1
		Feature Notification	4.2.3
Mobile Identity	5.2.13	Additional Service Notification	4.1.19
		ADDS Transfer	4.6.2
		CM Service Request	4.1.2
		Paging Response	4.1.4
		ADDS Page	4.6.1
		BS Service Request	4.1.16
		BS Service Response	4.1.17
		PACA Update	4.2.7
		PACA Update Ack	4.2.8
		Handoff Request	4.4.2
		Handoff Required	4.4.1
		Paging Request	4.1.3
		Authentication Request	4.3.1
		Authentication Response	4.3.5
		Location Updating Request	4.3.7
		ADDS Page Ack	4.6.4
		Feature Notification	4.2.3
		Feature Notification Ack	4.2.4
		Paging Request	4.1.3
		Status Response	4.3.15
		Status Request	4.3.14
		Rejection	4.7.1
		User Zone Reject	4.3.18

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
MS Information Records	5.2.59	Progress	4.1.6
		Assignment Request	4.1.7
		Alert With Information	4.1.15
		Flash With Information	4.2.1
		Status Response	4.3.15
		Feature Notification	4.2.3
PACA Order	5.2.72	PACA Update	4.2.7
PACA Reorigination Indicator	5.2.73	CM Service Request	4.1.2
PACA Timestamp	5.2.71	Assignment Request	4.1.7
		PACA Command	4.2.5
Serving PDSN IP Address	5.2.24	Handoff Required	4.4.1
		Handoff Request	4.4.2
Power Down Indicator	5.2.48	Clear Complete	4.1.14
Priority	5.2.15	Assignment Request	4.1.7
		PACA Command	4.2.5
		PACA Update	4.2.7
		PACA Update Ack	4.2.8
Protocol Discriminator	5.2.32	Additional Service Request	4.1.18
		ADDS Deliver	4.6.3
		ADDS Deliver Ack	4.6.5
		Alert With Information	4.1.15
		Authentication Request	4.3.1
		Authentication Response	4.3.5
		Base Station Challenge	4.3.4
		Base Station Challenge Response	4.3.5
		CM Service Request	4.1.2
		Connect	4.1.5
		Flash with Information	4.2.1
		Flash with Information Ack	4.2.2
		Location Updating Accept	4.3.8
		Location Updating Reject	4.3.9
		Location Updating Request	4.3.7
		Paging Response	4.1.4
		Parameter Update Confirm	4.3.11

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Protocol Discriminator (Continued)	5.2.32	Parameter Update Request	4.3.10
		Progress	4.1.6
		Rejection	4.7.1
		Service Release	4.1.10
		Service Release Complete	4.1.11
		SSD Update Request	4.3.3
		SSD Update Response	4.3.6
		Status Response	4.3.15
		Status Request	4.3.14
		User Zone Update Request	4.3.16
		User Zone Update	4.3.17
		User Zone Reject	4.3.18
Protocol Type	5.2.58	Handoff Required	4.4.1
		Handoff Request	4.4.2
PSMM Count	5.2.67	Radio Measurements for Position Request	4.2.9
Quality of Service Parameters	5.2.45	Assignment Request	4.1.7
		Handoff Request	4.4.2
		Handoff Required	4.4.1
Radio Environment and Resources	5.2.62	CM Service Request	4.1.2
		Paging Response	4.1.4
Registration Type	5.2.49	Location Updating Request	4.3.7
Reject Cause	5.2.36	Location Updating Reject	4.3.9

1 **Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages**

Information Element		Used in These Messages	
Reserved - Octet	5.2.33	Paging Response	4.1.4
		Authentication Request	4.3.1
		Authentication Response	4.3.5
		Base Station Challenge	4.3.4
		Base Station Challenge Response	4.3.5
		CM Service Request	4.1.2
		Connect	4.1.5
		Flash with Information	4.2.1
		Flash with Information Ack	4.2.2
		Location Updating Accept	4.3.8
		Location Updating Reject	4.3.9
		Location Updating Request	4.3.7
		Parameter Update Confirm	4.3.11
		Parameter Update Request	4.3.10
		Progress	4.1.6
		Rejection	4.7.1
		SSD Update Request	4.3.3
		SSD Update Response	4.3.6
		Status Response	4.3.15
		Status Request	4.3.14
		User Zone Update Request	4.3.16
		User Zone Update	4.3.17
		User Zone Reject	4.3.18
		ADDS Deliver	4.6.3
		ADDS Deliver Ack	4.6.5
		Alert With Information	4.1.15
Response Request	5.2.28	Handoff Required	4.4.1
RF Channel Identity	5.2.7	Handoff Command	4.4.5

2

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Service Option	5.2.53	Additional Service Notification	4.1.19
		Additional Service Request	4.1.18
		Assignment Complete	4.1.8
		Assignment Request	4.1.7
		CM Service Request	4.1.2
		Handoff Request	4.4.2
		Handoff Required	4.4.1
		Paging Request	4.1.3
		Paging Response	4.1.4
		BS Service Request	4.1.16
Service Option Connection Identifier (SOCI)	5.2.77	Additional Service Request	4.1.18
		Alert with Information	4.1.15
		CM Service Request	4.1.2
		Connect	4.1.5
		Flash with Information	4.2.1
		Flash with Information Ack	4.2.2
		Progress	4.1.6
		Paging Response	4.1.4
		Rejection	4.7.1
		Service Release	4.1.10
		Service Release Complete	4.1.11
SID	5.2.8	Handoff Command	4.4.5
Signal	5.2.42	Assignment Request	4.1.7
		Feature Notification	4.2.3
		Flash with Information	4.2.1
		Progress	4.1.6

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Slot Cycle Index	5.2.14	ADDS Page	4.6.1
		Authentication Request	4.3.1
		CM Service Request	4.1.2
		Feature Notification	4.2.3
		Handoff Request	4.4.1
		Handoff Required	4.4.1
		Location Updating Request	4.3.7
		Paging Request	4.1.3
		Status Request	4.3.14
		Paging Response	4.1.4
		User Zone Reject	4.3.18
Software Version	5.2.52	Reset Acknowledge	4.5.6
		Reset	4.5.5
Source RNC to Target RNC Transparent Container	5.2.75	Handoff Request	4.4.2
		Handoff Required	4.4.1
Tag	5.2.50	ADDS Deliver	4.6.3
		ADDS Deliver Ack	4.6.5
		ADDS Page	4.6.1
		ADDS Page Ack	4.6.4
		ADDS Transfer	4.6.2
		Authentication Request	4.3.1
		Authentication Response	4.3.5
		BS Service Request	4.1.16
		BS Service Response	4.1.17
		Feature Notification	4.2.3
		Feature Notification Ack	4.2.4
		Flash with Information	4.2.1
		Flash with Information Ack	4.2.2
		Paging Request	4.1.3
		Paging Response	4.1.4
Target RNC to Source RNC Transparent Container	5.2.76	Handoff Command	4.4.5
		Handoff Request Acknowledge	4.4.3
Transcoder Mode	5.2.47	Transcoder Control Request	4.5.9

Table 5.1.5-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
User Zone ID	5.2.26	CM Service Request	4.1.2
		Paging Response	4.1.4
		Location Updating Request	4.3.7
		User Zone Update Request	4.3.16
		User Zone Update	4.3.17
		User Zone Reject	4.3.18
Voice Privacy Request	5.2.11	Additional Service Request	4.1.18
		CM Service Request	4.1.2
		Paging Response	4.1.4
		Privacy Mode Complete	4.3.13

5.2 Information Elements

5.2.1 Message Discrimination

A 1 octet field is used in all messages to discriminate between DTAP and BSMAP messages. See Section 2.4 for details on use of this element in the header of all messages.

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 messages. All other messages shall have the D-bit set to 0. See Section 2.4.1.1 for an indication of when the D-bit is set (i.e., DTAP or BSMAP message).

5.2.2 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. See Section 2.4.1.1.2 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 is coded in one octet, as follows:

7	6	5	4	3	2	1	0	Octet
C2	C1	Reserved			S3	S2	S1	1

C2 and C1 are defined as:

C2	C1	Description
0	0	Represents the default for *TIA/EIA/IS-2000*
All other values		Reserved

Bits S3, S2, and S1 represent the SAPI (Signaling Access Point Identifier) value used on the radio link. The SAPI shall be set to zero for *TIA/EIA/IS-2000* systems.

5.2.3 Length Indicator (LI)

The length indicator is coded in one octet, and is the binary representation of the number of octets following the length indicator.

7	6	5	4	3	2	1	0	Octet
Length Indicator								1

5.2.4 Message Type

Element Format:

7	6	5	4	3	2	1	0	Octet
Message Type								1

Table 5.2.4-1 BSMAP Messages

BSMAP Message Name	Message Type Value	Message Category	Section Reference
Additional Service Notification	69H	Call Processing	4.1.19
ADDS Page	65H	Supplementary Services	4.6.1
ADDS Page Ack	66H	Supplementary Services	4.6.4
ADDS Transfer	67H	Supplementary Services	4.6.2
ADDS Transfer Ack	68H	Supplementary Services	4.6.6
Assignment Complete	02H	Call Processing	4.1.8
Assignment Failure	03H	Call Processing	4.1.9
Assignment Request	01H	Call Processing	4.1.7
Authentication Request	45H	Mobility Management	4.3.1
Authentication Response	46H	Mobility Management	4.3.5
Base Station Challenge	48H	Mobility Management	4.3.4
Base Station Challenge Response	49H	Mobility Management	4.3.5
Block	40H	Facilities Management	4.5.1
Block Acknowledge	41H	Facilities Management	4.5.2
BS Service Request	09H	Call Processing	4.1.16
BS Service Response	0AH	Call Processing	4.1.17
Clear Command	20H	Call Processing	4.1.13
Clear Complete	21H	Call Processing	4.1.14
Clear Request	22H	Call Processing	4.1.12
Complete Layer 3 Information	57H	Call Processing	4.1.1
Feature Notification	60H	Supplementary Services	4.2.3

Table 5.2.4-1 BSMAP Messages

BSMAP Message Name	Message Type Value	Message Category	Section Reference
Feature Notification Ack	61H	Supplementary Services	4.2.4
Handoff Command	13H	Radio Resource Mgmt.	4.4.5
Handoff Commenced	15H	Radio Resource Mgmt.	4.4.7
Handoff Complete	14H	Radio Resource Mgmt.	4.4.8
Handoff Failure	16H	Radio Resource Mgmt.	4.4.4
Handoff Performed	17H	Radio Resource Mgmt.	4.4.9
Handoff Request	10H	Radio Resource Mgmt.	4.4.2
Handoff Request Acknowledge	12H	Radio Resource Mgmt.	4.4.3
Handoff Required	11H	Radio Resource Mgmt.	4.4.1
Handoff Required Reject	1AH	Radio Resource Mgmt.	4.4.6
PACA Command	6CH	Supplementary Services	4.2.5
PACA Command Ack	6DH	Supplementary Services	4.2.6
PACA Update	6EH	Supplementary Services	4.2.7
PACA Update Ack	6FH	Supplementary Services	4.2.8
Paging Request	52H	Call Processing	4.1.3
Privacy Mode Command	53H	Call Processing	4.3.12
Privacy Mode Complete	55H	Call Processing	4.3.13
Radio Measurements for Position Request	23H	Supplementary Services	4.2.9
Radio Measurements for Position Response	25H	Supplementary Services	4.2.10
Rejection	56H	Call Processing	4.7.1
Reset	30H	Facilities Management	4.5.5
Reset Acknowledge	31H	Facilities Management	4.5.6
Reset Circuit	34H	Facilities Management	4.5.7
Reset Circuit Acknowledge	35H	Facilities Management	4.5.8
SSD Update Request	47H	Mobility Management	4.3.3
SSD Update Response	4AH	Mobility Management	4.3.6
Status Request	6AH	Mobility Management	4.3.14
Status Response	6BH	Mobility Management	4.3.15
Transcoder Control Acknowledge	39H	Facilities Management	6.1.6.11
Transcoder Control Request	38H	Facilities Management	4.5.9
Unblock	42H	Facilities Management	4.5.3
Unblock Acknowledge	43H	Facilities Management	4.5.4
User Zone Reject	0BH	Mobility Management	4.3.18

Table 5.2.4-2 DTAP Messages

DTAP Message Name	Message Value Type	Message Category	Section Reference
Additional Service Request	62H	Call Processing	4.1.18
ADDS Deliver	53H	Supplementary Services	4.6.3
ADDS Deliver Ack	54H	Supplementary Services	4.6.5
Alert With Information	26H	Call Processing	4.1.15
Authentication Request	45H	Mobility Management	4.3.1
Authentication Response	46H	Mobility Management	4.3.5
Base Station Challenge	48H	Mobility Management	4.3.4
Base Station Challenge Response	49H	Mobility Management	4.3.5
CM Service Request	24H	Call Processing	4.1.2
Connect	07H	Call Processing	4.1.5
Flash with Information	10H	Supplementary Services	4.2.1
Flash with Information Ack	50H	Supplementary Services	4.2.2
Location Updating Accept	02H	Mobility Management	4.3.8
Location Updating Reject	04H	Mobility Management	4.3.9
Location Updating Request	08H	Mobility Management	4.3.7
Paging Response	27H	Call Processing	4.1.4
Parameter Update Confirm	2BH	Mobility Management	4.3.11
Parameter Update Request	2CH	Mobility Management	4.3.10
Rejection	56H	Call Processing	4.7.1
Service Release	2EH	Call Processing	4.1.10
Service Release Complete	2FH	Call Processing	4.1.11
Status Request	6AH	Mobility Management	4.3.14
Status Response	6BH	Mobility Management	4.3.15
User Zone Reject	0BH	Mobility Management	4.3.18
User Zone Update	0CH	Mobility Management	4.3.17
User Zone Update Request	0DH	Mobility Management	4.3.16

5.2.5 Channel Number

This element contains a logical channel number assigned to the equipment providing a traffic channel.

This element is being kept in this revision of this standard for backward compatibility.. It is likely to be removed from a future revision of this standard.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Channel Number								2
Channel Number								3

A default value of zero may be used by manufacturers.

5.2.6 Channel Type

This element contains information that Call Processing may use to determine the radio resource that is required and is coded as follows:

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

The Length field is defined as the number of octets following the Length field.

The Speech or Data Indicator octet is coded as follows:

Table 5.2.6-1 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

The Channel Rate and Type is coded as follows:

Table 5.2.6-2 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

If octet 3 indicates that the call is a speech call or signaling (e.g., DCCH) then octet 5 is coded as follows:

Table 5.2.6-3 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 kb/s vocoder
0	0	0	0	0	1	0	0	8 kb/s enhanced vocoder (EVRC)
0	0	0	0	0	1	0	1	13 kb/s vocoder
0	0	0	0	0	1	1	0	ADPCM
All other values are reserved								

If octet 3 indicates that the call is a data call then octet 5 shall be coded as follows:

Table 5.2.6-4 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

5.2.7 RF Channel Identity

This element specifies the identity of an *ANSI/EIA/TIA-553* radio channel.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Color Code								2
Reserved						N-AMPS	ANSI EIA/TIA-553	3
Reserved						(Timeslot Number)		4
Reserved					ARFCN (high part)			5
ARFCN (low part)								6

The Color Code field in octet 2 identifies the unique code used by *ANSI/EIA/TIA-553* signaling system to distinguish the serving cell RF channels from cells reusing this RF channel. For *ANSI/EIA/TIA-553* cells, this color code corresponds to the 3 possible Supervisory Audio Tones (SAT) used to distinguish this cell's radio channels.

Octet 3 indicates a single signaling type allocated by a target BS in a hard handoff procedure. The allocated signaling type is indicated when the corresponding bit is set to 1. 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 5.2.7-1 RF Channel Identity – Timeslot Number

Value	Description
00	Centered on N
01	Channel below N
10	Channel above N
11	Reserved

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 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 *ANSI/EIA/TIA-553* 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 ([20]) 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.

5.2.8 SID

This element provides the System Identification used by mobiles to determine home/roam status. It is coded as follows:

<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>

The SID is a 15 bit unique number assigned to each wireless system coverage area.

5.2.9 *IS-95* Channel Identity

This element specifies identity information for one or more *TIA/EIA/IS-95-B* radio channels.

<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 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.

The Hard Handoff 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. If the Handoff Type element is also present in the same message, the value of Handoff Type shall agree with the setting of this bit.

In this version of the standard, the Number of Channels field shall be set to 001.

The Frame Offset field will contain 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 will contain the frame offset delay required by the target.

The following four octets may be included multiple times:

The Walsh Code Channel Index (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.

Octets n+1 and n+2 contain the 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.

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/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 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’.

The ARFCN (Absolute RF Channel Number) 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.

5.2.10 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Encryption Info - 1								3 - n
Encryption Info - 2								n+1 - m
. . .								
Encryption Info - k								p - q

The Length field (octet 2) is a binary number indicating the absolute length of the contents after the Length octet. 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 5.2.10-1 Encryption Information - Encryption Parameter Coding

<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=1</td><td colspan="5">Encryption Parameter Identifier</td><td>Status</td><td>Available</td><td>1</td></tr>
<tr><td colspan="8">Encryption Parameter Length</td><td>2</td></tr>
<tr><td>(MSB)</td><td colspan="7">Encryption Parameter value - octet 1</td><td>3</td></tr>
<tr><td colspan="8">. . .</td><td>. . .</td></tr>
<tr><td colspan="7">Encryption Parameter value - octet m</td><td>(LSB)</td><td>variable</td></tr>
</table>

Encryption Parameter Coding - Octet 1:

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’.

The Status indication, bit 1, is coded ‘1’ to indicate active and ‘0’ to indicate inactive.

Bits 2 through 6 contain the Encryption Parameter Identifier; see the table below.

Bit 7 is an extension bit.

Table 5.2.10-2 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
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 *TIA/EIA/IS-95-B* and *TIA/EIA/IS-2000*. Key length is 8 octets.

Private Longcode:

Encryption parameter for *TIA/EIA/IS-95-B* and *TIA/EIA/IS-2000*. 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 *TIA/EIA/IS-707*. Key length is 4 octets.

Initial RAND:

Parameter used for data encryption in *TIA/EIA/IS-707*. 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.

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.

5.2.11 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.

7	6	5	4	3	2	1	0	Octet
1	0	1	0	Element Identifier				1

5.2.12 Classmark Information Type 2

The Classmark Information Type 2 defines certain attributes of the mobile station equipment in use on a particular transaction, thus giving specific information about the mobile station. It is coded as follows:

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Mobile 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
-- Continued on next page --								

-- Continued from previous page --		
Band Class Entry Length		k+1
Reserved	Band Class 1	k+2
Band Class 1 Air Interfaces Supported		k+3
Band Class 1 MS Protocol Level		k+4
• • •		• • •
Reserved	Band Class n	m
Band Class n Air Interfaces Supported		m+1
Band Class n MS Protocol Level		m+2

The Length field is defined as the number of octets following the Length field.
The A1 Element Identifier is not included when this information element is sent as a mandatory element as part of a DTAP message." Editor: Globally look for IEs that appear as mandatory in DTAP messages and add this sentence if the definition of the IE contains an A1 Element Identifier.

The RF Power Capability field is coded as follows:

Table 5.2.12-1 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 mobile has an assigned power class capability that needs to be known at the base station in order 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.

The See List of Entries 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, in order to provide backward compatibility. The information contained in the first band class entry set in octets 12-14 shall be applicable to the current band class of the mobile.

The Mobile P_REV field in octet 3, and the Band Class 1 MS Protocol Level in octet 14, contain the current mobile station protocol revision level as defined in [1] to [6]. The Mobile P_REV field in octet 3 contains the low order 3 bits of the 8-bit MS Protocol Level. 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.

The ANSI/EIA/TIA-553 in bit 0 of octet 5 is set to 1 if the mobile supports analog capabilities. It is set to 0 if the mobile doesn't support analog mode

The Mobile Term field in bit 1 of octet 5 and bit 1 of octet 7 is set to '1' for *TIA/EIA/IS-2000* mobiles currently capable of receiving incoming calls, and is set to '1' for all other mobile types. It is set to '0' for *TIA/EIA/IS-2000* mobiles incapable of receiving incoming calls.

The DTX field in bit 2 of octet 5 indicates whether or not the mobile is capable of discontinuous transmission. It is set to '1' if the mobile is capable of DTX, otherwise it is set to '0'.

The Slotted field in bit 5 of octet 5 indicates that the mobile is operating in slotted paging request mode when set to '1' (*TIA/EIA/IS-2000* only).

The *IS-95* field in bit 6 of octet 5 indicates that the MS is capable of supporting ANSI *TIA/EIA/IS-95* and/or *TIA/EIA/IS-2000* air interfaces.

The NAR_AN_CAP 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.

The PACA Supported Indicator (PSI) field in bit 0 of octet 7 indicates the mobile station's capability to support PACA. This field is set to '1' if the mobile station supports PACA; otherwise it is set to '0'.

The SCM Length field indicates the length of the Station Class Mark field in the following octet(s).

The Station Class Mark field shall be coded as specified in [1] to [6].

The Count of Entries 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 mobile'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 mobile may also be included.

The Band Class Entry Length 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.

The Band Class n field shall be a binary value coded as shown in section 5.2.80.

The Band Class n Air Interfaces Supported field shall be a binary value consisting of subfields indicating which operating modes are supported by the mobile in the corresponding band class. The subfields are coded as defined in the *TIA/EIA/IS-2000* Operating Mode Information record [1] to [6]. The first subfield is OP_MODE0 and it shall correspond to bit 7.

The Band Class n MS Protocol Level_field contains the mobile station protocol revision level as defined in [1] to [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.

5.2.13 Mobile Identity

The purpose of the mobile identity information element is to provide the mobile station Electronic Serial Number (ESN), the International Mobile Subscriber Identity (IMSI), or the Broadcast Address.

The International Mobile Subscriber Identifier (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 Broadcast Address is used to deliver Short Messages to groups of subscribers and has the format specified in section 3.4.3.2 of [31] and is mapped to the Mobile Identity element as shown below.

The following is the Mobile Identity element coding: *TIA/EIA/IS-2000.*

Warning: The length limit for this information element was 10 octets in IOS v2.0a, IOS v2.1, and IOS v3.0.0. Care needs to be exercised for interoperability with implementations based on the previous standard.

<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 Length field is defined as the number of octets following the Length field.

Add sentence to 5.2.12 (line 6 of page 287): “The A1 Element Identifier is not included when this information element is sent as a mandatory element as part of a DTAP message.” Editor: Globally look for IEs that appear as mandatory in DTAP messages and add this sentence if the definition of the IE contains an A1 Element Identifier.

The Type of Identity is defined as follows:

Table 5.2.13-1 Mobile Identity - Type of Identity Coding

Binary Values	Meaning
000	No Identity Code
010	Broadcast Address
101	ESN
110	IMSI

The Odd/Even Indicator (octet 3; bit 3) field is set to ‘0’ for an even number of digits and to ‘1’ for an odd number of identity digits.

The identity digits (octet 3 etc.) 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’.

For Broadcast Address (type 010), the Mobile Identity is encoded as specified below based on [31].

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 mobile station.

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 mobile station should receive and process the broadcast message or page if the Service field contains a service category that the mobile station has been configured to receive.

Language:

This field contains a value used by the MS to distinguish the language used in the content of the broadcast message.

5.2.14 Slot Cycle Index

The Slot Cycle Index element is unique to *TIA/EIA/IS-2000* mobiles. It contains a parameter used in computation of the paging timeslot, allowing discontinuous reception in the mobile station. It is coded as follows:

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved					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. See also section 5.2.12.

5.2.15 Priority

This element indicates the PACA priority of the call and is coded as follows:

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved		Call Priority				Queuing Allowed	Preemption Allowed	3

The Length field is defined as the number of octets following the Length field.

In octet 3, the priority 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 5.2.15-1 Priority - Call Priorities

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)

Table 5.2.15-2 Priority - Queuing Allowed

Binary Values bit 1	Meaning
0	queuing not allowed
1	queuing allowed

Table 5.2.15-3 Priority - Preemption Allowed

Binary Values bit 0	Meaning
0	preemption not allowed
1	preemption allowed

5.2.16 Cause

This element is used to indicate the reason for occurrence of a particular event and is coded as shown below.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
0/1	Cause Value							3

This information element is used on multiple interfaces. When the information element is included in a message that is sent on the A1 or A9 interface, the Element Identifier field is coded as 04H. When the information element is included in a message sent on the A7 interface, the Element Identifier field is coded as 08H.

The Length field is defined as the number of octets following the Length field.

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 5.2.16-1 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 5.2.16-2 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
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) (Handoff Required msg.)
0	0	0	1	1	1	1	0F	Interference (Handoff Required msg.)
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	0	1	0	12	Invalid Call
0	0	1	0	0	1	1	13	Successful operation
0	0	1	0	1	0	0	14	Normal call release
0	0	1	0	1	0	1	15	Short Data Burst Authentication Failure
0	0	1	0	1	1	0	16	Initiate Re-activation of packet data call
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	0	1C	Update Accounting: Late Traffic Channel Setup
0	0	1	1	1	0	1	1D	Intra-BS Soft Handoff Drop Target
0	0	1	1	1	1	0	1E	Update Accounting: Parameter Change
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	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	1	2B	Alternate signaling type reject (Handoff Failure msg.)
0	1	0	1	1	0	1	2D	PACA Queue Overflow
0	1	0	1	1	1	0	2E	PACA Cancel Request Rejected

Table 5.2.16-2 Cause Values

6	5	4	3	2	1	0	Hex Value	Cause
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 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
0	1	1	0	1	0	1	35	Requested FPC Mode Change Failed
Service or Option Not Implemented Class (100 xxxx)								
1	0	0	0	0	0	0	40	Ciphering algorithm not supported
1	0	0	0	0	0	1	41	Private Long Code not available or not supported.
1	0	0	0	0	1	0	42	Requested MUX option or rates not available.
1	0	0	0	0	1	1	43	Requested Privacy Configuration unavailable
1	0	0	0	1	0	0	44	SCH not supported
1	0	0	1	1	1	1	4F	Terrestrial circuit already allocated.[a]
Invalid Message Class (101 xxxx)								
1	0	1	0	0	0	0	50	Terrestrial circuit already allocated
1	0	1	0	0	0	1	51	FPC Initial Gain too high
1	0	1	1	1	1	1	5F	Protocol Error between BS and MSC.[a]
1	1	0	1	1	1	1	6F	Invalid Call Connection Reference
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
1	1	1	0	0	1	0	72	MS-to-IWF TCP connection failure
1	1	1	0	0	1	1	73	ATH0 (Modem hang up) Command
1	1	1	0	1	0	0	74	+FSH/+FHNG (Fax session ended) Command
1	1	1	0	1	0	1	75	No carrier
1	1	1	0	1	1	0	76	PPP protocol failure
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	0	7A	Data ready to send
1	1	1	1	1	1	1	7F	Handoff procedure time-out (HO Failure message)
All other values								Reserved for future use.

a. Used prior to version 3.0.0 of this specification only.

If The MSC uses a CIC value that is unknown to the BS, the cause value used shall be 25H (BS not equipped) in the appropriate message.

5.2.17 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:

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Cell Identification Discriminator								3
Cell Identification								variable

This information element is used on multiple interfaces. When the information element is included in a message that is sent on the A1 interface, the Element Identifier field is coded as 05H. When the information element is included in a message sent on the A3 or A7 interface, the Element Identifier field is coded as 08H.

The Length field is defined as the number of octets following the Length field. The length depends on the Cell Identification Discriminator (octet 3).

The Cell Identification Discriminator is a binary number indicating if the whole or a part of 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 5.2.17-1 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 will be used.

Table 5.2.17-2 Cell Identifier - Cell Identification Discriminator = ‘0000 0010’

7	6	5	4	3	2	1	0	Octet
CI value								4
CI value cont.								5

Table 5.2.17-3 Cell Identifier - Cell Identification Discriminator = ‘0000 0101’

7	6	5	4	3	2	1	0	Octet
LAC								4
LAC cont.								5

Table 5.2.17-4 Cell Identifier - Cell Identification Discriminator = ‘0000 0111’

7	6	5	4	3	2	1	0	Octet
MSCID								4
MSCID continued								5
MSCID continued								6
CI value								7
CI value continued								8

MSCID, MSC Identifier (octets 4 through 6):

The MSCID is coded as defined in IS-41-C, 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.

CI, Cell Identity value (octets 7 and 8):

In the CI 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).

Table 5.2.17-5 Cell Identifier - Cell Identification Discriminator = ‘0000 1000’

7	6	5	4	3	2	1	0	Octet
MCC digit2				MCC digit1				4
MNC digit3				MCC digit 3				5
MNC digit2				MNC digit1				6
LAC								7
LAC cont.								8
CI value								9
CI value cont.								10

MCC, Mobile Country Code (octets 4 and 5):

The MCC field is coded as in [51].

MNC, Mobile Network Code (octets 5 and 6):

The coding of this field is the responsibility of each administration but BCD coding shall be used. If an administration decides to include only one digit in the MNC then bits 4-7 of octet 6 and bits 4-7 of octet 5 are coded as ‘1111’. If an administration decides to include only two digits in the MNC then bits 4-7 of octet 5 are coded as ‘1111’.

LAC, Location Area Code (octets 7 and 8):

In the LAC field bit 7 of octet 7 is the most significant bit and bit 0 of octet 8 is the least significant bit.

The coding of the location area code is the responsibility of each administration.

CI, Cell Identity value (octets 9 and 10):

In the CI value field bit 7 of octet 9 is the most significant bit and bit 0 of octet 10 the least significant bit.

The coding of the cell identity is the responsibility of each administration. Coding using full hexadecimal representation may be used. The cell identity consists of 2 octets maximum.

If an administration 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 9 are coded with a '0' in each.

If N=8 then octet 9 is coded with a '0' in each bit.

If N<8 then octet 9 is coded with a '0' in each bit and bits N through 7 of octet 3 are coded with a '0' in each.

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 IOS document the LAC field is supported; however, it may be ignored or filled with zeros at the supplier's option, and must not cause a protocol error.

The Cell Identifier within an MSC is unique.

5.2.18 Cell Identifier List

This element uniquely identifies cells and is of variable length containing the following fields:

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

The Length field is a binary value indicating the number of octets following the Length field.

5.2.19 Circuit Identity Code (CIC)

This element defines the terrestrial channel over which the call will 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.

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 define the PCM multiplexer in use.

Bits xxxxx define the actual timeslot in use.

The Circuit Identity Code defines the PCM multiplex and timeslot in use at the MSC. In cases where re-multiplexing takes place between the MSC and BS a translation may be necessary at the BS.

5.2.20 Circuit Identity Code Extension

This variable length element defines a full rate terrestrial channel.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Circuit Identity Code							3
Circuit Identity Code (cont.)							(LSB)	4
Reserved				Circuit Mode				5

The Length field is defined as the number of octets following the Length field.

The Circuit Identity Code field is coded as specified in octets 2-3 of section 5.2.19.

The Circuit Mode field informs the MSC about the use of this element, and is encoded as follows:

Table 5.2.20-1 Circuit Identity Code Extension - Circuit Mode Field

Binary Value	Name	Meaning
0000	Full-rate	Full-rate circuit operation.
All other values reserved		

5.2.21 Special Service Call Indicator

The presence of this information element in a message indicates to the MSC that the MS has initiated an emergency call.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved						MOPD = [0,1]	GECI = [0,1]	3

Length:

This field indicates the number of octets in this element following the Length field.

GECI:

Global Emergency Call Indication. This field is set to 1 if the user indicated an emergency call in the *IS-2000* air interface message. This field is set to 0 otherwise.

MOPD:

Mobile Originated Position Determination. This field is set to 1 if the mobile has indicated a request for mobile originated position determination in the *IS-2000* air interface message. This field is set to 0 otherwise.

5.2.22 Downlink Radio Environment

This element includes signal strength measurement information that was made by the mobile. It is of variable length and is coded as follows:

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

The Length field is defined as the number of octets following the Length field.

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.

In octet 4, the Cell Identification Discriminator is coded per section 5.2.17. It applies to all Cell Identification fields present in this element.

The Cell Identification is coded as per the equivalent octets described in section 5.2.17, and shall uniquely identify one cell. Only one cell can be indicated per replication.

Downlink Signal Measurement Raw is an average signal level measured by the mobile 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 mobile 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 mobile station.

The CDMA Target One Way Delay 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.

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 + Serving one way delay in PN chips) / 0.12288 $\rfloor$

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 serving one way delay is maintained in information known to the BS.

5.2.23 *IS-2000* Channel Identity 3X

This element specifies identity information for one or more *TIA/EIA/IS-2000* radio channels operating in 3X mode.

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
Reserved	Pilot Gating Rate 1		QOF Mask 1		Walsh Code Channel Index 1 (high part)			5
Walsh Code Channel Index 1 (low part)								6
-- Continued on next page --								

<table>
<tr><th colspan="7">-- Continued from previous page --</th><th></th></tr>
<tr><td colspan="7">Pilot PN Code 1 (low part)</td><td>7</td></tr>
<tr><td>Pilot PN Code 1 (high part)</td><td>Reserved</td><td colspan="2">Power combined 1</td><td>Freq. Included 1</td><td colspan="2">ARFCN 1 (high part)</td><td>8</td></tr>
<tr><td colspan="7">ARFCN (low part)</td><td>9</td></tr>
<tr><td colspan="2">Reserved</td><td colspan="4">Lower QOF Mask 1</td><td>Lower Walsh Code Channel Index 1 (high part)</td><td>10</td></tr>
<tr><td colspan="7">Lower Walsh Code Channel Index 1 (low part)</td><td>11</td></tr>
<tr><td colspan="3">Reserved</td><td colspan="3">Upper QOF Mask 1</td><td>Upper Walsh Code Channel Index 1 (high part)</td><td>12</td></tr>
<tr><td colspan="7">Upper Walsh Code Channel Index 1 (low part)</td><td>13</td></tr>
<tr><td colspan="7">…</td><td>…</td></tr>
<tr><td colspan="7">Physical Channel Type n</td><td>k</td></tr>
<tr><td>Reserved</td><td>Pilot Gating Rate n</td><td colspan="3">QOF Mask n</td><td colspan="2">Walsh Code Channel Index n (high part)</td><td>k+1</td></tr>
<tr><td colspan="7">Walsh Code Channel Index n (low part)</td><td>k+2</td></tr>
<tr><td colspan="7">Pilot PN Code n (low part)</td><td>k+3</td></tr>
<tr><td>Pilot PN Code n (high part)</td><td>Reserved</td><td colspan="2">Power combined n</td><td>Freq. Included n</td><td colspan="2">ARFCN n (high part)</td><td>k+4</td></tr>
<tr><td colspan="7">ARFCN n (low part)</td><td>k+5</td></tr>
<tr><td colspan="2">Reserved</td><td colspan="4">Lower QOF Mask n</td><td>Lower Walsh Code Channel Index n (high part)</td><td>k+6</td></tr>
<tr><td colspan="7">Lower Walsh Code Channel Index n (low part)</td><td>k+7</td></tr>
<tr><td colspan="3">Reserved</td><td colspan="3">Upper QOF Mask n</td><td>Upper Walsh Code Channel Index n (high part)</td><td>k+8</td></tr>
<tr><td colspan="7">Upper Walsh Code Channel Index n (low part)</td><td>k+9</td></tr>
</table>

Length:

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 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 mobile will be 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 will contain 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 below.

Table 5.2.23-1 *IS-2000* Channel Identity - Physical Channel Type

Hex Values	Meaning
01H	Fundamental Channel (FCH) *TIA/EIA/IS-2000*
02H	Dedicated Control Channel (DCCH) *TIA/EIA/IS-2000*
All other values	Reserved

Pilot Gating Rate:

The actual Reverse Pilot Gating Rate. This field is used to indicate the gating rate for the Reverse Pilot channel as shown in Table 5.2.23-2.

Table 5.2.23-2 *IS-2000* Channel Identity - 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 *TIA/EIA/IS-2000* 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 *TIA/EIA/IS-2000* code channel supporting the same physical channel listed in this element. In other words, if this is the second replication of octets 4n through 4n+5, then the power control sub-channel of this *TIA/EIA/IS-2000* code channel is diversity combined with power control sub-channel of the previous replication of octets 4n through 4n+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 (Absolute RF Channel Number) 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 (Quasi-Orthogonal Function) 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 *TIA/EIA/IS-2000* 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 (Quasi-Orthogonal Function) 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 *TIA/EIA/IS-2000* call. The high order 3 bits are reserved for future expansion. This Walsh Code is used with the upper frequency channel.

5.2.24 Serving PDSN IP Address

This element contains an IPv4 IP Address for a PDSN.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)								3
Serving PDSN IP Address								4
								5
							(LSB)	6

Length:

This field contains the number of octets in this element following this field as a binary number.

Serving PDSN IP Address:

This field contains an IPv4 address for a PDSN.

5.2.25 Handoff Power Level

This element contains the desired Handoff Power Level of the MS. This element is not applicable to CDMA.

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

The Length field is defined as the number of octets following the Length field.

Octet 3 indicates the number of cells represented by this element. For each cell, the Handoff Power Level and Cell Identification fields are replicated.

The Handoff Power Level element provides a recommendation of the uplink power level that the mobile should use when accessing the target on handoff.

The ID Type field in octet 4 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.

The Cell Identification field is coded as per the Cell Identification field described in section 5.2.17. 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'.

5.2.26 USER Zone ID

This element uniquely identifies a particular User Zone

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	UZID							3
							(LSB)	4

Length:

The length field contains the binary value that indicates the number of octets in the 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 [18].

5.2.27 *IS-2000* Channel Identity

This element specifies identity information for one or more *TIA/EIA/IS-2000* radio channels.

<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>OTD</td><td colspan="3">Physical Channel Count</td><td colspan="4">Frame Offset</td><td>3</td></tr>
<tr><td colspan="8">Physical Channel Type 1</td><td>4</td></tr>
<tr><td>Reserved</td><td colspan="2">Pilot Gating Rate 1</td><td colspan="2">QOF Mask 1</td><td colspan="3">Walsh Code Channel Index 1 (high part)</td><td>5</td></tr>
<tr><td colspan="8">Walsh Code Channel Index 1 (low part)</td><td>6</td></tr>
<tr><td colspan="8">Pilot PN Code 1 (low part)</td><td>7</td></tr>
<tr><td>Pilot PN Code 1 (high part)</td><td colspan="2">Reserved</td><td>Power combined 1</td><td>Freq. Included 1</td><td colspan="3">ARFCN 1 (high part)</td><td>8</td></tr>
<tr><td colspan="8">ARFCN 1 (low part)</td><td>9</td></tr>
<tr><td colspan="8">…</td><td>…</td></tr>
<tr><td colspan="8">Physical Channel Type n</td><td>k</td></tr>
<tr><td>Reserved</td><td colspan="2">Pilot Gating Rate n</td><td colspan="2">QOF Mask n</td><td colspan="3">Walsh Code Channel Index n (high part)</td><td>k+1</td></tr>
<tr><td colspan="8">Walsh Code Channel Index n (low part)</td><td>k+2</td></tr>
<tr><td colspan="8">Pilot PN Code n (low part)</td><td>k+3</td></tr>
<tr><td>Pilot PN Code n (high part)</td><td colspan="2">Reserved</td><td>Power combined n</td><td>Freq. Included n</td><td colspan="3">ARFCN n (high part)</td><td>k+4</td></tr>
<tr><td colspan="8">ARFCN n (low part)</td><td>k+5</td></tr>
</table>

Length:

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 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 mobile will be 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 will contain 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 below.

Table 5.2.27-1 *IS-2000* Channel Identity - Physical Channel Type

Hex Values	Meaning
01H	Fundamental Channel (FCH) *TIA/EIA/IS-2000*
02H	Dedicated Control Channel (DCCH) *TIA/EIA/IS-2000*
All other values	Reserved

Pilot Gating Rate:

The actual Reverse Pilot Gating Rate. This field is used to indicate the gating rate for the Reverse Pilot channel as shown in Table 5.2.27-2.

Table 5.2.27-2 *IS-2000* Channel Identity - 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]

Walsh Code Channel Index:

This field specifies one of 256 possible Walsh Codes used to channelize the downlink RF bit stream in a *TIA/EIA/IS-2000* 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 *TIA/EIA-2000* code channel with the previous *TIA/EIA-2000* code channel supporting the same physical channel listed in this element. In other words, if this is the second replication of octets 4n through 4n+5, then the power control sub-channel of this *TIA/EIA-2000* code channel is diversity combined with power control sub-channel of the previous replication of octets 4n through 4n+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 (Absolute RF Channel Number) identifies the Absolute Radio Frequency Channel Number relative to the band class for the call association.

5.2.28 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1

5.2.29 *IS-95* 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Band Class					(MSB)			3
ARFCN							(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.

ARFCN:

(Actual Radio Frequency Channel Number) – 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.

5.2.30 Calling Party ASCII Number

This element identifies the origin of a call. It is coded as shown below.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
ext = 0/1	Type of Number			Numbering Plan Identification				3
ext = 1	Presentation Indicator		0	0 Reserved	0	Screening Indicator		3a
Printable ASCII Character 1								4
Printable ASCII Character 2								5
• • •								…
Printable ASCII character m-2								n

Note: The characters that are transferred in this element shall be taken from the set of ASCII characters commonly referred to as "printable." Allowable characters are those specified in section 7.8 of [22].

The Length in octet 2 indicates the number of octets following the Length field.

See section 5.1.4 for the coding of extension bits (bit 7 in octets 3 and 3a).

The Type of Number field in octet 3 is coded as follows:

Table 5.2.30-1 Calling Party ASCII 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.

The Numbering Plan Identification field is coded as follows:

Table 5.2.30-2 Calling Party ASCII Number - Numbering Plan Identification Values

Binary Values	Meaning
0000	unknown [a]
0001	ISDN/telephony number plan ([50])
0011	data number plan ([53])
0100	telex numbering plan ([52])
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).

The coding of the Presentation Indicator field is shown below (extension bit in octet 3 is set to '0').

Table 5.2.30-3 Calling Party ASCII Number - Presentation Indicator

Binary Values	Meaning
00	Presentation allowed
01	Presentation restricted
10	Number not available due to interworking
11	Reserved

Note: In the mobile originating case, the Presentation Indicator value is used for indicating the intention of the calling mobile station for the presentation of the calling party number to the called user. This may also be requested on a subscription basis. If octet 3a is omitted (extension bit set to 1 in octet 3), and the network does not support subscription information for the calling party number information restrictions, the value "00 - Presentation allowed" is assumed.

The coding of Screening Indicator field is shown below (extension bit in octet 3 set to '0').

Table 5.2.30-4 Calling Party ASCII Number - Screening Indicator

Binary Values	Meaning
00	User-provided, not screened
01	User-provided, verified and paused
10	User-provided, verified and failed
11	Network provided

Note: If octet 3a is omitted, "00 - User provided, not screened" is assumed.

5.2.31 Layer 3 Information

This element is included in the Complete Layer 3 Information message. It contains either Location Updating Request message, CM Service Request message or Paging Response message.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Layer 3 Information								3-n

The Length field indicates the number of octets following the Length field.

The coding of the Layer 3 Information in octets 3 through n 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.

5.2.32 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 5.2.4-2.

7	6	5	4	3	2	1	0	Octet
Reserved				Protocol Discriminator				1

The coding of the Protocol Discriminator field is shown below.

Table 5.2.32-1 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				

5.2.33 Reserved-Octet

This element, used in DTAP messages, does not have an element identifier. It uses a single octet and is always coded as zero.

7	6	5	4	3	2	1	0	Octet
0	0	0	0	0	0	0	0	1

5.2.34 Location Updating Type

This element indicates whether a normal or a periodic location updating is required. This is a type 1 information element.

7	6	5	4	3	2	1	0	Octet
1	IEI			reserved	Reserved	Location Updating Type		1

The Location Updating Type is a two bit field and it is coded as shown below. *TIA/EIA/IS-2000*

Table 5.2.34-1 Location Updating Type

Location Updating Type (bits 1 and 0)	Use
00	Normal Location Updating
01	Periodic Updating
10	Reserved
11	Reserved

5.2.35 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
RANDC								2

5.2.36 Reject Cause

This element indicates the reason for rejecting an MS request by the network.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reject Cause Value								2

The Reject Cause value in octet 2 is coded as follows:

Table 5.2.36-1 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.									

5.2.37 AuthenticationChallenge Parameter (RAND/RANDU/RANDBS/RANDSSD)

The Authentication Challenge Parameter information element provides a non-predictable number which is used for authentication/SSD update. Bit 7 of octet 2 is the most significant bit, while bit 0 of the highest numbered octet is the least significant bit.

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Octet**
A1 Element Identifier								1
Length								2
Reserved				Random Number Type				3
(MSB)								4
RAND/RANDU/RANDBS/RANDSSD Value								5-m
							(LSB)	m+1

Length:

The Length field is a binary value indicating the number of octets following the Length field.

Random Number Type:

Table 5.2.37-1 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.		

5.2.38 Authentication Response Parameter (AUTHR/AUTHU/AUTHBS)

This element provides the authentication response signature calculated by the MS or the network as appropriate.

In *TIA/EIA/IS-2000* 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.

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:

The Length field is a binary value indicating the number of octets 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 5.2.38-1 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).

5.2.39 Authentication Parameter COUNT

This element provides the HLR/AC with the mobile station’s call history parameter.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved		Count						2

5.2.40 Message Waiting Indication

This element is used by the MSC to specify the number of messages waiting.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Number of Messages								2

5.2.41 Progress Indicator

The Progress Indicator information element describes an event which has occurred during the life of a call. The Progress Description field setting specified in this element is to be retained until overridden by the next setting specified in a subsequent message. Prior to receipt of a Progress Description setting by the MSC, the BS assumes that call progress information will be provided in-band by the MSC/network.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
ext=1	Coding Standard		Reserved	Location				3
ext=1	Progress Description							4

Table 5.2.41-1 Progress Indicator - Coding Standard

Binary Values	Meaning
00	Standardized coding as described in [54]
01	Reserved for other international standards
10	National standard
11	Reserved for other international standards

Table 5.2.41-2 Progress Indicator - Location

Binary Values	Meaning
0000	User
0001	Private network serving the local user
0010	Public network serving the local user
0100	Public network serving the remote user
0101	Private network serving the remote user
1010	Network beyond interworking point
All other values reserved	

Note: Depending on the location of the users, the local public network and remote public network may be the same network.

Table 5.2.41-3 Progress Indicator - Progress Description

Binary Values	Meaning
000 0001	Call is not end-to-end PLMN/ISDN and further call progress information may be available in-band.
000 0010	Destination address in non-PLMN/ISDN
000 0011	Origination address in non-PLMN/ISDN
000 0100	Call has returned to the PLMN/ISDN
000 1000	In-band information or appropriate pattern now available
000 1010	Delay encountered at the terminating switch
All other values reserved	

Note: Progress Description value ‘000 0100’ specifies that tones are to be locally generated at the BS. The other values specify in-band tones generated by the network.

5.2.42 Signal

This element is used by the 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 information element may be repeated in a message. It is the responsibility of the MSC to map any signal values received via *TIA/EIA-41* or other protocol into the values given below.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Signal value								2
Reserved						Alert Pitch		3

Table 5.2.42-1 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 5.2.42-2 Signal Value: TIA/EIA/*IS-2000* 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

Table 5.2.42-3 Signal - Alert Pitch Values

Binary Values	Meaning
00	Medium pitch (standard alert)
01	High pitch
10	Low pitch
11	Reserved

Table 5.2.42-4 provides a mapping between signal values in [18], [[1] to [6], and this specification.

Table 5.2.42-4 Signal - Signal Value Mapping: *TIA/EIA-41, TIA/EIA/IS-2000, and this specification*

Tone & Reference	TONES (Signal Type = '00')			
Reference	TIA/EIA/IS-2000 Table 3.7.5.5-3		*TIA/EIA-41.5* Table 117 Announcement Code Value	*TIA/EIA/IS-2001-A* Table 5.2.42-2
	SIGNAL_TYPE	SIGNAL field		
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
	SIGNAL_TYPE	SIGNAL field		
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 5.2.42-4 (Cont.) Signal - Signal Value Mapping: *TIA/EIA-41, TIA/EIA/IS-2000, and this specification*

Alert Type & Reference	Alerting (Signal Type = '01')			
Reference	*TIA/EIA/IS-2000* Table 3.7.5.5-3		*TIA/EIA-41*.5 Table 115, Cadence Octet of Alert Code	*TIA/EIA/IS-2001-A* Table 5.2.42-1
	SIGNAL_TYPE	SIGNAL field		
Normal Alerting	01	000000	000001	01000000
Intergroup Alerting	01	000001	NA[1]	01000001
Special/Priority Alerting	01	000010	NA	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

5.2.43 CM Service Type

This element specifies the type of service requested from the network.

The CM Service Type information element is coded as shown below. It is a type 1 information element.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier				Service Type				1

Table 5.2.43-1 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	

5.2.44 Called Party BCD Number

The purpose of the Called Party BCD Number information element is to identify the called party.

[1] IS-41C does not support the Alert Codes marked 'NA'.

The Called Party BCD Number information element is coded as shown below. It is a type 4 information element with 19 octets length maximal. The maximum number of number digit(s)/end mark(s) is 32.

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

The Length field in octet 2 indicates the number of octets following the Length field.

If the Called Party BCD Number information element is included in a Setup message for emergency call establishment, the Length field may be set to 0.

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’.

The Type of Number field in octet 3 is coded as follows:

Table 5.2.44-1 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.

The Numbering Plan Identification field is coded as follows:

Table 5.2.44-2 Called Party BCD Number - Numbering Plan Identification Values

Binary Values	Meaning
0000	unknown [a]
0001	ISDN/telephony number plan ([50])
0011	data number plan ([53])
0100	telex numbering plan ([52])
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).

The Number Digits/End Marks in octets 4 through n are coded as follows:

Table 5.2.44-3 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

5.2.45 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.

<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">Non-Assured Mode Packet Priority</td><td>3</td></tr>
</table>

Element Identifier:

This information element is used on multiple interfaces. When the information element is included in a message that is sent on the A1 or A9 interface, the Element Identifier field is coded as 07H. When the information element is included in a message sent on the A7 interface, the Element Identifier field is coded as 0FH.

Length:

This field indicates the number of octets in this element following the Length field.

Reserved:

This field shall be set to ‘0000’ and ignored.

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.

5.2.46 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 information element.

<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>ext=1</td><td colspan="2">Coding Standard</td><td>Reserved</td><td colspan="4">Location</td><td>3</td></tr>
<tr><td>ext=1</td><td colspan="7">Cause Value</td><td>4</td></tr>
</table>

Table 5.2.46-1 Cause Layer 3 - Coding Standard

Binary Values	Meaning
00	Standard as described in [54]
01	Reserved for other international standards
10	National standard
11	Reserved for other international standards

Table 5.2.46-2 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	

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.

Table 5.2.46-3 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

Table 5.2.46-4 Cause Layer 3 Values

Binary Cause Values	Hex Cause Values	Cause Diagnostic Remarks
Class (000) and Class (001) - Normal Event		
000 0001	01	Unassigned (unallocated) number
000 0011	03	No route to destination
000 0110	06	Channel unacceptable
000 1111	0F	Procedure failed
001 0000	10	Normal Clearing
001 0001	11	User busy
001 0010	12	No user responding
001 0011	13	User alerting, no answer
001 0101	15	Call rejected
001 0110	16	Number changed New destination[a]
001 1010	1A	Non selected user clearing
001 1011	1B	Destination out of order
001 1100	1C	Invalid number format (incomplete number)
001 1101	1D	Facility rejected
001 1111	1F	Normal, unspecified
Class (010) - Resource Unavailable		
010 0010	22	No circuit/channel available
010 0110	26	Network out of order
010 1001	29	Temporary failure
010 1010	2A	Switching equipment congestion
010 1011	2B	Access information discarded information element ids
010 1100	2C	requested circuit/channel not available
010 1111	2F	Resources unavailable, unspecified
Class (011) - Service or Option Not Available		
011 0001	31	Quality of service unavailable
011 0010	32	Requested facility not subscribed
011 0011	33	Request MUX option or rates unavailable
011 1001	39	Bearer capability not authorized[c]
011 1010	3A	Bearer capability not presently available[c]
011 1011	3B	SSD Update Rejected
011 1111	3F	Service or option not available, unspecified

Table 5.2.46-4 Cause Layer 3 Values

Binary Cause Values	Hex Cause Values	Cause Diagnostic Remarks
Class (100) - Service or Option Not Implemented		
100 0001	41	Bearer service not implemented[c]
100 0101	45	Requested facility not implement
100 0110	46	Only restricted digital information bearer capability is available[c]
100 1111	4F	Service or option not implemented, unspecified
Class (101) - Invalid Message		
101 0001	51	Reserved
101 1000	58	Incompatible destination incompatible parameter[b]
101 1011	5B	Invalid transit network selection
101 1111	5F	Invalid message, unspecified
Class (110) - Protocol Error		
110 0000	60	Mandatory information element error information element identifier(s)
110 0001	61	Message type nonexistent or not implemented message type
110 0010	62	Message not compatible with control state message type or message type nonexistent or not implemented
110 0100	64	Invalid information element contents Information element Identifier(s)
110 0101	65	Message not compatible with call state message type
110 1111	6F	Protocol error, unspecified
Class (111) - Interworking		
111 1111	7F	Interworking, unspecified
All other values reserved		

a. New destination is formatted as the called party number information element, including information element identifier.

b. Incompatible parameter is composed of incompatible information element identifier.

c. This value is being kept for backward compatibility to TSB-80 [??].

5.2.47 Transcoder Mode

This element specifies the settings of the transcoder in the BS, for one party of the call.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length = [01H]								2
Reserved							TFO Mode	3

Bit 0 of octet 3 specifies whether the transcoder should disable the inband signaling mechanism and employ the speech coding algorithm appropriate to the channel type (e.g., QCELP for *IS-95*) or enable the inband signaling mechanism and attempt tandem free operation. The bit is set to '0' for tandem mode, '1' for TFO.

5.2.48 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.

7	6	5	4	3	2	1	0	Octet
1	0	1	0	A1 Element Identifier				1

5.2.49 Registration Type

This information element indicates the type of registration requested by an MS. A mobile station registering on an access channel may initiate any of the following six 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Location Registration Type								2

The Location Registration Type field in octet 2 is coded as follows:

Table 5.2.49-1 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	Reserved.
0000 0110	Distance-based
All other values reserved	

Timer Based Registration

Timer based registration is performed when a timer expires in the mobile station. This causes the mobile station to register at regular intervals, allowing deregistration of inactive mobiles by the network.

Power Up Registration

Power up registration is performed when power is applied to the mobile station. This is used to notify the network that the mobile unit 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 mobile station identifies the current zone via parameters on the forward control channel, which are specific to the air interface type. When the mobile station enters a 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 mobile station is registered.

Power Down Registration

Power down registration may be performed when the mobile station 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 mobile station are modified.

Distance Based Registration

When the distance (computed via control channel parameters) between the current cell and the cell where the mobile last registered is exceeded by a threshold, distance based registration may be performed by the mobile station.

5.2.50 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 must be 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Tag Value								2-5

The Tag Value is a 32 bit fixed length field (octets 2 through 5). The value of this field is a manufacturer's concern.

5.2.51 Hard Handoff Parameters

This element is used to deliver information needed by the source BS to perform hard handoff.

<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 colspan="3">Reserved</td><td>Nom_ Pwr_Ext</td><td colspan="4">Nom_Pwr</td><td>4</td></tr>
</table>

The Band Class field corresponds to the CDMA frequency assignment for the CDMA channel. The coding of this field is specified in [35].

The Number of Preamble Frames is the number of traffic channel preamble frames that the mobile has to send when performing a Hard Handoff. All values ‘000’ through ‘111’ are valid.

The Private LCM is the Private Long Code Mask Indicator used to change the 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 Encryption Mode indicates whether encryption will 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

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

The Reset L2 (Reset Layer 2 Acknowledgment) field indicates whether the layer 2 acknowledgment 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 Acknowledgment

‘1’ Reset Layer 2 Acknowledgment

The Nom_Pwr_Ext field is coded per [1] to [6].

The Nom_Pwr field is coded per [1] to [6].

5.2.52 Software Version

This element provides software version information about the sub-system originating the message. Its definition is a BS and MSC manufacturer concern.

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

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.

Each separate software load from a manufacturer shall have some software load identity. In addition, the carrier may wish to exchange 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.

5.2.53 Service Option

This element indicates the service option requested by the MS, or by the network. It is coded as follows:

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
(MSB)	Service Option							2
							(LSB)	3

For signaling type *TIA/EIA/IS-2000*, the Service Option field in octets 2 and 3 is coded as defined in [35].

The service options supported are given in Table 5.2.53-1.

Table 5.2.53-1 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

Table 5.2.53-1 Service Option Values

Service Option Value (hex)	Description
0009H	13K loopback
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: 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))
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 (see Feature Document). Any other use of these values is outside the scope of this version of the standard.

5.2.54 ADDS User Part

This element contains the user information portion of an ADDS message. That is, it carries the application data message.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Data Burst Type								3
Application Data Message								4-n

The Length field is defined as the number of octets following the Length field and has a value greater than zero.

The Data Burst Type field is coded as follows:

For CDMA: the 6-bit Data Burst Type defined in [1] to [6] is contained in bits 5 through 0, with bits 6 and 7 set to zero.

The Application Data Message field has variable length and is encoded as follows:

For CDMA SMS Services, the Application Data Message is the CDMA SMS Transport Layer Message defined in [31].

For CDMA PLD Services, the Application Data Message is defined in [34].

For AMPS Extended Protocol Enhanced Services, the Application Data Message field consists of the IS-91 message fields. If necessary, padding bits with a value of '0' are added at the end to make an integral number of octets. For the specific instance of the CLI Order, the Application Data Message is the 4-bit DIGIT fields. No padding bits are used. For the specific instance of the Short Message, the Application Data Message is the 6-bit CHAR fields. If necessary, padding bits are added to make an integer number of octets. For the specific instance of the Voice Mail Message, the Application Data Message is the 6-bit CHAR fields. If necessary, padding bits are added to make an integer number of octets.

For Alert with Information SMS Services, the Application Data Message is the Teleservice Identifier followed by one or more Teleservice Sub-parameters (see 4.3.1.4.2 of [31]).

For Short Data Burst, the Application Data Message is the SDB as specified in [33]. This data is not included for mobile originated short data bursts or CCPD mode. 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.

5.2.55 *IS-2000* Service Configuration Record

This information element contains the service configuration record as defined in [5] when the call is *TIA/EIA/IS-2000*, and as defined in [19] when the call is *TIA/EIA/IS-95*.

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

Element Identifier:

This information element is used on multiple interfaces. When the information element is included in a message that is sent on the A1 interface, the Element Identifier field is coded as 0EH. When the information element is included in a message sent on the A7 interface, the Element Identifier field is coded as 10H.

Bit-Exact Length – Octet Count:

This field contains the total number of octets in this element following the Length field represented as a binary value.

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 *TIA/EIA/IS-2000*. This field is coded according to [19] 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. 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.

5.2.56 *IS-2000* Non-Negotiable Service Configuration Record

This information element contains the non-negotiable service configuration record as defined in [5].

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 contains the total number of octets in this element following this field represented as a binary value.

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. 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.

5.2.57 *IS-2000* Mobile Capabilities

This element contains information about the *IS-2000*-specific capabilities of the mobile.

<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="2">Reserved</td><td>ERAM Supported</td><td>DCCH Supported</td><td>FCH Supported</td><td>OTD Supported</td><td>Enhanced RC CFG Supported</td><td>QPCH Supported</td><td>3</td></tr>
<tr><td colspan="8">FCH Information: Bit-Exact Length – Octet Count</td><td>4</td></tr>
<tr><td>Reserved</td><td colspan="3">Geo Location Type</td><td>Geo Location Included</td><td colspan="3">FCH Information:
Bit-Exact Length – Fill Bits</td><td>5</td></tr>
<tr><td>(MSB)</td><td colspan="7"></td><td>6</td></tr>
<tr><td colspan="8">FCH Information Content</td><td>. . .</td></tr>
<tr><td></td><td>Seventh Fill Bit – if needed</td><td>Sixth Fill Bit – if needed</td><td>Fifth Fill Bit – if needed</td><td>Fourth Fill Bit – if needed</td><td>Third Fill Bit – if needed</td><td>Second Fill Bit – if needed</td><td>First Fill Bit – if needed</td><td>k</td></tr>
<tr><td colspan="8">DCCH Information: Bit-Exact Length – Octet Count</td><td>k+1</td></tr>
<tr><td colspan="5">Reserved</td><td colspan="3">DCCH Information:
Bit-Exact Length – Fill Bits</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</td><td>. . .</td></tr>
<tr><td></td><td>Seventh Fill Bit – if needed</td><td>Sixth Fill Bit – if needed</td><td>Fifth Fill Bit – if needed</td><td>Fourth Fill Bit – if needed</td><td>Third Fill Bit – if needed</td><td>Second Fill Bit – if needed</td><td>First Fill Bit – if needed</td><td>m</td></tr>
</table>

Length:

This field contains the total number of octets in this element following the Length field represented as a binary value.

ERAM Supported:

This field is set to ‘1’ if mobile indicated that it supports Enhanced Rate Adaptation Mode, otherwise it is set to ‘0’.

DCCH Supported:

This field is set to ‘1’ if mobile indicated that it supports the *IS-2000* DCCH, otherwise it is set to ‘0’.

FCH Supported:

This field is set to ‘1’ if the mobile 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 mobile 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.

FCH 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 FCH 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 FCH Information Content field.

Geo_Location_Included:

This field is set to 1 if geo-location capabilities about the mobile are included. Geo Location is not supported by mobiles 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.

Geo_Location_Type:

If Geo_Location_Included is set to 1 this field is included and set as follows:

000 – No mobile assisted geo-location capabilities

001 – IS801 capable (Advanced Forward Link Triangulation only (AFLT))

010 – IS801 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.

FCH Information Content:

The FCH Capabilities Information field is coded per [5] section 2.7.4.27.1.

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. 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 DCCH Information Content field.

DCCH Information Content:

The DCCH Capabilities Information field is coded per [5] section 2.7.4.27.2.

5.2.58 Protocol Type

This information element contains the Link Layer / Network Layer Protocol Type used by the PDSN.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)	Protocol Type							3
							(LSB)	4

Length:

This field contains the number of bytes in this element following this field as a binary number.

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].

5.2.59 MS Information Records

This information element contains a list of *TIA/EIA/IS-2000* Information Records. Examples of such information records are signal, displan, calling party ASCII number, message waiting indicator, etc.

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)								5
Information Record Content - 1								. . .
							(LSB)	j
Information Record Type - 2								j+1
Information Record Length - 2								j+2
(MSB)								j+3
-- Continued on next page --								

-- Continued from previous page --								
Information Record Content – 2								…
							(LSB)	k
. . .								…
Information Record Type - n								m
Information Record Length - n								m+1
(MSB)								m+2
Information Record Content - n								…
							(LSB)	n

For coding of the Information Record Type field and Information Record Content field refer to [1] to [6]. The Information Record Length field indicates the number of octets in the immediately following Information Record Content field in this element.

The BS shall transparently transmit the contents from octet 3 to the end of this element without verifying or modifying them.

This information element was referred to as *IS-95* Information Records in some previous versions of this standard.

5.2.60 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 *TIA/EIA/IS-2000* In-Traffic System Parameters message.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Search Window A Size (Srch_Win_A)				Search Window N Size (Srch_Win_N)				3
Search Window R Size (Srch_Win_R)				Add Pilot Threshold (T_Add) high order bits				4
T_Add low order bits		Drop Pilot Threshold (T_Drop)						5
Compare Threshold (T_Comp)				Drop Timer Value (T_TDrop)				6
Neighbor Max Age (Nghbor_Max_AGE)				Reserved				7
Reserved		SOFT_SLOPE						8
Reserved		ADD_INTERCEPT						9
Reserved		DROP_INTERCEPT						10
Target BS P_REV								11

For coding of the parameters listed in this element, refer to [1] to [6].

5.2.61 CDMA Serving One Way Delay

This element specifies the estimated one-way delay from the MS to the cell associated with the REF_PN (see [1] to [6]). It is coded as follows:

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

The Length field contains the number of octets in this element following the Length field.

The Cell Identifier 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 5.2.17. The allowable cell discriminator values are ‘0000 0010’, and ‘0000 0111’.

The CDMA Serving One Way Delay field is the one-way delay from the MS to the cell associated with the REF_PN (see [1] to [6]) as estimated by the BS.

The Resolution field indicates the units used to calculate the CDMA Serving One Way Delay. The allowable values are:

00 – 100 ns

01 – 50 ns

10 – 1/16 TIA/EIA-95 PN Chip

11 - reserved

The CDMA Serving One Way Delay Time Stamp is a 16-bit binary number that contains the 16 least significant bits of the 36-bit SYS_TIME at the time that the One Way Delay was measured. The SYS_TIME is counted at the BS in units of 80 ms.

5.2.62 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Reserved	Include Priority	Forward		Reverse		Alloc	Avail	2

The Include Priority 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.

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.

The coding of the Forward, Reverse, Alloc and Avail fields is given in Table 5.2.62-1.

The Alloc field indicates that radio resources have been allocated for the call.

The Avail field indicates that resources are available and can be allocated for this call.

Table 5.2.62-1 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'.

5.2.63 Called Party ASCII Number

This element contains the called party number in ASCII format. It is coded as shown below.

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

The Length 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 section 5.2.44.

5.2.64 *IS-2000* Cause Value

This information element contains the cause indication sent by an *TIA/EIA/IS-2000* mobile station.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
IS-2000 Cause Information								variable

The Length field contains the number of octets in this element following the Length field.

The content, values and format of the *IS-2000* Cause Information field are as specified for the ORDQ field of the Reject Order in *TIA/EIA/IS-2000*.

This information element is referred to as *IS-95* Cause Value in previous versions of this standard.

5.2.65 Authentication Event

This information element is included by the BS to provide information to the MSC only when an unexpected authentication event occurs.

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.

The coding of Event 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).

All other values reserved.

5.2.66 Authentication Data

This element contains the authentication data used as input to the authentication algorithm.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)								3
Auth-Data								4
							(LSB)	5

Length:

The Length field contains 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 the "Authentication of Mobile Station Origination" section of *TIA/EIA/IS-2000* ([1] to [6])

5.2.67 PSMM Count

This element indicates the number of Pilot Strength Measurement Messages to be sent or if this element is 0, it indicates that the geographic location of the mobile is to be determined by the BS.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved				PSMM Count				3

Length:

This field shall be set to the length of this element in octets 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 location if there is LPDE at the BS.

5.2.68 Geographic Location

This Information Element contains the geographic location of a mobile.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)								3
Calling Geodetic Location (CGL)								…
							(LSB)	k

Length:

This field shall be set to the length of this element in octets following the Length field.

CGL:

See T1.628 for population of the Calling Geodetic Location (CGL).

5.2.69 Downlink Radio Environment List

This element contains a list of Downlink Radio Environments.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Downlink Radio Environment 1								3
. . .								…
Downlink Radio Environment n								k

Length:

This field shall be set to the length of this element in octets following the Length field.

Downlink Radio Environment:

This field is coded as specified in section 5.2.22 from octet 3 to the end.

5.2.70 Circuit Group

This element contains a list of circuit identities represented by a beginning circuit identity code value, a count, and an optional bitmap. Please see the details below.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved						All Circuits	Inclusive	3
-- Continued on next page --								

-- Continued from previous page --								
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:

The Length field contains 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 a single instance of this element may be present in the message and 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 and multiple instances of this element may exist in the message.

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 the first occurrence of 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 5.2.19.

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:

$$\lceil (Count + 1) / 8 \rceil$$

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.

5.2.71 PACA Timestamp

PACA Timestamp indicates the time when the PACA call was originally queued.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)								3
PACA Queuing Time								4
								5
							(LSB)	6

Length:

This field shall be set to the length of this element in octets following the Length field.

PACA Queuing Time:

A binary value representing the time of the service request. The lower the binary value the earlier the time.

5.2.72 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved					PACA Action Required			3

Length:

This field shall be set to the length of this element in octets following the Length field.

The PACA Action Required field is coded as follows:

Table 5.2.72-1 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	

Reserved:

This field shall be set to '00000'.

5.2.73 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved							PRI	3

Length:

This field shall be set to the length of this element in octets 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'.

Reserved :

This field shall be set to '0000000'.

5.2.74 Access Network Identifiers

The Access Network Identifiers (PZID, SID and NID) uniquely identify the PCF and 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 needs to trigger an MIP Registration Request so the Foreign Agent / Home Agent tunnel will be setup properly.

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 contains the number of octets in this element following this field as a binary number.

SID:

This two octet 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 two 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.

5.2.75 Source RNC to Target RNC Transparent Container

This information element 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)								3
Container								…
							(LSB)	k

Length:

The Length field is a binary value indicating the number of octets following the Length field.

Container:

This field contains the Source RNC to Target RNC Transparent Container element as defined in ETSI TS 125.413 V3.3.0.

5.2.76 Target RNC to Source RNC Transparent Container

This information element 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.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)								3
Container								…
							(LSB)	k

Length:

The Length field is a binary value indicating the number of octets following the Length field.

Container:

This field contains the Target RNC to Source RNC Transparent Container element as defined in 3GPP TS 25.413.

5.2.77 Service Option Connection Identifier (SOCI)

The purpose of the Service Option Connection Identifier is to distinguish multiple parallel service option connections within one mobile station between BS and MSC. It is coded as follows:

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved					Service Option Connection Identifier			3

Length:

The Length field is a binary value indicating the number of octets following the Length field.

Service Option Connection Identifier :

SOCI values are always assigned by the BS. At the beginning of a service option connection between BS and MSC a free 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 free and may be reassigned to a later service option connection.

This field has a range of 001-110 and all other values are reserved.

5.2.78 Service Option List

This element indicates a list of the service options requested by the MS, or by the network. It is coded as follows:

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Number of Service Options								3
Reserved				SOCI- 1				4
(MSB)	Service Option – 1							5
							(LSB)	6
. . .								. . .
Reserved				SOCI - n				k
(MSB)	Service Option - n							k+1
							(LSB)	k+2

Length:

The Length field is a binary value indicating the number of octets following the Length field.

The Number of Service Options field contains the number of service options included in this element. The maximum value of this field is 2 in this revision of IOS.

Service Option Connection Identifier (SOCI):

This field uses to distinguish multiple parallel service option connections within one mobile station between BS and MSC. It shall be formatted according to Service Option Connection Identifier element defined in section 5.2.77.

Service Option:

This field contains the Service Option associated with the Service Option Connection Identifier. It shall be formatted according to octets 2 through the end of the Service Option element defined in section 5.2.53.

5.2.79 AMPS Hard Handoff Parameters

This element is used to deliver information needed by the source BS to perform hard handoff to an AMPS system.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
Reserved						Encryption Mode		3

Length:

This field contains the total number of octets in this element following the Length field represented as a binary value.

Encryption Mode:

The Encryption Mode indicates whether encryption will 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.

5.2.80 Band Class

This information element specifies the frequency band.

<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="3">Reserved</td><td colspan="5">Band Class</td><td>3</td></tr>
</table>

The Length field contains the number of octets in this element following the Length field.

The coding of the Band Class field is specified in Table 5.2.80-1. This table contains band class values defined in [35]. If there are any discrepancies between this table and [35], the latter shall be considered correct.

Table 5.2.80-1 Band Class

Binary Values	Meaning
0 0000	800 MHz Cellular System
0 0001	1.850 to 1.990 GHz Broadband PCS
0 0010	872 to 960 MHz TACS band
0 0011	832 to 925 MHz JTACS band
0 0100	1.750 to 1.870 GHz Korean PCS band
0 0101	NMT-450 band
0 0110	IMT-2000 band
0 0111	North American 700 MHz Cellular Band
All other values reserved	

5.2.81 Information Record Requested

This information element 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.

<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="8">Information Record Type 1</td><td>3</td></tr>
<tr><td colspan="8">• • •</td><td>• • •</td></tr>
<tr><td colspan="8">Information Record Type n</td><td>variable</td></tr>
</table>

For coding of the Information Record Type refer to C.S0005-A.

5.2.82 Anchor PDSN IP Address

This element is used to deliver IPv4 address of Anchor PDSN for Fast Handoff.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
(MSB)								3
Anchor PDSN IP Address								4
								5
							(LSB)	6

Length:

This field contains the number of octets in this element following this field as a binary number.

Anchor PDSN IP Address:

This field contains an IPv4 address for an anchor PDSN.

5.2.83 Protocol Revision

This Protocol Revision element contains the protocol revision level being used for the mobile at the BS (PREV_IN_USE). This value is equal to the lesser of the mobile protocol revision level supported by the mobile (MOB_P_REV) and the BS. The BS uses this information to determine how to set the PD (Protocol Discriminator) bit in the associated air interface message. This new capability is introduced by *IS-2000* Release A.

7	6	5	4	3	2	1	0	Octet
A1 Element Identifier								1
Length								2
PREV_IN_USE								3

If PREV_IN_USE is equal to seven or greater, the BS shall set the PD field to ‘01’ for all messages sent to the mobile on the Paging Channel[2]. If the PREV_IN_USE field is set to less than 7, the BS shall set the PD field to ‘00’.

[2] Except General Page Message

6.0 Timer Definitions

6.1 Timer Values

The following table is in units of seconds unless otherwise noted.

Table 6.1-1 Timer Values and Ranges Sorted by Name

Timer Name	Default Value (seconds)	Range of Values (seconds)	Granularity (seconds)	Section Reference	Classification
T1	55	0 – 255	1	6.2.5.1	Facilities Management
T2	60	0 – 255	1	6.2.5.2	Facilities Management
T4	60	0 – 255	1	6.2.5.3	Facilities Management
T7	10	0 – 255	1	6.2.4.1	Handoff
T8	See section 6.2.4.2.			6.2.4.2	Handoff
T9	10	0 – 255	1	6.2.4.3	Handoff
T10	5	0 – 99	1	6.2.1.1	Call Processing
T11	5	0 – 99	1	6.2.4.4	Handoff
T12	60	0 – 255	1	6.2.5.4	Facilities Management
T13	55	0 – 255	1	6.2.5.5	Facilities Management
T16	60	0 – 255	1	6.2.5.6	Facilities Management
T20	5	0 – 99	1	6.2.1.2	Call Processing
T60	5	0 – 99	1	6.2.2.4	Supplementary Services
T62	5	0 - 99	1	6.2.2.2	Supplementary Services
T63	See section 6.2.2.3.			6.2.2.3	Supplementary Services
T300	1.5	0 - 99	0.1	6.2.1.3	Call Processing
T301	30	0 - 60	1	6.2.1.4	Call Processing
T303	6	0 - 99	1	6.2.1.5	Call Processing
T306	5	0 - 99	1	6.2.1.6	Call Processing
T308	5	0 - 99	1	6.2.1.7	Call Processing
T309	5	0 - 90	1	6.2.5.7	Facilities Management
T311	1	0 - 5	0.1	6.2.1.8	Call Processing
T314	5	0 - 99	1	6.2.1.9	Call Processing
T315	5	0 - 99	1	6.2.1.10	Call Processing
T3231	5	0-99	1	6.2.1.13	Call Processing

Table 6.1-1 Timer Values and Ranges Sorted by Name

Timer Name	Default Value (seconds)	Range of Values (seconds)	Granularity (seconds)	Section Reference	Classification
T3113	See section 6.2.1.14.			6.2.1.14	Call Processing
T3210	30	0 - 99	1	6.2.3.1	Mobility Management
T3220	10	0 - 99	1	6.2.3.2	Mobility Management
T3230	5	0 - 99	1	6.2.1.15	Call Processing
T3260	30	0 - 99	1	6.2.3.3	Mobility Management
T3270	5	0 - 99	1	6.2.3.4	Mobility Management
T3271	15	0 - 99	1	6.2.3.5	Mobility Management
T3272	5	0 - 99	1	6.2.3.6	Mobility Management
T3280	15	0 - 99	1	6.2.1.16	Call Processing
Tpaca1	5	0 - 99	1	6.2.1.11	Call Processing
Tpaca2	5	0 - 99	1	6.2.1.12	Call Processing
Tsoftpos	10	0 - 99	1	6.2.2.1	Supplementary Services

6.2 Timer Definitions

6.2.1 Call Processing Timers

6.2.1.1 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.

6.2.1.2 T_{20}

This BS timer is started when the Assignment Failure message is sent, and stopped when the Assignment Request message (retry) is received or when the MSC initiates call clearing.

6.2.1.3 T_{300}

This BS timer is started when a Clear Request message is sent. It is stopped when a Clear Command message is received.

6.2.1.4 T_{301}

This MSC timer is started when the Assignment Complete message is received, and stopped when the Connect message is received (ring time-out, max. 60 seconds).

6.2.1.5 T_{303}

BS timer T303 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 or a Clear Command 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 from the MSC.

6.2.1.6 T_{306}

BS timer T_{306} is started when the Handoff Commenced message is sent and stopped when the Clear Command message is received.

6.2.1.7 T_{308}

This timer is started when the Service Release message is sent, and stopped when the Service Release Complete message is received. This timer is used at both the MSC and BS.

6.2.1.8 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.

6.2.1.9 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.

6.2.1.10 T_{315}

This MSC timer is started when the Clear Command message is sent, and stopped when the Clear Complete message is received.

6.2.1.11 T_{paca1}

This MSC timer is started the PACA Command message is sent and is stopped when a PACA Command Ack Message is received.

6.2.1.12 T_{paca2}

This MSC timer is started the PACA Update message is sent and is stopped when a PACA Update Ack Message is received.

6.2.1.13 T_{3231}

This MSC timer is started the SCCP Connection Request primitive is sent, and is stopped when an SCCP Connection Confirm primitive or an SCCP Connection Refused primitive is received.

6.2.1.14 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 for this timer can be calculated for a MS in slotted mode by the following formula:

$$T_{3113} = 4.72 + (1.28 * 2^{\text{Slot Cycle Index}})$$

6.2.1.15 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.

6.2.1.16 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.

6.2.1.17 T_{waitho}

This is a *TIA/EIA/IS-2000* timer that is shown in this standard for descriptive purposes only. It 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 must wait until this timer expires (if the timer is started) before sending the Handoff Commenced message to the MSC.

6.2.1.18 T_{rp}

This is the A10 connection registration Lifetime timer. This timer is started at the time of establishment of an A10 connection and updated during periodic re-registrations of the A10 connection. The A10 connection is cleared on expiration of this timer. A T_{rp} value of “FF FF H” (two octets, all bits set to ‘1’) indicates infinite Lifetime. A value of “00 00 H” (two octets, all bits set to ‘0’) indicates that the A10 connection is to be released.

6.2.1.19 T_{regreq}

The PCF timer Tregreq is started when the Registration Request message is sent, and stopped when the Registration Reply message is received.

6.2.1.20 T_{regupd}

The PDSN timer T_{regupd} is started when the Registration Update message is sent, and stopped when the Registration Acknowledge message is received.

6.2.2 Supplementary Services Timers

6.2.2.1 $T_{softpos}$

MSC timer Tsoftpos is started when the Radio Measurements for Position Request message is sent and stopped when the Radio Measurements for Position Response message is received.

6.2.2.2 T_{62}

MSC timer T_{62} is started when the Flash with Information message is sent and stopped when the Flash with Information Ack message is received.

6.2.2.3 T_{63}

MSC timer T_{63} 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 for this timer can be calculated for a MS in slotted mode by the following formula:

$$T_{63} = 4.72 + (1.28 * 2^{\text{Slot Cycle Index}})$$

6.2.2.4 T_{60}

The BS starts this timer when the ADDS Transfer Message is sent to the MSC with the ADDS User Part element Data Burst Type field set equal to Short Data Burst. The BS stops this timer when the ADDS Transfer Ack Message is received from the MSC.

6.2.3 Mobility Management Timers

6.2.3.1 T_{3210}

This BS timer is started when the Location Updating Request message is sent, and is stopped when a Location Updating Accept message, or a Location Updating Reject message is received.

6.2.3.2 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.

6.2.3.3 T_{3260}

This MSC timer is started when the Authentication Request message is sent, and is stopped when the Authentication Response message is received.

6.2.3.4 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.

6.2.3.5 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.

6.2.3.6 T3272

This MSC timer is started when the Status Request message is sent and is stopped when the Status Response message is received.

6.2.4 Handoff Timers

6.2.4.1 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 (see 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.

6.2.4.2 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 mobile has not left the source BS).

For further information and an explicit definition of this timer see the appropriate air interface standard, e.g., [1] to [6].

6.2.4.3 T_9

The target BS starts this timer when sending the Handoff Request Acknowledge message to the MSC. It is stopped when the mobile station is acquired. It represents the time to reserve the target channel while waiting for the mobile to arrive on the target channel. This should be at least as long as T_8.

6.2.4.4 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 is received or the SCCP connection is refused or released by the BS.

6.2.5 Facility Management Timers

6.2.5.1 T_1

The BS starts this timer when the Block or Unblock message is sent and stops it when the Block Acknowledge or Unblock Acknowledge message is received.

6.2.5.2 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).

6.2.5.3 T_4

The BS starts this timer when the Reset message is sent and stops it when the Reset Acknowledge message is received. If timer T_4 expires without receiving a Reset Acknowledge message, the BS repeats the Reset procedure. 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).

6.2.5.4 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.

6.2.5.5 T_{13}

Timer T_{13} represents a Reset guard period at the BS. To avoid a “deadlock” situation during a MSC triggered global reset procedure, timer T_{13} (BS) should always be less than timer T_{16} (MSC).

6.2.5.6 T_{16}

The MSC starts this timer when a Reset message is sent and stops it when a Reset Acknowledge message is received. If timer T_{16} expires without receiving a Reset Acknowledge message, the MSC repeats the Reset procedure. To avoid a “deadlock” situation during a MSC triggered global reset procedure, timer T_{13} (BS) should always be less than timer T_{16} (MSC).

6.2.5.7 T_{309}

The MSC starts this timer when the Transcoder Control Request message is sent, and stops it when the Transcoder Control Acknowledge message is received.