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Interoperability Specification (IOS) for cdma2000 Access Network Interfaces — Part 6 (A8 and A9 Interfaces)

(3G-IOS v4.3)

(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 A8 and A9 interfaces.

1.1.1 Purpose

The purpose is to provide the standard for interfacing a PCF with one or more BSs. This document defines the functional capabilities, including services and features, of the specified interface. These services and features are the defining characteristics that are the basis for the overall system standard.

1.1.2 Scope

This standard provides the specification for the Interface which coincides with the Reference Point "$A_{quinter}$" defined in the TR45 Network Reference Model shown in [23]. The scope of this standard includes the following topics:

- Descriptions of the specified functional capabilities that provide packet data services across the BS-PCF interface;
- Descriptions of the division of responsibility of the functions provided between the BS and the PCF without prescribing specific implementations.

1.2 References

1.2.1 TIA / EIA

For ease of cross referencing, the Telecommunications Industry Association (TIA) / Electronics Industry Association (EIA) references provided in this section are aligned with the 3GPP2 references, provided in section 1.2.2.

[1] TIA/EIA/IS-2000.1-B, Introduction for cdma2000 Standards for Spread Spectrum Systems, May 2002.

[2] TIA/EIA/IS-2000.2-B, Physical Layer Standard for cdma2000 Spread Spectrum Systems, May 2002.

[3] TIA/EIA/IS-2000.3-B, Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems, May 2002.

[4] TIA/EIA/IS-2000.4-B, Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems, May 2002.

[5] TIA/EIA/IS-2000.5-B, Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems, May 2002.

[6] TIA/EIA/IS-2000.6-B, Analog Signaling Standard for cdma2000 Spread Spectrum Systems, May 2002.

[7] Reserved.

[8] Reserved.

[9] TIA/EIA-41-D, Cellular Radiotelecommunications Intersystem Operations; December 1997.
[10] Reserved.
[11] Reserved.
[12] Reserved.
[13] TIA/EIA-2001.3-C, Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 3 Features, May 2002.
[14] TIA/EIA-2001.4-C, Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 4 (A1, A2, and A5 Interfaces), May 2002.
[15] TIA/EIA-2001.7-C, Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)
[16] Reserved.
[17] Reserved.
[18] TIA/EIA/IS-637-B, Short Message Service for Wideband Spread Spectrum Systems, January 2002.
[19] TIA/EIA/IS-707-A-2, Data Service Options for Spread Spectrum Systems - Addendum 2, March 2001.
[20] TIA/EIA/IS-801-1, Position Determination Service Standards for Dual Mode Spread Spectrum Systems, March 2001.
[21] TIA/EIA/TSB29-D, International Implementation of Wireless Telecommunication Systems Compliant with ANSI/TIA/EIA-41, December 2000.
[22] TIA/EIA/TSB58-E, Administration of Parameter Value Assignments for cdma2000 Spread Spectrum Standards; January 2002.
[23] TIA/EIA/TSB100-A, Wireless Network Reference Model, March 2001.

1.2.2 3GPP2

The 3GPP2 references are aligned with the TIA/EIA references of section 1.2.1 and are provided here for information and cross reference purposes.

[1] 3GPP2 C.S0001-B, Introduction to cdma2000 Standards for Spread Spectrum Systems, May 2002.
[2] 3GPP2 C.S0002-B, Physical Layer Standard for cdma2000 Spread Spectrum Systems, May 2002.
[3] 3GPP2 C.S0003-B, Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems, May 2002.
[4] 3GPP2 C.S0004-B, Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems, May 2002.
[5] 3GPP2 C.S0005-B, Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems, May 2002.
[6] 3GPP2 C.S0006-B, Analog Signaling Standard for cdma2000 Spread Spectrum Systems, May 2002.
[7] Reserved.
[8] Reserved.
[9] Reserved.
[10] Reserved.
[11] Reserved.
[12] Reserved.
[13] 3GPP2 A.S0013-A, Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 3 Features, May 2002.
[14] 3GPP2 A.S0014-A, Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 4 (A1, A2, and A5 Interfaces), May 2002.
[15] Reserved.
[16] Reserved.
[17] Reserved.

[18] 3GPP2 C.S0015-0, Short Message Service (SMS) for Wideband Spread Spectrum Systems, January 2002.
[19] 3GPP2 C.S0017-0-2, Data Service Options for Spread Spectrum Systems - Addendum 2, August 2000.
[20] 3GPP2 C.S0022-0-1, Position Determination Service Standard for Dual Mode Spread Spectrum Systems - Addendum, February 2001.
[21] 3GPP2 N.S0017-A, International Implementation of Wireless Telecommunication Systems Compliant with TIA/EIA-41, March 2001.
[22] 3GPP2 C.R1001-V, Administration of Parameter Value Assignments for CDMA Spread Spectrum Standards, January 2002.
[23] 3GPP2 S.R0005-B, Network Reference Model for cdma2000 Spread Spectrum Systems, April 2001.

1.3 Terminology

1.3.1 Acronyms

Acronym	Meaning
3GPP2	Third Generation Partnership Project 2
ADDS	Application Data Delivery Service
BS	Base Station
BSC	Base Station Controller
CCPD	Common Channel Packet Data
CDMA	Code Division Multiple Access
CM	Connection Management
CON_REF	Connection Reference
DRS	Data Ready to Send
EIA	Electronics Industry Association
ESN	Electronic Serial Number
GRE	Generic Routing Encapsulation
IEI	Information Element Identifier
IMSI	International Mobile Subscriber Identity
IOS	Interoperability Specification
IP	Internet Protocol
IS	Interim Standard
LSB	Least Significant Bit
MIP	Mobile Internet Protocol
MS	Mobile Station
MSB	Most Significant Bit
MSC	Mobile Switching Center
MSCID	Mobile Station Connection Identifier
NID	Network Identification

Acronym	Meaning
OAM&P	Operations, Administration, Maintenance, and Provisioning
PANID	Previous Access Network Identifiers
PCF	Packet Control Function
PDSN	Packet Data Serving Node
PPP	Point-to-Point Protocol
P-P	PDSN-PDSN Interface
PZID	Packet Zone Identifier
QoS	Quality of Service
RN-PDIT	Radio Network Packet Data Inactivity Timer
SDB	Short Data Burst
SID	System Identification
SR_ID	Session Reference ID
TIA	Telecommunications Industry Association
TSB	Telecommunications Systems Bulletin
UZID	User Zone ID

1.3.2 Definitions

Reserved

1.4 Message Body, Coding, and Ordering of Elements

For each A9 Interface message there are a number of information elements that are individually defined in section 4. Each information element in a given message is tagged with a reference in section 4, 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 -> PCF	Element flows from the BS to the PCF
PCF->BS	Element flows from the PCF to the BS

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

M — Information elements which are mandatory for the message.

O — Information elements which are optional for the message.

R — Required in the message whenever the message is sent.

C — Conditionally required. The conditions for inclusion of this element are defined in the operation(s) where the message is used (refer to [13])

and in footnotes associated with the table defining the order of information elements in the message.

Information elements which are mandatory for a given message shall be present, and appear in the order shown in the message definitions in this chapter.

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 3.0 are patterned after the format for the information elements of section 4 and use the following conventions:

⇒ **Element Name{<# instances>:**

= Name of information element.

Different elements within a message are separated by double lines.

Fields within elements are separated by single lines.

Octets are renumbered at the beginning of every element.

[<values>] = Set of allowed values.

} Element Name The number of instances of an element is 1 by default. If the **Element Name{<# instances … }Element Name** notation is used, the <**# instances**> notation indicates:

n = exactly n occurrences of the element

n+ = n or more occurrences of the element

1..n = 1 to n inclusive occurrences of the element

label {<# instances>:

<octet 1>

<octet m>

} label = Number of instances of the bracketed set of fields where <**# instances**> notation indicates:

n = exactly n occurrences of the field

n+ = n or more occurrences of the field

1..n = 1 to n inclusive occurrences of the field

SSSS SSSS

… = Variable length field.

SSSS SSSS

1.5 Forward Compatibility Guidelines

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

Unexpected signaling information may be received at an entity due to differing levels of signaling protocol at different entities within a network: an entity using a more enhanced version of the protocol may send 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 to ensure predictable network behavior.

If the receiving entity is implemented to TIA/EIA/IS-2001 (IOS V4.0) 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.

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 3.

1. If a message is received containing a Message Type value which is not defined for the revision level implemented then the message shall be discarded and ignored. There shall be no change in state or in timers due to receipt of an unknown message.
2. If a message is received without an expected mandatory information element for the revision level implemented then the message shall be discarded and ignored. There shall be no change in state or in timers due to receipt of the message.
3. If a message is received that contains an information element which is defined for the revision level implemented but contains invalid values in some fields, these fields shall be ignored and the remainder of the information element processed to the extent possible. The message and all other information elements shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue. Also refer to message processing guidelines 9 and 10 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. If a field within a received information element contains a value that is specified as "reserved" or is otherwise not defined in the revision level implemented, this field shall be ignored and the remainder of the information element processed to the extent possible. In this situation, all other information elements in the message shall be processed to the extent possible.
8. Octets and bits designated as "Reserved" or which are undefined for the revision implemented shall be set to zero by a sending entity and ignored by a receiving entity.
9. If an element is received containing a field that is larger than expected, i.e., is indicated as having more bits/octets than expected, then the expected bits/octets of that field shall be processed to the extent possible and the additional bits/octets shall be ignored.
10. If an element is received containing a field that is smaller than expected, i.e., is indicated as having fewer bits/octets than expected, then the length field or other indicator shall be considered correct and the bits/octets actually present in the element shall be processed to the extent possible. Failure handling may be initiated if call processing cannot continue.

1.7 Message Definition Guidelines

1. New messages shall have a Message Type that has never been previously used.
2. 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 3.
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.

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2.0 Message Procedures

2.1 A8/A9 Interface Setup Procedures And Messages

This section contains the messages used to set up an A8 connection.

2.1.1 A9-Setup-A8

This message is sent from the BS to the PCF to initiate the establishment of an A10 connection and to set up an A8 connection (if required).

2.1.1.1 Successful Operation

When the BS receives an Assignment Request from the MSC, as a result of sending a CM Service Request (in response to an Origination Message from the mobile with a Service Option that requests packet data service and with the DRS bit set to 1), or as a result of sending a Paging Response, it initiates the procedure for establishing radio traffic channels. After establishing traffic channels, the BS determines the characteristics for an A8 connection such as QoS and generates an A9-Setup-A8 message indicating the normal call setup (i.e., the handoff indicator field of the A9-Setup-A8 message is set to '0'). The BS sends the message to the PCF on the A9 interface and starts timer $T_{A8\text{-}Setup}$. Upon receiving the message, the PCF initiates the procedure for establishing an A10 connection.

After establishing an A10 connection, the PCF sends an A9-Connect-A8 message to the BS.

When the mobile station performs a hard handoff during packet data services, the target BS sends the A9-Setup-A8 message upon receipt of the Handoff Request message from the MSC and starts timer $T_{A8\text{-}Setup}$. In this case, the BS sets the Handoff Indicator field of the A9-Setup-A8 message to '1' and Data Ready Indicator is set to '1'.

In the case of dormant handoff the BS sends the A9-Setup-A8 message to the PCF upon receipt of the ADDS Transfer Ack message from the MSC as a result of sending an ADDS Transfer message (in response to an Origination message from the mobile with a Service Option that requests packet data service and with the DRS bit set to '0'). The BS sets both the Data Ready Indicator and the Handoff Indicator to '0'. The BS awaits the response from the PCF to determine if a traffic channel needs to be established. If upon receipt of the A9-Setup-A8 message the PDSN has no data to send to the MS (in the case of a dormant handoff), or if the PCF could not setup the A8 connection due to PDSN resources being unavailable, the PCF sends the A9-Release-A8 Complete message. Upon receipt of this message, the BS stops timer $T_{A8\text{-}setup}$.

This message is also sent as a result of a CCPD Mode Request from a mobile, or a network initiated CCPD Mode. The BS shall set the CCPD Mode bit in the message to '1' to indicate to the PCF that an A8 connection is not required for the call. If the CCPD mode request was initiated by a CCPD Device, i.e. the mobile doesn't support IS-2000 traffic channels, the BS shall set the CCPD Device bit in the message to '1'.

2.1.1.2 Failure Operation

If the BS fails to receive an A9-Connect-A8, that is to say, the timer $T_{A8\text{-}setup}$ has expired before receiving an A9-Connect-A8 or A9-Release-A8 Complete message, the BS sends an Assignment Failure message or a Handoff Failure message, as appropriate, to the MSC.

If the message was sent as a result of a CCPD Mode request and the timer expires, the CCPD call attempt shall fail.

If the A10/A11 connection establishment procedure is required but fails, the PCF should send an A9-Release-A8 Complete message with Cause Value set to "PDSN resources not available (0x79)".

2.1.2 A9-Connect-A8

This A9 message is used to respond to an A9-Setup-A8 message.

2.1.2.1 Successful Operation

The PCF sends an A9-Connect-A8 message to the BS in response to an A9-Setup-A8 message. If establishment of an A10/A11 connection is needed (e.g., during normal call setup), this message shall be sent after the connection establishment is successful. If the handoff indicator field of the A9-Setup-A8 message is set to '1', the PCF starts timer $T_{waitho9}$. The PCF stops timer $T_{waitho9}$ upon receipt of the A9-AL (Air Link) Connected message. Upon receiving the A9-Connect-A8 message, the BS stops the timer $T_{A8\text{-}setup}$.

Then the BS sends an Assignment Complete message or a Handoff Request Ack message to the MSC to indicate that all resources for the requested connection have been allocated successfully.

2.1.2.2 Failure Operation

If the timer $T_{waitho9}$ expires, the PCF should initiate clearing of the A8 connection by sending a A9-Disconnect-A8 to the BS. The PCF starts timer $T_{discon9}$.

2.1.3 A9-BS Service Request

This A9 interface message is sent from the PCF to the BS to begin a BS initiated call setup.

2.1.3.1 Successful Operation

To initiate a call setup, the PCF sends an A9-BS Service Request message to the BS containing the identity of the mobile station that needs to be paged. The PCF starts timer T_{bsreq9} and awaits the reception of the A9-BS Service Response message.

2.1.3.2 Failure Operation

If an A9-BS Service Response message is not received at the PCF before the expiration of timer T_{bsreq9}, then the PCF may resend the A9-BS Service Request message.

2.1.4 A9-BS Service Response

This A9 interface message is sent from the BS to the PCF in response to an A9-BS Service Request.

2.1.4.1 Successful Operation

The BS shall send an A9-BS Service Response message to the PCF originating the A9-BS Service Request message. Upon receiving the A9-BS Service Response Message, the PCF stops timer T_{bsreq9}.

2.1.4.2 Failure Operation

None.

2.2 A8/A9 Interface Clearing Procedures and Messages

2.2.1 A8/A9 Interface Clearing Procedures

Procedures for clearing the A8 connection are described in this section. An A8 connection clearing is initiated whenever the state of the packet data service changes from the active state to the dormant/null state. Clearing the A8 connection and the traffic channel does not necessarily correspond to clearing of the packet data service session. These scenarios assume that the mobile is not engaged in concurrent services.

2.2.1.1 Successful Clearing Scenarios

An A8 connection clearing occurs:

- When a packet data inactivity timer in the BS expires. The BS, after sending the Clear Request message, sets timer T_{300} and waits for a Clear Command message from the MSC. To release all allocated resources, the MSC shall send a Clear Command message to the BS, start timer T_{315}, and wait for the Clear Complete message from the BS. After stopping timer T_{300} and releasing the air resources, the BS sends an A9-Release-A8 message to the PCF and starts timer T_{rel9}. The PCF responds with an A9-Release-A8 Complete message. Then the BS sends a Clear Complete message and stops timer T_{rel9}. The BS Initiated Call Release to Dormant State scenario is illustrated in [13]. .
- When the packet data inactivity timer in the MS expires. When the BS receives a Release Order requesting the transition to dormant, the BS shall send a Clear Request message to the MSC. The rest of the procedure is same as the BS initiated scenario. The MS Initiated Call Release to Dormant State scenario is illustrated in [13].
- When the MS releases the call. When the BS receives a Release Order, the BS shall send a Clear Request message to the MSC and start timer T_{300}. To release all allocated resources, the MSC shall send a Clear Command message to the BS, start timer T_{315}, and wait for the Clear Complete message from the BS. After stopping timer T_{300} and releasing the air resources with the Release Order, the BS sends an A9-Release-A8 message to the PCF and starts timer T_{rel9}. The PCF responds with an

A9-Release-A8 Complete message. Then the BS sends a Clear Complete message and stops timer T_{rel9}. The MS Power Down scenario is illustrated in [13].

- When the A10/A11 connection is released by the PDSN. When the PCF detects that the A10/A11 connection is released, the PCF sends an A9-Disconnect-A8 message to the BS and starts timer $T_{discon9}$. Then the BS initiates the release of the A8 connection by sending an A9-Release-A8 message and starts timer T_{rel9}. The PCF responds with an A9-Release-A8 Complete message and stops timer $T_{discon9}$. The BS, after sending the Clear Request message and stopping timer T_{rel9}, sets timer T_{300} and waits for a Clear Command message from the MSC. To release all allocated resources, the MSC shall send a Clear Command message to the BS, start timer T_{315}, and wait for the Clear Complete message from the BS. Then the BS stops timer T_{300}, releases the air resources, and responds with a Clear Complete message. The PDSN Initiated Service Release scenario is illustrated in [13]. Note that the A9-Release-A8 message and A9-Release-A8 Complete message are also used to indicate that an A8 connection is not being established due to either PDSN resources being unavailable, during dormant handoff if the PDSN has no data to send, or during a CCPD call.

2.2.1.2 Unsuccessful A8 Interface Clearing Procedures

Refer to the message procedures for the A9-Release-A8, A9-Release-A8 Complete and A9-Disconnect-A8 messages in sections 2.2.2, 2.2.3 and 2.2.4.

2.2.2 A9-Release-A8

This A9 interface message is sent from the BS to the PCF to request the release of the associated dedicated resource.

2.2.2.1 Successful Operation

When the BS needs to release an A8 connection, it sends an A9-Release-A8 message to the PCF. The BS starts timer T_{rel9} and waits for the A9-Release-A8 Complete message from the PCF.

When the PCF receives the A9-Release-A8 message, it stops timer $T_{discon9}$ or T_{aldak} if it is active and performs the appropriate procedure to release the associated dedicated resources. For the handoff case, timer $T_{waitho9}$ is stopped.

2.2.2.2 Failure Operation

If an A9-Release-A8 Complete message is not received from the PCF before timer T_{rel9} expires, the BS may resend the A9-Release-A8 message to the PCF and restart timer T_{rel9}. If the A9-Release-A8 Complete message is not received from the PCF before timer T_{rel9} expires a second time or if the BS chooses to not resend the A9-Release-A8 message, the BS shall cease further supervision of this call connection, release all dedicated resources, air and terrestrial, and release the connection.

2.2.3 A9-Release-A8 Complete

This A9 interface message is sent from the PCF to the BS to acknowledge completion of the request to release the A8 connection or to indicate to the BS that an A8 connection

has not been established due to either PDSN resources being unavailable, during dormant handoffs if the PDSN has no data to send, or during a CCPD mode call setup.

2.2.3.1 Successful Operation

Upon receipt of the A9-Release-A8 message from the BS, the PCF closes the A8 connection and sends an A9-Release-A8 Complete to notify the BS of the outcome. Alternatively, if upon receipt of the A9-Setup-A8 message the PDSN has no data to send to the MS (in the case of a dormant handoff), the PCF could not setup the A8 connection due to PDSN resources being unavailable, or a CCPD mode call setup or dormant mode handoff is being performed for a CCPD mobile, the PCF shall send the A9-Release-A8 Complete message. Upon receipt of this message the BS stops timer $T_{A8\text{-}Setup}$ if the message was sent in response to an A9-Update-A8 message. The BS stops timer T_{rel9} if the message was sent in response to an A9-Release-A8.

2.2.3.2 Failure Operation

None.

2.2.4 A9-Disconnect-A8

This A9 interface message is sent from the PCF to the BS to request to release the associated dedicated resource.

2.2.4.1 Successful Operation

When the PCF needs to release an A8 connection, it sends an A9-Disconnect-A8 message to the BS. The PCF starts timer $T_{discon9}$.

2.2.4.2 Failure Operation

If an A9-Release-A8 message is not received from the BS before timer $T_{discon9}$ expires, the PCF may resend an A9-Disconnect-A8 message to the BS and restart timer $T_{discon9}$. If the A9-Release-A8 message is not received from the BS before timer $T_{discon9}$ expires a second time or if the PCF chooses to not resend the A9-Disconnect-A8 message, the PCF shall cease further supervision of this call connection, send the A9-Release-A8 Complete message, and release its resources.

2.3 A8/A9 Interface Handoff Procedures and Messages

This section contains the messages used during handoff procedure.

2.3.1 A9-Air Link (AL) Connected

After the mobile station performs (inter-BS) hard handoff, the A9-AL Connected message is sent from the target BS managing the active air link to the target PCF. This message is employed to notify the target PCF that handoff is successfully completed and that the air link has been established and that the PCF can send packets on the new A8 connection. An A9-AL Connected Ack message is expected in response in a successful situation. If the target PCF is not able to establish an A10 connection with a selected PDSN, it sends back an A9-Disconnect-A8 to the BS to release the A8 connection.

2.3.1.1 Successful Operation

After the mobile station performs (inter-BS) hard handoff including the case of return on failure, the target BS managing the active air link sends the A9-AL Connected message to the target PCF and starts timer T_{alc9}.

Upon the receipt of the A9-AL Connected message, the PCF updates its routing table to route packet data sent from the PDSN to the target BS managing the active air link. The PCF performs A10/A11 connection establishment if the A10/A11 connection has not been established yet. If the PCF is unable to establish the new A10/A11 connection, it sends an A9-Disconnect-A8 message to the BS. Upon receipt of this message, the BS begins call tear-down.

In the case when the PCF supports fast handoff, the A10 connection has already been established, and when the PCF receives the A9-AL Connected message it starts to forward the data from the PDSN to the BS.

2.3.1.2 Failure Operation

If timer T_{alc9} expires, the message may be resent. If the A9-AL-Connected message is not resent or resending of this message also results in failure, the BS shall send either a Service Release message (in the case the handoff was for a concurrent service) or a Clear Request message (in the case the handoff was for a single service) to the MSC. If the target PCF is unable to establish an A10 connection with a selected PDSN it should release the A8 connection. It does so by signaling to the BS that the A8 connection is to be torn down (via the A9-Disconnect-A8 message).

2.3.2 A9-Air Link (AL) Connected Ack

The A9-AL Connected Ack message is sent from the target PCF to the target BS to indicate the result of processing the A9-AL Connected message.

2.3.2.1 Successful Operation

Upon receipt of an A9-AL Connected message from the target BS, the PCF shall transmit an A9-AL Connected Ack message to the target BS to indicate the outcome of processing the received message. The target BS shall stop timer T_{alc9}.

2.3.2.2 Failure Operation

None.

2.3.3 A9-Air Link (AL) Disconnected

When the mobile station performs hard handoff, the A9-AL Disconnected message is sent from the source BS to the source PCF. This message is employed to notify the source PCF that the air link is temporarily disconnected. An A9-AL Disconnected Ack message is expected in response.

2.3.3.1 Successful Operation

When the source BS receives the Handoff Command message which instructs it to perform hard handoff, the source BS shall send an A9-AL Disconnected message to the PCF and start timer T_{ald9}.

Upon receipt of an A9-AL Disconnected message from the source BS, the PCF shall stop transmitting packet data and start buffering packets from the PDSN.

2.3.3.2 Failure Operation

If timer T_{ald9} expires, the message may be resent.

2.3.4 A9-Air Link (AL) Disconnected Ack

The A9-AL Disconnected Ack message is sent from the PCF to the BS to indicate the result of processing the A9-AL Disconnected message.

2.3.4.1 Successful Operation

Upon receipt of an A9-AL Disconnected message from the BS, the PCF shall transmit an A9-AL Disconnected Ack message to the BS to indicate the outcome of processing the received message. The source BS shall stop timer T_{ald9} upon receipt of the A9-AL Disconnected Ack message. The PCF starts timer T_{aldak}.

2.3.4.2 Failure Operation

If timer T_{aldak} expires, the PCF may send the A9-AL Disconnected Ack to the BS again. .

2.3.5 A9-Short Data Delivery

This A9 interface message is sent from the BS to the PCF when it receives a short data burst from the MS. It may also be sent from the PCF to the BS when there is a small amount of packet data to be sent from the PDSN to a mobile. This message is used when the mobile's packet data service instance is dormant. The data is encapsulated in the ADDS user part element in SDB format as specified in [19].

This message is sent from the PCF to the BS when the PCF determines that a short data burst may be used to send the data to a dormant packet data service instance at the mobile.

When used in the PCF to BS direction, the PCF retains a copy of the data sent in the message. The message also contains a count of the number of additional bytes of data remaining at the PCF for the packet data service instance. This information may be used by the BS, for example in determining whether short data bursts could be used to deliver the data to the mobile.

When used to send data from the PCF to the BS for a CCPD device, the PCF shall not buffer the data.

2.3.5.1 Successful Operation

The BS sends the A9-Short Data Delivery message to the PCF after receiving a short data burst from the mobile and after optionally authenticating the mobile. Upon receipt of this message by the PCF, the packet data is sent to the PDSN.

The PCF sends the A9-Short Data Delivery message to the BS when it determines that there is a small amount of data to be sent to a dormant packet data service instance at the mobile or if the data is destined for a CCPD device. If the data is not being sent for a CCPD device, the PCF starts timer T_{sdd9} and waits for an A9-Short Data Ack message from the BS. If the BS decides that the data can be sent to the mobile as a Short Data Burst, an A9-Short Data Ack message is sent to the PCF with a successful Cause Value. The BS may also reject the PCF's request for a short data burst delivery via the A9-Short Data Ack. If the data is destined for a CCPD device, the BS shall not respond to the PCF with an A9-Short Data Ack message.

2.3.5.2 Failure Operation

If timer T_{sdd9} expires before the PCF receives an A9-Short Data Ack message from the BS, the buffered data at the PCF is discarded. This operation does not apply if the data was sent for a CCPD device.

2.3.6 A9-Short Data Ack

This message is sent from the BS to the PCF to acknowledge the receipt of the A9-Short Data Delivery message from the PCF. It also indicates to the PCF whether the data received is to be sent to the MS as a short data burst. This message is not used if the data sent from the PCF to the BS was destined for a CCPD device.

2.3.6.1 Successful Operation

If the BS decides to send the data received from the PCF to the mobile as a short data burst, it shall indicate this to the PCF in the A9-Short Data Ack message. Upon receiving this indication, the PCF stops timer T_{sdd9} and discards its copy of the buffered data. Note that acceptance of the data is independent of how what mechanism the BS chooses to send the data to the MS over the air interface. The BS may send this data directly to the mobile via a short data burst, or it may forward the data to the MSC using the BS Service Request/Response procedure. If the BS is unsuccessful in delivering the data to the MS on its own, it may choose to send the data to the MSC for delivery to the mobile via the ADDS Page procedure.

If the BS decides against delivering the data to the mobile as an SDB, it shall respond to the PCF with an A9-Short Data Ack message with a reject indication. Upon reception of this message, the PCF shall stop timer T_{sdd9} and then initiate re-activation of the packet data service instance from the dormant state. Refer to [13] for more details.

2.3.6.2 Failure Operation

None.

2.4 A8/A9 Interface Maintenance Procedures and Messages

This section describes the A9 version control messages.

2.4.1 A9-Version Info

This A9 interface message is sent from the PCF to the BS, or the BS to the PCF, when the sending entity requires the software version information of the receiving entity. The message may also be sent as result of BS or PCF reset. The sending entity includes its software version information in the message and a Cause Value if the message is sent as the result of reset.

2.4.1.1 Successful Operation

The sending entity starts timer T_{vers9} after the message is sent. The receiving entity responds with the A9-Version Info Ack message, which includes its software version information in the message.

2.4.1.2 Failure Operation

If the receiving entity fails to respond with an A9-Version Info Ack message prior to the expiration of Timer T_{vers9}, the sending entity may resend the message.

2.4.2 A9-Version Info Ack

This A9 interface message is sent from the PCF to the BS, or the BS to the PCF, in response to the A9-Version Info message. The message includes the software version information of the receiving entity.

2.4.2.1 Successful Operation

The BS or PCF that receives the A9-Version Info Ack message stops timer T_{vers9} upon reception of the message.

2.4.2.2 Failure Operation

If a BS or PCF receives the A9-Version Info Ack message without initiating the procedure with an A9-Version Info message, the message shall be ignored.

2.5 A9 Session Update Procedures

This section contains message procedures for passing update information over the A9 interface. The A8 connection may or may not be established prior to sending an update on the A9 interface.

2.5.1 A9-Update-A8

The A9-Update-A8 message is sent from the PCF to the BS to update the BS with new or updated packet data session parameters. An A8 connection may or may not be active when this message is sent.

The A9-Update-A8 message is sent from the BS to the PCF to convey accounting information to the PCF if the A8 connection is established before traffic channel establishment (in which case the PCF resumes data transmission on the A8 connection only after it receives the A9-Update-A8 message) or during an active session following accounting parameter changes which need to be conveyed to the PDSN indirectly via the PCF.

The A9-Update-A8 message is used to indicate to the PCF a successful Short Data Burst delivery.

The A9-Update-A8 message is also used to inform the PCF of an authentication failure at the MSC following an access attempt by a mobile undergoing dormant handoff. The BS can also use this message to inform the PCF that a dormant mobile has powered down. In these two cases, the PCF initiates the release of the A10 connection associated with the mobile.

2.5.1.1 Successful Operation

If the message is sent from the PCF to the BS to update packet data session parameters, the PCF sends the A9-Update-A8 message to the BS with the Cause field set to 'Session Parameter Update' upon reception of any new or updated session parameters from the PDSN. After sending the message to the BS, the PCF starts timer T_{upd9} and waits for an A9-Update-A8 Ack message from the BS.

If the message is sent from the BS to the PCF to pass update information, the BS shall set the Cause field to the appropriate value, start timer T_{upd9}, and wait for an A9-Update-A8 Ack message from the PCF.

2.5.1.2 Failure Operation

When the message is sent from the PCF to the BS to update packet data session parameters, if T_{upd9} expires, the PCF may resend the A9-Update-A8 message to the BS and restart timer T_{upd9} a configurable number of times. If the A9-Update-Ack message is not received from the BS, the session update procedure is considered failed and the PCF notifies the PDSN. In the event of a failure, if an A8 connection was active prior to the session update procedure, it shall remain connected.

When the message is sent from the BS to the PCF to pass update information, if an A9-Update-A8-Ack is not received from the PCF before timer T_{upd9} expires, the BS may resend the A9-Update-A8 message and restart timer T_{upd9}. If the Acknowledgment is not received from the PCF before timer T_{upd9} expires a configurable number of times, the BS ceases sending this message, and commences call clearing.

2.5.2 A9-Update-A8 Ack

This A9 interface message is sent to indicate the result of processing the A9-Update-A8 message.

2.5.2.1 Successful Operation

Upon receipt of an A9-Update-A8 message, the receiving entity shall transmit the A9-Update-A8 Ack message to indicate the result of processing the received message. The sending entity shall stop timer T_{upd9} upon receipt of the A9-Update-A8 Ack message.

2.5.2.2 Failure Operation

None.

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3.0 Message Formats

3.1 A9-Setup-A8

This A9 interface message is sent from the BS to the PCF to request the establishment of an A8 connection.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	BS -> PCF	M	
Call Connection Reference	4.2.10	BS -> PCF	O	R
Correlation ID	4.2.11	BS -> PCF	O[a]	C
Mobile Identity (IMSI)	4.2.2	BS -> PCF	O	R
Mobile Identity (ESN)	4.2.2	BS -> PCF	O[b]	C
CON_REF	4.2.14	BS -> PCF	O	R
Quality of Service Parameters	4.2.7	BS -> PCF	O[c]	C
A9 Cell Identifier	4.2.15	BS -> PCF	O	R
A8 Traffic ID	4.2.16	BS -> PCF	O	R
Service Option	4.2.8	BS -> PCF	O	R
A9 Indicators	4.2.17	BS -> PCF	O	R
User Zone ID	4.2.6	BS -> PCF	O[d]	C
IS-2000 Service Configuration Record	4.2.20	BS -> PCF	O[e]	C
Access Network Identifiers	4.2.19	BS -> PCF	O[f]	C
Current PDSN Address (source)	4.2.5	BS -> PCF	O[g]	C
Anchor PDSN Address	4.2.22	BS -> PCF	O[g]	C
Anchor P-P Address	4.2.12	BS -> PCF	O[i]	C
SR_ID	4.2.4	BS -> PCF	O[j]	R

a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Connect A8 message sent in response to this message.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. This information element is included if information is available at the BS. In this version of this standard, this element is used to carry the current non-assured mode priority of the packet data session.

d. The User Zone ID is included if received from the MS.

e. This information element may be omitted if the BS does not possess this information at the time the message if created.

f. The Access Node Identifiers (PANID) are included if received from the MS.

g. This is the IP address for the A10/A11 interface of the source PDSN. This element is only present if the BS received this information from source BS as part of a fast handoff request.

h. This is the IP address for the A10/A11 interface of the anchor PDSN. This element is only present if the BS received this information from source BS as part of a fast handoff request.

i. This is the IP address for the P-P interface of the anchor PDSN. This element is only present if the BS received this information from source BS as part of a fast handoff request.

j. This element specifies the SR_ID of the service instance in the Service Option element.

The following table shows the bitmap layout for the A9-Setup-A8 message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [01H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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):** A9 Element Identifier = [0DH]				1
Length = [05H]				2
Identity Digit 1 = [0000]		Odd/even Indicator = [0]	Type of Identity = [101] (ESN)	3
(MSB)	ESN = <any value>			4
				5
				6
			(LSB)	7
⇒ **CON_REF:** A9 Element Identifier = [01H]				1
Length = [01H]				2
IS-2000 CON_REF = [00H – FFH]				3
⇒ **Quality of Service Parameters:** A9 Element Identifier = [07H]				1
Length = [01H]				2
Reserved = [0000]		Non-Assured Mode Packet Priority = [0000 – 1101]		3
⇒ **A9 Cell Identifier:** A9 Element Identifier = [06H]				1
Length = [06H]				2
Cell Identification Discriminator = [07H]				3
(MSB)	MSCID = <any value>			4
				5
			(LSB)	6
(MSB)	Cell = [001H-FFFH]			7
		(LSB)	Sector = [0H-FH] (0H = Omni)	8
⇒ **A8 Traffic ID:** A9 Element Identifier = [08H]				1
Length = [0CH]				2
A8 transport protocol stack = [01H] (GRE/IP)				3
(MSB)	Protocol Type = [88 81H] (Unstructured byte stream)			4
			(LSB)	5
(MSB)	Key = <any value>			6
				7
				8
			(LSB)	9
Address Type = [01H] (IPv4)				10
(MSB)	IP Address = <any value>			11
				12
				13
			(LSB)	14

⇒ **Service Option:** A9 Element Identifier = [03H]								1
(MSB)	Service Option							2
= [00 21H (3G High Speed Packet Data), 00 3DH (Link Layer Assisted RObust Header Compression)]]							(LSB)	3
⇒ **A9 Indicators:** A9 Element Identifier = [05H]								1
Length = [01H]								2
Reserved = [0000]			CCPD Mode = [0,1]	CCPD Device = [0,1]	Data Ready Indicator = [0,1]		Handoff indicator = [0, 1]	3
⇒ **User Zone ID:** A9 Element Identifier = [02H]								1
Length = [02H]								2
(MSB)	UZID = <any value>							3
							(LSB)	4
⇒ ***IS-2000* Service Configuration Record:** A9 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
⇒ **Access Network Identifiers:** A9 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
⇒ **Current PDSN IP Address:** A9 Element Identifier = [14H]								1
Length = [04H]								2
(MSB)	Current PDSN Address = <any value>							3
								4
								5

	(LSB)	6
⇒ **Anchor PDSN Address:** A9 Element Identifier = [30H]		1
Length = [04H]		2
(MSB)	Anchor PDSN Address = <any value>	3
		4
		5
	(LSB)	6
⇒ **Anchor P-P Address:** A9 Element Identifier = [40H]		1
Length = [04H]		2
(MSB)	Serving P-P IP Address = <any value>	3
		4
		5
	(LSB)	6
⇒ **SR_ID:** A9 Element Identifier = [0BH]		1
Length = [01H]		2
Reserved = [0000 0]	IS-2000 SR_ID = [001 - 110]	3

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3.2 A9-Connect-A8

This A9 interface message is sent from the PCF to the BS to complete the setup of the A8 connection.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF -> BS	M	
Call Connection Reference	4.2.10	PCF -> BS	O	R
Correlation ID	4.2.11	PCF -> BS	O[a]	C
Mobile Identity (IMSI)	4.2.2	PCF -> BS	O	R
Mobile Identity (ESN)	4.2.2	PCF -> BS	O[b]	C
CON_REF	4.2.14	PCF -> BS	O	R
A8 Traffic ID	4.2.16	PCF -> BS	O	R
Cause	4.2.3	PCF -> BS	O[c]	R
Current PDSN Address	4.2.5	PCF -> BS	O[d]	R
Anchor PDSN Address	4.2.22	PCF -> BS	O[e]	C
Anchor P-P Address	4.2.12	PCF -> BS	O[f]	C
SR_ID	4.2.4	PCF -> BS	O[g]	R
Service Instance Info	4.2.26	PCF -> BS	O[h]	C

a. This element shall only be included if it was also included in the A9-Setup-A8 message. This element shall be set to the value received in that message.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. Allowable Cause Values are: “PCF resources not available”; “Equipment failure”; “Successful operation”, “PDSN resources are not available”, “Data ready to send”.

d. This is the IP address of the A11 connection of the PDSN that terminates the A10 connection corresponding to the just-established A8 connection. It is saved by the BS and included in the Handoff Required message in the event of a hard handoff.

e. This is the IP address of the A11 connection to the anchor PDSN. This element shall be included if fast handoff is supported and if the value was received from the PDSN. It is saved by the BS and included in the Handoff Required message in the event of a fast handoff. During a fast handoff, inclusion of this field indicates acceptance of the fast handoff.

f. This is the IP address for establishing P-P connections to the serving PDSN . This element shall be included if fast handoff is supported and if the value was received from the PDSN. It is saved by the BS and included in the Handoff Required message in the event of a fast handoff. During a fast handoff, inclusion of this field indicates acceptance of the fast handoff.

g. This element specifies the SR_ID of the connected service instance.

h. This element identifies all service instances for which the PCF has an A10 connection, excluding the service instance identified by the SR_ID information element. This element shall be included on transition of the packet data session to the Active State, i.e., when the first A8 connection of a packet data session is being established, but not during handoff (i.e., the handoff indicator in the A9-Setup-A8 message was set to 1).

The following table shows the bitmap layout for the A9-Connect-A8 message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [02H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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):** A9 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ **CON_REF:** A9 Element Identifier = [01H]								1

Length = [01H]		2
IS-2000 CON_REF = [00H – FFH]		3
⇒ **A8 Traffic ID:** A9 Element Identifier = [08H]		1
Length = [0CH]		2
A8 transport protocol stack = [01H] (GRE/IP)		3
(MSB)	Protocol Type = [88 81H] (Unstructured byte stream)	4
	(LSB)	5
(MSB)	Key = <any value>	6
		7
		8
	(LSB)	9
Address Type = [01H] (IPv4)		10
(MSB)	IP Address = <any value>	11
		12
		13
	(LSB)	14
⇒ **Cause:** A9 Element Identifier = [04H]		1
Length = [01H]		2
ext = [0]	Cause Value = [13H (Successful operation), 20H (Equipment failure), 32H (PCF resources not available), 79H (PDSN resources are not available), 7AH (Data Ready to Send)]	3
⇒ **Current PDSN Address:** A9 Element Identifier = [14H]		1
Length = [04H]		2
(MSB)	Current PDSN Address = <any value>	3
		4
		5
	(LSB)	6
⇒ **Anchor PDSN Address:** A9 Element Identifier = [30H]		1
Length = [04H]		2
(MSB)	Anchor PDSN Address = <any value>	3
		4
		5
	(LSB)	6
⇒ **Anchor P-P Address:** A9 Element Identifier = [40H]		1
Length = [04H]		2

(MSB)	Anchor P-P Address = <any value>						3
							4
							5
						(LSB)	6
⇒ **SR_ID:** A9 Element Identifier = [0BH]							1
Length = [01H]							2
Reserved = [0000 0]					IS-2000 SR_ID = [001 - 011]		3
⇒ **Service Instance Info:** A9 Element Identifier = [41H]							1
Length = [00-0FH]							2
Reserved	SR_ID-6	SR_ID-5	SR_ID-4	SR_ID-3	SR_ID-2	SR_ID-1	3
(MSB)	Service Option – 1						4
						(LSB)	5
…							…
(MSB)	Service Option – n						2n+2
						(LSB)	2n+3

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3.3 A9-Disconnect-A8

This A9 interface message is sent from the PCF to the BS to release the associated dedicated resource.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF -> BS	M	
Call Connection Reference	4.2.10	PCF -> BS	O	R
Correlation ID	4.2.11	PCF -> BS	O[a]	C
Mobile Identity (IMSI)	4.2.2	PCF -> BS	O	R
Mobile Identity (ESN)	4.2.2	PCF -> BS	O[b]	C
CON_REF	4.2.14	PCF -> BS	O	R
A8 Traffic ID	4.2.16	PCF -> BS	O	R
Cause	4.2.3	PCF -> BS	O[c,d]	R
A9 PDSN Code	4.2.23	PCF -> BS	O[d,e]	C
SR_ID	4.2.4	PCF -> BS	O[f]	R

a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Release-A8 message sent in response to this message.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. Allowable Cause Values are: “Packet call going dormant”; “Equipment failure”; “Normal call release”, “OAM&P Intervention”, “PDSN Resources Unavailable”.

d. If the A9 PDSN Code IE is present, the Cause element is coded to ‘PDSN Resources Unavailable’.

e. This element contains the PDSN failure code.

f. This element specifies the SR_ID of the service instance to be disconnected.

The following table shows the bitmap layout for the A9-Disconnect-A8 message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [03H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9

		(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]			1
Length = [04H]			2
(MSB)	Correlation Value = <any value>		3
			4
			5
		(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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):** A9 Element Identifier = [0DH]			1
Length = [05H]			2
Identity Digit 1 = [0000]	Odd/even Indicator = [0]	Type of Identity = [101] (ESN)	3
(MSB)	ESN = <any value>		4
			5
			6
		(LSB)	7
⇒ **CON_REF:** A9 Element Identifier = [01H]			1
Length = [01H]			2
IS-2000 CON_REF = [00H – FFH]			3
⇒ **A8 Traffic ID:** A9 Element Identifier = [08H]			1
Length = [0CH]			2
A8 transport protocol stack = [01H] (GRE/IP)			3
(MSB)	Protocol Type = [88 81H] (Unstructured byte stream)		4
		(LSB)	5
(MSB)	Key = <any value>		6
			7
			8
		(LSB)	9
Address Type = [01H] (IPv4)			10

(MSB)	IP Address = <any value>	11
		12
		13
	(LSB)	14
⇒ **Cause:** A9 Element Identifier = [04H]		1
Length = [01H]		2
ext = [0]	Cause Value = [10H (Packet call going dormant), 14H (Normal call release), 20H (Equipment failure), 07H (OAM&P Intervention) 79H (PDSN Resources Unavailable)]	3
⇒ **A9 PDSN Code:** A9 Element Identifier = [0CH]		1
Length = [01H]		2
PDSN Code = [C1H (Connection Release - Reason Unspecified), C2H (Connection Release - PPP Timeout), C3H (Connection Release - Registration Timeout), C4H (Connection Release - PDSN Error), C5H (Connection Release - Inter-PCF Handoff), C6H (Connection Release - Inter-PDSN Handoff), C7H (Connection Release - PDSN OAM&P Intervention), C8H (Connection Release - Accounting Error)]		3
⇒ **SR_ID:** A9 Element Identifier = [0BH]		1
Length = [01H]		2
Reserved = [0000 0]	IS-2000 SR_ID = [001 - 011]	3

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3.4 A9-Release-A8

This A9 interface message is sent from the BS to the PCF to release the associated dedicated resource

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	BS-> PCF	M	
Call Connection Reference	4.2.10	BS-> PCF	O	R
Correlation ID	4.2.11	BS-> PCF	O[a]	C
Mobile Identity (IMSI)	4.2.2	BS-> PCF	O	R
Mobile Identity (ESN)	4.2.2	BS-> PCF	O[b]	C
CON_REF	4.2.14	BS-> PCF	O	R
A8 Traffic ID	4.2.16	BS-> PCF	O	R
Cause	4.2.3	BS-> PCF	O[c]	R
Active Connection Time in Seconds	4.2.1	BS-> PCF	O[d]	R
All Dormant Indicator	4.2.25	BS-> PCF	O[e]	C
SR_ID	4.2.4	BS -> PCF	O[f]	R

a. This element shall be included if it was also included in the A9-Disconnect-A8 message. This element shall be set to the value received in that message. If this element was not included in that message, it may be included in this message.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. Allowable Cause Values are: “Packet call going dormant”; “Equipment failure”; “Normal call release”; "Handoff Successful"; “Authentication Failure”. Note that Normal Call Release indicates that the service has been released and therefore the A10 resources should be dropped.

d. This element shall be included to indicate the active connection time for a traffic channel.

e. This element shall be included if, after releasing this service instance, the BS has no active packet data service instances remaining for the mobile. This indication is used to support fast handoff.

f. This element specifies the SR_ID of the service instance to be released.

The following table shows the bitmap layout for the A9-Release-A8 message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [04H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6

(MSB)	Call Connection Reference = <any value>		7
			8
			9
		(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]			1
Length = [04H]			2
(MSB)	Correlation Value = <any value>		3
			4
			5
		(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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):** A9 Element Identifier = [0DH]			1
Length = [05H]			2
Identity Digit 1 = [0000]	Odd/even Indicator = [0]	Type of Identity = [101] (ESN)	3
(MSB)	ESN = <any value>		4
			5
			6
		(LSB)	7
⇒ **CON_REF:** A9 Element Identifier = [01H]			1
Length = [01H]			2
IS-2000 CON_REF = [00H – FFH]			3
⇒ **A8 Traffic ID:** A9 Element Identifier = [08H]			1
Length = [0CH]			2
A8 transport protocol stack = [01H] (GRE/IP)			3
(MSB)	Protocol Type = [88 81H] (Unstructured byte stream)		4
		(LSB)	5
(MSB)	Key = <any value>		6
			7

		8
	(LSB)	9
Address Type = [01H] (IPv4)		10
(MSB)	IP Address = <any value>	11
		12
		13
	(LSB)	14
⇒ **Cause:** A9 Element Identifier = [04H]		1
Length = [01H]		2
ext = [0]	Cause Value = [0FH (Packet Data Session Release) 10H (Packet call going dormant), 14H (Normal call release), 0BH (Handoff Successful), 20H (Equipment failure), 1AH (Authentication Failure)]	3
⇒ **Active Connection Time in Seconds:** A9 Element Identifier = [0AH]		1
Length = [04H]		2
(MSB)	Active Connection Time = [00 00 00 00H – FF FF FF FFH]	3
		4
…		5
	(LSB)	6
⇒ **All Dormant Indicator:** A9 Element Identifier = [10H]		1
Length = [00H]		2
⇒ **SR_ID:** A9 Element Identifier = [0BH]		1
Length = [01H]		2
Reserved = [0000 0]	IS-2000 SR_ID = [001 - 011]	3

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3.5 A9-Release-A8 Complete

This A9 interface message is sent from the PCF to the BS to acknowledge completion of the request to release the connection.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF -> BS	M	
Call Connection Reference	4.2.10	PCF -> BS	O	R
Correlation ID	4.2.11	PCF -> BS	O[a]	C
Cause	4.2.3	PCF -> BS	O[b,c]	C
A9 PDSN Code	4.2.23	PCF -> BS	O[c,d]	C
SR_ID	4.2.4	PCF -> BS	O[e]	R

a. This element shall only be included if it was also included in the A9-Release-A8 message. This element shall be set to the value received in that message.

b. Allowable Cause Values are: "PDSN Resource Unavailable", “PCF resource unavailable”, “Equipment failure ”, “OAM&P Intervention”, and “Packet call going dormant”.

c. If a PDSN Code IE is present, the Cause element is coded to ‘PDSN Resources Unavailable”.

d. This element contains the PDSN failure code.

e. This element indicates the SR_ID of the service instance that was released.

The following table shows the bitmap layout for the A9-Release-A8 Complete message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [05H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5

	(LSB)	6
⇒ **Cause:** A9 Element Identifier = [04H]		1
Length = [01H]		2
ext = [0]	Cause Value = [79H (PDSN Resource Unavailable), 32H (PCF resource unavailable), 20H (Equipment failure), 10H (Packet call going dormant), 07H (OAM&P Intervention)]	3
⇒ **A9 PDSN Code:** A9 Element Identifier = [0CH]		1
Length = [01H]		2
PDSN Code = [00H (Registration Accepted), 80H (Registration Denied – reason unspecified) 81H (Registration Denied - administratively prohibited) 82H (Registration Denied – insufficient resources) 83H (Registration Denied – mobile node failed authentication) 85H (Registration Denied – identification mismatch) 86H (Registration Denied – poorly formed request) 88H (Registration Denied – unknown PDSN address) 89H (Registration Denied – requested reverse tunnel unavailable) 8AH (Registration Denied – reverse tunnel is mandatory and 'T' bit not set) 8DH (Registration Denied – unsupported vendor ID or unable to interpret data in the CVSE)]		3
⇒ **SR_ID:** A9 Element Identifier = [0BH]		1
Length = [01H]		2
Reserved = [0000 0]	IS-2000 SR_ID = [001 - 011]	3

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3.6 A9-BS Service Request

This A9 interface message is sent from the PCF to the BS to request re-activation of a packet data service in Dormant state.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF -> BS	M	
Correlation ID	4.2.11	PCF -> BS	O[a]	C
Mobile Identity (IMSI)	4.2.2	PCF -> BS	O	R
Mobile Identity (ESN)	4.2.2	PCF -> BS	O[b]	C
Service Option	4.2.8	PCF -> BS	O	R
Data Count	4.2.18	PCF -> BS	O[c]	C
SR_ID	4.2.4	PCF -> BS	O[d]	R

a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-BS Service Response message sent in response to this message.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. This IE may be included by the PCF to indicate to the BS the amount of data remaining at the PCF that is to be transmitted.

d. This element specifies the SR_ID of the service instance in the Service Option element.

The following table shows the bitmap layout for the A9-BS Service Request message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [06H]								1
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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):** A9 Element Identifier = [0DH]				1
Length = [05H]				2
Identity Digit 1 = [0000]		Odd/even Indicator = [0]	Type of Identity = [101] (ESN)	3
(MSB)	ESN = <any value>			4
				5
				6
			(LSB)	7
⇒ **Service Option:** A9 Element Identifier = [03H]				1
(MSB)	Service Option			2
= [00 21H (3G High Speed Packet Data)]			(LSB)	3
⇒ **Data Count:** A9 Element Identifier = [09H]				1
Length = [02H]				2
Count = <any value>				3
…				4
⇒ **SR_ID:** A9 Element Identifier = [0BH]				1
Length = [01H]				2
Reserved = [0000 0]			IS-2000 SR_ID = [001 - 011]	3

3.7 A9-BS Service Response

This A9 interface message is sent from the BS to the PCF to acknowledge the call setup.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	BS -> PCF	M	
Correlation ID	4.2.11	BS -> PCF	O[a]	C
Cause	4.2.3	BS -> PCF	O[b]	C
SR_ID	4.2.4	PCF -> BS	O[c]	R

a. This element shall only be included if it was also included in the A9-BS Service Request message. This element shall be set to the value received in that message.

b. This element shall only be included if the BS does not grant the A9-BS Service Request. The allowable Cause Values are “MS busy” and “Service option not available”.

c. This element indicates the SR_ID of the service instance that was set up.

The following table shows the bitmap layout for the A9-BS Service Response message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [07H]								1
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Cause:** A9 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [08H (MS busy), 11H (Service option not available)]							3
⇒ **SR_ID:** A9 Element Identifier = [0BH]								1
Length = [01H]								2
Reserved = [0000 0]					IS-2000 SR_ID = [001 - 011]			3

3.8 A9-AL (Air Link) Connected

This A9 interface message is sent from the BS to the PCF to notify that the traffic channel was established when the MS performed hard handoff or fast handoff.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	BS -> PCF	M	
Call Connection Reference	4.2.10	BS -> PCF	O	R
Correlation ID	4.2.11	BS -> PCF	O[a]	C
A8 Traffic ID	4.2.16	BS -> PCF	O	R
Current PDSN Address	4.2.5	BS -> PCF	O[b]	C
IS-2000 Service Configuration Record	4.2.20	BS -> PCF	O	R
Service Option	4.2.8	BS -> PCF	O	R
User Zone ID	4.2.6	BS -> PCF	O	R
Quality of Service Parameters	4.2.7	BS -> PCF	O	R
Access Network Identifiers	4.2.19	BS -> PCF	O[c]	

a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-AL Connected Ack message sent in response to this message.

b. This element may be omitted if this message is sent as part of a fast handoff because the corresponding A10 connection has already been established. Otherwise, this element shall be included.

c. The Access Network Identifiers are those of the source PCF communicated by the source BS via the MSC (Handoff Required, Handoff Requested messages).

d. This element specifies the SR_ID of the service instance in the Service Option element.

The following table shows the bitmap layout for the A9-AL Connected message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [08H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1

Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **A8 Traffic ID:** A9 Element Identifier = [08H]								1
Length = [0CH]								2
A8 transport protocol stack = [01H] (GRE/IP)								3
(MSB)	Protocol Type = [88 81H] (Unstructured byte stream)							4
							(LSB)	5
(MSB)	Key = <any value>							6
								7
								8
							(LSB)	9
Address Type = [01H] (IPv4)								10
(MSB)	IP Address = <any value>							11
								12
								13
							(LSB)	14
⇒ **Current PDSN Address:** A9 Element Identifier = [14H]								1
Length = [04H]								2
(MSB)	Current PDSN Address = <any value>							3
								4
								5
							(LSB)	6
⇒ **IS-2000 Service Configuration Record:** A9 Element Identifier = [0EH]								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 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
⇒ **Service Option:** A9 Element Identifier = [03H]								1

(MSB)	Service Option		2
= [00 21H (3G High Speed Packet Data), 00 3DH (Link Layer Assisted RObust Header Compression)]		(LSB)	3
⇒ **User Zone ID:** A9 Element Identifier = [02H]			1
Length = [02H]			2
(MSB)	UZID = <any value>		3
		(LSB)	4
⇒ **Quality of Service Parameters:** A9 Element Identifier = [07H]			1
Length = [01H]			2
Reserved = [0000]	Non-Assured Mode Packet Priority = [0000 – 1101]		3
⇒**Access Network Identifiers:** A9 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

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3.9 A9-AL (Air Link) Connected Ack

This A9 interface message is sent from the PCF to the BS to acknowledge completion of processing the A8 connection request. In the case of inter-PCF hard handoff without fast handoff, this message is sent after establishment of the A10 connection.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF -> BS	M	
Call Connection Reference	4.2.10	PCF -> BS	O	R
Correlation ID	4.2.11	PCF -> BS	O[a]	C
Current PDSN Address	4.2.5	PCF -> BS	O[b]	C

a. This element shall only be included if it was also included in the A9-AL Connected message. This element shall be set to the value received in that message.

b. This IE may be included if the target PCF could not connect to the PDSN designated in the A9-AL Connected message.

c. This element indicates the SR_ID of the service instance that was connected.

The following table shows the bitmap layout for the A9-AL Connected Ack message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [09H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Current PDSN Address:** A9 Element Identifier = [14H]								1
Length = [04H]								2
(MSB)	Current PDSN Address = <any value>							3
								4
								5
							(LSB)	6

3.10 A9-AL Disconnected

This A9 interface message is sent from the BS to the PCF to notify that the traffic channel is to be released when a hard handoff is performed.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	BS -> PCF	M	
Call Connection Reference	4.2.10	BS -> PCF	O	R
Correlation ID	4.2.11	BS -> PCF	O[a]	C
A8 Traffic ID	4.2.16	BS -> PCF	O	R

a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-AL Disconnected Ack message sent in response to this message.

The following table shows the bitmap layout for the A9-AL Disconnected message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [0AH]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **A8 Traffic ID:** A9 Element Identifier = [08H]								1
Length = [0CH]								2
A8 transport protocol stack = [01H] (GRE/IP)								3
(MSB)	Protocol Type = [88 81H] (Unstructured byte stream)							4
							(LSB)	5
(MSB)	Key = <any value>							6

		7
		8
	(LSB)	9
Address Type = [01H] (IPv4)		10
(MSB)	IP Address = <any value>	11
		12
		13
	(LSB)	14

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3.11 A9-AL Disconnected Ack

This A9 interface message is sent from the PCF to the BS to acknowledge reception of the A9-AL Disconnect message.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF -> BS	M	
Call Connection Reference	4.2.10	PCF -> BS	O	R
Correlation ID	4.2.11	PCF -> BS	O[a]	C

a. This element shall only be included if it was also included in the A9-AL Disconnected message. This element shall be set to the value received in that message.

The following table shows the bitmap layout for the A9-AL Disconnected Ack message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [0BH]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6

3.12 A9-Short Data Delivery

This message is sent from the BS to the PCF when a short data burst is received from a mobile. It is sent from the PCF to the BS when a small amount of data is received for a mobile when it's packet data service instance is dormant.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF <-> BS	M	
Correlation ID	4.2.11	PCF -> BS	O[a]	C
Mobile Identity (IMSI)	4.2.2	PCF <-> BS	O	R
Mobile Identity (ESN)	4.2.2	PCF <-> BS	O[b]	C
SR_ID	4.2.4	PCF <-> BS	O	R
Data Count	4.2.18	PCF -> BS	O[c]	C
ADDS User Part	4.2.9	PCF <-> BS	O[d]	R

a. If this element is included, its value shall be returned in the corresponding element in the A9-Short Data Ack message from the BS.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. This element is included in this message when sent from the PCF to the BS and indicates the number of additional bytes of data queued at the PCF and waiting to be sent to a specific mobile.

d. Contains the packet data received from the PDSN or an MS in a SDB format as specified in [19].

The following table shows the bitmap layout for the A9-Short Data Delivery message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [0CH]								1
⇒ **Correlation ID:** A8/A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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):** A9 Element Identifier = [0DH]		1
Length = [05H]		2
Identity Digit 1 = [0000]	Odd/even Indicator = [0] Type of Identity = [101] (ESN)	3
(MSB) ESN = <any value>		4
		5
		6
(LSB)		7
⇒ **SR_ID:** A9 Element Identifier = [0BH]		1
Length = [01H]		2
Reserved = [0000 0]	IS-2000 SR_ID = [001 - 011]	3
⇒ **Data Count:** A9 Element Identifier = [09H]		1
Length = [02H]		2
Count = <any value>		3
…		4
⇒ **ADDS User Part:** A9 Element Identifier = [3DH]		1
Length = <variable>		2
Reserved = [00]	Data Burst Type = [06H (Short Data Burst)]	3
(MSB) Application Data Message = <any value>		4
…		…
(LSB)		n

3.13 A9-Short Data Ack

This A9 interface message is sent from the BS to the PCF to acknowledge reception of the A9-Short Data Delivery message and to indicate to the PCF whether the data was accepted for delivery to the mobile.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	BS->PCF	M	
Correlation ID	4.2.11	BS->PCF	O[a]	C
Mobile Identity (IMSI)	4.2.2	BS->PCF	O	R
Mobile Identity (ESN)	4.2.2	BS->PCF	O[b]	C
SR_ID	4.2.4	BS->PCF	O	R
Cause	4.2.3	BS->PCF	O[c]	R

a. If this element is included, it's value shall be set to the value of the corresponding element in the A9-Short Data Delivery message from the PCF.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. The Cause Value indicates to the PCF whether a short data burst is to be sent to the mobile.

The following table shows the bitmap layout for the A9-Short Data Ack message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [0DH]								1
⇒ **Correlation ID:** A8/A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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)			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
⇒ **Mobile Identity (ESN):** A9 Element Identifier = [0DH]								1
Length = [05H]								2

Identity Digit 1 = [0000]		Odd/even Indicator = [0]	Type of Identity = [101] (ESN)	3
(MSB)	ESN = <any value>			4
				5
				6
			(LSB)	7
⇒ **SR_ID:** A9 Element Identifier = [0BH]				1
Length = [01H]				2
Reserved = [0000 0]		IS-2000 SR_ID = [001 - 011]		3
⇒ **Cause:** A9 Element Identifier = [04H]				1
Length = [01H]				2
ext = [0]	Cause Value = [13H (Successful Operation), 16H (Initiate Re-activation of Packet Data call)]			3

3.14 A9-Update-A8

This A9 interface message is sent from the BS to the PCF to indicate a change to the session airlink parameters. This message is also sent from the PCF to the BS to transfer new or updated packet data session parameters to the BS.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	BS <-> PCF	M	
Call Connection Reference	4.2.10	BS <-> PCF	O	R
Correlation ID	4.2.11	BS <-> PCF	O[a]	C
Mobile Identity (IMSI)	4.2.2	BS <-> PCF	O	R
Mobile Identity (ESN)	4.2.2	BS <-> PCF	O[b,c]	C
IS-2000 Service Configuration Record	4.2.20	BS <-> PCF	O[c]	C
Service Option	4.2.8	BS< -> PCF	O[c]	C
User Zone ID	4.2.6	BS -> PCF	O[c]	C
Quality of Service Parameters	4.2.7	BS< -> PCF	O[c]	C
Cause	4.2.3	BS <-> PCF	O	R
RC-PDSDT	4.2.24	PCF -> BS	O[d]	C
SR_ID	4.2.4	BS -> PCF	O[c,e]	R

a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Update-A8-Ack message sent in response to this message.

b. This second occurrence of the Mobile Identity element, if included, shall contain the ESN of the MS. Use of the ESN in this message is a network operator decision.

c. These elements are required unless the message is used to indicate Dormant Power down or Authentication Failure.

d. This element is included in the message when the PDSN has sent the parameter to the PCF.

e. This element specifies the SR_ID of the service instance in the Service Option element.

The following table shows the bitmap layout for the A9-Update-A8 message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [03H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7

								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Mobile Identity (IMSI):** A9 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)			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
⇒ **Mobile Identity (ESN):** A9 Element Identifier = [0DH]								1
Length = [05H]								2
Identity Digit 1 = [0000]				Odd/even Indicator = [0]	Type of Identity = [101] (ESN)			3
(MSB)	ESN = <any value>							4
								5
								6
							(LSB)	7
⇒ ***IS-2000* Service Configuration Record:** A9 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
⇒ **Service Option:** A9 Element Identifier = [03H]								1

(MSB)	Service Option		2
= [00 21H (3G High Speed Packet Data)]		(LSB)	3
⇒ **User Zone ID:** A9 Element Identifier = [02H]			1
Length = [02H]			2
(MSB)	UZID = <any value>		3
		(LSB)	4
⇒ **Quality of Service Parameters:** A9 Element Identifier = [07H]			1
Length = [01H]			2
Reserved = [0000]	Non-Assured Mode Packet Priority = [0000 – 1101]		3
⇒ **Cause:** A9 Element Identifier = [04H]			1
Length = [01H]			2
Ext= [0]	Cause Value = [19H (Power down from dormant state), 1CH (update accounting: late traffic channel setup), 1EH (update accounting: parameter change), 1AH (Authentication Failure), 7BH (Session Parameter Update)]		3
⇒ **RC-PDSDT:** A9 Element Identifier = [0FH]			1
Length = [01H]			2
RC-PDSDT = [01H-FFH]			3
⇒ **SR_ID:** A9 Element Identifier = [0BH]			1
Length = [01H]			2
Reserved = [0000 0]	IS-2000 SR_ID = [001 - 011]		3

1

3.15 A9-Update-A8 Ack

This A9 interface message is sent from the PCF to the BS to acknowledge the change to the session airlink parameters. This message is also sent from the BS to the PCF to acknowledge the processing of any new or updated session parameters.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF<->BS	M	
Call Connection Reference	4.2.10	PCF<->BS	O	R
Correlation ID	4.2.11	PCF<->BS	O[a]	C
Cause	4.2.3	BS -> PCF	O[b]	C

a. This element shall only be included if it was also included in the A9-Update-A8 message. This element shall be set to the value received in that message.

b. The Cause element shall be included when the message is sent by the BS to the PCF to indicate if the updated session parameter(s) was accepted by the BS.

The following table shows the bitmap layout for the A9-Update-A8 Ack message.

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [03H]								1
⇒ **Call Connection Reference:** A9 Element Identifier = [3FH]								1
Length = [08H]								2
(MSB)	Market ID = <any value>							3
							(LSB)	4
(MSB)	Generating Entity ID = <any value>							5
							(LSB)	6
(MSB)	Call Connection Reference = <any value>							7
								8
								9
							(LSB)	10
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Cause:** A9 Element Identifier = [04H]								1
Length = [01H]								2
Ext= [0]	Cause value = [13H (Successful operation), 36H (Session Parameter/Option not Supported at BS)]							3

3.16 A9-Version Info

This A9 interface message is sent from the PCF to the BS, or the BS to the PCF, when the sending entity requires the software version information from the receiving entity.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF<->BS	M	
Correlation ID	4.2.11	PCF<->BS	O[a]	C
Cause	4.2.3	PCF<->BS	O[b]	C
Software Version	4.2.21	PCF<->BS	O	R

a. If this element is included in this message, its value shall be returned in the corresponding element in the A9-Version Info Ack message sent in response to this message.

b. This element shall be included if the message is being sent as the result of a reset at the sending entity.

The following table shows the bitmap layout for the A9-Version Info message:

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [10H]								1
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Cause:** A9 Element Identifier = [04H]								1
Length = [01H]								2
ext = [0]	Cause Value = [07H (OAM&P Intervention), 20H (Equipment failure)]							3
⇒ **Software Version:** A9 Element Identifier = [31H]								1
Length = <variable>								2
IOS Major Revision Level (X) = [04H]								3
IOS Minor Revision Level (Y) = [03H]								4
IOS Point Release Level (Z) = [00H]								5
Manufacturer/Carrier Software Information = <printable ASCII character>								6
…								…
Manufacturer/Carrier Software Information = <printable ASCII character>								n

3.17 A9-Version Info Ack

This A9 interface message is sent from the PCF to the BS, or BS to PCF, in response to the A9-Version Info message. The message includes the software version information from the receiving entity.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	4.2.13	PCF<->BS	M	
Correlation ID	4.2.11	PCF<->BS	O[a]	C
Software Version	4.2.21	PCF<->BS	O	R

a. This element is included in this message if it was sent in the A9-Version Info message. Its value shall be set to the same value as in the A9-Version Info message.

The following table shows the bitmap layout for the A9-Version Info Ack message:

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [11H]								1
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **Software Version:** A9 Element Identifier = [31H]								1
Length = <variable>								2
IOS Major Revision Level (X) = [04H]								3
IOS Minor Revision Level (Y) = [03H]								4
IOS Point Release Level (Z) = [00H]								5
Manufacturer/Carrier Software Information = <printable ASCII character>								6
…								…
Manufacturer/Carrier Software Information = <printable ASCII character>								n

4.0 Information Element Definitions

This section contains the coding of the information elements used in the messages defined in section 3.0.

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 3.0.

4.1 Generic Information Element Encoding

4.1.1 Conventions

The following conventions are assumed for the sequence of transmission of bits and bytes:

- Each bit position is marked as 0 to 7. Bit 0 is the least significant bit and is transmitted first.
- In a message, octets are identified by number. Octet 1 is transmitted first, then octet 2, etc.

For variable length elements, a length indicator is included. This indicates the number of octets following in the element.

The definition of whether an information element is mandatory or optional is specified in section 3.0.

The Information Element Identifier is included for all cases of signaling messages on the A9 Interface.

All 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.

4.1.2 Information Element Identifiers

The following tables contain lists of all elements that make up the messages defined in section 3.0. The tables include the Information Element Identifier (IEI) coding which distinguishes one element from another. The tables also include reference to the section where the element coding can be found.

Elements used in messages on the A9 interface are contained in Table 4.1.2-1 sorted by element name and in Table 4.1.2-2 sorted by identifier value.

Table 4.1.2-1 A9 Information Element Identifiers Sorted by Identifier Name

Element Name	Identifier	Reference
A8 Traffic ID	08H	4.2.16
A9 Cell Identifier	06H	4.2.15
A9 Indicators	05H	4.2.17
A9 PDSN Code	0CH	4.2.23
Access Network Identifiers	20H	4.2.19
Active Connection Time in Seconds	0AH	4.2.1
ADDS User Part	3DH	4.2.9
All Dormant Indicator	10H	4.2.25
Anchor P-P Address	40H	4.2.12
Anchor PDSN Address	30H	4.2.22
Call Connection Reference	3FH	4.2.10
Cause	04H	4.2.3
CON_REF	01H	4.2.14
Correlation ID	13H	4.2.11
Current PDSN Address	14H	4.2.5
Data Count	09H	4.2.18
IS-2000 Service Configuration Record	0EH	4.2.20
Mobile Identity	0DH	4.2.2
Quality of Service Parameters	07H	4.2.7
RC-PDSDT	0FH	4.2.24
Service Instance Info	41H	4.2.26
Service Option	03H	4.2.8
Software Version	31H	4.2.21
SR_ID	0BH	4.2.4
User Zone ID	02H	4.2.6

Table 4.1.2-2 A9 Information Element Identifiers Sorted by Identifier Value

Element Name	Identifier	Reference
CON_REF	01H	4.2.14
User Zone ID	02H	4.2.6
Service Option	03H	4.2.8
Cause	04H	4.2.3
A9 Indicators	05H	4.2.17
A9 Cell Identifier	06H	4.2.15
Quality of Service Parameters	07H	4.2.7
A8 Traffic ID	08H	4.2.16
Data Count	09H	4.2.18
Active Connection Time in Seconds	0AH	4.2.1
SR_ID	0BH	4.2.4
A9 PDSN Code	0CH	4.2.23
Mobile Identity	0DH	4.2.2
IS-2000 Service Configuration Record	0EH	4.2.20
RC-PDSDT	0FH	4.2.24
All Dormant Indicator	10H	4.2.25
Correlation ID	13H	4.2.11
Current PDSN Address	14H	4.2.5
Access Network Identifiers	20H	4.2.19
Anchor PDSN Address	30H	4.2.22
Software Version	31H	4.2.21
ADDS User Part	3DH	4.2.9
Call Connection Reference	3FH	4.2.10
Anchor P-P Address	40H	4.2.12
Service Instance Info	41H	4.2.xx

4.1.3 Additional Coding and Interpretation Rules for Information Elements

Information elements shall always use the same Information Element Identifier for all occurrences on a specific A9 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 A9 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 reserved bits, these bits are indicated as being set to ‘0’. To allow compatibility with future implementation, messages shall not be rejected simply because a reserved bit is set to ‘1’.

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

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.

4.1.4 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 4.1.4-1 Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
A8 Traffic ID	4.2.16	A9-Setup-A8	3.1
		A9-AL Connected	3.8
		A9-AL Disconnected	3.10
		A9-Connect-A8	3.2
		A9-Disconnect-A8	3.3
		A9-Release-A8	3.4
A9 Cell Identifier	4.2.15	A9-Setup-A8	3.1
A9 Indicators	4.2.17	A9-Setup-A8	3.1
A9 Message Type	4.2.13	A9-Setup-A8	3.1
		A9-AL Connected	3.8
		A9-AL Connected Ack	3.9
		A9-AL Disconnected	3.10
		A9-AL Disconnected Ack	3.11
		A9-BS Service Request	3.6
		A9-BS Service Response	3.7
		A9-Connect-A8	3.2
		A9-Disconnect-A8	3.3
		A9-Release-A8	3.4
		A9-Release-A8 Complete	3.5
		A9-Short Data Delivery	3.12
		A9-Short Data Delivery Ack	3.13
		A9-Update-A8	3.14
		A9-Update-A8 Ack	3.15
		A9-Version Info	3.16
		A9-Version Info Ack	3.17
A9 PDSN Code	4.2.23	A9-Disconnect-A8	3.3
		A9-Release-A8 Complete	3.5
Access Network Identifier	4.2.19	A9-Setup-A8	3.1
		A9-AL Connected	3.8
Active Connection Time in Seconds	4.2.1	A9-Release-A8	3.4
All Dormant Indicator	4.2.25	A9-Release-A8	3.4
Anchor P-P Address	4.2.12	A9-Setup-A8	3.1
		A9-Connect-A8	3.2

Anchor PDSN Address	4.2.22	A9-Setup-A8	3.1
		A9-Connect-A8	3.2

Table 4.1.4-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
ADDS User Part	4.2.9	A9-Short Data Delivery	3.12
Call Connection Reference	4.2.10	A9-AL Connected	3.8
		A9-AL Connected Ack	3.9
		A9-AL Disconnected	3.10
		A9-AL Disconnected Ack	3.11
		A9-Connect-A8	3.2
		A9-Disconnect-A8	3.3
		A9-Setup-A8	3.1
		A9-Release-A8	3.4
		A9-Release-A8 Complete	3.5
		A9-Update-A8	3.14
		A9-Update-A8 Ack	3.15
Cause	4.2.3	A9-Connect-A8	3.2
		A9-Disconnect-A8	3.3
		A9-Release-A8	3.4
		A9-Release-A8 Complete	3.5
		A9-BS Service Response	3.7
		A9-Short Data Ack	3.13
		A9-Update-A8	3.14
		A9-Update-A8 Ack	3.15
		A9-Version Info	3.16
CON_REF	4.2.14	A9-Setup-A8	3.1
		A9-Connect-A8	3.2
		A9-Disconnect-A8	3.3
		A9-Release-A8	3.4

1 **Table 4.1.4-1 (Cont.) Cross Reference of Information Elements With Messages**

Information Element		Used in These Messages	
Correlation ID	4.2.11	A9-AL Disconnected Ack	3.11
		A9-Short Data Delivery	3.12
		A9-Short Data Delivery Ack	3.13
		A9-Setup-A8	3.1
		A9-Connect-A8	3.2
		A9-Disconnect-A8	3.3
		A9-Release-A8	3.4
		A9-Release-A8 Complete	3.5
		A9-BS Service Request	3.6
		A9-BS Service Response	3.7
		A9-AL Connected	3.8
		A9-AL Connected Ack	3.9
		A9-AL Disconnected	3.10
		A9-Update-A8	3.14
		A9-Update-A8 Ack	3.15
		A9-Version Info	3.16
		A9-Version Info Ack	3.17
Current PDSN Address	4.2.5	A9-Setup-A8	3.1
		A9-Connect-A8	3.2
		A9-AL Connected	3.8
		A9-AL Connected Ack	3.9
Data Count	4.2.18	A9-BS Service Request	3.6
		A9-Short Data Delivery	3.12
IS-2000 Service Configuration Record	4.2.20	A9-Setup-A8	3.1
		A9-AL Connected	3.8
		A9-Update-A8	3.14
Mobile Identity	4.2.2	A9-Setup A8	3.1
		A9-Connect A8	3.2
		A9-Disconnect-A8	3.3
		A9-Release-A8	3.4
		A9-BS Service Request	3.6
		A9-Short Data Delivery	3.12
		A9-Short Data Delivery Ack	3.13
		A9-Update-A8	3.14
Quality of Service Parameters	4.2.7	A9-Setup-A8	3.1
		A9-AL Connected	3.8
		A9-Update-A8	3.14

RC-PDSDT	4.2.24	A9-Update-A8	3.14
Service Instance Info	4.2.26	A9-Connect-A8	3.2

Table 4.1.4-1 (Cont.) Cross Reference of Information Elements With Messages

Information Element		Used in These Messages	
Service Option	4.2.8	A9-BS Service Request	3.6
		A9-Setup-A8	3.1
		A9-AL Connected	3.8
		A9-Update-A8	3.14
Software Version	4.2.21	A9-Version Info	3.16
		A9-Version Info Ack	3.17
SR_ID	4.2.4	A9-Setup-A8	3.1
		A9-Connect-A8	3.2
		A9-Disconnect-A8	3.3
		A9-Release-A8	3.4
		A9-Release-A8 Complete	3.5
		A9-BS Service Request	3.6
		A9-BS Service Response	3.7
		A9-Short Data Delivery	3.12
		A9-Short Data Delivery Ack	3.13
		A9-Update-A8	3.14
User Zone ID	4.2.6	A9-Setup-A8	3.1
		A9-AL Connected	3.8
		A9-Update-A8	3.14

4.2 Information Elements

4.2.1 Active Connection Time in Seconds

This element indicates the duration of traffic channel connection. It is coded as follows.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	Active Connection Time							3
…								4
…								5
…							(LSB)	6

Length:

This field shall be set to the length of this element in octets following the Length field. This field shall be set to 04H.

Active Connection Time:

This field indicates the duration of traffic channel established in seconds.

4.2.2 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 [18] and is mapped to the Mobile Identity element as shown below.

This element is coded as specified in [1] – [6].

<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">A9 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.

The Type of Identity is defined as follows:

Table 4.2.2-1 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 [18].

7	6	5	4	3	2	1	0	Octet
A9 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.

4.2.3 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
A9 Element Identifier								1
Length								2
0/1	Cause Value							3

Length:

This field indicates the number of octets in this element following the Length field.

Cause Value:

This field is a single octet field if the extension bit (bit 7) is set to '0'. If bit 7 of octet 3 is set to '1' then the Cause Value is a two octet field. If the value of the first octet of the cause field is '1XXX 0000' then the second octet is reserved for national applications, where 'XXX' indicates the Cause Class as indicated in the table below.

Table 4.2.3-1 Cause Class Values

Binary Values	Meaning
000	Normal Event
001	Normal Event
010	Resource Unavailable
011	Service or option not available
100	Service or option not implemented
101	Invalid message (e.g., parameter out of range)
110	Protocol error
111	Interworking

Table 4.2.3-2 Cause Values

6	5	4	3	2	1	0	Hex Value	Cause
Normal Event Class (000 xxxx and 001 xxxx)								
0	0	0	0	1	1	1	07	OAM&P intervention
0	0	0	1	0	0	0	08	MS busy
0	0	0	1	0	1	1	0B	Handoff successful
0	0	0	1	1	1	1	0F	Packet Data Session Release
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	1	13	Successful operation
0	0	1	0	1	0	0	14	Normal call release
0	0	1	0	1	1	0	16	Initiate Re-activation of packet data call
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	1	0	0	1C	Update Accounting: Late Traffic Channel Setup
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
Service or Option Not Available Class (011 xxxx)								
0	1	1	0	0	1	0	32	PCF resources not available
0	1	1	0	1	1	0	36	Session Parameter/Option not Supported at BS
Service or Option Not Implemented Class (100 xxxx)								
Invalid Message Class (101 xxxx)								
Protocol Error (110 xxxx)								
Interworking (111 xxxx)								
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	0	1	1	7B	Session Parameter Update
All other values								Reserved for future use.

4.2.4 SR_ID

This information element identifies the service reference identifier for a particular service instance.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
Reserved					IS-2000 SR_ID			3

Length:

This field shall be set to the length of this element in octets following the Length field.

IS-2000 SR_ID:

This field is used to uniquely identify a packet data service instance in the mobile. This field contains the MN Session Reference Identifier value as defined in ([1] to [1]).

4.2.5 Current PDSN Address

When sent from a PCF to a BS, this element contains an IPv4 IP Address for the A10/A11 interface of the PDSN that terminates the A10 connection corresponding to the just-established A8 connection.

When sent from a target BS to a target PCF, this element contains an IPv4 IP Address for the source PDSN during a fast handoff.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	Current PDSN Address							3
								4
								5
							(LSB)	6

Length:

This field contains the number of octets in this element following this field as a binary number.

Current PDSN Address:

This field contains an IPv4 address for the A10/A11 interface of a PDSN.

4.2.6 User Zone ID

This element uniquely identifies a particular User Zone.

7	6	5	4	3	2	1	0	Octet
A9 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 [9].

4.2.7 Quality of Service Parameters

This element identifies the Quality of Service for a given packet data service. In this version of this standard the only information carried is non-assured mode packet priority.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
Reserved				Non-Assured Mode Packet Priority				3

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.

4.2.8 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
A9 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 [22].

The service options supported are given in Table 4.2.8-1.

Table 4.2.8-1 Service Option Values

Service Option Value (hex)	Description
0021H	(3G High Speed Packet Data)
003CH	Header Removal (LLA-ROHC)
003DH	Link-Layer Assisted Robust Header Compression

4.2.9 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
A9 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 [1]) 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 Short Data Burst, the Application Data Message is the SDB as specified in [19]. This data is not included for mobile originated short data bursts.

4.2.10 Call Connection Reference

This information element contains a globally unique identification for a call connection.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	Market ID							3
Market ID (continued)							(LSB)	4
(MSB)	Generating Entity ID							5
Generating Entity ID (continued)							(LSB)	6
(MSB)	Call Connection Reference Value							7
								8
								9
							(LSB)	10

Length:

The Length field contains the number of octets in this element following the Length field.

Market ID:

This field represents a unique market ID that is specified by the service provider (refer to [21]).

Generating Entity ID:

This two octet field represents a unique code assigned by the operator to the entity that generates this Call Connection Reference value.

Call Connection Reference Value:

This four octet field may contain any value. It is assigned by the generating entity whose responsibility it is to guarantee its uniqueness.

4.2.11 Correlation ID

This information element is used to correlate request and response messages.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	Correlation Value							3
								3
								5
							(LSB)	6

Length:

The Length field contains the number of octets in this element following the Length field and is set to a value of 4.

Correlation Value:

This field contains a value that allows the network entity to correlate a request-response pair of messages. The value is a manufacturer concern. In this revision of this standard, this value shall be exactly 4 octets in length.

4.2.12 Anchor P-P Address

This element contains the IPv4 address for the P-P interface of the anchor PDSN for fast handoff.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	Anchor P-P Address							3
								4
								5
							(LSB)	6

Length:

This field contains the number of octets in this element following this field as a binary number.

Anchor PDSN P-P Address:

This field contains an IPv4 address of the P-P interface for an anchor PDSN.

4.2.13 A9 Message Type

The A9 Message Type element is used to indicate the type of a message on the A9 interface.

A9 Message Name	A9 Message Type	Section Reference
A9-Setup-A8	01H	3.1
A9-Connect-A8	02H	3.2
A9-Disconnect-A8	03H	3.3
A9-Release-A8	04H	3.4
A9-Release-A8 Complete	05H	3.5
A9-BS Service Request	06H	3.6
A9-BS Service Response	07H	3.7
A9-AL Connected	08H	3.8
A9-AL Connected Ack	09H	3.9
A9-AL Disconnected	0AH	3.10
A9-AL Disconnected Ack	0BH	3.11
A9-Short Data Delivery	0CH	3.12
A9-Short Data Ack	0DH	3.13
A9-Update-A8	0EH	3.14
A9-Update-A8-Ack	0FH	3.15
A9-Version Info	10H	3.16
A9-Version Info Ack	11H	3.17

4.2.14 CON_REF

This information element identifies connection instance between the MS and the source BS.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
IS-2000 CON_REF								3

Length:

This field shall be set to the length of this element in octets following the Length field.

IS-2000 CON_REF:

This field contains the connection reference value defined in [1] to [6].

4.2.15 A9 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
A9 Element Identifier								1
Length								2
Cell Identification Discriminator								3
MSCID								4
MSCID continued								5
MSCID continued								6
CI value								7
CI value continued								8

Length:

This field shall be set to the length of this element in octets following the Length field.

Cell Identification Discriminator:

This field shall be set to 7.

MSCID, MSC Identifier (octets 4 through 6):

The MSCID is coded as defined in [9].

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).

4.2.16 A8 Traffic ID

This information element identifies the connection used by the MS for packet data service.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
A8 transport protocol stack								3
(MSB)	Protocol Type							4
							(LSB)	5
(MSB)	Key							6
								7
								8
							(LSB)	9
Address Type								10
(MSB)	IP Address							11
								…
							(LSB)	k

Length:

This field shall be set to the length of this element in octets following the Length field.

A8 transport protocol stack:

This field is used to identify the A8 transport protocol stack to be used for the A8 connection.

Table 4.2.16-1 A8 Traffic ID - A8 Transport Protocol Stack

Values	Meaning
01H	GRE/IP
All Others	Reserved

Protocol Type:

This field is used to indicate the protocol type to be tunneled across the A8 interface. It is same as the Protocol Type field in the GRE header. This field is set to 0x88 81H (Unstructured Byte Stream).

Key:

This is a four octet field. This field is used to indicate the A8 connection identification. It is same as the Key field in the GRE header.

Address Type:

This field indicates the type and format of the IP Address that follows.

Table 4.2.16-2 A8 Traffic ID - Address Type

Value	Address Type	Length of IP Address
01H	Internet Protocol IPv4	4 octets
02H	Internet Protocol IPv6	variable
All other values reserved		

IP Address:

This field has a variable length that is dependent on the Type field. This field is used to indicate the IP address of the A8 bearer port on the sending entity. That is, when the BS sends the A9-Setup-A8 message containing this element, this field contains the IP address at the BS where the A8 user traffic connection terminates.

4.2.17 A9 Indicators

This information element indicates whether an A9-Setup-A8 message is being sent by the source BS as a result of an initial connection, or by the target BS as a result of a handoff operation.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
Reserved				CCPD Mode	CCPD Device	Data Ready Indicator	Handoff Indicator	3

Length:

This field shall be set to the length of this element in octets following the Length field.

Handoff indicator:

This field indicates whether or not a handoff was performed. If this field is set '0', the A9-Setup-A8 message indicates a normal call setup. If this field is set '1', the A9-Setup-A8 message indicates a hard handoff is to be performed and it is not necessary to establish the A10/A11 connection immediately. This field is set to ''0' for Dormant handoff. This field is set to '0' in the case of fast handoff because an A10 connection needs to be setup immediately. Refer to [13].

Data Ready Indicator:

This field indicates whether there is data ready to be sent from the mobile to the network. It reflects the value of the DRS bit of the air interface. If this field is set to '0', it indicates that data is not ready to be sent and the A9-Setup-A8 message is reporting a mobility event. Otherwise (set to '1') it indicates that data is ready to be sent.

CCPD Device:

This field indicates if the call is for a CCPD device. If the call is for a CCPD device, this field shall be set to '1'. For all other mobiles, it shall be set to '0'. When this bit is set, the PCF shall send any packet data arriving from the PDSN for a CCPD device in SDB format on the A9 signaling channel. The PCF shall not buffer the data, nor shall an A9-Short Data Ack message be sent from the BS to the PCF.

CCPD Mode: This field indicates that a mobile has requested CCPD Mode. The PCF is not required to allocate an A8 connection when this bit is set. Any signalling or data exchanged between the PCF and BS is sent over the A9 signalling channel.

4.2.18 Data Count

This element contains a count the number of bytes to be transmitted.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
Count - Octet 1								3
Count - Octet 2								4

Length:

This field indicates the number of octets in this element following the Length field, and shall be set to 02H.

Count:

This element indicates the number of bytes remaining in the PCF. The value FF FFH means that the number of bytes remaining is greater than or equal to FF FFH bytes (65536 bytes).

4.2.19 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 is setup properly.

7	6	5	4	3	2	1	0	Octet
A9 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.

4.2.20 IS-2000 Service Configuration Record

This information element contains the service configuration record as defined in [5].

7	6	5	4	3	2	1	0	Octet
A9 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 A9 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]. 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.

4.2.21 Software Version

This element provides software version information about the sub-system originating the message. Its definition is a BS, PCF, and MSC manufacturer concern.

7	6	5	4	3	2	1	0	Octet
A9 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 require the exchange of specific information between entities in their network. This information shall be placed in octets 6-n in ASCII format as agreed between the carrier and the manufacturer.

4.2.22 Anchor PDSN Address

This element contains the IPv4 address for the A10/A11 interface of the Anchor PDSN for fast handoff.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	Anchor PDSN Address							3
								4
								5
							(LSB)	6

Length:

This field contains the number of octets in this element following this field as a binary number.

Anchor PDSN Address:

This field contains an IPv4 address of the A10/A11 interface for an anchor PDSN.

4.2.23 A9 PDSN Code

This element contains the PDSN failure code sent from the PDSN to the PCF in the A11-Registration Reply and A11-Registration Update messages. It is used to convey the PDSN failure code from the PCF to the BS.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
PDSN Code								3

Length:

This field contains the number of octets in this element following this field as a binary number.

PDSN Code:

This field contains the Code sent from the PDSN to the PCF. The supported Code values are listed in Table 4.2.22-1.

Table 4.2.23 -1 PDSN Code Values

Hex Value	Decimal Value	Code
00H	0	Registration Accepted
80H	128	Registration Denied – reason unspecified
81H	129	Registration Denied – administratively prohibited
82H	130	Registration Denied – insufficient resources
83H	131	Registration Denied – mobile node failed authentication
85H	133	Registration Denied – identification mismatch
86H	134	Registration Denied – poorly formed request
88H	136	Registration Denied – unknown PDSN address
89H	137	Registration Denied – requested reverse tunnel unavailable
8AH	138	Registration Denied – reverse tunnel is mandatory and ‘T’ bit not set
8DH	141	Registration Denied – unsupported Vendor ID or unable to interpret data in the CVSE
C1H	193	Connection Release - Reason Unspecified
C2H	194	Connection Release - PPP Timeout
C3H	195	Connection Release - Registration Timeout
C4H	196	Connection Release - PDSN Error
C5H	197	Connection Release - Inter-PCF Handoff
C6H	198	Connection Release - Inter-PDSN Handoff
C7H	199	Connection Release - PDSN OAM&P Intervention
C8H	200	Connection Release - Accounting Error
All other values reserved		

4.2.24 RC-PDSDT

This element contains the Realm Configured Packet Data Session Dormancy Timer.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
RC-PDSDT								3

Length:

This field indicates the number of octets in this element following the Length field, and shall be set to 01H.

RC-PDSDT:

This field contains the Realm Configured Packet Data Session Dormancy Timer and has a range of 1-255 seconds (Refer to [15]).

4.2.25 All Dormant Indicator

Inclusion of this element is used to indicate that the BS has no active packet data service instances remaining for the mobile. This indicator triggers completion of a fast handoff, which is accomplished by transferring the PPP session to the target PDSN.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2

4.2.26 Service Instance Info

This element indicates a list of the service option instances requested by the MS, or by the network. It is coded as follows:

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
Reserved		SR-ID-6	SR-ID-5	SR-ID-4	SR-ID-3	SR-ID-2	SR-ID-1	3
(MSB)	Service Option – 1							4
							(LSB)	5
…								…
(MSB)	Service Option – n							2n+2
							(LSB)	2n+3

Length:

The Length field is a binary value indicating the number of octets following the Length field.

SR_ID-n:

This field is set to 1 if the packet data session contains a service instance with SR_ID=n.

Service Option – n:

This field indicates the service option requested by the MS, or by the network. Refer to section 4.2.8 for the encoding of this field. The first service option is associated with the service instance with the smallest SR_ID value and the last Service Option in the list is associated with the service instance with the largest SR_ID

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5.0 Timer Definitions

5.1 Timer Values

The following table is in units of seconds unless otherwise noted.

Table 5.1-1 Timer Values and Ranges Sorted by Name

Timer Name	Default Value (seconds)	Range of Values (seconds)	Granularity (seconds)	Section Reference
$T_{A8\text{-}Setup}$	4	0-99	1	5.2.1
T_{alc9}	0.5	0 – 1.0	0.1	5.2.4
T_{ald9}	0.5	0 – 1.0	0.1	5.2.7
T_{aldak}	1	0 – 5	0.1	5.2.10
T_{bsreq9}	1.5	0 – 5	0.1	5.2.6
$T_{discon9}$	1	0-5	0.1	5.2.2
T_{rel9}	1	0-5	0.1	5.2.3
T_{sdd9}	1.5	0-5	0.1	5.2.8
T_{upd9}	1	0-5	0.1	5.2.9
$T_{waitho9}$	Refer to section 5.2.5			5.2.5
T_{ver9}	1	0-5	0.1	5.2.11

5.2 Timer Definitions

5.2.1 $T_{A8\text{-}setup}$

This is a BS timer. The timer is started when an A9-Setup-A8 message is sent and stopped when an A9-Connect-A8 message is received.

5.2.2 $T_{discon9}$

This is a PCF timer. The timer is started when an A9-Disconnect-A8 message is sent and stopped when an A9-Release-A8 message is received.

5.2.3 T_{rel9}

This is a BS timer. The timer is started when an A9-Release-A8 message is sent and stopped when an A9-Release-A8 Complete message is received.

5.2.4 T_{alc9}

This is a BS timer. The timer is started when an A9-AL Connected message is sent and stopped when an A9-AL Connected Ack message is received.

5.2.5 $T_{waitho9}$

This is a PCF timer. The timer is started when an A9-Connect-A8 message is sent and stopped when an A9-AL Connected message is received. The value of this timer shall be greater than that of the air interface timer T_{waitho}. Refer to [14].

5.2.6 T_{bsreq9}

This is a PCF timer. The timer is started when an A9-BS Service Request message is sent and stopped when an A9-BS Service Response message is received.

5.2.7 T_{ald9}

This is a BS timer. The timer is started when an A9-AL Disconnected message is sent and stopped when an A9-AL Disconnected Ack message is received.

5.2.8 T_{sdd9}

This PCF timer is started after the A9-Short Data Delivery message is sent to the BS and stopped when the A9-Short Data Ack message is received.

5.2.9 T_{upd9}

The BS timer is started after the A9-Update-A8 message is sent to the PCF and stopped when the A9-Update-A8 Ack message is received.

5.2.10 T_{aldak}

This is a PCF timer. The timer is started when an A9-AL Disconnected Ack message is sent and stopped when an A9-Release-A8 message or A9-AL Connected message is received.

5.2.11 T_{vers9}

This is a BS and PCF timer. The timer is started when an A9-Version Info message is sent and stopped when an A9-Version Info Ack message is received.