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4 # Interoperability Specification (IOS) for Broadcast Multicast
5 # Services (BCMCS)

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8 # 3GPP2 Publication Version

Table of Contents

Table of Figures

Table of Tables

₁ **Foreword**

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₃ <center>(This foreword is not part of this specification.)</center>

₄ This document was produced by Working Groups TR45.4 of the Telecommunications Industry Associat-
₅ ion and TSG-A of the Third Generation Partnership Project 2. This document was developed in accord-
₆ ance with TIA/EIA and 3GPP2 procedural guidelines, and represents the consensus position of the
₇ Working Groups.

₈ Suggestions for improvement of this specification are welcome. They should be sent to:
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₁₃ **Revision History**

Revision	Date	Description
0 v1.0	Nov. 2004	Initial release.
0 v2.0	Jan. 2006	Editorial corrections and consideration of packet-boundaries.
A v1.0	Oct. 2006	Addition of support for QoS (via the Enhanced BCMCS Information List and Enhanced Session Information) and network initiated BCMCS.
A v2.0	April 2008	Bug fix for air link record, Code IE, A10 refresh and connection(s) release.

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1.   Introduction

This document contains the procedures, call flows and message descriptions associated with Broadcast-Multicast Services (BCMCS) support in the access network.

1.1   Purpose

The purpose of this document is to provide IOS feature description (stage 1), IOS feature call flows (stage 2) and IOS message definitions (stage 3) for support of BCMCS in cdma2000®[1] networks. This document covers access network support for BCMCS over cdma2000 1x and High Rate Packet Data (HRPD) air interfaces.

1.2   Scope

This document provides user level descriptions and access network call flows and messages designed to assist in the understanding of BCMCS operation. It defines the messages, procedures and timers for the interfaces that coincide with the reference points: "A", "A$_{quater}$", and "A$_{quinter}$", as defined in the Network Reference Model. Refer to [I-1].

This document may be used in conjunction with any of the following standards:
- IOS (refer to [11] ~ [17])
- HRPD IOS with SC/MM in the AN (refer to [19])
- HRPD IOS with SC/MM in the PCF (refer to [20])

This document is a superset of the information needed to support BCMCS on three types of cdma2000 radio access networks: 1x, HRPD with SC/MM in the AN, and HRPD with SC/MM in the PCF. As such, not all information in this document is applicable to a given implementation. For example, A14 messaging does not apply to cdma2000 1x networks or HRPD networks with SC/MM in the AN.

1.3   Document Convention

"Shall" and "shall not" identify requirements to be followed strictly to conform to the standard and from which no deviation is permitted. "Should" and "should not" indicate that one of several possibilities is recommended as particularly suitable, without mentioning or excluding others; that a certain course of action is preferred but not necessarily required; or (in the negative form) that a certain possibility or course of action is discouraged but not prohibited. "May" and "need not" indicate a course of action permissible within the limits of the standard. "Can" and "cannot" are used for statements of possibility and capability, whether material, physical, or causal.

1.4   References

For consistency between RAN specifications, the most commonly referenced documents [1] ~ [17] shall be the same, or left as "Reserved" if not used in this specification.

1.4.1   Normative References

[1]~[4]   Reserved.

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

[5] 3GPP2 C.S0005-D v2.0, *Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems,* September 2005.

[6]~[7] Reserved.

[8] 3GPP2 X.S0011-C v3.0, *Wireless IP Network Standard, six parts*, October 2006.

[9]~[10] Reserved.

[11] 3GPP2 A.S0011-C v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 1 Overview*, December 2005.

[12] 3GPP2 A.S0012-C v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 2 Transport*, December 2005.

[13] 3GPP2 A.S0013-C v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 3 Features*, December 2005.

[14] 3GPP2 A.S0014-C v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 4 (A1, A2, and A5 Interfaces)*, December 2005.

[15] 3GPP2 A.S0015-C v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 5 (A3 and A7 Interfaces)*, December 2005.

[16] 3GPP2 A.S0016-C v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 6 (A8 and A9 Interfaces)*, December 2005.

[17] 3GPP2 A.S0017-C v2.0, *Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)*, December 2005.

[18] 3GPP2 C.S0024-B v1.0, *cdma2000 High Rate Packet Data Air Interface Specification*, May 2006.

[19] 3GPP2 A.S0008-B v1.0, *Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network*, October 2006.

[20] 3GPP2 A.S0009-B v1.0, *Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Packet Control Function*, October 2006.

[21] 3GPP2 C.S0054-A v1.0, *cdma2000 High Rate Broadcast-Multicast Packet Data Air Interface Specification*, February 2006.

[22] 3GPP2 X.S0022-A v1.0, *Broadcast and Multicast Service in cdma2000 Wireless IP Network*, April 2007.

[23] Internet Engineering Task Force, *RFC 2002 - IP Mobility Support*, October 1996.

[24] Internet Engineering Task Force, *RFC 2784 - Generic Routing Encapsulation (GRE)*, September 2000.

[25] Internet Engineering Task Force, *RFC 2865 - Remote Authentication Dial In User Service (RADIUS)*, June 2000.

[26] Internet Engineering Task Force, *RFC 2866 - RADIUS Accounting*, June 2000.

[27] Internet Engineering Task Force, *RFC 2890 - Key and Sequence Number Extensions to GRE*, September 2000.

[28] Internet Engineering Task Force, *RFC 3115 - Mobile IP Vendor/Organization-Specific Extensions*, April 2001.

1.4.2   Informative References

[I-1]   3GPP2 S.R0005-B v2.0, *Network Reference Model for cdma2000 Spread Spectrum Systems*, May 2007.

[I-2]   3GPP2 S.R0083-0 v1.0, *Broadcast-Multicast Service Security Framework*, October 2003.

1.5   Terminology

1.5.1   Acronyms

Acronym	Meaning
3GPP2	Third Generation Partnership Project 2
ADDS	Application Data Delivery Service
AN	Access Network
AT	Access Terminal
ATI	Access Terminal Identifier
BAK	Broadcast Access Key
BCD	Binary Code Decimal
BCMCS	Broadcast Multicast Services
BS	Base Station
BSN	Broadcast Serving Node
CDMA	Code Division Multiple Access
EIA	Electronics Industry Association
GRE	Generic Routing Encapsulation
HRPD	High Rate Packet Data
IE	Information Element
IEI	Information Element Identifier
IMSI	International Mobile Subscriber Identity
IOS	Interoperability Specification
IP	Internet Protocol
MIP	Mobile IP
MS	Mobile Station
MSC	Mobile Switching Center
MSID	Mobile Station Identifier
OAM&P	Operations, Administration, Maintenance, and Provisioning
PCF	Packet Control Function
PDSN	Packet Data Serving Node
RAN	Radio Access Network

Acronym	Meaning
RSD	RAN Session Discovery
SC/MM	Session Control / Mobility Management
SPI	Security Parameter Index
TIA	Telecommunications Industry Association

1.5.2 Definitions

BCMCS Content Stream	A single BCMCS broadcast program identified by content name.
BCMCS Flow ID	A value used for identification of a BCMCS multicast IP flow.
Broadcast A8/A10 connection	A unidirectional bearer traffic connection used for BCMCS between a PCF and BS/AN and between a BSN and PCF, respectively. Broadcast A8/A10 connections are established using broadcast A9/A11 signaling messages, respectively.
Broadcast A9/A11 interface	A signaling interface used for BCMCS. Broadcast A9/A11 signaling is used between a PCF and BS/AN and between a BSN and PCF, respectively.
BSN	This logical function communicates with the PCF to add and remove Multicast IP Flows. The BSN terminates the broadcast bearer and signaling connections. The BSN chosen by the PCF to supply Multicast IP Flows may be different from the PDSN supporting unicast connections to the MS/AT.
Dynamic Broadcast	The broadcast service wherein the bearer path can be established dynamically based on the user presence in the cell/sector.
MS/AT Directed Message	A message destined to an MS or AT. The message uses IMSI to identify the MS in a 1x system (refer to [5]) and UATI to identify the AT in an HRPD system (refer to [18]).
Multicast IP Flow	Similar to an ordinary IP flow, with the exception that the destination address is an IP multicast address. The flow can be identified by source address, source port, destination IP multicast address, and destination port.
Program ID	An identifier for a program that consists of one or more flows.
SC/MM function	SC/MM (Session Control and Mobility Management) is logically located in the AN [19] or the PCF [20] and includes the following functions:

- Storage of HRPD session related information: This function keeps HRPD session related information (e.g., Keep Alive timer, MNID, mapping between MNID and UATI, etc.) for dormant ATs.
- Assignment of UATI (Unicast AT identifier): This function assigns a new UATI to an AT.
- Access [19] or Terminal [20] Authentication: This function performs the access or terminal authentication procedure. This function judges whether or not an AT should be authenticated when the AT is

	accessing the HRPD RAN. The SC/MM performs PPP procedures for access or terminal authentication.
	• <u>Mobility Management:</u> This function manages the location of an AT.
Static Broadcast	The broadcast service wherein the bearer path is statically provisioned by the operator (e.g., via OAM&P) regardless of the user presence in the cell/ sector.
Unicast A8/A10 connection	A bearer traffic connection used for unicast IP services between a PCF and BS/AN and between a unicast PDSN and PCF, respectively. Unicast A8/A10 connections are established using unicast A9/A11 signaling messages, respectively.
Unicast A9/A11 interface	A signaling interface used for unicast IP services. Unicast A9/A11 signaling is used between a PCF and BS/AN and between a unicast PDSN and PCF, respectively.
Unicast PDSN	This logical function communicates with the PCF to add and remove Unicast IP flows. The unicast PDSN terminates the unicast bearer and signaling connections. It may be referred to as simply "PDSN". Refer to the Network Reference Model in [22].

Refer to [11], [19] and [20] for additional definitions.

1.6   BCMCS IOS Assumptions

This section describes assumptions in this standard.

1. There is only one A10 connection between a PCF and a BSN for a given BCMCS Flow ID. Whether the operator has configured the network such that only one BSN sends A11 network initiated BCMCS signaling to a PCF for a given BCMCS Flow ID or how the PCF resolves multiple BSN network initiated BCMCS session information updates for a given BCMCS Flow ID, is beyond the scope of this standard.

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1 ## 2. Architecture and Protocols

2 This section describes the architectural models and protocols used to support BCMCS.

3 ## 2.1 Architectural Model

4 The section describes the base architecture to support BCMCS. There is no interaction specified between
5 cdma2000 1x systems and HRPD systems in the Radio Access Network (RAN) for BCMCS.

6 ### 2.1.1 cdma2000 1x System

7 The architectural model for cdma2000 1x systems is specified in [11] ~ [17]. The following interfaces are
8 enhanced with respect to [11] ~ [17] to support BCMCS.
9 - A1/A1p interface
10 - A8/A9 interfaces
11 - A10/A11 interfaces

12 Unicast A10 bearer connections and unicast A11 signaling messages (refer to [11] ~ [17]) terminate in the
13 unicast PDSN logical function. Broadcast A10 bearer connections and broadcast A11 signaling messages
14 (refer to section 7) terminate in the BSN logical function.

15 ### 2.1.2 cdma2000 HRPD System with SC/MM in the AN

16 The architectural model for cdma2000 HRPD systems with SC/MM in the AN is specified in [19]. The
17 following interfaces are enhanced with respect to [19] to support BCMCS.
18 - A8/A9 interfaces
19 - A10/A11 interfaces

20 Unicast A10 bearer connections and unicast A11 signaling messages (refer to [19]) terminate in the
21 unicast PDSN logical function. Broadcast A10 bearer connections and broadcast A9/A11 signaling
22 messages (refer to section 7) terminate in the BSN logical function.

23 ### 2.1.3 cdma2000 HRPD System with SC/MM in the PCF

24 The architectural model for cdma2000 HRPD systems with SC/MM in the PCF is specified in [20]. The
25 following interfaces are enhanced with respect to [20] to support BCMCS.
26 - A8/A9 interfaces
27 - A10/A11 interfaces

28 Unicast A10 bearer connections and unicast A11 signaling messages (refer to [20]) terminate in the
29 unicast PDSN logical function. Broadcast A10 bearer connections and broadcast A11 signaling messages
30 (refer to section 7) terminate in the BSN logical function.
31

2.2   Bearer Path Architecture

Figure 2.2-1 illustrates the bearer path architecture for BCMCS flows.
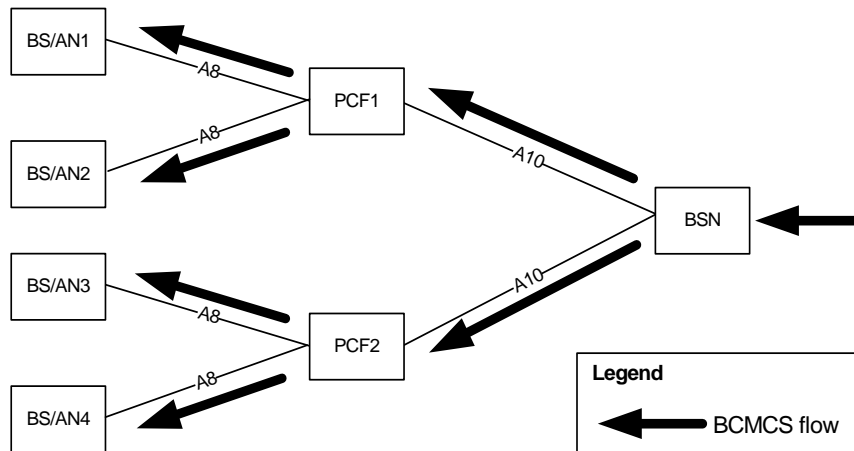
Note: BS/AN is used to represent a BS in cdma2000 1x systems or an AN in cdma2000 HRPD systems.

Figure 2.2-1   Bearer path architecture

Every broadcast A10 connection is unidirectional, carrying traffic only from a BSN to a PCF. Every broadcast A8 connection is unidirectional, carrying traffic only from a PCF to a BS/AN.

A PCF receives a BCMCS flow (associated with a BCMCS Flow ID) on at most one A10 connection, i.e., two A10 connections to the same PCF cannot carry the same flow. A PCF receives at most one BCMCS flow on each A10 connection, i.e., one A10 connection cannot carry more than one BCMCS flow.

A BS/AN receives a BCMCS flow (associated with a BCMCS Flow ID) on at most one A8 connection, i.e., two A8 connections to the same BS/AN cannot carry the same flow. A BS/AN receives at most one BCMCS flow on each A8 connection, i.e., one A8 connection cannot carry more than one BCMCS flow.

3. Feature Description

BCMCS allows optimized use of the cdma2000 radio interfaces for delivery of BCMCS content stream(s) to one or more terminals in one or more regions of an operator's network. [22] provides an architectural overview and a framework for the service.

3.1 Basic Concepts

This section addresses the overall concepts of BCMCS service discovery, subscriptions, RAN session discovery and bearer path establishment and release.

3.1.1 Service Announcement and Discovery

BCMCS service announcement and discovery mechanisms allow users to request or to be informed about BCMCS content.

Service announcement and discovery are transparent to the BCMCS IOS.

3.1.2 Content Subscriptions

Content subscriptions are an optional function wherein the user subscribes to one or more BCMCS contents via out of band mechanisms.

Content subscriptions are transparent to the BCMCS IOS.

3.1.3 Content Information Acquisition

Content information acquisition is the procedure whereby the MS/AT communicates with the BCMCS Controller to acquire session related information such as IP multicast address/port and flow treatment. Content information acquisition may be performed over the MS/AT's packet data session (via the PDSN).

Content information acquisition is transparent to the BCMCS IOS.

3.1.4 Content Availability Determination

Service announcement and discovery may not inform the user/terminal of the geographical or radio coverage areas in which the content is to be available. This information may be obtained by the terminal via one of the following methods:

1. The RAN advertises the content availability over the air interface channels. This method is transparent to the BCMCS IOS.

2. The terminal queries the RAN about the availability of IP flows. In this method, the RAN queries the BSN about the availability of the IP flows requested by the terminal. The BSN fetches the information from the core network and responds to the RAN.

3.1.5 RAN Session Discovery

Before establishing the BCMCS bearer path, the RAN obtains session related information about the flow such as start time and end time. The procedure for obtaining this information is called session discovery.

RAN session discovery for a given flow may be triggered by the first MS that registers for that flow or session information may be provided to the RAN by the BSN for network initiated flows (refer to [22]). Refer to section 3.1.6 and 3.1.8 for more information.

The procedures for RAN session discovery are covered in this specification. Refer to 6.2.1 and 7.2.1 for A9 and A11 interface session discovery procedures.

3.1.6   BCMCS Registration

The MS/AT may perform BCMCS registration to request delivery of one or more multicast IP flows identified by the BCMCS Flow ID(s). The first MS/AT that performs a BCMCS registration at the BS/AN may trigger RAN session discovery and may trigger establishment of all or part of the bearer path. The network may require the MS/AT to perform re-registrations for the flows that the MS/AT is continuing to monitor. The network may authorize one or more of the (re-)registrations to ensure that only authorized users can cause the start or continuation of transmission of programs.

The procedures for handling registrations from terminals in the RAN are covered in this specification. Refer to 6.2.1 and 7.2.1 for A9 and A11 interface registration procedures.

3.1.7   BCMCS Deregistration

The MS/AT may perform BCMCS deregistration to notify the BS/AN that the MS/AT is no longer monitoring the flow(s). BCMCS deregistration may occur via timeout at the BS/AN if the lifetime of the BCMCS registration has expired and BCMCS re-registration has not been received.

3.1.8   Bearer Path Establishment

BCMCS bearer paths may be set up via static provisioning at any time. Static provisioning is outside the scope of the IOS.

The bearer path establishment procedure is invoked when there is a need to establish the bearer path for a BCMCS flow. The RAN performs RAN session discovery (refer to section 3.1.5) before establishing the BCMCS bearer paths.

The procedures for establishing a bearer path in the RAN are covered in this specification. Refer to sections 6.2.3 and 7.2.3 for A9 and A11 interface bearer path establishment procedures.

3.1.9   Bearer Path Release

When there is a request to release the bearer path for the BCMCS flow, or the system determines that the number of MS/ATs listening to a particular flow has dropped below some predefined threshold, or the BCMCS program ends, the RAN or BSN may initiate the bearer path release procedure. One or more of the air (radio channels), A8, and A10 bearers may be removed during bearer path release.

The procedures for releasing a bearer path in the RAN are covered in this specification. Refer to sections 6.2.4 and 7.2.3 for A9 and A11 interface bearer path release procedures.

3.2   Static Broadcast and Dynamic Broadcast

Static BCMCS is the broadcast service wherein the bearer path is provisioned by the operator (e.g., via OAM&P) regardless of the user presence in the cell/sector. Dynamic BCMCS is the broadcast service wherein the bearer path is established based on the user presence in the cell/sector.

Network initiated BCMCS is for static flows, however the time at which the RAN sets up the network bearer is based on operator policy.

3.3   Accounting

The accounting information collected by the RAN for BCMCS may be used for billing the user and/or the content provider. It may also be used for monitoring the system and generating operations statistics.

3.4   Encryption

BCMCS programs may be encrypted to reduce the ability of unauthorized users to access program content. The content may be encrypted at various places in the protocol stack, including at the application layer or at the link layer. Link layer encryption, if performed, is done at the BS/AN.

For link layer encryption, it is necessary to transport the Broadcast Access Keys (BAKs) for the program from the BSNs to the BS/ANs during RAN session discovery.

3.5   Security

BAK related information (refer to [22]) may be passed from the BCMCS Controller to the BS/AN, via the BSN, and stored there for purposes of bearer path authorization and/or link layer encryption. This information should be protected when transmitted via A11 and A9 signaling during RAN session dis-covery and/or session information update. Refer to [13] and [14] for security considerations. This inform-ation should also be protected when stored in the RAN. Refer to [I-2]. Protection mechanisms are outside the scope of this document.

3.6   Page Set Maintenance

In sectors where multiple frequencies exist, both cdma2000 1x and HRPD systems use a hash function to distribute MS/ATs across the frequencies. The inputs to the hash function and the hash function itself are such that the RAN can determine which frequency an MS/AT will hash (called the hash-to frequency). The network can page the MS/AT in the correct frequency using this knowledge.

A BCMCS program may be available in a subset of the frequencies in a sector. For many MS/ATs, a BCMCS program of interest may not be on their hash-to frequency. An MS/AT interested in receiving a BCMCS program may need to tune away from its hash-to frequency. In this case, the network needs to know which frequency the MS/AT is monitoring. When an MS/AT registers, the network stores the frequency that the MS/AT is to monitor. The network uses this information when it needs to send an MS/AT Directed Message on the common channels. This functionality is known as page set maintenance.

3.7   BSN Selection Algorithm

Since a PCF can be connected to multiple BSN's for BCMCS, it can receive a BCMCS program from any BSN capable of transmitting that program. For the purpose of RAN session discovery, registrations and bearer path establishment the PCF selects a BSN among the BSNs to which it is connected. A BSN selection algorithm is specified to increase the likelihood that multiple PCF's connect to the same BSN for receiving the same BCMCS program. This ensures that the minimum number of BSN's are transmitting the same BCMCS program. It also reduces the time that it takes to set up a bearer path from the source of the BCMCS program to an MS/AT that is crossing PCF boundaries, when the target PCF is not already receiving the program. To have the same BSN deliver all flows for a given BCMCS program, selection is based on the BCMCS Program ID and not individual BCMCS Flow IDs. This allows for simultaneous establishment and release of all bearer paths for a BCMCS program and for the component flows of a BCMCS program to experience similar delays.

The algorithm specified in this standard shall be used for the selection of a BSN. Once selected, all subsequent communication related to the same BCMCS program shall be performed with the selected BSN.

Each PCF shall maintain a configuration table with IP addresses as follows.

BSN Number	BSN IP Address
0	a b c d
1	k l m n
…	
N-1	w x y z

1 The BSNs accessible from the PCF shall be listed in ascending order of BSN IP addresses. For two PCFs
2 to resolve the same BCMCS program to the same BSN, the PCFs need to have tables of equal lengths. In
3 network configurations with full connectivity, the BSN selection algorithm allows two PCFs to resolve
4 the same BCMCS program to the same BSN. In network configurations with partial connectivity, tables
5 of equal lengths can be achieved by adding dummy entries in the tables for BSNs that exist in the network
6 but are not accessible from the PCF. The PCF shall be capable of including dummy entries in the
7 configuration table. Each dummy entry shall be placed in the position in the table that the BSN entry
8 would have had if the PCF had had connectivity to that BSN. The BSN IP address for such "dummy"
9 BSN entries shall be set to '0.0.0.0'. Finally, the entries shall be numbered from 0 to N-1 in ascending
10 order, N being the total number of entries in the table.

11 For initial BSN assignment and for BSN reselection, the PCF shall determine which BSN to use for a
12 particular MS by the following BSN Selection algorithm:

13 BSN No. = (BCMCS program identifier) modulo N, if BCMCS program identifier is derivable, or

14 BSN No. = (BCMCS flow identifier) modulo N, otherwise,

15 The IP address of the selected BSN shall be obtained by indexing at the BSN Number entry in the
16 configuration table. If the selected BSN does not reply to the service request or replies with a code other
17 than "Registration accepted" (00H), "Identification mismatch" (85H), or "Unknown BSN address" (88H),
18 the PCF may select another BSN among the other non-dummy entries. The PCF may repeat this
19 procedure until it successfully completes BSN selection.

20 If the selected BSN proposes another BSN in the A11-BC Service Response message, the PCF may re-
21 quest service with the proposed BSN.

22

4. Feature Call Flows

This section describes the call flows associated for IOS support for BCMCS. While specific air interface messages may be identified in the BCMCS IOS call flows, they are provided only for informational purposes. For the definitions and formats of these cdma2000 messages, refer to [5] for 1x systems and [21] for HRPD systems. Refer to sections 6 through 9 for the definitions of BCMCS IOS messages and timers used in this section.

4.1 MS Initiated BCMCS Registration and RAN Session Discovery

This section describes the call flows for BCMCS registration and RAN session discovery.

4.1.1 BCMCS Registration and RSD (1x System)

Figure 4.1.1-1 illustrates the call flow associated with MS Initiated BCMCS registration and RAN Session Discovery (RSD) via an MS initiated registration[2] for a 1x system.
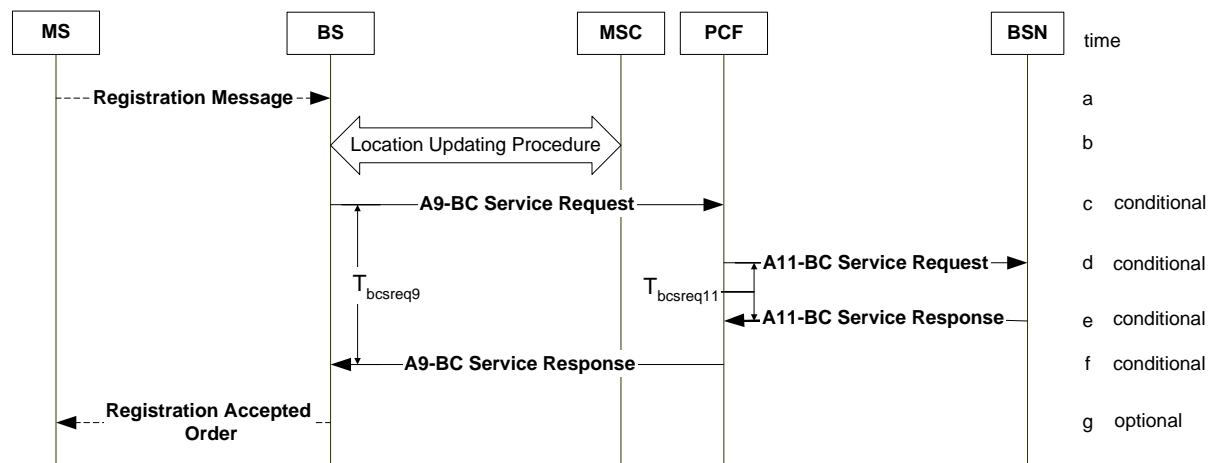
Figure 4.1.1-1: BCMCS Registration and RSD (1x System)

a. The MS initiates a BCMCS registration operation by sending the Registration Message to the BS and includes a set of BCMCS flow identifier(s) and optionally the corresponding Auth Signature's for those flows.

b. The BS performs the Location Updating Procedure. For this procedure, refer to [13].

If the BS has RAN session information on the requested BCMCS flow(s) and the BAK authorization is performed at the BS or the BAK authorization is not required, step 'c' through step 'f' are omitted.

c. The BS sends an A9-BC Service Request message to the PCF to request BAK authorization from the BCMCS controller and/or RAN session information from the BSN and starts timer $T_{bcsreq9}$.

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2 An MS may also initiate a BCMCS Registration operation during an origination attempt or at page response. In this case the BCMSC flow identifier(s) and authorization signatures are included in the corresponding Origination Message, Enhanced Origination Message or Page Response Message. In these scenarios step 'a' is replaced by the appropriate call origination or termination procedure and steps 'c' through 'f' apply as necessary.

If the PCF has RAN session information on the requested BCMCS flow(s) and the BAK authorization is performed at the BS or the BAK authorization is not required, step 'd' and step 'e' are omitted.

d. The PCF selects a BSN (if required) and sends an A11-BC Service Request message to the BSN to request RAN session information and/or user authorization. The PCF starts timer $T_{bcsreq11}$.

e. The BSN sends an A11-BC Service Response message to the PCF to transfer RAN session information requested in the A11-BC Service Request message and the user authorization result if requested. The PCF stops timer $T_{bcsreq11}$.

f. The PCF sends an A9-BC Service Response message to the BS to transfer RAN session information requested in the A9-BC Service Request message and user authorization result if requested. The BS stops timer $T_{bcsreq9}$.

g. The BS may transmit a Registration Accepted Order message to inform the MS of the registration result. This step may occur after bearer path establishment. Refer to section 4.3.

4.1.2 BCMCS Registration and RSD (HRPD System with SC/MM in the AN)

Figure 4.1.2-1 illustrates the call flow associated with BCMCS registration and RSD via an AT initiated registration for an HRPD system with SC/MM in the AN. It is assumed that the AT has already established an HRPD session. Refer to [19].
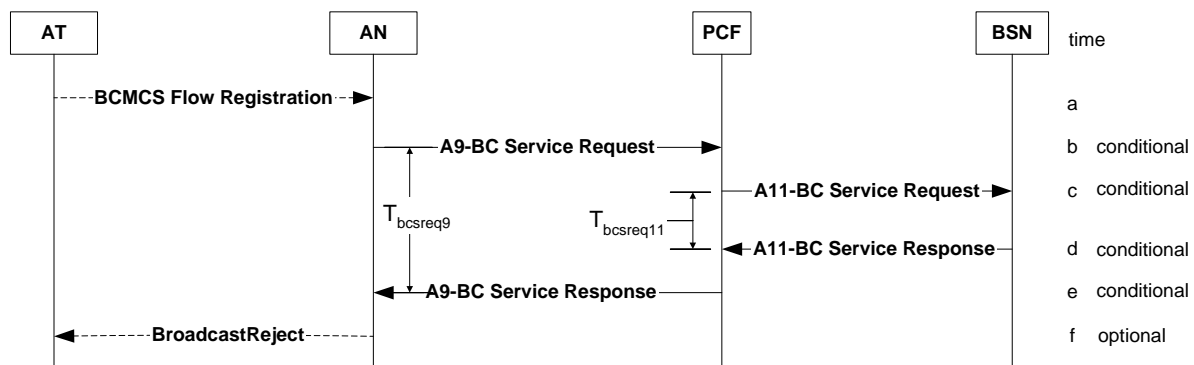
Figure 4.1.2-1: BCMCS Registration and RSD (HRPD System with SC/MM in the AN)

a. The AT initiates a BCMCS registration operation by sending the BCMCS Flow Registration message to the BS and includes a set of BCMCS flow identifier(s) and optionally the corresponding Auth Signature's for those flows.

If the AN has RAN session information on the requested BCMCS flow(s) and the BAK authorization is performed at the AN or the BAK authorization is not required, step 'b' through step 'e' are omitted.

b. The AN sends an A9-BC Service Request message to the PCF to request BAK authorization from the BCMCS controller and/or RAN session information from the BSN and starts timer $T_{bcsreq9}$.

If the PCF has RAN session information on the requested BCMCS flow(s) and the BAK authorization is performed at the AN or the BAK authorization is not required, step 'c' and step 'd' are omitted.

c. The PCF selects a BSN (if required) and sends an A11-BC Service Request message to the BSN to request RAN session information and/or user authorization. The PCF starts timer $T_{bcsreq11}$.

1 d. The BSN sends an A11-BC Service Response message to the PCF to transfer RAN session informat-
2   ion requested in the A11-BC Service Request message and user authorization result if requested. The
3   PCF stops timer $T_{bcsreq11}$.

4 e. The PCF sends an A9-BC Service Response message to the AN to transfer RAN session information
5   requested in the A9-BC Service Request message and user authorization result if requested. The AN
6   stops timer $T_{bcsreq9}$.

7 f. The AN can send a BroadcastReject message to inform the AT that one or more BCMCS Flows
8   requested by the user are rejected. This step may occur after bearer path establishment (e.g., in the
9   case bearer traffic does not arrive). Refer to section 4.3.

10 **4.1.3   BCMCS Registration and RSD (HRPD System with SC/MM in the PCF)**

11 Figure 4.1.3-1 illustrates the call flow associated with BCMCS registration and RSD via an AT initiated
12 registration for an HRPD system with SC/MM in the PCF. It is assumed that the AT has already
13 established an HRPD session. Refer to [20].

14
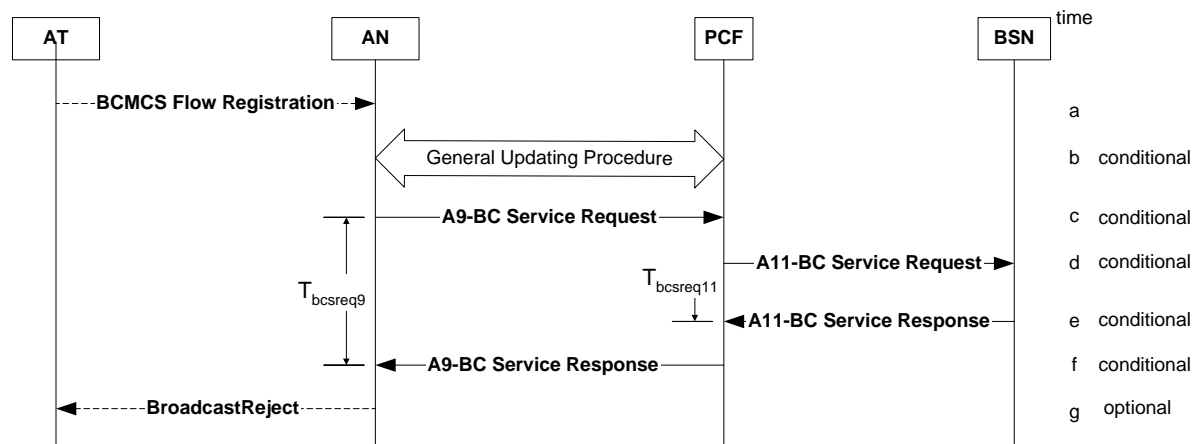
15 **Figure 4.1.3-1: BCMCS Registration and RSD (HRPD System with SC/MM in the PCF)**

16 a. The AT initiates a BCMCS registration operation by sending the BCMCS Flow Registration message
17   to the BS and includes a set of BCMCS flow identifier(s) and optionally the corresponding Auth
18   Signature's for those flows.

19 b. The AN performs the General Updating Procedure if the AT is not active. This step may be perform-
20   ed in parallel with following steps. For this procedure, refer to [20].

21 If the AN has RAN session information on the requested BCMCS flow(s) and the BAK authorization is
22 not required, step 'c' through step 'f' are omitted.

23 c. The AN sends an A9-BC Service Request message including parameters received from the AT, to the
24   PCF and starts timer $T_{bcsreq9}$.

25 If the PCF has RAN session information on the requested BCMCS flow(s) and the BAK authorization is
26 performed at the PCF or the BAK authorization is not required, step 'd' and step 'e' are omitted.

27 d. The PCF selects a BSN (if required) and sends an A11-BC Service Request message to the BSN to
28   request RAN session information and/or user authorization. The PCF starts timer $T_{bcsreq11}$.

e. The BSN sends an A11-BC Service Response message to the PCF to transfer RAN session information requested in the A11-BC Service Request message and user authorization result if requested. The PCF stops timer $T_{bcsreq11}$.

f. The PCF sends an A9-BC Service Response message to the AN. This message may include the result of message validation and user authorization if failure event occurs. The AN stops timer $T_{bcsreq9}$.

g. The AN can send a BroadcastReject message to inform the AT that one or more BCMCS Flows requested by the user are rejected. This step may occur after bearer path establishment (e.g., in the case bearer traffic does not arrive). Refer to section 4.3.

4.2 BSN Session Information Update

This section describes the call flows when the BCMCS session information is provided by the BSN to the RAN.

4.2.1 BSN Session Information Update (1x and HRPD Systems)

Figure 4.2.1-1 illustrates the call flow associated with Session information update initiated by the BSN for network initiated flows for 1x or HRPD systems. The BCMCS Controller performs network initiated bearer set-up and the BSN provides a session information update to the RAN.
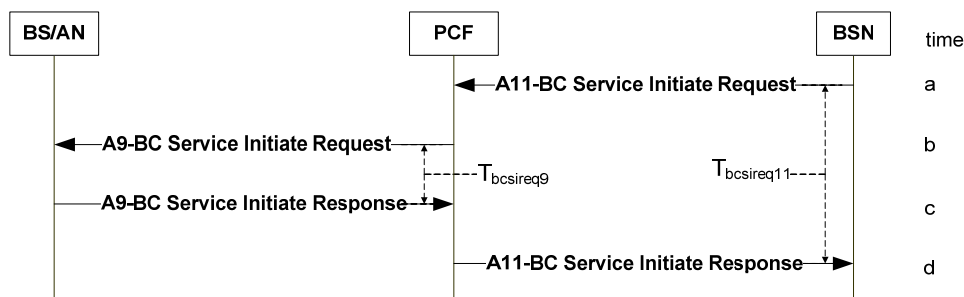
Figure 4.2.1-1   BSN Session Information Update for 1x or HRPD Systems

a. The BSN sends an A11-BC Service Initiate Request message to the PCF including BCMCS session information that the RAN needs and starts the timer $T_{bcsireq11}$.

b. The PCF sends an A9-BC Service Initiate Request message to the BS/AN, including the BCMCS session information, and starts timer $T_{bcsireq9}$. This message includes the Common and RAN Session Info, Subnet/BSID.

c. The BS/AN sends an A9-BC Service Initiate Response message to the PCF. The PCF stops the timer $T_{bcsireq9}$.

d. The PCF sends an A11-BC Service Initiate Response message to the BSN. The BSN stops the timer $T_{bcsireq11}$.

4.3 Bearer Path Establishment

This section describes the call flows for the establishment of A8 and A10 connections for BCMCS. The BS/AN establishes only one A8 connection per A9 signaling message. Therefore, the BS/AN has to send an A9 signaling message for each A8 connection establishment. This method is also applied to the A10 connection establishment procedure.

4.3.1   BS/AN Initiated Bearer Establishment - No A10 Established

Figure 4.3.1-1 illustrates the call flow associated with the establishment of an A8/A10 connection in the case where there is no A8/A10 connection established for the BCMCS flow.
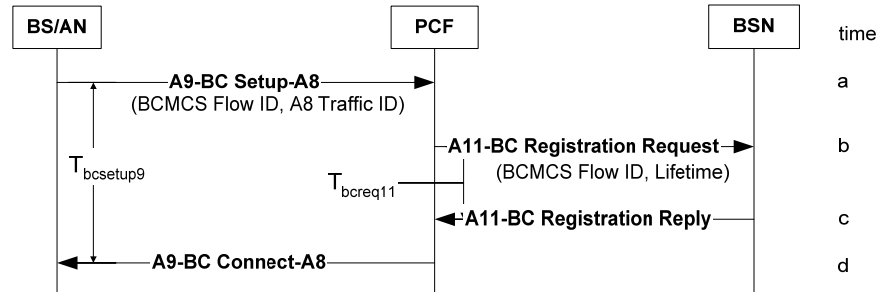
Figure 4.3.1-1: A8/A10 Establishment - Initiated by the BS/AN

a.   The BS/AN determines that the transmission of a BCMCS flow is required at this step. This determination may be triggered by detection of the existence of an AT trying to listen to the BCMCS flow (e.g., by receiving a BCMCS Registration message). Upon this determination, the BS/AN sends an A9-BC Setup-A8 message to the PCF to establish an A8 connection and starts timer $T_{bcsetup9}$.

b.   The PCF selects a BSN (if required) and sends an A11-BC Registration Request message to the BSN to establish an A10 connection for broadcast stream and starts timer $T_{bcreq11}$.

c.   The BSN sends an A11-BC Registration Reply message to the PCF. The PCF stops timer $T_{bcreq11}$.

d.   The PCF sends an A9-BC Connect-A8 message to the BS/AN. The BS/AN stops timer $T_{bcsetup9}$.

4.3.2   BS/AN Initiated Bearer Establishment - A10 Established

Figure 4.3.2-1 illustrates the call flow associated with the establishment of an A8 connection in the case where there is an A10 connection established for the BCMCS flow.
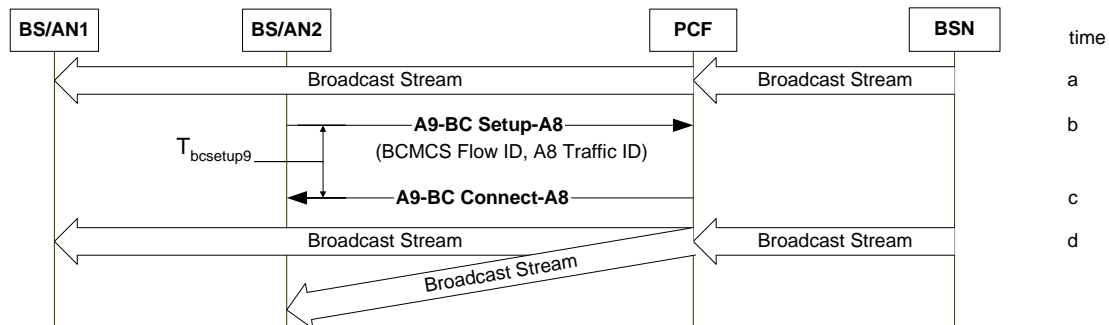
Figure 4.3.2-1: A8/A10 Establishment (A10 Established) - Initiated by the BS/AN

a.   The BCMCS flow is transmitted from the BSN to BS/AN1 via the PCF.

b.   BS/AN2 determines that the transmission of a BCMCS flow is required at this step. This determination may be triggered by detection of the existence of the AT trying to listen to the BCMCS flow (e.g., by receiving a BCMCS Registration message). Upon this determination, the BS/AN sends an A9-BC Setup-A8 message to the PCF to establish an A8 connection and starts timer $T_{bcsetup9}$. This message includes the BCMCS Flow ID of the requested flow. The PCF determines that it has already had A10

connection for this flow. Therefore, the PCF does not send any signaling to the BSN for A10 connection establishment.

c. The PCF sends an A9-BC Connect-A8 message to BS/AN2. BS/AN2 stops timer $T_{bcsetup9}$.

d. The BCMCS flow received at the PCF is simultaneously transmitted to BS/AN1 and BS/AN2 using their respective A8 connections.

4.4   Bearer Path Release

This section describes the call flows for the release of A8 and A10 connections for BCMCS. The BS/AN and PCF release only one A8 connection per A9 signaling message. Therefore, the BS/AN and PCF have to send an A9 signaling message for each A8 connection. This method is also applied to the A10 connection release procedure.

4.4.1   BS/AN Initiated Bearer Release - Last A8 Connection

Figure 4.4.1-1 illustrates the call flow associated with the release of an A8 connection in the case where the A8 connection is the last connection for the BCMCS flow under the PCF.
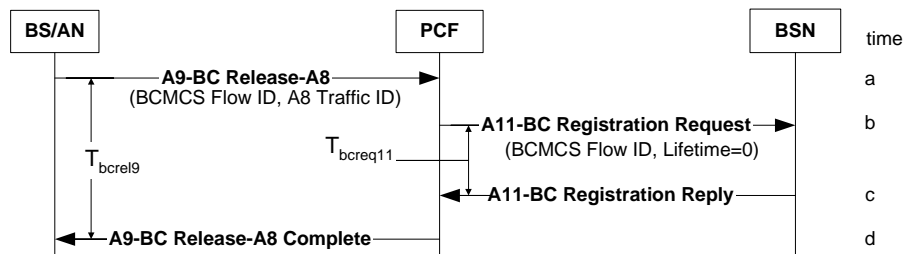
Figure 4.4.1-1: A8/A10 Release (Last A8 Connection) - Initiated by the BS/AN

a. The BS/AN determines that the transmission of a BCMCS flow is no longer required. This determination may be triggered by detection of absence of MS/ATs listening to the BCMCS flow. The BS/AN sends an A9-BC Release-A8 message to the PCF to release an A8 connection and starts timer T_{bcrel9}.

b. The PCF sends an A11-BC Registration Request message with lifetime set to zero to the BSN to release the A10 connection for the broadcast stream because there is no other A8 connection for the broadcast stream under the PCF. The BS/AN starts timer $T_{bcreq11}$.

c. The BSN sends an A11-BC Registration Reply message to the PCF. The PCF stops timer $T_{bcreq11}$.

d. The PCF sends an A9-BC Release-A8 Complete message to the BS/AN. The BS/AN stops timer T_{bcrel9}.

4.4.2   BS/AN Initiated Bearer Release - Not Last A8 Connection

Figure 4.4.2-1 illustrates the call flow associated with the release of an A8 connection in the case where there is an A8 connection for the BCMCS flow with another BS/AN(s) under the PCF.
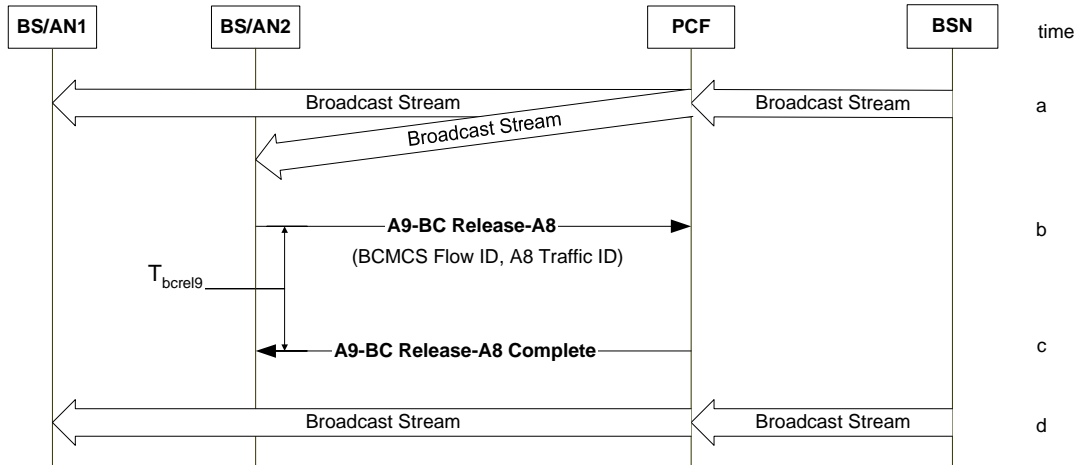
Figure 4.4.2-1: A8/A10 Release (Not the Last A8 Connection) - Initiated by BS/AN

a.   The BCMCS flow received at the PCF is transmitted simultaneously to BS/AN1 and BS/AN2 using their respective A8 connections.

b.   BS/AN2 determines that the transmission of a BCMCS flow is no longer required. This determination may be triggered by detection of absence of MS/ATs listening to the broadcast flow. BS/AN2 sends an A9-BC Release-A8 message to the PCF to release an A8 connection and starts timer T_{bcrel9}. The PCF does not release the A10 connection for this flow because the PCF still has an A8 connection with BS/AN1 for this stream.

c.   The PCF sends an A9-BC Release-A8 Complete message to BS/AN2. BS/AN2 stops timer T_{bcrel9}.

d.   The BCMCS flow continues to be transmitted to BS/AN1 via the PCF.

4.4.3   PCF Initiated Bearer Release – A8 Connection

Figure 4.4.3-1 illustrates the call flow associated with the release of an A8 connection under the PCF.
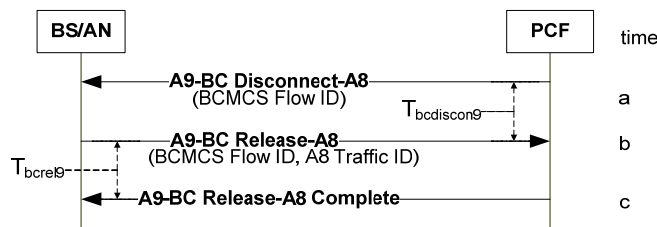
Figure 4.4.3-1: A8 Connection Release - Initiated by the PCF

a.   When the PCF determines that the A8 connection is no longer required, the PCF sends an A9-BC Disconnect-A8 message to the BS/AN to release the A8 connection and starts timer $T_{bcdiscon9}$.

b.   The BS/AN sends an A9-BC Release-A8 message in response to the A9-BC Disconnect-A8 message and starts timer Tbcrel9. The PCF stops timer $T_{bcdiscon9}$.

c.   The PCF sends an A9-BC Release-A8 Complete message to the BS/AN. The BS/AN stops timer T_{bcrel9}.

4.4.4 PCF Initiated Bearer Release – A10 Connection

Figure 4.4.4-1 illustrates the call flow associated with the release of an A10 connection initiated by the PCF.
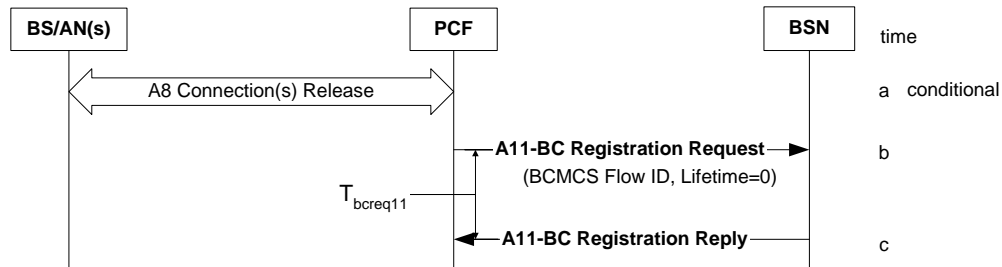
Figure 4.4.4-1: A8/A10 Release - Initiated by the PCF

a. The PCF releases all A8 connection(s), if any, associated with an A10 connection. Refer to section 4.4.3.

b. At the time when the last A8 connection release is processed, the PCF sends an A11-BC Registration Request message with lifetime set to zero, to the BSN to release the A10 connection and starts timer $T_{bcreq11}$.

c. The BSN sends an A11-BC Registration Reply message to the PCF. The PCF stops timer $T_{bcreq11}$.

4.4.5 BSN Initiated Bearer Release

Figure 4.4.5-1 illustrates the call flow associated with the release of an A10 connection initiated by the BSN.
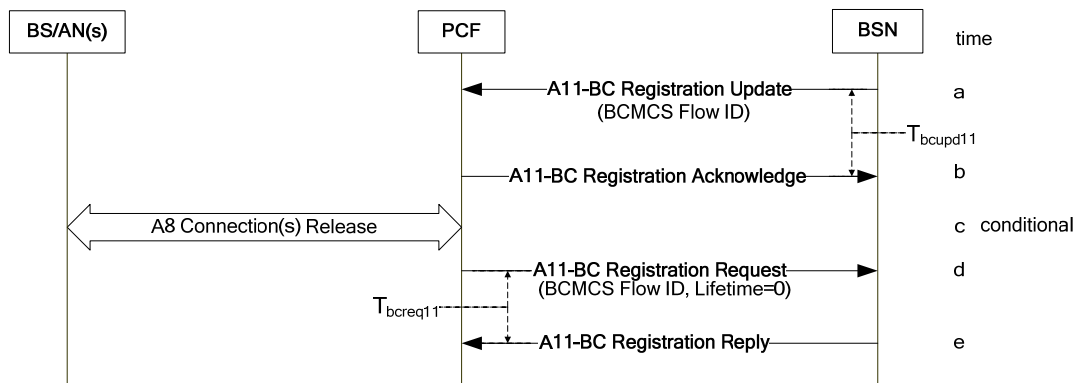
Figure 4.4.5-1: A8/A10 Release - Initiated by the BSN

a. The BSN sends an A11-BC Registration Update message to the PCF to release the A10 connection and starts timer $T_{bcupd11}$.

b. The PCF responds with an A11-BC Registration Acknowledge message to the BSN. The BSN stops timer $T_{bcupd11}$.

c. The PCF releases all A8 connection(s), if any, for the associated broadcast stream. Refer to section 4.4.3.

1 d. The PCF sends an A11-BC Registration Request message with lifetime set to zero, to the BSN to
2   release the A10 connection and starts timer $T_{bcreq11}$.

3 e. The BSN sends an A11-BC Registration Reply message to the PCF. The PCF stops timer $T_{bcreq11}$.

4.5   Page Set Maintenance

This section describes page set maintenance for different type of systems. Refer to section 3.6. The node
responsible for mobility management shall store the frequency that the MS/AT indicates it is monitoring.
Table 4.5-1 shows the node responsible for mobility management in each system.

Table 4.5-1   Mobility Managers by System Type

cdma2000 System	Mobility Manager
1x	MSC/VLR
HRPD with SC/MM in the AN	AN
HRPD with SC/MM in the PCF	PCF

The following subsections illustrate call flows related to page set maintenance.

4.5.1   1x System

Figure 4.5.1-1 illustrates the call flow associated with page set maintenance via an MS initiated registrat-
ion for a 1x system. In this call flow it is assumed that the BCMCS flow request from the MS contains the
designated frequency.
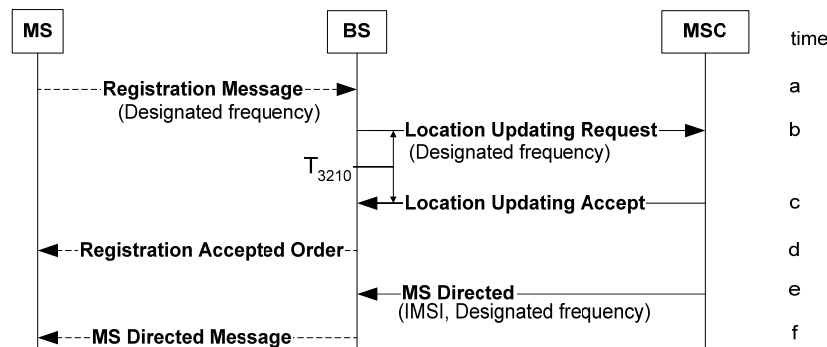
Figure 4.5.1-1: Page Set Maintenance (1x System)

a. The MS initiates a BCMCS registration operation by sending the Registration Message to the BS and
   includes a set of BCMCS flow identifier(s) and optionally the corresponding Auth Signature's for
   those flows. The message contains the frequency that the MS is to monitor (which is shown as
   'Designated frequency' in Figure 4.5.1-1).

b. The BS constructs a Location Updating Request message, places it in a Complete Layer 3 Informat-
   ion message, sends it to the MSC and starts timer T_{3210}. This message contains the frequency that the
   MS sent in step 'a'.

c. The MSC/VLR stores the frequency information received in step 'b'. The MSC sends a Location
   Updating Accept message to the BS to indicate that the Location Updating Request message has been
   processed. Upon receipt of the Location Updating Accept message, the BS stops timer T_{3210}.

d. The BS may transmit a Registration Accepted Order message to inform the MS of the registration re-
sult. This step may occur after bearer path establishment. Refer to section 4.3.

e. When the MSC sends any MS Directed message, the MSC includes the stored frequency in the
message that it sends to the BS.

f. The BS uses the frequency information it received to determine the frequency(s) on which to send the
MS Directed Message(s).

4.5.2   HRPD System with SC/MM in AN

The AT performs BCMCS Flow Registration, which the AN can use to determine which CDMA channels
the AT may be monitoring. This case has no IOS impacts.

4.5.3   HRPD System with SC/MM in the PCF

Figure 4.5.3-1 illustrates the call flow associated with page set maintenance for an HRPD system with
SC/MM in the PCF.
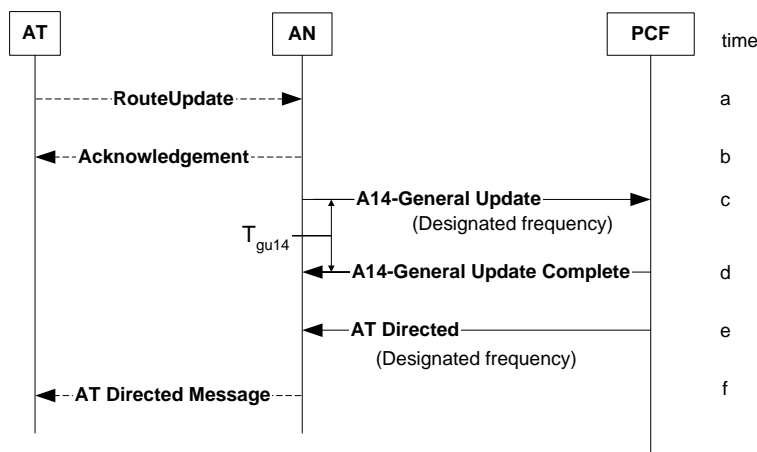
Figure 4.5.3-1: Page Set Maintenance (HRPD System with SC/MM in the PCF)

a. The AT transmits a RouteUpdate message to the AN.

b. The AN acknowledges the receipt of the RouteUpdate message.

c. The AN sends an A14-General Update message to the PCF and starts timer T_{gu14}. The message con-
tains the AT's frequency information determined in step 'a'.

d. The PCF stores the frequency received in the message in step 'c' and sends an A14-General Update
Complete message to the AN. The AN stops timer T_{gu14}.

e. When the PCF sends any AT Directed message, the PCF includes the stored frequency in the message
that it sends to the AN.

f. The AN uses the frequency information it received to determine the frequency(s) on which to send
the AT Directed Message(s).

5.   Control Plane and Bearer Plane Considerations

5.1   Bearer Plane Considerations for the A8 and A10 Interfaces

5.1.1   Protocol Stacks and Protocols

The protocol stacks and the protocols used for BCMCS user data transport on the A8 and A10 interfaces are the same as in [12], with the following modifications related to the usage of GRE:

- The A8 and A10 connections for the transport of BCMCS flow data are set up in the BSN to PCF to BS/AN direction only.
- When setting up an A8 connection for a BCMCS flow, the BS/AN shall select a GRE key value different from any other GRE key value in use between the BS/AN and the PCF, and signal this value to the PCF as specified in section 6.4.2.2. The PCF shall apply this key to all GRE frames associated with the BCMCS flow that are sent to the BS/AN.
- When setting up an A10 connection for a BCMCS flow, the PCF shall select a GRE key value different from any other GRE key value in use between the PCF and the BSN, and signal this value to the BSN as specified in section 7.4.2.12. The BSN shall apply this key to all GRE frames associated with the BCMCS flow that are sent to the PCF.

This paragraph describes the bearer plane processing for one BCMCS flow between a BSN and a BS/AN. With the A10 connection and the A8 connection in place, link layer/network layer frames pass over these connections from the BSN to the BS/AN using GRE framing. The link layer/network layer frames consist of either the IP packets containing the BCMCS flow data or HDLC-like frames encapsulating these IP packets. The BSN encapsulates the link/network layer frames in GRE frames and sends them over an IP transport to the PCF. The PCF decapsulates the link/network layer frames from the GRE frames and re-encapsulates the frames into GRE frames before forwarding them over an IP transport to the BS/AN. The BS/AN accepts these GRE frames, strips the GRE headers, and processes the link/network layer frames as necessary before transmission over the air. IP packet boundary information shall be available at the PCF and BS/AN when the IP packets are not encapsulated in HDLC-like frames.

5.1.2   BCMCS Framing

The BS/AN, PCF, and BSN shall support link layer/network layer frames consisting of HDLC-like frames encapsulating the IP packets containing the BCMCS flow data on the A8 and A10 interfaces. Refer to section 5.1.1 for more information.

The BS/AN, PCF, and BSN may support link layer/network layer frames consisting of the IP packets containing the BCMCS flow data on the A8 and A10 interfaces. Refer to section 5.1.1 for more information.

When both choices (support for enabling and disabling the Broadcast Framing Protocol) are available it is an operator choice to configure the framing mechanism used.

5.2   Control Plane Considerations for A9 and A11 Interfaces

The protocol stacks and the protocols used for BCMCS signaling on the A9 and A11 interfaces are the same as in [12].

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2

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6. Broadcast A9 Signaling Messages

This section defines a set of messages supporting BCMCS that enhance the A9 interface defined in cdma2000 [11] ~ [17] for 1x systems, [19] for HRPD systems with SC/MM in the AN, and [20] for HRPD systems with SC/MM in the PCF.

6.1 General Considerations

The following topics are specified in [16], with the following additions, related to requirements for BCMCS Flow ID lists:

1. Message Body, Coding and Ordering of Elements.

2. Forward Compatibility Guidelines.

3. Message Processing Guidelines.

4. Message Definition Guidelines.

6.2 A9 Message Procedures

This section describes the BCMCS message procedures for the A9 interface when RAN session discovery and BCMCS registration are initiated by the MS.

6.2.1 MS initiated Registration and RAN Session Discovery

This section describes the message procedures for MS initiated registration and RAN session discovery.

6.2.1.1 A9-BC Service Request

The A9-BC Service Request message is sent from the BS/AN to the PCF to perform BCMCS registration and RAN session discovery.

6.2.1.1.1 Successful Operation

When the BS/AN receives a message from the MS/AT that initiates a BCMCS registration operation[3], the BS/AN shall send an A9-BC Service Request message to the PCF if any of following conditions are met:
- The BS/AN does not have RAN session information for the BCMCS flow(s) requested by the MS/AT.
- The BS/AN is not capable of BAK authorization or does not have permission to authorize if the BCMCS Registration message requires to be authorized. The permission may be obtained during the RAN session discovery procedure performed before this procedure.

When the BS/AN receives a BCMCS Flow ID as the BCMCS flow identifier from the MS/AT, the BS/AN shall include the BCMCS Flow ID as the BCMCS flow identifier in the A9-BC Service Request message.

When the BS/AN receives the length of the flow discriminator, Program ID and Flow Discriminator(s) as the BCMCS flow identifier(s) from the MS/AT, the BS/AN shall derive the BCMCS Flow ID(s) from those fields and include the BCMCS Flow ID(s) as the BCMCS flow identifier(s) in the A9-BC Service Request message. Refer to [22] for the structure of BCMCS Flow ID(s).

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[3] An MS/AT may also initiate a BCMCS Registration operation during an origination attempt or at page response.

When the BS/AN receives a Program ID as the BCMCS flow identifier without Flow Discriminator(s), the BS/AN shall include the Program ID as the BCMCS flow identifier in the A9-BC Service Request message. The BS/AN shall not modify the length of the Program ID.

The BS/AN may send an A9-BC Service Request message at any time to request RAN session information regardless of BCMCS registration.

When the BS/AN sends an A9-BC Service Request message, the BS/AN shall start timer $T_{bcsreq9}$.

6.2.1.1.2 Failure Operation

If timer $T_{bcsreq9}$ expires, the BS/AN may resend the A9-BC Service Request message to the PCF and restart timer $T_{bcsreq9}$ a configurable number of times. If the A9-BC Service Response message is not received from the PCF, the BS/AN may attempt to perform registration and/or RAN session discovery with another PCF.

6.2.1.2 A9-BC Service Response

The A9-BC Service Response message is sent from the PCF to the BS/AN to convey RAN session information and/or the BAK authorization result requested in the A9-BC Service Request message.

6.2.1.2.1 Successful Operation

The PCF shall send an A9-BC Service Response message to the BS/AN in response to the A9-BC Service Request message. The BS/AN shall stop timer $T_{bcsreq9}$ upon receipt of this message.

6.2.1.2.2 Failure Operation

None.

6.2.2 BSN Session Information Update

This section describes the BCMCS message procedures for the A9 interface when the BCMCS session information is provided by the BSN.

6.2.2.1 A9-BC Service Initiate Request

The A9-BC Service Initiate Request message is sent from the PCF to the BS/AN to provide RAN session information or to remove session information previously provided to the RAN.

6.2.2.1.1 Successful Operation

When the PCF receives session information for network initiated BCMCS flows from the BSN, the PCF shall send an A9-BC Service Initiate Request message to the BS/AN including the session information and the broadcast transmission area, if any, received from the BSN.

When the PCF receives an indication from the BSN to remove session information previously sent to the BS/AN, the PCF shall send an A9-BC Service Initiate Request message to the BS/AN that indicates to remove session information for the specified network initiated BCMCS flows.

Upon sending the message to the BS/AN, the PCF starts timer $T_{bcsireq9}$.

6.2.2.1.2 Failure Operation

If timer $T_{bcsireq9}$ expires, the PCF may resend the A9-BC Service Initiate Request message to the BS/AN and restart timer $T_{bcsireq9}$ a configurable number of times.

6.2.2.2 A9-BC Service Initiate Response

This A9 interface message is sent to indicate the result of processing the A9-BC Service Initiate Request message.

6.2.2.2.1 Successful Operation

Upon receipt of an A9-BC Service Initiate Request message, the BS/AN shall send an A9-BC Service Initiate Response message to the PCF to indicate the result of processing the received message. The PCF stops timer $T_{bcsireq9}$ upon receipt of this message.

6.2.2.2.2 Failure Operation

None.

6.2.3 BCMCS Bearer Path Establishment and Refresh

This section describes the message procedures to establish or refresh an A8 connection for BCMCS.

6.2.3.1 A9-BC Setup-A8

The A9-BC Setup-A8 message is sent from the BS/AN to the PCF to establish or refresh an A8 connection for BCMCS.

6.2.3.1.1 Successful Operation

When the BS/AN determines that the transmission of a BCMCS flow is required, the BS/AN shall send an A9-BC Setup-A8 message to the PCF to establish or refresh an A8 connection for the BCMCS and start timer $T_{bcsetup9}$. Note that the BS/AN establishes or refreshes only one A8 connection per A9 signaling message. Therefore, the BS/AN has to send an A9 signaling message for each A8 connection establishment.

Upon receipt of the A9-BC Setup-A8 message, the PCF shall establish or refresh an A10 connection corresponding to the BCMCS if the PCF does not have the A10 connection. For establishment or refresh of the A10 connection, refer to section 7.2.3.

If the PCF is not able to continue the establishment or refresh procedure of the A8 connection, the PCF shall send an A9-BC Release-A8 Complete message including a cause value to show the reason for the failure, to the BS/AN.

6.2.3.1.2 Failure Operation

If timer $T_{bcsetup9}$ expires, the BS/AN may resend the A9-BC Setup-A8 message to the PCF and restart timer $T_{bcsetup9}$ a configurable number of times.

6.2.3.2 A9-BC Connect-A8

The A9-BC Connect-A8 message is sent from the PCF to the BS/AN to establish an A8 connection for BCMCS.

6.2.3.2.1   Successful Operation

This message may be sent in response to an A9-BC Setup-A8 message.

The BS/AN shall stop timer $T_{bcsetup9}$ upon receipt of the A9-BC Connect-A8 message.

6.2.3.2.2   Failure Operation

None.

6.2.4   BCMCS Bearer Path Release

This section describes the message procedures to release an A8 connection for BCMCS.

6.2.4.1   A9-BC Disconnect-A8

The A9-BC Disconnect-A8 message is sent from the PCF to the BS/AN to release an A8 connection for BCMCS.

6.2.4.1.1   Successful Operation

When the PCF determines that an A8 connection is no longer required (e.g., upon receiving an A11-BC Registration Update message), the PCF shall send an A9-BC Disconnect-A8 message to the BS/AN and start timer $T_{bcdiscon9}$. Note that the PCF releases only one A8 connection per A9 signaling message. Therefore, the PCF has to send an A9 signaling message for each A8 connection release.

6.2.4.1.2   Failure Operation

If timer $T_{bcdiscon9}$ expires, the PCF may resend the A9-BC Disconnect-A8 message to the BS/AN and restart timer $T_{bcdiscon9}$ a configurable number of times. If the A9-BC Release-A8 message is not received from the BS/AN, the PCF should release all resources for the A8 connection.

6.2.4.2   A9-BC Release-A8

The A9-BC Release-A8 message is sent from the BS/AN to the PCF to release an A8 connection for BCMCS.

6.2.4.2.1   Successful Operation

When the BS/AN determines that the A8 connection is no longer required (e.g., by detection of the absence of MS/ATs listening to the BCMCS flow), or when the BS/AN receives an A9-BC Disconnect-A8 message from the PCF, the BS/AN shall send an A9-BC Release-A8 message to the PCF and start timer T_{bcrel9}. The PCF/AN shall stop timer $T_{bcdiscon9}$ if it is running. Note that the BS/AN releases only one A8 connection per A9 signaling message. Therefore, the BS/AN has to send an A9 signaling message for each A8 connection release.

6.2.4.2.2   Failure Operation

If timer T_{bcrel9} expires, the BS/AN may resend the A9-BC Release-A8 message to the PCF and restart timer T_{bcrel9} a configurable number of times. If the A9-BC Release-A8 Complete message is not received from the PCF, the BS/AN should release all resources for the A8 connection.

6.2.4.3 A9-BC Release-A8 Complete

The A9-BC Release-A8 Complete message is sent from the PCF to the BS/AN in response to an A9-BC Release-A8 message or an A9-BC Setup-A8 message.

6.2.4.3.1 Successful Operation

When the PCF receives an A9-BC Release-A8 message from the BS/AN, the PCF may release an A10 connection if required and shall send A9-BC Release-A8 Complete message to the BS/AN. The BS/AN shall stop timer T_{bcrel9} upon receipt of the message.

When the PCF receives an A9-BC Setup-A8 message from the BS/AN, however the PCF is not able to establish an A8 connection, the PCF shall send an A9-BC Release-A8 Complete message to the BS/AN. The BS/AN shall stop timer $T_{bcsetup9}$ upon receipt of the message.

6.2.4.3.2 Failure Operation

None.

6.3 A9 Message Formats

6.3.1 A9-BC Service Request

This A9 interface message is sent from the BS/AN to the PCF to request RAN session information and BAK authorization for the BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	BS/AN → PCF	M	
Correlation ID	6.4.2.8	BS/AN → PCF	O[a]	R
Mobile Identity (IMSI/ATI)	6.4.2.9	BS/AN → PCF	O[b,c]	C
BCMCS Flow and Registration Information	6.4.2.4	BS/AN → PCF	O[b,d,e]	C

a. This information element (IE) shall be included in this message and its value shall be returned in the corresponding IE in the A9-BC Service Response message in response to this message.

b. This IE shall be included when the BS/AN requests BAK authorization.

c. This IE, if included, shall contain the IMSI for 1x systems and HRPD systems with SC/MM in the AN, or the ATI (refer to [20]) for HRPD systems with SC/MM in the PCF.

d. If authorization information is included in this IE, the following parameters shall be included: 'Authorization Signature', 'BAK Sequence Number' and 'Time Stamp Long'. At least one of the flags Session Info. Req. or Reg. Req. shall be set to one in every entry of this IE.

e. This IE shall include the BCMCS Flow ID(s) belonging to a single Program ID for the BCMCS Information Entry when the Session Info. Req. flag is set to '1'.

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

6.3.1 A9-BC Service Request

7	6	5	4	3	2	1	0	Octet
⇒ A9 Message Type = [B0H]								1
⇒ Correlation ID: A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB) Correlation Value = <any value>								3
								4
								5
							(LSB)	6
⇒ Mobile Identity (IMSI/ATI): A9 Element Identifier = [0DH]								1
Length = [variable]								2
Identity Digit 1 = [0H-9H] (BCD)			Odd/even Indicator =[1,0]		Type of Identity = [110 (IMSI), 111 (ATI)]			3
IF (Type of Identity = 110 (IMSI)) {								
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
• • •								• • •
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
} Type of Identity = 110								
IF (Type of Identity = 111 (ATI)) {								
History Ind = [0H (Current)]				ATI Type = [2H (UATI32)]				4
UATIColorCode = <any value>								5
(MSB) UATI024 = <any value>								6
								7
							(LSB)	8
} Type of Identity = 111								
⇒ BCMCS Flow and Registration Information: A9 Element Identifier = [B2H]								1
Length = [variable]								2
BCMCS Information Entry { 1+:								
Entry Length = [variable]								i
Session Info. Req = [0, 1]	Reg. Req. = [0, 1]	Flow ID Type = [00 - 01]		BCMCS Flow ID Length = [2H - 4H]				i+1
IF (Flow ID Type = '00' (BCMCS Flow ID)) { 1:								
(MSB) BCMCS Flow ID = <any value>								i+2
• • •								• • •
							(LSB)	j
} Flow ID Type = '00'								

6.3.1 A9-BC Service Request

7	6	5	4	3	2	1	0	Octet
IF (Flow ID Type = '01' (Program ID)) { 1:								
Reserved = [000]			Program ID Length = [variable]					i+2
(MSB)		Program ID = \<any value\>						i+3
• • •								• • •
							(LSB)	j
} Flow ID Type = '01'								
IF (Reg. Req. = '1') Authorization Parameters {0 - 1:								
Parameter Type = [01H] (Authorization Signature)								k
Parameter Length = [04H]								k+1
(MSB)		Authorization Signature = \<any value\>						k+2
								k+3
								k+4
							(LSB)	k+5
Parameter Type = [02H] (BAK Sequence Number)								m
Parameter Length = [01H]								m+1
Reserved = [0000]				BAK Sequence Number = \<any value\>				m+2
Parameter Type = [03H] (Time Stamp Long)								n
Parameter Length = [variable]								n+1
Time Stamp Long Length = [variable]								n+2
(MSB)		Time Stamp Long = \<any value\>						n+3
• • •								• • •
							(LSB)	p
} Authorization Parameters								
} BCMCS Information Entry								

6.3.2 A9-BC Service Response

This A9 interface message is sent from the PCF to the BS/AN to transmit the BAK authorization result and RAN session information for the BCMCS flow that the BS/AN requested in the A9-BC Service Request message.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	PCF → BS/AN	M	
Correlation ID	6.4.2.8	PCF → BS/AN	O[a]	R
BCMCS Information List	6.4.2.3	PCF → BS/AN	O[b]	C
Mobile Identity (IMSI/ATI)	6.4.2.9	PCF → BS/AN	O[c,d]	C
BCMCS Registration Result	6.4.2.5	PCF → BS/AN	O[c]	C
Cause	6.4.2.7	PCF → BS/AN	O	R

Enhanced BCMCS Information List	6.4.2.13	PCF → BS/AN	O[b]	C

1 a. This IE shall be included and shall be set to the value in the A9-BC Service Request message.

2 b. Either the BCMCS Information List IE or the Enhanced BCMCS Information List IE shall be
3   included if the BCMCS Flow and Registration Information IE is included in corresponding A9-BC
4   Service Request message. The set of BCMCS FLOW IDs identified in this message shall be the same
5   set as identified in the A9-BC Service Request message. The BS/AN should silently discard messages
6   that do not meet this requirement.

7 c. This IE shall be included if the Mobile Identity IE or the BCMCS Flow and Registration Information
8   IE, respectively, was included in corresponding A9-BC Service Request message.

9 d. This IE, if included, shall contain the IMSI for 1x systems and HRPD systems with SC/MM in the
10   AN, or the ATI (refer to [20]) for HRPD systems with SC/MM in the PCF.

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

6.3.2   A9-BC Service Response

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [B1H]								1
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **BCMCS Information List:** A9 Element Identifier = [B1H]								1
(MSB)	Length = [variable]							2
							(LSB)	3
BCMCS Flow ID Entry { 1+:								
BCMCS Information Entry Length = [variable]								j
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				j+1
(MSB)	BCMCS Flow ID = <any value>							j+2
• • •								• • •
							(LSB)	n
Code = { 01H (Complete information transfer), 80H (Information unavailable) 81H (Information unreachable due to program mismatch)}								n+1
IF (Code <= 7FH) BCMCS Parameter Record { 1+:								
Parameter Type= [variable]								n+2
• • •								n+3
• • •								n+4
Parameter Length = [variable]								n+5
(MSB)	Parameter Value = [variable]							n+6

6.3.2 A9-BC Service Response

7	6	5	4	3	2	1	0	Octet
• • •								• • •
							(LSB)	p
} BCMCS Parameter Record								
} BCMCS Flow ID Entry								
⇒ **Mobile Identity (IMSI/ATI):** A9 Element Identifier = [0DH]								1
Length = [variable]								2
Identity Digit 1 = [0H-9H] (BCD)			Odd/even Indicator =[1,0]	Type of Identity = [110 (IMSI), 111 (ATI)]				3
IF (Type of Identity = 110 (IMSI)) {								
Identity Digit 3 = [0H-9H] (BCD)				Identity Digit 2 = [0H-9H] (BCD)				4
• • •								• • •
Identity Digit N+1 = [0H-9H] (BCD)				Identity Digit N = [0H-9H] (BCD)				n
= [1111] (if even number of digits)				Identity Digit N+2 = [0H-9H] (BCD)				n+1
} Type of Identity = 110								
IF (Type of Identity = 111 (ATI)) {								
History Ind = [0H (Current)]				ATI Type = [2H (UATI32)]				4
UATIColorCode = <any value>								5
(MSB)	UATI024 = <any value>							6
								7
							(LSB)	8
} Type of Identity = 111								
⇒ **BCMCS Registration Result:** A9 Element Identifier = [B3H]								1
Length = [variable]								2
BCMCS Flow ID Entry { 1+:								
Entry Length = [variable]								i
Reserved = [00]		Flow ID Type = [00, 01]		BCMCS Flow ID Length = [2H – 4H]				i+1
IF (Flow ID Type = '00' (BCMCS Flow ID)) { 1:								
(MSB)	BCMCS Flow ID = <any value>							i+2
• • •								• • •
							(LSB)	j
} Flow ID Type = '00'								
IF (Flow ID Type = '01' (Program ID)) { 1:								
Reserved = [000]			Program ID Length = [variable]					i+2
(MSB)	Program ID = <any value>							i+3
• • •								• • •

6.3.2 A9-BC Service Response

7	6	5	4	3	2	1	0	Octet
	7th Fill Bit – if needed	6th Fill Bit – if needed	5th Fill Bit – if needed	4th Fill Bit – if needed	3rd Fill Bit – if needed	2nd Fill Bit – if needed	1st Fill Bit – if needed	j
} Flow ID Type = '01'								
Result Code = { 01H (Registration completed),								k
80H (BCMCS flow/program not available),								
81H (BCMCS flow/program not transmitted),								
82H (Invalid authorization signature)								
83H (BAK not available)}								
} BCMCS Flow ID Entry								
⇒ **Cause:** A9 Element Identifier = [04H]								1
Length = [01H]								2
Cause Value = { 13H (Successful operation),								3
20H (Equipment failure),								
32H (BSN unavailable) }								
⇒ **Enhanced BCMCS Information List:** A9 Element Identifier = [B7H]								1
(MSB)	Length = [variable]							2
							(LSB)	3
BCMCS Flow ID Entry { 1+:								
BCMCS Information Entry Length = [variable]								j
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				j+1
(MSB)	BCMCS Flow ID = <any value>							j+2
• • •								• • •
							(LSB)	n
Code = { 01H (Complete information transfer),								n+1
80H (Information unavailable),								
81H (Information unreachable due to program mismatch)}								
IF (Code = 01H) Session Info{ 1:								
Length of Common Session Info = [variable]								n+2
(MSB)	Common Session Info = <any value>							n+3
• • •								• • •
							(LSB)	p
Length of RAN Session Info = [variable]								p+1
(MSB)	RAN Session Info = <any value>							p+2
• • •								• • •
							(LSB)	r
} Session Info								

6.3.2   A9-BC Service Response

7	6	5	4	3	2	1	0	Octet
} BCMCS Flow ID Entry								

6.3.3 A9-BC Setup-A8

This A9 interface message is sent from the BS/AN to the PCF to request the establishment or refresh of an A8 connection for the BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	BS/AN → PCF	M	
BCMCS Flow ID	6.4.2.6	BS/AN → PCF	O	R
Correlation ID	6.4.2.8	BS/AN → PCF	O[a]	C
A8 BC Traffic ID	6.4.2.2	BS/AN → PCF	O	R
HRPD Subnet	6.4.2.10	BS/AN → PCF	O[b]	C
A9 Indicators	6.4.2.11	BS/AN → PCF	O[c]	C

a. If this IE is included in this message, its value shall be returned in the corresponding IE in the A9-BC Connect-A8 or the A9-BC Release-A8 Complete message sent in response to this message.

b. This IE shall be included if the sender of this message is an HRPD AN. This IE shall not be included in 1x systems.

c. The PCF assumes all indicators are set to '0' if this IE is not included in this message.

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

6.3.3   A9-BC Setup-A8

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [B2H]								1
⇒ **BCMCS Flow ID:** A9 Element Identifier = [B4H]								1
Length = [03H – 05H]								2
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				3
(MSB)	BCMCS Flow ID = <any value>							4
• • •								• • •
							(LSB)	n
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **A8 BC Traffic ID:**		A9 Element Identifier = [B0H]						1

6.3.3 A9-BC Setup-A8

7	6	5	4	3	2	1	0	Octet
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
⇒ **HRPD Subnet:** A9 Element Identifier = [B5H]								1
Length = [10H]								2
(MSB)	Subnet = <any value>							3
• • •								• • •
							(LSB)	18
⇒ **A9 Indicators:** A9 Element Identifier = [05H]								1
Length = [01H]								2
QoS Mode = [0] (ignored)	Packet Boundary Supported [0] (ignored)	GRE Segment. Supported = [0,1]	SDB Supported = [0] (ignored)	CCPD Mode = [0] (ignored)	Reserved = [0] (ignored)	Data Ready Indicator = [0] (ignored)	Handoff Indicator = [0] (ignored)	3

6.3.4 A9-BC Connect-A8

This A9 interface message is sent from the PCF to the BS/AN to complete the setup of an A8 connection for the BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	PCF → BS/AN	M	
BCMCS Flow ID	6.4.2.6	PCF → BS/AN	O	R
Correlation ID	6.4.2.8	PCF → BS/AN	O[a]	C
A9 Indicators	6.4.2.11	PCF → BS/AN	O[b]	C

a. This IE shall only be included if it was also included in the A9-BC Setup-A8 message. This IE shall be set to the value in the corresponding A9-BC Setup-A8 message.

1   b.   This IE shall be included if the PCF has enabled packet boundary indications.

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

6.3.4   A9-BC Connect-A8

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [B3H]								1
⇒ **BCMCS Flow ID:** A9 Element Identifier = [B4H]								1
Length = [03H – 05H]								2
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				3
(MSB) BCMCS Flow ID = <any value>								4
• • •								• • •
							(LSB)	n
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB) Correlation Value = <any value>								3
								4
								5
							(LSB)	6
⇒ **A9 Indicators:** A9 Element Identifier = [05H]								1
Length = [01H]								2
QoS Mode = [0] (ignored)	Packet Boundary Supported = [0,1]	GRE Segment. Supported = [0] (ignored)	SDB Supported = [0] (ignored)	CCPD Mode = [0] (ignored)	Reserved = [0] (ignored)	Data Ready Indicator = [0] (ignored)	Handoff Indicator = [0] (ignored)	3

3

6.3.5   A9-BC Disconnect-A8

5 This A9 interface message is sent from the PCF to the BS/AN to release the associated A8 connection for
6 the BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	PCF → BS/AN	M	
BCMCS Flow ID	6.4.2.6	PCF → BS/AN	O	R
Correlation ID	6.4.2.8	PCF → BS/AN	O[a]	C
A8 BC Traffic ID	6.4.2.2	PCF → BS/AN	O[b]	R
Cause	6.4.2.7	PCF → BS/AN	O	R

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

9   b.   The Key field shall be set to the value configured for the corresponding A8 connection sent in the A9-
10   BC Setup-A9 message.

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

6.3.5 A9-BC Disconnect-A8

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [B4H]								1
⇒ **BCMCS Flow ID:** A9 Element Identifier = [B4H]								1
Length = [03H – 05H]								2
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				3
(MSB)	BCMCS Flow ID = <any value>							4
• • •								• • •
							(LSB)	n
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5
							(LSB)	6
⇒ **A8 BC Traffic ID:** A9 Element Identifier = [B0H]								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 = {14H (Normal call release), 20H (Equipment failure)}							3

2 ## 6.3.6 A9-BC Release-A8

3 This A9 interface message is sent from the BS/AN to the PCF to release the associated A8 connection for
4 the BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	BS/AN → PCF	M	
BCMCS Flow ID	6.4.2.6	BS/AN → PCF	O	R
Correlation ID	6.4.2.8	BS/AN → PCF	O[a]	C
A8 BC Traffic ID	6.4.2.2	BS/AN → PCF	O[b]	R
Cause	6.4.2.7	BS/AN → PCF	O	R

1 a. If this IE is included in this message, its value shall be returned in the corresponding IE in the A9-BC
2   Release-A8 Complete message sent in response to this message.

3 b. The Key field shall be set to the value configured for the corresponding A8 connection sent in the A9-
4   BC Setup-A9 message.

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

6.3.6   A9-BC Release-A8

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [B5H]								1
⇒ **BCMCS Flow ID:** A9 Element Identifier = [B4H]								1
Length = [03H – 05H]								2
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				3
(MSB) BCMCS Flow ID = <any value>								4
• • •								• • •
							(LSB)	n
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB) Correlation Value = <any value>								3
								4
								5
							(LSB)	6
⇒ **A8 BC Traffic ID:** A9 Element Identifier = [B0H]								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

6.3.6   A9-BC Release-A8

7	6	5	4	3	2	1	0	Octet
								13
							(LSB)	14
⇒ **Cause:** A9 Element Identifier = [04H]								1
Length = [01H]								2
ext=[0]	Cause Value = { 14H (Normal call release),							3
	20H (Equipment failure) }							

1

6.3.7   A9-BC Release-A8 Complete

This A9 interface message is sent from the PCF to the BS/AN to release the associated A8 connection for the BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	PCF → BS/AN	M	
BCMCS Flow ID	6.4.2.6	PCF → BS/AN	O	R
Correlation ID	6.4.2.8	PCF → BS/AN	O[a]	C
Cause	6.4.2.7	PCF → BS/AN	O[b]	C

a.   This IE shall only be included if it was also included in the corresponding A9-BC Setup-A8 or A9-Release-A8 message. This IE shall be set to the value in the corresponding message.

b.   This IE is present in the case where an A8 connection is not established during a setup request. The IE contains a release cause.

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

6.3.7   A9-BC Release-A8 Complete

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [B6H]								1
⇒ **BCMCS Flow ID:** A9 Element Identifier = [B4H]								1
Length = [03H – 05H]								2
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				3
(MSB)	BCMCS Flow ID = <any value>							4
• • •								• • •
							(LSB)	n
⇒ **Correlation ID:** A9 Element Identifier = [13H]								1
Length = [04H]								2
(MSB)	Correlation Value = <any value>							3
								4
								5

6.3.7 A9-BC Release-A8 Complete

7	6	5	4	3	2	1	0	Octet
							(LSB)	6
	⇒	**Cause:** A9 Element Identifier = [04H]						1
		Length = [01H]						2
ext=[0]	Cause Value = { 14H (Normal call release),							3
	20H (Equipment failure),							
	32H (PCF resource not available),							
	79H (BSN resource unavailable) }							

1

2 6.3.8 A9-BC Service Initiate Request

3 This A9 interface message is sent from the PCF to the BS/AN to provide RAN session information for
4 network initiated BCMCS flows or to remove session information previously provided to the RAN.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	PCF → BS/AN	M	
Correlation ID	6.4.2.8	PCF → BS/AN	O[a]	R
Enhanced BCMCS Information List	6.4.2.13	PCF → BS/AN	O[b]	R
HRPD Subnet	6.4.2.10	PCF → BS/AN	O[c]	C
BSID	6.4.2.12	PCF → BS/AN	O[d]	C

5 a. This IE shall be included in this message and its value shall be returned in the corresponding IE in the
6 A9-BC Service Initiate Response message sent in response to this message.

7 b. Code shall be set to 01H (Complete information transfer) when this message is sent to provide the
8 session information for a network initiated BCMCS flow. Code shall be set to 85H (Remove session
9 information) when this message is sent to remove session information.

10 c. Multiple instances of this IE may be included if the receiver of this message is an HRPD AN. This IE
11 shall not be included in 1x systems.

12 d. Multiple instances of this IE may be included if the receiver of this message is a 1x BS. This IE shall
13 not be included in HRPD systems.

14 The following table shows the bitmap layout for the A9-BC Service Initiate Request message.

6.3.8 A9-BC Service Initiate Request

7	6	5	4	3	2	1	0	Octet
		⇒	**A9 Message Type** = [B7H]					1
	⇒	**Correlation ID:** A9 Element Identifier = [13H]						1
		Length = [04H]						2
(MSB)	Correlation Value = <any value>							3
								4
								5

6.3.8   A9-BC Service Initiate Request

7	6	5	4	3	2	1	0	Octet
							(LSB)	6
	⇒	**Enhanced BCMCS Information List:** A9 Element Identifier = [B7H]						1
(MSB)		Length = [variable]						2
							(LSB)	3
BCMCS Flow ID Entry { 1+:								
BCMCS Information Entry Length = [variable]								j
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				j+1
(MSB)		BCMCS Flow ID = <any value>						j+2
• • •								• • •
							(LSB)	n
Code =		[01H (Complete information transfer)						n+1
		85H (Remove session information)]						
IF (Code = 01H) Session Info{ 1:								
Length of Common Session Info = [variable]								n+2
(MSB)		Common Session Info = <any value>						n+3
• • •								• • •
							(LSB)	p
Length of RAN Session Info = [variable]								p+1
(MSB)		RAN Session Info = <any value>						p+2
• • •								• • •
							(LSB)	r
} Session Info								
} BCMCS Flow ID Entry								
⇒		**HRPD Subnet:** A9 Element Identifier = [B5H] (HRPD systems)						1
Length = [10H]								2
(MSB)		Subnet = <any value>						3
• • •								• • •
							(LSB)	18
⇒		**BSID:** A9 Element Identifier = [B6H] (1x systems)						1
Length = [06H]								2
(MSB)		BSID = <any value>						3
• • •								• • •
							(LSB)	8

1

6.3.9 A9-BC Service Initiate Response

This message is sent from the BS/AN to the PCF to acknowledge receipt of BCMCS flows session information or negation of session information previously provided to the RAN.

Information Element	Section Reference	Element Direction	Type	
A9 Message Type	6.4.2.1	BS/AN -> PCF	M	
Correlation ID	6.4.2.8	BS/AN -> PCF	O[a]	C
Cause	6.4.2.7	BS/AN -> PCF	O[b]	C

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

b. The Cause IE shall be included when the message is sent by the BS/AN to the PCF to indicate that the session information was not accepted by the BS/AN.

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

6.3.9   A9-BC Service Initiate Response

7	6	5	4	3	2	1	0	Octet
⇒ **A9 Message Type** = [B8H]								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 = [13H (Successful operation), 36H (Session parameter/option not supported at BS)]							3

6.4   A9 Information Element Definitions

This section contains the coding of the IEs used in the messages defined in section 6.3.

6.4.1   Generic Information Element Encoding

Refer to [16] for A9 interface generic IE encoding information.

6.4.1.1   A9 Information Element Identifiers

The following table contains a list of all the IEs used on the A9 interface in this specification. The table is sorted by the Information Element Identifier (IEI) coding which distinguishes one IE from another. The table also includes a reference to the section where the element coding can be found.

Element Name	Identifier	Section Reference
Reserved	01H - 03H	[16]
Cause	04H	6.4.2.7
A9 Indicators	05H	6.4.2.11
Reserved	06H - 0CH	[16]
Mobile Identity	0DH	6.4.2.9
Reserved	0EH - 12H	[16]
Correlation ID	13H	6.4.2.8
Reserved	14H - 41H	[16]
Reserved	88H - 8CH	[20]
A8 BC Traffic ID	B0H	6.4.2.2
BCMCS Information List	B1H	6.4.2.3
BCMCS Flow and Registration Information	B2H	6.4.2.4
BCMCS Registration Result	B3H	6.4.2.5
BCMCS Flow ID	B4H	6.4.2.6
HRPD Subnet	B5H	6.4.2.10
BSID	B6H	6.4.2.12
Enhanced BCMCS Information List	B7H	6.4.2.13
All other values are reserved.		

6.4.1.2 Cross Reference of Information Elements with Messages

The following table provides a cross reference between the IEs and the messages defined in this specification.

Table 6.4.1.2-1   Cross Reference of IEs with Messages

Information Element	Reference	IEI	Used in These Messages	Reference
A8 BC Traffic ID	6.4.2.2	B0H	A9-BC Setup-A8	6.3.3
			A9-BC Disconnect-A8	6.3.5
			A9-BC Release-A8	6.3.6
A9 Indicators	6.4.2.11	05H	A9-BC Setup-A8	6.3.3
			A9-BC Connect-A8	6.3.4
A9 Message Type	6.4.2.1	None	A9-BC Service Request	6.3.1
			A9-BC Service Response	6.3.2
			A9-BC Setup-A8	6.3.3
			A9-BC Connect-A8	6.3.4
			A9-BC Disconnect-A8	6.3.5
			A9-BC Release-A8	6.3.6
			A9-BC Release-A8 Complete	6.3.7
			A9-BC Service Initiate Request	6.3.8
			A9-BC Service Initiate Response	6.3.9
BCMCS Flow ID	6.4.2.6	B4H	A9-BC Setup-A8	6.3.3

Table 6.4.1.2-1   Cross Reference of IEs with Messages

Information Element	Reference	IEI	Used in These Messages	Reference
			A9-BC Connect-A8	6.3.4
			A9-BC Disconnect-A8	6.3.5
			A9-BC Release-A8	6.3.6
			A9-BC Release-A8 Complete	6.3.7
BCMCS Information List	6.4.2.3	B1H	A9-BC Service Response	6.3.2
BCMCS Flow and Registration Information	6.4.2.4	B2H	A9-BC Service Request	6.3.1
BCMCS Registration Result	6.4.2.5	B3H	A9-BC Service Response	6.3.2
BSID	6.4.2.12	B6H	A9-BC Service Initiate Request	6.3.8
Cause	6.4.2.7	04H	A9-BC Service Response	6.3.2
			A9-BC Disconnect-A8	6.3.5
			A9-BC Release-A8	6.3.6
			A9-BC Release-A8 Complete	6.3.7
			A9-BC Service Initiate Response	6.3.9
Correlation ID	6.4.2.8	13H	A9-BC Service Request	6.3.1
			A9-BC Service Response	6.3.2
			A9-BC Setup-A8	6.3.3
			A9-BC Connect-A8	6.3.4
			A9-BC Disconnect-A8	6.3.5
			A9-BC Release-A8	6.3.6
			A9-BC Release-A8 Complete	6.3.7
			A9-BC Service Initiate Request	6.3.8
			A9-BC Service Initiate Response	6.3.9
Enhanced BCMCS Information List	6.4.2.13	B7H	A9-BC Service Response	6.3.2
			A9-BC Service Initiate Request	6.3.8
Mobile Identity	6.4.2.9	0DH	A9-BC Service Request	6.3.1
			A9-BC Service Response	6.3.2
HRPD Subnet	6.4.2.10	B5H	A9-BC Setup-A8	6.3.3
			A9-BC Service Initiate Request	6.3.8

6.4.2   Information Elements

6.4.2.1   A9 Message Type

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

A9 Message Type	A9 Message Type	Section Reference
Reserved	01H – 11H	[16]

A9-BC Service Request	B0H	6.3.1
A9-BC Service Response	B1H	6.3.2
A9-BC Setup-A8	B2H	6.3.3
A9-BC Connect-A8	B3H	6.3.4
A9-BC Disconnect-A8	B4H	6.3.5
A9-BC Release-A8	B5H	6.3.6
A9-BC Release-A8 Complete	B6H	6.3.7
A9-BC Service Initiate Request	B7H	6.3.8
A9-BC Service Initiate Response	B8H	6.3.9

1 ## 6.4.2.2   A8 BC Traffic ID

2 This IE identifies the A8 connection for the BCMCS flow.

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

3 Length: This field indicates the number of octets in this IE following the Length
4   field.

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

7 **Table 6.4.2.2-1   A8 BC Traffic ID - A8 Transport Protocol Stack**

Values	Meaning
01H	GRE/IP
All Others	Reserved

8 Protocol Type: This field is used to indicate the protocol type to be tunneled across the
9   A8 interface, and contains the same value that is used in the Protocol

Type field in the GRE header on the associated A8 connection. 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, and contains the same value that is used in the Key field in
                            the GRE header on the associated A8 connection.

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

Table 6.4.2.2-2   A8 BC 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 send-
                            ing entity. That is, when the BS/AN sends the A9-BC Setup-A8 message
                            containing this IE, this field contains the IP address at the BS/AN where
                            the A8 user traffic connection terminates.

6.4.2.3   BCMCS Information List

This IE indicates the RAN parameters for the BCMCS flows. This IE is only used in Revision 0 systems.
It is retained for backwards compatibility with Revision 0 systems.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
(MSB)	Length							2
							(LSB)	3
BCMCS Information Entry 1								variable
BCMCS Information Entry 2								variable
• • •								• • •
BCMCS Information Entry n								variable

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

BCMCS Information Entry: This field may include multiple BCMCS Flow ID Entries. This field is
                            coded as follows.

7	6	5	4	3	2	1	0	Octet
BCMCS Information Entry Length								j
Reserved				BCMCS Flow ID Length				j+1
(MSB)	BCMCS Flow ID							j+2
• • •								• • •
							(LSB)	n

7	6	5	4	3	2	1	0	Octet
Code								n+1
Parameter Type								n+2
• • •								n+3
• • •								n+4
Parameter Length								n+5
Parameter Value								n+6
• • •								• • •
								p

1   BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets.
2   This field shall be set to 02H, 03H or 04H.

3   BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

4   Code: This field indicates the result code of the information request for each
5   BCMCS flow. The most significant bit of this field indicates whether the
6   procedure completed successfully (set to '0') or failed (set to '1').

7   **Table 6.4.2.3-1   BCMCS Information List - Code**

Values	Meaning
01H	Complete information transfer
80H	Information unavailable
81H	Information unreachable due to program mismatch
All Others	Reserved

8   Parameter Type: This field indicates what type of parameters are included in Parameter
9   Value field and is coded as follows. Refer also to Table 6.4.2.3-2. This
10   field is not included if the MSB of the Code field is set to '1'.

7	6	5	4	3	2	1	0	Octet
Vendor Type								n+2
Type								n+3
Subtype								n+4

11   Parameter Length: Type (1 octet) + Length (1 octet) + Parameter Length (in octets) from
12   Table 6.4.2.3-2. This field is not included if the MSB of the Code field is
13   set to '1'.

14   Parameter Value: Payload of the Session Information (refer to [22]). This field is not
15   included if the MSB of the Code field is set to '1'.

Table 6.4.2.3-2   Session Parameter Value.

Parameter	Vendor Type	Type	Sub-Type	Max. Payload Length (octet)	Format
Encryption mechanism	68H	1AH	2	4	Integer[4]
BAK ID	68H	1AH	3	3	Integer
BAK	68H	1AH	4	18	Binary
BAK expire time	68H	1AH	5	6	Integer
Session Bandwidth	68H	1AH	6	4	Integer
BCMCS FLOW ID	66H	1AH	1	4	Binary
Program start time	66H	1AH	2	6	Integer
Program end time	66H	1AH	3	6	Integer
Program allowed registration time	66H	1AH	4	6	Integer
Authorization required flag	66H	1AH	5	3	Integer

6.4.2.4   BCMCS Flow and Registration Information

This IE identifies the BCMCS flows for which session information or registration is requested. For registration requests, the IE includes the BCMCS registration information for the identified BCMCS flows.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
BCMCS Information Entry 1								variable
BCMCS Information Entry 2								variable
• • •								• • •
BCMCS Information Entry n								variable

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

BCMCS Information Entry: This field contains the registration information for a flow. This field is coded as follows.

7	6	5	4	3	2	1	0	Octet
Entry Length								i
Session Info. Req.	Reg. Req.	Flow ID Type		BCMCS Flow ID Length				i+1
BCMCS Flow Identifier								variable
Authorization Parameters								variable

---

[4]   Note all integer formats in this section refer to unsigned integers.

1 Entry Length: This field indicates the number of octets in this entry following the Entry
2 Length field.

3 Session Info. Req.: This bit is set to '1' if session information for the identified flow(s) is
4 requested. It is set to '0' otherwise.

5 Reg. Req. This bit is set to '1' if the BS/AN received a registration for BCMCS
6 flow from the MS/AT. It is set to '0' otherwise.

7 Flow ID Type: This field indicates the flow ID type used in the BCMCS Flow Identifier
8 field.

Flow ID Type	Meaning
00	BCMCS Flow ID
01	Program ID
other values	Reserved

9

10 BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow Identifier field in
11 octets. This field shall be set to 2H, 3H or 4H.

12 For Flow ID Type '00' (BCMCS Flow ID), the BCMCS Flow Identifier field is coded as follows.

7	6	5	4	3	2	1	0	Octet
BCMCS Flow ID								i+2
• • •								• • •
								j

13 BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

14 For Flow ID Type '01' (Program ID), the BCMCS Flow Identifier field is coded as follows.

7	6	5	4	3	2	1	0	Octet
Reserved			Program ID Length					i+2
Program ID								i+3
• • •								• • •
								j

15 Program ID Length: This field indicates the length of the Program ID field in units of bits.

16 Program ID: This field includes the Program ID. The value of the Program ID is filled
17 from LSB and unused bits are set to '0'. The length of this field shall be
18 an integer multiple of an octet.

19 Authorization Parameters: If Reg. Req. is set to '0', then this field is null. If Reg. Req. is set to '1',
20 then this field contains the authorization parameters received from the
21 MS/AT and is coded as follows.

7	6	5	4	3	2	1	0	Octet
Parameter Type 1								k
Parameter Length 1								k+1
Parameter Value 1								variable
Parameter Type 2								m
Parameter Length 2								m+1
Parameter Value 2								variable
• • •								• • •
Parameter Type n								n
Parameter Length n								n+1
Parameter Value n								variable

Parameter Type: This field indicates what kind of parameters are included in Parameter Value field.

Parameter Type	Meaning
01H	Authorization Signature
02H	BAK Sequence Number
03H	Time Stamp Long

Parameter Length: This field indicates the number of octets in this IE following the Parameter Length field.

For Parameter Type 01H (Authorization Signature), Parameter Value field is coded as follows.

7	6	5	4	3	2	1	0	Octet
Authorization Signature								1
								2
								3
								4

Authorization Signature: This field includes the authorization signature created by the MS/AT. For a detailed description, refer to [5] for 1x systems, or [21] for HRPD systems.

For Parameter Type 02H (BAK Sequence Number), Parameter Value field is coded as follows.

7	6	5	4	3	2	1	0	Octet
Reserved				BAK Sequence Number				1

BAK Sequence Number: This field includes the sequence number of the BAK to identify the BAK used to generate authorization signature. For a detailed description, refer

1   to the definition of BAK ID in [5] for 1x systems, or the definition of
2   BAKSequenceNumber in [21] for HRPD systems.

3 For Parameter Type 03H (Time Stamp Long), Parameter Value field is coded as follows.

7	6	5	4	3	2	1	0	Octet
Time Stamp Long Length								1
Time Stamp Long								2
• • •								• • •
								p

4 Time Stamp Long Length: This field includes the length of Time Stamp Long field in units of bits.

5 Time Stamp Long: This field includes the time stamp used to generate the authorization sig-
6   nature at the MS/AT. The time stamp value is filled from LSB and un-
7   used bits are set to '0'. The length of this field shall be an integer multi-
8   ple of an octet. For a detailed description, including conversion between
9   Time Stamp Short sent by the MS/AT and Time Stamp Long included in
10   this field and units of this field, refer to [5] for 1x systems, or [21] for
11   HRPD systems.

12 6.4.2.5   BCMCS Registration Result

13 This IE indicates the BCMCS registration result.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
BCMCS Flow ID Entry 1								variable
BCMCS Flow ID Entry 2								variable
• • •								• • •
BCMCS Flow ID Entry n								variable

14 Length: This field indicates the number of octets in this IE following the
15   Length field.

16 BCMCS Flow ID Entry: This field may include multiple BCMCS Flow ID Entries. This field is
17   coded as follows.

7	6	5	4	3	2	1	0	Octet
Entry Length								i+1
Reserved		Flow ID Type		BCMCS Flow ID Length				i+2
BCMCS Flow Identifier								variable
Result Code								k

18 Entry Length: This field indicates the number of octets in this entry following the Entry
19   Length field.

¹ Flow ID Type: This field indicates the flow ID type included in the BCMCS Flow
²   Identifier field.

Flow ID Type	Meaning
00	BCMCS Flow ID
01	Program ID
other values	Reserved

³ BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets.
⁴   This field shall be set to 2H, 3H or 4H.

⁵ For Flow ID Type '00' (BCMCS Flow ID), the BCMCS Flow Identifier field is coded as follows.

7	6	5	4	3	2	1	0	Octet
BCMCS Flow ID								i+2
• • •								• • •
								j

⁶ BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

⁷ For Flow ID Type '01' (Program ID), the BCMCS Flow Identifier field is coded as follows.

7	6	5	4	3	2	1	0	Octet
Reserved			Program ID Length					i+2
MSB	Program ID							i+3
• • •								• • •
	7th Fill Bit – if needed	6th Fill Bit – if needed	5th Fill Bit – if needed	4th Fill Bit – if needed	3rd Fill Bit – if needed	2nd Fill Bit – if needed	1st Fill Bit – if needed	j

⁸ Program ID Length: This field indicates the length of Program ID field in units of bits.

⁹ Program ID: This field includes the Program ID. The value begins in the high order bit
¹⁰   position of octet 2 of this BCMCS Flow Identifier field and extends into
¹¹   the last octet of this field. The length of this field shall be integer
¹²   multiple of octet.

¹³ N'th Fill Bit – if needed   Bit positions in the last octet that are not used, if any, are considered fill
¹⁴   bits, are set to '0', and occupy the low order bit positions of the last octet.

¹⁵ Result Code: This field indicates the authorization result for the program.

Table 6.4.2.5-1   BCMCS Registration Result - Result Code

Values	Meaning
01H	Registration completed
80H	BCMCS flow/program not available
81H	BCMCS flow/program not transmitted
82H	Invalid authorization signature
83H	BAK not available
All Others	Reserved

6.4.2.6   BCMCS Flow ID

This IE indicates the flow identifier for the BCMCS.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
Reserved				BCMCS Flow ID Length				3
(MSB)	BCMCS Flow ID							4
• • •								• • •
							(LSB)	n

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

BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets. This field shall be set to 02H, 03H or 04H.

BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

6.4.2.7   Cause

This IE is used to indicate the reason for the occurrence of a particular event and is coded as follows.

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 IE 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 Table 6.4.2.7-1.

Table 6.4.2.7-1   Cause Class

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 6.4.2.7-2   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	0	1	05	Program end
0	0	0	0	1	1	0	06	Too few users
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
0	0	1	1	1	1	1	1F	Air link lost (HRPD)
Resource Unavailable Class (010 xxxx)								
0	1	0	0	0	0	0	20	Equipment failure
0	1	0	0	0	1	1	23	Authentication Required (HRPD)
0	1	0	0	1	0	0	24	Session unreachable (HRPD)
Service or Option Not Available Class (011 xxxx)								
0	1	1	0	0	1	0	32	PCF (or BSN) 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	PCF (or BSN) 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.

6.4.2.8   Correlation ID

Refer to [16].

6.4.2.9   Mobile Identity (IMSI/ATI)

Refer to [16] for 1x systems, [19] for HRPD systems with SC/MM in the AN, and [20] for HRPD systems with SC/MM in the PCF.

6.4.2.10   HRPD Subnet

This IE indicates the subnet to which the AN belongs.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	Subnet							3
• • •								• • •
							(LSB)	n

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

Subnet: This field indicates the subnet to which the AN belongs. Refer to [18].

6.4.2.11   A9 Indicators

This IE indicates properties of the A8 connection and of the MS.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
QoS Mode	Packet Boundary Supported	GRE Segment Supported	SDB Supported	CCPD Mode	Reserved	Data Ready Indicator	Handoff Indicator	3

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

GRE Segmentation Supported: This field is set to '1' if the AN is capable of receiving the GRE segmentation attribute in the GRE header for the corresponding A8 connection, for packets fragmented over one or more GRE frames.

Packet Boundary Supported: This field is set to '1' if the PCF guarantees IP packet boundaries. The PCF guarantees packet boundaries either by encapsulating one packet in one GRE frame or by supplying GRE segmentation indication in the GRE frame (if supported by the AN) for the corresponding A8 connection.

All other indicators: Not used in IOS BCMCS. Refer to [16].

1 ## 6.4.2.12 BSID

2 This IE provides the BSID (Base Station ID) string for 1x systems.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
Length								2
(MSB)	BSID							3
• • •								• • •
							(LSB)	8

3 Length: This field indicates the number of octets in this IE following the Length
4   field.

5 BSID: The string is the result of the concatenation of SID+NID+Cell Identifier
6   (Type 2), where each item is encoded using four hexadecimal uppercase
7   ASCII characters.

8

9 ## 6.4.2.13 Enhanced BCMCS Information List

10 This IE indicates the RAN parameters for the BCMCS flows. This IE is only used for Revision A and
11 later systems.

7	6	5	4	3	2	1	0	Octet
A9 Element Identifier								1
(MSB)	Length							2
							(LSB)	3
BCMCS Information Entry 1								variable
BCMCS Information Entry 2								variable
• • •								• • •
BCMCS Information Entry n								variable

12 Length: This field indicates the number of octets in this IE following the Length
13   field.

14 BCMCS Information Entry: This field may include multiple BCMCS Flow ID Entries. This field is
15   coded as follows.

7	6	5	4	3	2	1	0	Octet
BCMCS Information Entry Length								j
Reserved				BCMCS Flow ID Length				j+1
(MSB)	BCMCS Flow ID							j+2
• • •								• • •
							(LSB)	n
Code								n+1

7	6	5	4	3	2	1	0	Octet
Length of Common Session Info								n+2
(MSB)	Common Session Info							n+3
• • •								• • •
							(LSB)	p
Length of RAN Session Info								p+1
(MSB)	RAN Session Info							p+2
• • •								• • •
							(LSB)	r

1 BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets.
2   This field shall be set to 02H, 03H or 04H.

3 BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

4 Code: This field indicates the result code of the information request or specifies
5   sending or removing network initiated session information for each
6   BCMCS flow. The most significant bit of this field indicates whether the
7   procedure completed successfully (set to '0') or failed (set to '1').

8   **Table 6.4.2.13-1   BCMCS Information List - Code**

Values	Meaning
01H	Complete information transfer
80H	Information unavailable
81H	Information unreachable due to program mismatch
85H	Remove session information
All Others	Reserved

9

10 When Code value is 80H-85H, the remaining fields shall be omitted.

11 Length of Common Session Info: This field indicates the length of the Common Session Info field
12   in octets.

13 Common Session Info: This field contains the Common Session Info Vendor Specific
14   Attribute (Type = 26, Vendor-Type = 102) formatted as specified
15   in [22] in section 1.4, beginning with the octet "Sub-Type (=1)".

16 Length of RAN Session Info: This field indicates the length of the RAN Session Info field in
17   octets.

18 RAN Session Info: This field contains the RAN Session Info Vendor Specific
19   Attribute (Type = 26, Vendor-Type = 104) formatted as specified
20   in [22] in section 1.4, beginning with the octet "Sub-Type (=1)".

21

6.5   Timer Definitions

6.5.1   Timer Values

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

Table 6.5.1-1   Timer Values and Ranges Sorted by Name

Timer Name	Default Value (s)	Range of Values (s)	Granularity (s)	Section Reference
$T_{bcsreq9}$	4	0.1-60	0.1	6.5.2.1
$T_{bcsetup9}$	1	0-5	0.1	6.5.2.2
T_{bcrel9}	1	0-5	0.1	6.5.2.3
$T_{bcdiscon9}$	1	0-5	0.1	6.5.2.4
$T_{bcsireq9}$	1	0.1-60	0.1	6.5.2.5

6.5.2   Timer Definitions

6.5.2.1 $T_{bcsreq9}$

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

6.5.2.2 $T_{bcsetup9}$

This is a BS/AN timer. The timer is started when an A9-BC Setup-A8 message is sent and stopped when an A9-BC Connect-A8 or an A9-BC Release-A8 Complete message is received.

6.5.2.3 T_{bcrel9}

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

6.5.2.4 $T_{bcdiscon9}$

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

6.5.2.5 $T_{bcsireq9}$

This is a PCF timer. The timer is started when an A9-BC Service Initiate Request message is sent to the BS/AN and stopped when an A9-BC Service Initiate Response message is received.

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2

3

7. Broadcast A11 Signaling Messages

This section defines a set of messages supporting BCMCS that enhance the A11 interface defined in [11] ~ [17] for cdma2000 1x systems, [19] for HRPD systems with SC/MM in the AN, and [20] for HRPD systems with SC/MM in the PCF. Logically, the A11 messages defined here terminate in the BSN function, while the A11 messages defined in [11] ~ [17] for cdma2000 1x systems, [19] for HRPD systems with SC/MM in the AN, and [20] for HRPD systems with SC/MM in the PCF terminate in the unicast PDSN function.

7.1 General Considerations

Refer to [17] for A11 interface general considerations.

7.2 A11 Message Procedures

This section describes the BCMCS message procedures for the A11 interface.

7.2.1 MS initiated Registration and RAN Session Discovery

This section describes the message procedures for MS initiated registration and RAN session discovery.

7.2.1.1 A11-BC Service Request

The A11-BC Service Request message is sent from the PCF to the BSN to perform BCMCS registration and RAN session discovery.

7.2.1.1.1 Successful Operation

When the PCF receives an A9-BC Service Request message, the PCF shall send an A11-BC Service Request message to the BSN if any of following conditions are met:
- The PCF does not have RAN session information for the BCMCS flow(s) requested by the BS/AN.
- The PCF is not capable of BAK authorization or does not have permission to authorize if the received A9-BC Service Request message requires BAK authorization. The permission may be obtained during the RAN session discovery procedure performed before this procedure.

The PCF may send an A11-BC Service Request message at any time to request RAN session information regardless of BCMCS registration or request from the BS/AN.

When the PCF sends an A11-BC Service Request message, the PCF shall start timer $T_{bcsreq11}$.

7.2.1.1.2 Failure Operation

If timer $T_{bcsreq11}$ expires, the PCF may resend the A11-BC Service Request message to the BSN and restart timer $T_{bcsreq11}$ a configurable number of times. If the A11-BC Service Response message is not received from the PDSN, the PCF may attempt to perform registration and/or RAN session discovery with another PDSN.

7.2.1.2 A11-BC Service Response

The A11-BC Service Response message is sent from the BSN to the PCF to convey RAN session information and/or the BAK authorization result requested in the A11-BC Service Request message.

7.2.1.2.1   Successful Operation

The BSN shall send an A11-BC Service Response message to the PCF in response to the A11-BC Service Request message. The PCF shall stop timer $T_{bcsreq11}$ upon receipt of this message.

The BSN may return an A11-BC Service Response message with a Reason code '88H' (Unknown BSN address). When code '88H' is used, an alternate BSN address is included in the A11-BC Service Response message. The address of the alternate proposed BSN shall be returned in the Home Agent field of the A11-BC Service Response message.

On receipt of an A11-BC Service Response with code '88H', the PCF shall either send a new A11-BC Service Request message to the proposed BSN as indicated in this section, or it shall use internal algorithms to select a new BSN.

7.2.1.2.2   Failure Operation

None.

7.2.2   BSN Session Information Update

This section describes the BCMCS message procedures for the A11 interface when the BCMCS Controller performs network initiated bearer set-up and the BCMCS session information is then provided by the BSN.

7.2.2.1   A11-BC Service Initiate Request

The A11-BC Service Initiate Request message is sent from the BSN to the PCF to provide the session information for network initiated BCMCS flows or to remove session information previously provided to the RAN.

7.2.2.1.1   Successful Operation

When the BSN has session information for network initiated BCMCS flows to send to the RAN, the BSN shall send an A11-BC Service Initiate Request message to the PCF including the session information and optionally including the broadcast transmission area for the flows.

When the BSN decides to remove session information previously sent to the RAN, the BSN shall send an A11-BC Service Initiate Request message to the PCF that indicates to remove session information for the specified network initiated BCMCS flows.

Upon sending the A11-BC Service Initiate Request message, the BSN starts timer $T_{bcsireq11}$.

7.2.2.1.2   Failure Operation

If timer $T_{bcsireq11}$ expires, the BSN may resend the A11-BC Service Initiate Request message to the PCF and restart timer $T_{bcsireq11}$ a configurable number of times.

7.2.2.2   A11-BC Service Initiate Response

The A11-BC Service Initiate Response message is sent from the PCF to the BSN to respond to the A11-BC Service Initiate Request message.

7.2.2.2.1 Successful Operation

When the PCF receives an A11-BC Service Initiate Request message from the BSN, the PCF shall send an A11-BC Service Initiate Response message to the BSN. The BSN stops timer $T_{bcsireq11}$ upon receipt of the message.

If the A11-BC Service Initiate Request message was sent to provide session information:
- The PCF includes code 'B1H' (Session information accepted) if the PCF supports all of the session parameters/options included in the message;
- Otherwise, it includes code 'B2H' (Session parameter/option not supported at BS).

If the A11-BC Service Initiate Request message fails authentication or there is an identification mismatch, the PCF includes a code specifying the reason for rejection of the request.

7.2.2.2.2 Failure Operation

None.

7.2.3 BCMCS Bearer Path Establishment, Refresh and Release

This section describes the message procedures to establish, refresh and release an A10 connection for BCMCS.

7.2.3.1 A11-BC Registration Request

The A11-BC Registration Request message is sent from the PCF to the BSN to establish, refresh or release an A10 connection for BCMCS.

7.2.3.1.1 Successful Establishment Operation

When the PCF determines that an A10 connection for a broadcast stream is required, the PCF shall send an A11-BC Registration Request message and start timer $T_{bcreq11}$. Depending on operator policy, a BCMCS A10 Connection Setup Airlink Record may be included. Note that the PCF establishes only one A10 connection per A11 signaling message. Therefore, the PCF has to send an A11 signaling message for each A10 connection establishment.

Depending on operator policy, when the PCF establishes the first A8 connection for the A10 connection, the PCF includes a BCMCS Active Start Airlink Record in the A11-BC Registration Request message.

7.2.3.1.2 Successful Refresh Operation

All A11-BC Registration Request messages with a non-zero Lifetime value sent for an existing A10 connection have the effect of requesting a refresh of that A10 connection. When sending an A11-BC Registration Request message for an already existing A10 connection, the PCF shall use the same Key value (refer to the Session Specific Extension in section 7.4.2.12).

- If an A9-BC Setup-A8 is received to refresh an existing A10 connection, then the PCF shall send an A11-BC Registration Request message to the BSN with a non-zero Lifetime value.

7.2.3.1.3 Successful Release Operation

When the PCF determines that an A10 connection for a BCMCS flow is no longer required, or when the PCF receives the A11-BC Registration Update message from the BSN, the PCF shall send an A11-BC Registration Request message with lifetime set to '0' and start timer $T_{bcreq11}$. Note that the PCF releases

only one A10 connection per A11 signaling message. Therefore, the PCF has to send an A11 signaling message for each A10 connection release.

When the PCF releases the last A8 connection for the A10 connection, the PCF shall send an A11-BC Registration Request message to the BSN and start timer $T_{bcreq11}$. Depending on operator policy, a BCMCS Active Stop Airlink Record may be included.

7.2.3.1.4   Failure Operation

If timer $T_{bcreq11}$ expires, the PCF may resend the A11-BC Registration Request message to the BSN and restart timer $T_{bcreq11}$ a configurable number of times.

7.2.3.2   A11-BC Registration Reply

The A11-BC Registration Reply message is sent from the BSN to the PCF to respond to the A11-BC Registration Request message.

7.2.3.2.1   Successful Operation

When the BSN receives an A11-BC Registration Request message, the BSN shall send an A11-BC Registration Reply message to the PCF. The PCF shall stop timer $T_{bcreq11}$ upon receipt of the message.

7.2.3.2.2   Failure Operation

None.

7.2.3.3   A11-BC Registration Update

The A11-BC Registration Update message is sent from the BSN to the PCF to release the A10 connection.

7.2.3.3.1   Successful Operation

When the BSN determines that an A10 connection is no longer required, the BSN shall send an A11-BC Registration Update message to the PCF and start timer $T_{bcupd11}$. Note that the BSN releases only one A10 connection per A11 signaling message. Therefore, the BSN has to send an A11 signaling message for each A10 connection release.

7.2.3.3.2   Failure Operation

If timer $T_{bcupd11}$ expires, the BSN may resend the A11-BC Registration Update message to the PCF and restart timer $T_{bcupd11}$ a configurable number of times. If the A11-BC Registration Acknowledge message is not received from the PCF, the PDSN should release all resources for the A10 connection.

7.2.3.4   A11-BC Registration Acknowledge

The A11-BC Registration Acknowledge message is sent from the PCF to the BSN to respond to the A11-BC Registration Update message.

7.2.3.4.1   Successful Operation

When the PCF receives an A11-BC Registration Update message from the BSN, the PCF shall send an A11-BC Registration Acknowledge message to the BSN. The BSN shall stop timer $T_{bcupd11}$ upon receipt of the message.

1 7.2.3.4.2   Failure Operation

2 None.

7.3   A11 Message Formats

4

7.3.1   A11-BC Service Request

6 This A11 interface message is sent from the PCF to the BSN to request RAN session information and
7 BAK authorization for BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	PCF → BSN	M	
Reserved <3 octets>	None	PCF → BSN	O	R
Home Address	7.4.2.4	PCF → BSN	O	R
Care-of-Address	7.4.2.6	PCF → BSN	O	R
Identification	7.4.2.7	PCF → BSN	O	R
BCMCS Session Extension	7.4.2.13	PCF → BSN	O[a,b]	R
Mobile-Home Authentication Extension	7.4.2.10	PCF → BSN	O	R

8 a.   One or more instances of this IE may be included.

9 b.   At least one of the flags Session Info. Req. or Reg. Req. shall be set to one in every entry of this IE.

10 The following table shows the bitmap layout for the A11-BC Service Request message.

7.3.1   A11-BC Service Request

0	1	2	3	4	5	6	7	Octet
⇒ **A11 Message Type** = [B0H]								1
⇒ **Reserved** = [00 00 00H]								1
								2
								3
(MSB)	⇒ **Home Address** = [00 00 00 00H]							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Care-of-Address** = <any value>							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Identification** = <any value>							1
								2

7.3.1   A11-BC Service Request

0	1	2	3	4	5	6	7	Octet
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **BCMCS Session Extension: Type** = [B0H]								1
Length = [variable]								2
Session Data Type = [01H]								3
IF (Session Data Type = 01H (BCMCS Flow and Registration Information)) {1:								
BCMCS Information Entry { 1+:								
Entry Length = [variable]								i
Session Info. Req. = [0, 1]	Reg. Req. = [0, 1]	Flow ID Type = [00 – 01]		BCMCS Flow ID Length = [2H – 4H]				i+1
IF (Flow ID Type = '00' (BCMCS Flow ID)) {1:								
(MSB)	BCMCS Flow ID = <any value>							i+2
• • •								• • •
							(LSB)	j
} Flow ID Type = '00'								
IF (Flow ID Type = '01' (Program ID)) { 1:								
Reserved = [000]		Program ID Length = [variable]						i+2
(MSB)	Program ID = <any value>							i+3
• • •								• • •
	7th Fill Bit – if needed	6th Fill Bit – if needed	5th Fill Bit – if needed	4th Fill Bit – if needed	3rd Fill Bit – if needed	2nd Fill Bit – if needed	1st Fill Bit – if needed]	j
} Flow ID Type = '01'								
IF (Reg. Req. = 1) Authorization Parameters { 0 - 1:								
Parameter Type = [01H] (Authorization Signature)								k
Parameter Length = [04H]								k+1
(MSB)	Authorization Signature = <any value>							k+2
								k+3
								k+4
							(LSB)	k+5
Parameter Type = [02H] (BAK Sequence Number)								k+6
Parameter Length = [01H]								k+7

7.3.1 A11-BC Service Request

0	1	2	3	4	5	6	7	Octet
Reserved = [0000]				BAK Sequence Number = <any value>				k+8
Parameter Type = [03H] (Time Stamp Long)								k+9
Parameter Length = [variable]								k+10
Time Stamp Long Length = [variable]								k+11
(MSB) Time Stamp Long = <any value>								k+12
• • •								• • •
							(LSB)	m
} Authorization Parameters								
} BCMCS Information Entry								
} Session Data Type = 01H								
⇒ **Mobile-Home Authentication Extension: Type** = [20H]								1
Length = [14H]								2
(MSB) SPI = [00 00 01 00H to FF FF FF FFH]								3
								4
								5
							(LSB)	6
(MSB) Authenticator = <any value > (keyed-MD-5 authentication)								7
…								…
							(LSB)	22

7.3.2 A11-BC Service Response

This A11 interface message is sent from the BSN to the PCF to transmit the BAK authorization result and RAN session information for the BCMCS flow that the PCF requested in the A11-BC Service Request message.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	BSN → PCF	M	
Reserved <2 octet>	None	BSN → PCF	O	R
Reason	7.4.2.14	BSN → PCF	O	R
Home Address	7.4.2.4	BSN → PCF	O	R
Home Agent	7.4.2.5	BSN → PCF	O	R
Identification	7.4.2.7	BSN → PCF	O	R
BCMCS Session Extension	7.4.2.13	BSN → PCF	O[a,b]	C
Mobile-Home Authentication Extension	7.4.2.10	BSN → PCF	O	R

a. This IE may be included a multiple number of times to transmit session information for the BCMCS flows that the PCF requested in the A11-BC Service Request message. Each IE shall include

1   information on only one BCMCS flow. When this IE is used to transmit session information, then
2   either Session Data Type 02H (Session Information) or Session Data Type 04H (Enhanced Session
3   Information) shall be used.

4   b. This IE shall be included when the Reason value is set to 00H (Request Accepted).

5   The following table shows the bitmap layout for the A11-BC Service Response message.

7.3.2   A11-BC Service Response

0	1	2	3	4	5	6	7	Octet
⇒ **A11 Message Type** = [B1H]								1
⇒ **Reserved** = [00 00H]								1
								2
⇒ **Reason** = [00H (Request Accepted), 80H (Request Denied – reason unspecified), 83H (Request Denied – PCF failed authentication), 85H (Request Denied – identification mismatch) 88H (Unknown BSN address)]								1
(MSB)	⇒ **Home Address** = [00 00 00 00H]							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Home Agent** = <any value>							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Identification** = <any value>							1
								2
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **BCMCS Session Extension: Type** = [B0H]								1
Length = [variable]								2
Session Data Type = [02H, 03H, 04H]								3
IF (Session Data Type = 02H (Session information)) {1:								
BCMCS Information Entry { 1:								
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				j
(MSB)	BCMCS Flow ID = <any value>							j+1
• • •								• • •

7.3.2   A11-BC Service Response

0	1	2	3	4	5	6	7	Octet
							(LSB)	n
Code = { 01H (Complete information transfer), 80H (Information unavailable), 81H (Failure caused by other transaction), 82H (BSN resource unavailable - too many sessions), 83H (BSN resource unavailable - too many multicast IP addresses), 84H (Invalid session information received) }								n+1
IF (Code <= 7FH) BCMCS Parameter Record { 1+:								
Parameter Type = [variable]								1
• • •								2
• • •								3
Parameter Length = [variable]								4
(MSB)	Parameter Value = [variable]							5
• • •								• • •
							(LSB)	p
} BCMCS Parameter Record								
} BCMCS Information Entry								
} Session Data Type = 02H								
IF (Session Data Type = 03H (BCMCS Registration Result)) {1:								
BCMCS Flow ID Entry { 1:								
Entry Length = [variable]								j
Reserved = [00]		Flow ID Type = [00 – 01]		BCMCS Flow ID Length = [2H – 4H]				j+1
IF (Flow ID Type = '00' (BCMCS Flow ID)) { 1:								
(MSB)	BCMCS Flow ID = <any value>							j+2
• • •								• • •
							(LSB)	k
} Flow ID Type = '00'								
IF (Flow ID Type = '01' (Program ID)) { 1:								
Reserved = [000]			Program ID Length = [variable]					j+2
(MSB)	Program ID = <any value>							j+3
• • •								• • •
	7th Fill Bit – if needed	6th Fill Bit – if needed	5th Fill Bit – if needed	4th Fill Bit – if needed	3rd Fill Bit – if needed	2nd Fill Bit – if needed	1st Fill Bit – if needed	k
} Flow ID Type = '01'								

7.3.2   A11-BC Service Response

0	1	2	3	4	5	6	7	Octet
Result Code = { 01H (Registration completed), 80H (Program ID not available), 81H (Program ID not transmitted), 82H (Invalid authorization signature) 83H (BAK not available) }								m
} BCMCS Flow ID Entry								
} Session Data Type = 03H								
IF (Session Data Type = 04H (Enhanced Session Information)) { 1:								
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				j
(MSB)	BCMCS Flow ID = <any value>							j+1
• • •								• • •
							(LSB)	k
Code = [01H (Complete information transfer) 80H (Information unavailable), 81H (Failure caused by other transaction), 82H (BSN resource unavailable - too many sessions), 83H (BSN resource unavailable - too many multicast IP addresses), 84H (Invalid session information received)]								k+1
IF (Code = 01H) Session Info{ 1:								
Length of Common Session Info = [variable]								k+2
(MSB)	Common Session Info = <any value>							k+3
• • •								• • •
							(LSB)	m
Length of RAN Session Info = [variable]								m+1
(MSB)	RAN Session Info = <any value>							m+2
• • •								• • •
							(LSB)	n
} Session Info								
} Session Data Type = 04H								
⇒ **Mobile-Home Authentication Extension: Type** = [20H]								1
Length = [14H]								2
(MSB)	SPI = [00 00 01 00H to FF FF FF FFH]							3
								4
								5
							(LSB)	6
(MSB)	Authenticator = <any value > (keyed-MD-5 authentication)							7
…								**…**
							(LSB)	22

1 ### 7.3.3 A11-BC Registration Request

2 This A11 interface message is sent from the PCF to the BSN for:
3 • establishing an A10 connection for the BCMCS flow,
4 • periodic re-registration of an A10 connection for the BCMCS flow,
5 • clearing an A10 connection for the BCMCS flow,
6 • passing accounting related information.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	PCF → BSN	M	
Flags	7.4.2.2	PCF → BSN	O	R
Lifetime	7.4.2.3	PCF → BSN	O	R
Home Address	7.4.2.4	PCF → BSN	O	R
Home Agent	7.4.2.5	PCF → BSN	O	R
Care-of-Address	7.4.2.6	PCF → BSN	O	R
Identification	7.4.2.7	PCF → BSN	O	R
Session Specific Extension	7.4.2.12	PCF → BSN	O	R
Critical Vendor/Organization Specific Extension	7.4.2.15	PCF → BSN	O[a]	C
Normal Vendor/Organization Specific Extension	7.4.2.16	PCF → BSN	O[b]	C
Mobile-Home Authentication Extension	7.4.2.10	PCF → BSN	O	R

7 a. One or more instances of this IE may be included in the A11-BC Registration Request message.

8 b. The PCF includes this IE if it is capable of receiving the GRE Segmentation attribute in the GRE
9 header for the corresponding A10 connection, for packets fragmented over one or more GRE frames.

10 The following table shows the bitmap layout for the A11-BC Registration Request message.

7.3.3   A11-BC Registration Request

0	1	2	3	4	5	6	7	Octet
⇒ **A11 Message Type** = [B2H]								1
⇒ **Flags** = [0AH, 8AH]								1
(MSB)	⇒ **Lifetime** = [00 00H to FF FEH]							1
							(LSB)	2
(MSB)	⇒ **Home Address** = [00 00 00 00H]							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Home Agent** = <any value>							1
								2
								3
							(LSB)	4

7.3.3   A11-BC Registration Request

0	1	2	3	4	5	6	7	Octet
(MSB)	⇒ **Care-of-Address** = <any value>							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Identification** = <any value>							1
								2
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **Session Specific Extension: Type** = [27H]								1
Length = [0FH–11H]								2
(MSB)	Protocol Type = [88 81H]							3
							(LSB)	4
(MSB)	Key = <any value>							5
								6
								7
							(LSB)	8
Reserved = [00H]								9
Reserved = [0000 00]						Session ID Ver = ['01' (Version 1)]		10
(MSB)	MN Session Reference Id = [00 01H]							11
							(LSB)	12
(MSB)	MSID Type = [00 08H] (BCMCS Flow ID)							13
							(LSB)	14
MSID Length = [02-04H]								15
(MSB)	BCMCS Flow ID = <any value>							16
• • •								• • •
							(LSB)	n
⇒ **Critical Vendor/Organization Specific Extension: Type** = [26H]								1
Reserved = [00H]								2
(MSB)	Length = <variable>							3
							(LSB)	4
(MSB)	3GPP2 Vendor ID = 00 00 15 9FH							5

7.3.3   A11-BC Registration Request

0	1	2	3	4	5	6	7	Octet
								6
								7
							(LSB)	8
Application Type = [01H]								9
Application Sub Type = [01H]								10
(MSB)	Application Data (contains accounting information)							11
…								**…**
							(LSB)	k
⇒ **Normal Vendor/Organization Specific Extension: Type** = [86H]								1
Length = <variable>								2
(MSB)	Reserved = [00 00H]							3
							(LSB)	4
(MSB)	3GPP2 Vendor ID = [00 00 15 9FH]							5
								6
								7
							(LSB)	8
Application Type = [0BH] (PCF Enabled Features)								9
IF (Application Type = 0BH (PCF Enabled Features)){1								
Application Sub Type = [02H (GRE Segment Enabled)]								10
} Application Type = 0BH								
⇒ **Mobile-Home Authentication Extension: Type** = [20H]								1
Length = [14H]								2
(MSB)	SPI = [00 00 01 00H to FF FF FF FFH]							3
								4
								5
							(LSB)	6
(MSB)	Authenticator = <any value > (keyed-MD-5 authentication)							7
…								**…**
							(LSB)	22

1   **7.3.4   A11-BC Registration Reply**

2   This A11 interface message is sent from the BSN to the PCF in response to an A11-BC Registration
3   Request message.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	BSN → PCF	M	
Code	7.4.2.8	BSN → PCF	O	R
Lifetime	7.4.2.3	BSN → PCF	O	R
Home Address	7.4.2.4	BSN → PCF	O	R
Home Agent	7.4.2.5	BSN → PCF	O	R
Identification	7.4.2.7	BSN → PCF	O	R
Session Specific Extension	7.4.2.12	BSN → PCF	O[a]	R
Normal Vendor/Organization Specific Extension	7.4.2.16	BSN → PCF	O[b]	C
Mobile-Home Authentication Extension	7.4.2.10	BSN → PCF	O	R

1   a.   The Key field shall be set to the value received in the corresponding A11-BC Registration Request
2   message.

3   b.   This IE is included if the BSN guarantees packet boundaries either by encapsulating one packet in
4   one GRE frame or by supplying GRE segmentation indication in the GRE frame (if supported for the
5   RAN) for the corresponding A10 connection.

6   The following table shows the bitmap layout for the A11-BC Registration Reply message.

7.3.4   A11-BC Registration Reply

0	1	2	3	4	5	6	7	Octet
⇒ A11 Message Type = [B3H]								1

⇒ Code =
[00H   (Registration Accepted),
  80H   (Registration Denied – reason unspecified),
  81H   (Registration Denied – administratively prohibited),
  82H   (Registration Denied – insufficient resources),
  83H   (Registration Denied – PCF failed authentication),
  85H   (Registration Denied – identification mismatch),
  86H   (Registration Denied – poorly formed request),
  89H   (Registration Denied – requested reverse tunnel unavailable),
  B0H   (Registration Denied - BSN session info unavailable),
  8AH   (Registration Denied – reverse tunnel is mandatory and 'T' bit not set),
  8DH   (Registration Denied – unsupported vendor ID or unable to interpret Application
          Type or Application Sub Type in the CVSE sent by the PCF to the BSN.)]
								1

(MSB) ⇒ Lifetime = [00 00H to FF FEH]								1
(LSB)								2
(MSB) ⇒ Home Address = [00 00 00 00H]								1
								2
								3
(LSB)								4

7.3.4 A11-BC Registration Reply

0	1	2	3	4	5	6	7	Octet
(MSB)	⇒ **Home Agent** = <any value>							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Identification** = <any value>							1
								2
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **Session Specific Extension: Type** = [27H]								1
Length = [0FH–11H]								2
(MSB)	Protocol Type = [88 81H]							3
							(LSB)	4
(MSB)	Key = <any value>							5
								6
								7
							(LSB)	8
Reserved = [00H]								9
Reserved = [0000 00]						Session ID Ver = ['01' (Version 1)]		10
(MSB)	MN Session Reference Id = [00 01H]							11
							(LSB)	12
(MSB)	MSID Type = [00 08H] (BCMCS Flow ID)							13
							(LSB)	14
MSID Length = [02-04H]								15
(MSB)	BCMCS Flow ID = <any value>							16
• • •								• • •
							(LSB)	n
⇒ **Normal Vendor/Organization Specific Extension: Type** = [86H]								1
Length = <variable>								2
Reserved = [00 00H]								3
								4
(MSB)	3GPP2 Vendor ID = [00 00 15 9FH]							5

7.3.4   A11-BC Registration Reply

0	1	2	3	4	5	6	7	Octet
								6
								7
							(LSB)	8
Application Type = [0AH (BSN Enabled Features)]								9
IF (Application Type = 0AH (BSN Enabled Features)){1:								
Application Sub Type = [02H (Packet Boundary Enabled)]								10
} Application Type = 0AH								
⇒ **Mobile-Home Authentication Extension: Type** = [20H]								1
Length = [14H]								2
(MSB)	SPI = [00 00 01 00H to FF FF FF FFH]							3
								4
								5
							(LSB)	6
(MSB)	Authenticator = <any value > (keyed-MD-5 authentication)							7
…								**…**
							(LSB)	22

7.3.5 A11-BC Registration Update

This A11 interface message is sent from the BSN to the PCF to release an A10 connection for the BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	BSN → PCF	M	
Reserved <3 octets>	None	BSN → PCF	O	R
Home Address	7.4.2.4	BSN → PCF	O	R
Home Agent	7.4.2.5	BSN → PCF	O	R
Identification	7.4.2.7	BSN → PCF	O	R
Session Specific Extension	7.4.2.12	BSN → PCF	O[a]	R
Registration Update Authentication Extension	7.4.2.11	BSN → PCF	O	R

a. The Key field shall be set to the value received in the corresponding A11-BC Registration Request message.

The following table shows the bitmap layout for the A11-BC Registration Update message.

7.3.5   A11-BC Registration Update

0	1	2	3	4	5	6	7	Octet

7.3.5   A11-BC Registration Update

0	1	2	3	4	5	6	7	Octet
⇒ **A11 Message Type** = [B4H]								1
⇒ **Reserved** = [00 00 00H]								1
								2
								3
(MSB)		⇒ **Home Address** = [00 00 00 00H]						1
								2
								3
							(LSB)	4
(MSB)		⇒ **Home Agent** = <any value>						1
								2
								3
							(LSB)	4
(MSB)		⇒ **Identification** = <any value>						1
								2
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **Session Specific Extension: Type** = [27H]								1
Length = [0FH–11H]								2
(MSB)		Protocol Type = [88 81H]						3
							(LSB)	4
(MSB)		Key = <any value>						5
								6
								7
							(LSB)	8
Reserved = [00H]								9
Reserved = [0000 00]						Session ID Ver = ['01' (Version 1)]		10
(MSB)		MN Session Reference Id = [00 01H]						11
							(LSB)	12
(MSB)		MSID Type = [00 08H] (BCMCS Flow ID)						13
							(LSB)	14
MSID Length = [02-04H]								15

7.3.5   A11-BC Registration Update

0	1	2	3	4	5	6	7	Octet
(MSB)		BCMCS Flow ID = <any value>						16
			• • •					• • •
							(LSB)	n
⇒ **Registration Update Authentication Extension: Type** = [28H]								1
Length = [14H]								2
(MSB)		SPI = [00 00 01 00H to FF FF FF FFH]						3
								4
								5
							(LSB)	6
(MSB)		Authenticator = <any value > (keyed-MD-5 authentication)						7
			...					...
							(LSB)	22

7.3.6 A11-BC Registration Acknowledge

This A11 interface message is sent from the PCF to the BSN in response to an A11-BC Registration Update message.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	PCF → BSN	M	
Reserved <2 octets>	None	PCF → BSN	O	R
Status	7.4.2.9	PCF → BSN	O	R
Home Address	7.4.2.4	PCF → BSN	O	R
Care-of-Address	7.4.2.6	PCF → BSN	O	R
Identification	7.4.2.7	PCF → BSN	O	R
Session Specific Extension	7.4.2.12	PCF → BSN	O[a]	R
Registration Update Authentication Extension	7.4.2.11	PCF → BSN	O	R

a.   The Key field shall be set to the value received in the corresponding A11-BC Registration Request message, if there is an A10 connection. If there is no A10 connection stored in the PCF, the Key field shall be set to '0'.

The following table shows the bitmap layout for the A11-BC Registration Acknowledge message.

7.3.6   A11-BC Registration Acknowledge

0	1	2	3	4	5	6	7	Octet
⇒ **A11 Message Type** = [B5H]								1
⇒ **Reserved** = [00 00H]								1
								2

7.3.6   A11-BC Registration Acknowledge

0	1	2	3	4	5	6	7	Octet
⇒ **Status =** [00H (Update Accepted) 80H (Update Denied – reason unspecified) 83H (Update Denied – sending node failed authentication) 85H (Update Denied – identification mismatch) 86H (Update Denied – poorly formed registration update)]								1
(MSB) ⇒ **Home Address** = [00 00 00 00H]								1
								2
								3
							(LSB)	4
(MSB) ⇒ **Care-of-Address** = <any value>								1
								2
								3
							(LSB)	4
(MSB) ⇒ **Identification** = <any value>								1
								2
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **Session Specific Extension: Type** = [27H]								1
Length = [0FH–11H]								2
(MSB) Protocol Type = [88 81H]								3
							(LSB)	4
(MSB) Key = <any value>								5
								6
								7
							(LSB)	8
Reserved = [00H]								9
Reserved = [0000 00]						Session ID Ver = ['01' (Version 1)]		10
(MSB) MN Session Reference Id = [00 01H]								11
							(LSB)	12
(MSB) MSID Type = [00 08H] (BCMCS Flow ID)								13
							(LSB)	14

7.3.6 A11-BC Registration Acknowledge

0	1	2	3	4	5	6	7	Octet
MSID Length = [02-04H]								15
(MSB)	BCMCS Flow ID = <any value>							16
• • •								• • •
							(LSB)	n
⇒ Registration Update Authentication Extension: Type = [28H]								1
Length = [14H]								2
(MSB)	SPI = [00 00 01 00H to FF FF FF FFH]							3
								4
								5
							(LSB)	6
(MSB)	Authenticator = <any value > (keyed-MD-5 authentication)							7
...								...
							(LSB)	22

7.3.7 A11-BC Service Initiate Request

This A11 interface message is sent from the BSN to the PCF to provide the session information for network initiated BCMCS flows or to remove session information previously provided to the RAN.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	BSN → PCF	M	
Home Address	7.4.2.4	BSN → PCF	O	R
Home Agent	7.4.2.5	BSN → PCF	O	R
Identification	7.4.2.7	BSN → PCF	O	R
Normal Vendor/Organization Specific Extension	7.4.2.16	BSN → PCF	O[a]	R
BCMCS Session Extension	7.4.2.13	BSN → PCF	O[b]	R
Mobile-Home Authentication Extension	7.4.2.10	BSN → PCF	O	R

a. This IE is included to provide the session information for network initiated BCMCS flows, for 1x and/or HRPD systems.

b. Code shall be set to 01H (Complete information transfer) when this message is sent to provide the session information for a network initiated BCMCS flow. Code shall be set to 85H (Remove session information) when this message is sent to remove session information. Multiple instances of this IE may be included.

The following table shows the bitmap layout for the A11-BC Service Initiate Request message.

7.3.7   A11-BC Service Initiate Request

0	1	2	3	4	5	6	7	Octet
⇒ **A11 Message Type** = [B6H]								1
(MSB)	⇒ **Home Address** = [00 00 00 00H]							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Home Agent** = <any value>							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Identification** = <any value>							1
								2
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **Normal Vendor/Organization Specific Extension: Type** = [86H]								1
Length = <variable>								2
(MSB)	Reserved = [00 00H]							3
							(LSB)	4
(MSB)	3GPP2 Vendor ID = [00 00 15 9FH]							5
								6
								7
							(LSB)	8
Application Type = [B0H] (System Identifiers)								9
IF (Application Type = B0H (System Identifiers)){								
Application Sub Type = [01H (BSID / HRPD Subnet)]								10
IF (Application Sub Type = 01H (BSID / HRPD Subnet){1+								
Length = <00H or 06H>								11
(MSB)	BSID = <any value>							12
• • •								• • •
							(LSB)	17
Subnet Sub Type = 1								18
Length = <00H or 11H>								19
Subnet Length = <variable>								20

7.3.7   A11-BC Service Initiate Request

0	1	2	3	4	5	6	7	Octet
(MSB)				Subnet = <any value>				21
				• • •				• • •
							(LSB)	36
			Subnet Sub Type = 2					37
			Length = <00H or 10H>					38
(MSB)				Sector ID = <variable>				39
				• • •				• • •
							(LSB)	54
} Application Subtype Type = 01H								
} Application Type = B0H								
⇒ **BCMCS Session Extension: Type** = [B0H]								1
Length = [variable]								2
Session Data Type = [04H (Enhanced Session Information)]								3
Reserved = [0000]				BCMCS Flow ID Length = [2H – 4H]				j
(MSB)			BCMCS Flow ID = <any value>					j+1
				• • •				• • •
							(LSB)	k
Code = [01H (Complete information transfer), 85H (Remove session information)]								k+1
IF (Code = 01H) Session Info{ 1:								
Length of Common Session Info = [variable]								k+2
(MSB)			Common Session Info = <any value>					k+3
				• • •				• • •
							(LSB)	m
Length of RAN Session Info = [variable]								m+1
(MSB)			RAN Session Info = <any value>					m+2
				• • •				• • •
							(LSB)	n
} Session Info								
} Session Data Type = 04H								
⇒ **Mobile-Home Authentication Extension: Type** = [20H]								1
Length = [14H]								2
(MSB)			SPI = [00 00 01 00H to FF FF FF FFH]					3
								4
								5
							(LSB)	6

7.3.7 A11-BC Service Initiate Request

0	1	2	3	4	5	6	7	Octet
(MSB)	Authenticator = <any value > (keyed-MD-5 authentication)							7
...								...
							(LSB)	22

1

7.3.8 A11-BC Service Initiate Response

This A11 interface message is sent from the PCF to the BSN to convey the results of processing the A11-BC Service Initiate Request message for network initiated BCMCS flows or negation of session information previously provided to the RAN.

Information Element	Section Reference	Element Direction	Type	
A11 Message Type	7.4.2.1	PCF → BSN	M	
Code	7.4.2.8	PCF → BSN	O[a]	C
Home Address	7.4.2.4	PCF → BSN	O	R
Home Agent	7.4.2.5	PCF → BSN	O	R
Identification	7.4.2.7	PCF → BSN	O	R
Mobile-Home Authentication Extension	7.4.2.10	PCF → BSN	O	R

a. The Code IE shall be included when the message is sent by the PCF in response to a BSN providing session information for a network initiated BCMCS flow and shall be included when a request is rejected. The Code IE is omitted when the message is sent to acknowledge successful removal of session information previously provided to the RAN.

The following table shows the bitmap layout for the A11-BC Service Initiate Response message.

7.3.8 A11-BC Service Initiate Response

0	1	2	3	4	5	6	7	Octet
⇒ **A11 Message Type** = [B7H]								1
⇒ **Code** = [B1H (Session information accepted), B2H (Session parameter/option not supported at BS), B3H (Rejected - failed authentication), B4H (Rejected - identification mismatch).]								1
(MSB)	⇒ **Home Address** = [00 00 00 00H]							1
								2
								3
							(LSB)	4
(MSB)	⇒ **Home Agent** = <any value>							1
								2

7.3.8   A11-BC Service Initiate Response

0	1	2	3	4	5	6	7	Octet
								3
							(LSB)	4
(MSB)				⇒ **Identification** = <any value>				1
								2
								3
								4
								5
								6
								7
							(LSB)	8
⇒ **Mobile-Home Authentication Extension: Type** = [20H]								1
Length = [14H]								2
(MSB)		SPI = [00 00 01 00H to FF FF FF FFH]						3
								4
								5
							(LSB)	6
(MSB)		Authenticator = <any value > (keyed-MD-5 authentication)						7
			...					...
							(LSB)	22

1

7.4   A11 Information Element Definitions

3 This section contains the coding of the IEs used in the messages defined in section 7.3.

7.4.1   Generic Information Element Encoding

5 Refer to [17] for A11 interface generic IE encoding information.

7.4.1.1   A11 Information Element Identifiers

7 The following table contains a list of all the IEs used on the A11 interface in this specification. The table
8 is sorted by the IEI coding which distinguishes one IE from another. The table also includes a reference to
9 the section where the element coding can be found.

Element Name	Identifier	Section Reference
A11 Message Type	None	7.4.2.1
Care-of-Address	None	7.4.2.6
Code	None	7.4.2.8
Flags	None	7.4.2.2

Home Address	None	7.4.2.4
Home Agent	None	7.4.2.5
Identification	None	7.4.2.7
Lifetime	None	7.4.2.3
Status	None	7.4.2.9
Mobile-Home Authentication Extension	20H	7.4.2.10
Critical Vendor/Organization Specific Extension	26H	7.4.2.15
Session Specific Extension	27H	7.4.2.12
Registration Update Authentication Extension	28H	7.4.2.11
Normal Vendor/Organization Specific Extension	86H	7.4.2.16
BCMCS Session Extension	B0H	7.4.2.13
Reason	None	7.4.2.14
All other values are reserved.		

1 ### 7.4.1.2   Cross Reference of Information Elements with Messages

2 The following table provides a cross reference between the IEs and the messages defined in this specification.

Table 7.4.1.2-1   Cross Reference of IEs with Messages

Information Element	Ref.	IEI	Used in These Messages	Ref.
A11 Message Type	7.4.2.1	None	A11-BC Service Request	7.3.1
			A11-BC Service Response	7.3.2
			A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
			A11-BC Registration Update	7.3.5
			A11-BC Registration Acknowledge	7.3.6
			A11-BC Service Initiate Request	7.3.7
			A11-BC Service Initiate Response	7.3.8
BCMCS Session Extension	7.4.2.13	B0H	A11-BC Service Request	7.3.1
			A11-BC Service Response	7.3.2
			A11-BC Service Initiate Request	7.3.7
Care-of-Address	7.4.2.6	None	A11-BC Service Request	7.3.1
			A11-BC Registration Request	7.3.3
			A11-BC Registration Acknowledge	7.3.6
Code	7.4.2.8	None	A11-BC Registration Reply	7.3.4
			A11-BC Service Initiate Response	7.3.8
Critical Vendor/Organization Specific Extension	7.4.2.15	26H	A11-BC Registration Request	7.3.3
Flags	7.4.2.2	None	A11-BC Registration Request	7.3.3
Home Address	7.4.2.4	None	A11-BC Service Request	7.3.1

Table 7.4.1.2-1   Cross Reference of IEs with Messages

Information Element	Ref.	IEI	Used in These Messages	Ref.
			A11-BC Service Response	7.3.2
			A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
			A11-BC Registration Update	7.3.5
			A11-BC Registration Acknowledge	7.3.6
			A11-BC Service Initiate Request	7.3.7
			A11-BC Service Initiate Response	7.3.8
Home Agent	7.4.2.5	None	A11-BC Service Response	7.3.2
			A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
			A11-BC Registration Update	7.3.5
			A11-BC Service Initiate Request	7.3.7
			A11-BC Service Initiate Response	7.3.8
Identification	7.4.2.7	None	A11-BC Service Request	7.3.1
			A11-BC Service Response	7.3.2
			A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
			A11-BC Registration Update	7.3.5
			A11-BC Registration Acknowledge	7.3.6
			A11-BC Service Initiate Request	7.3.7
			A11-BC Service Initiate Response	7.3.8
Lifetime	7.4.2.3	None	A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
Mobile-Home Authentication Extension	7.4.2.10	20H	A11-BC Service Request	7.3.1
			A11-BC Service Response	7.3.2
			A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
			A11-BC Service Initiate Request	7.3.7
			A11-BC Service Initiate Response	7.3.8
Normal Vendor/Organization Specific Extension	7.4.2.16	26H	A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
			A11-BC Service Initiate Request	7.3.7
Reason	7.4.2.14	None	A11-BC Service Response	7.3.2
Registration Update Authentication Extension	7.4.2.11	28H	A11-BC Registration Update	7.3.5
			A11-BC Registration Acknowledge	7.3.6
Status	7.4.2.9	None	A11-BC Registration Acknowledge	7.3.6

Table 7.4.1.2-1   Cross Reference of IEs with Messages

Information Element	Ref.	IEI	Used in These Messages	Ref.
Session Specific Extension	7.4.2.12	27H	A11-BC Registration Request	7.3.3
			A11-BC Registration Reply	7.3.4
			A11-BC Registration Update	7.3.5
			A11-BC Registration Acknowledge	7.3.6

7.4.2   Information Element

7.4.2.1   A11 Message Type

This one octet element identifies the type of the A11 interface message. The structure of the element conforms to [23], and is shown as follows.

0	1	2	3	4	5	6	7	Octet
A11 Message Type								1

The A11 interface message types are listed in Table 7.4.2.1-1.

Table 7.4.2.1-1   A11 Interface Message Types

A11 Interface Message Name	A11 Message Type Value	Section Reference
A11-Registration Request	01H	[17]
A11-Registration Reply	03H	[17]
A11-Registration Update	14H	[17]
A11-Registration Acknowledge	15H	[17]
A11-Session Update	16H	[17]
A11-Session Update Acknowledge	17H	[17]
A11-BC Service Request	B0H	7.3.1
A11-BC Service Response	B1H	7.3.2
A11-BC Registration Request	B2H	7.3.3
A11-BC Registration Reply	B3H	7.3.4
A11-BC Registration Update	B4H	7.3.5
A11-BC Registration Acknowledge	B5H	7.3.6
A11-BC Service Initiate Request	B6H	7.3.7
A11-BC Service Initiate Response	B7H	7.3.8

7.4.2.2   Flags

Refer to [17].

1 ### 7.4.2.3 Lifetime

2 Refer to [17].

3 ### 7.4.2.4 Home Address

4 Refer to [17].

5 ### 7.4.2.5 Home Agent

6 Refer to [17].

7 ### 7.4.2.6 Care-of-Address

8 Refer to [17].

9 ### 7.4.2.7 Identification

10 Refer to [17].

11 ### 7.4.2.8 Code

12 This IE is used to indicate the reason for the occurrence of a particular event. The IE includes codes from
13 [23] and is shown as follows.

0	1	2	3	4	5	6	7	Octet
Code								1

14 The supported Code values are listed in Table 7.4.2.8-1.

15 **Table 7.4.2.8-1   A11 Code Values**

Hex Value	Decimal Value	Code
00H	0	Registration Accepted
09H	9	Reserved
80H	128	Registration Denied - reason unspecified
81H	129	Registration Denied - administratively prohibited
82H	130	Registration Denied - insufficient resources
83H	131	Registration Denied - PCF failed authentication
85H	133	Registration Denied - identification mismatch
86H	134	Registration Denied - poorly formed request
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 Application Type or Application Sub Type in the CVSE sent by the PCF to the BSN
B0H	176	Registration Denied - BSN session info unavailable
B1H	177	Session information accepted
B2H	178	Session parameter/option not supported at BS
B3H	179	Rejected - failed authentication
B4H	180	Rejected - identification mismatch
All other values reserved		

1   7.4.2.9   Status

2   Refer to [17].

3   7.4.2.10   Mobile-Home Authentication Extension

4   Refer to [17].

5   7.4.2.11   Registration Update Authentication Extension

6   Refer to [17].

7   7.4.2.12   Session Specific Extension

8   This IE is present in all A11-BC Registration Request, A11-BC Registration Reply, A11-BC Registration
9   Update and A11-BC Registration Acknowledge messages. This IE includes the BCMCS flow identity and
10   session specific information.

0	1	2	3	4	5	6	7	Octet
A11 Element Identifier (Type)								1
Length								2
(MSB)	Protocol Type							3
							(LSB)	4
(MSB)	Key							5
								6
								7
							(LSB)	8
Reserved								9
Reserved						Session ID Ver		10
(MSB)	MN Session Reference Id							11
							(LSB)	12
(MSB)	MSID Type							13
							(LSB)	14
MSID Length								15
(MSB)	BCMCS Flow ID							17
• • •								• • •
							(LSB)	variable

11   Type: 27H

12   Length: This field indicates the number of octets following the Length field.

13   Protocol Type: This two octet field identifies the type of the link layer protocol/network
14   layer protocol in use at the mobile node. The supported 'Protocol Type'
15   values are listed below:

1

Table 7.4.2.12-1   A11 Protocol Type Values

Protocol Type	Value
Unstructured Byte Stream	88 81H

2   Key: This field indicates to the receiver the value to use in the GRE header
3   Key field when sending traffic frames on the A10 connection. Refer to
4   [24] and [27].

5   Session ID Ver: This field is used to negotiate the Session Identifier Version to be used.
6   A one step negotiation is used where the initiating entity (the PCF) indi-
7   cates the highest version it supports, and the replying entity (the BSN)
8   indicates the highest version it supports that is less than or equal to the
9   version received from the initiating entity.

10   For BCMCS, this field shall be set to '01' in the A11-BC Registration
11   Request message and set to '00' (ignored) in the A11-BC Registration
12   Reply message.

13   Values greater than '1' are reserved.

14   MN Session Reference ID: This field is used to uniquely identify a packet data service instance in
15   the MS for cdma2000 1x systems. The PCF shall set the MN Session
16   Reference ID to 01H for BCMCS.

17   MSID Type: This field indicates the type of the address used by the mobile node. The
18   field is coded as shown in Table 7.4.2.12-2. Note only the least signifi-
19   cant bits are shown, all other bits are set to zero.

20

Table 7.4.2.12-2   Mobile Identity - Type of Identity Coding

Binary Values	Meaning
000	No Identity Code
101	Reserved
110	IMSI
1000	BCMCS Flow ID

21   MSID Length: This field indicates the number of octets in this element following the
22   MSID Length field. This field shall be set to 02H, 03H or 04H.

23   BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

24   7.4.2.13   BCMCS Session Extension

25   This IE includes BCMCS specific information.

0	1	2	3	4	5	6	7	Octet
A11 Element Identifier (Type)								1
Length								2
Session Data Type								3
BCMCS Session Data								variable

1   Type: B0H

2   Length: This field indicates the number of octets in this IE following the Length
3   field.

4   Session Data Type: This field indicates the type of BCMCS session data.

Session Data Type	Meaning
01H	BCMCS Flow and Registration Information
02H	Session Information
03H	BCMCS Registration Result
04H	Enhanced Session Information
other values	Reserved

5   For Session Data Type 01H (BCMCS Flow and Registration Information), the BCMCS Session Data
6   field is coded as follows.

0	1	2	3	4	5	6	7	Octet
BCMCS Information Entry 1								variable
BCMCS Information Entry 2								variable
• • •								• • •
BCMCS Information Entry n								variable

7   BCMCS Information Entry: This field indicates the BCMCS flow identifier. This field is coded as
8   follows.

0	1	2	3	4	5	6	7	Octet
Entry Length								i
Session Info. Req.	Reg. Req.	Flow ID Type		BCMCS Flow ID Length				i+1
BCMCS Flow Identifier								variable
Authorization Parameters								variable

9   Entry Length: This field indicates the number of octets in this entry following the Entry
10   Length field.

11   Session Info. Req.:   This bit is set to '1' if session information for the identified flow(s) is
12   requested. It is set to '0' otherwise.

13   Req. Req.:   This bit is set to '1' if the PCF received a registration request from the
14   BS/AN in the A9-BC Service Request message. It is set to '0' otherwise.

15   Flow ID Type: This field indicates the flow ID type included in the BCMCS Flow
16   Identifier field.

Flow ID Type	Meaning
00	BCMCS Flow ID
01	Program ID
other values	Reserved

1 BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets.
2   This field shall be set to 02H, 03H or 04H.

3 For Flow ID Type '00' (BCMCS Flow ID), the BCMCS Flow Identifier field is coded as follows.

0	1	2	3	4	5	6	7	Octet
(MSB)			BCMCS Flow ID					i+2
			• • •					• • •
							(LSB)	j

4 BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

5 For Flow ID Type '01' (Program ID), the BCMCS Flow Identifier field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Reserved			Program ID Length					i+2
(MSB)			Program ID					i+3
			• • •					• • •
	7th Fill Bit – if needed	6th Fill Bit – if needed	5th Fill Bit – if needed	4th Fill Bit – if needed	3rd Fill Bit – if needed	2nd Fill Bit – if needed	1st Fill Bit – if needed	j

6 Program ID Length: This field indicates the length of Program ID field in units of bits.

7 Program ID: This field includes the Program ID. The value begins in the high order bit
8   position of octet 2 of this BCMCS Flow Identifier field and extends into
9   the last octet of this field. The length of this field shall be an integer
10   multiple of an octet.

11 N'th Fill Bit – if needed Bit positions in the last octet that are not used, if any, are considered fill
12   bits, are set to '0', and occupy the low order bit positions of the last octet.

13 Authorization Parameters: If Reg. Req. is set to '0', then this field is null. If Reg. Req. is set to '1',
14   then this field contains the authorization parameters received from the
15   BS/AN. This field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Parameter Type 1								k
Parameter Length 1								k+1
Parameter Value 1								variable
Parameter Type 2								m
Parameter Length 2								m+1

0	1	2	3	4	5	6	7	Octet
Parameter Value 2								variable
• • •								• • •
Parameter Type n								n
Parameter Length n								n+1
Parameter Value n								variable

1 Parameter Type: This field indicates what kind of parameters are included in the Para-
2 meter Value field.

Parameter Type	Meaning
01H	Authorization Signature
02H	BAK Sequence Number
03H	Time Stamp Long

3 Parameter Length: This field indicates the number of octets in this element following the
4 Parameter Length field.

5 For Parameter Type 01H (Authorization Signature), the Parameter Value field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Authorization Signature								1
								2
								3
								4

6 Authorization Signature: This field includes the authorization signature created by the MS/AT. For
7 a detailed description, refer to [5] for 1x systems, or [21] for HRPD
8 systems.

9 For Parameter Type 02H (BAK Sequence Number), Parameter Value field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Reserved				BAK Sequence Number				1

10 BAK Sequence Number: This field includes the sequence number of the BAK to identify the BAK
11 used to generate authorization signature. For a detailed description, refer
12 to the definition of BAK ID in [5] for 1x systems, or the definition of
13 BAKSequenceNumber in [21] for HRPD systems.

14 For Parameter Type 03H (Time Stamp Long), Parameter Value field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Time Stamp Long Length								1
Time Stamp Long								2

0	1	2	3	4	5	6	7	Octet
• • •								• • •
								n

1 Time Stamp Long Length: This field includes the length of the Time Stamp Long field in units of
2   bits.

3 Time Stamp Long: This field includes the time stamp used to generate authorization signa-
4   ture at the MS/AT. The time stamp value is filled from LSB and unused
5   bits are set to '0'. The length of this field shall be an integer multiple of
6   an octet. For a detailed description including units of this field, refer to
7   [5] for 1x systems, or [21] for HRPD systems.

8

9 For Session Data Type 02H (Session Information), the BCMCS Session Data field is coded as follows.
10 Session Data Type 02H is only used in Revision 0 systems. It is retained for backwards compatibility
11 with Revision 0 systems.

0	1	2	3	4	5	6	7	Octet
Reserved				BCMCS Flow ID Length				j
BCMCS Flow ID								j+1
• • •								• • •
								n
Code								n+1
BCMCS Parameter Record 1								variable
BCMCS Parameter Record 2								variable
• • •								• • •
BCMCS Parameter Record n								variable

12 BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets.
13   This field shall be set to 02H, 03H or 04H.

14 BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

15 Code: This field indicates the result of the session discovery procedure. The
16   MSB of the Code field indicates whether the procedure is successful (the
17   MSB is set to '0') or not (the MSB is set to '1').

Code	Meaning
01H	Complete information transfer
80H	Information unavailable
81H	Failure caused by other transaction
82H	BSN resource unavailable due to over-session
83H	BSN resource unavailable due to over-MIP address
84H	Invalid session information received
other values	Reserved

1 BCMCS Parameter Record: This field includes session information. This field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Parameter Type								1
• • •								2
• • •								3
Parameter Length								4
Parameter Value								5
• • •								• • •
								p

2 Parameter Type: This field indicates what kind of parameters are included in the Para-
3 meter Value field and is coded as follows. Refer also to Table 7.4.2.13-1.

0	1	2	3	4	5	6	7	Octet
Vendor Type								1
Type								2
Subtype								3

4 Parameter Length: This field indicates the number of octets in this record following the
5 parameter length field.

6 Parameter Value: Payload of the Session Information (refer to [22]).

Table 7.4.2.13-1 Session Parameter Value.

Parameter	Vendor Type	Type	Sub-Type	Max. Payload Length (octet)	Format
Encryption mechanism	68H	1AH	2	4	Integer[5]
BAK ID	68H	1AH	3	3	Integer
BAK	68H	1AH	4	18	Binary
BAK expire time	68H	1AH	5	6	Integer
Session Bandwidth	68H	1AH	6	4	Integer
BCMCS FLOW ID	68H	1AH	1	4	Binary
Program start time	66H	1AH	2	6	Integer
Program end time	66H	1AH	3	6	Integer
Program allowed registration time	66H	1AH	4	6	Integer
Authorization required flag	66H	1AH	5	3	Integer

For Session Data Type 03H (BCMCS Registration Result), the BCMCS Session Data field is coded as follows.

0	1	2	3	4	5	6	7	Octet
BCMCS Flow ID Entry 1								variable
BCMCS Flow ID Entry 2								variable
• • •								• • •
BCMCS Flow ID Entry n								variable

BCMCS Flow ID Entry:　　　　　　　This field may include multiple BCMCS Flow ID Entries. This field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Entry Length								1
Reserved		Flow ID Type		BCMCS Flow ID Length				2
BCMCS Flow Identifier								variable
Result Code								n

Entry Length:　　　　　　　This field indicates the number of octets in this entry following the Entry Length field.

Flow ID Type:　　　　　　　This field indicates the flow ID type included in the BCMCS Flow Identifier field.

---

[5] Note all integer formats in this section refer to unsigned integers.

Flow ID Type	Meaning
00	BCMCS Flow ID
01	Program ID
other values	Reserved

1 BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets.
2 This field shall be set to 2H, 3H or 4H.

3 For Flow ID Type '00' (BCMCS Flow ID), the BCMCS Flow Identifier field is coded as follows.

0	1	2	3	4	5	6	7	Octet
(MSB)				BCMCS Flow ID				1
				• • •				• • •
							(LSB)	n

4 BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

5 For Flow ID Type '01' (Program ID), the BCMCS Flow Identifier field is coded as follows.

0	1	2	3	4	5	6	7	Octet
Reserved			Program ID Length					1
(MSB)				Program ID				2
				• • •				• • •
	7th Fill Bit – if needed	6th Fill Bit – if needed	5th Fill Bit – if needed	4th Fill Bit – if needed	3rd Fill Bit – if needed	2nd Fill Bit – if needed	1st Fill Bit – if needed	n

6 Program ID Length: This field indicates the length of Program ID field in units of bits.

7 Program ID: This field includes the Program ID. The value begins in the high order bit
8 position of octet 2 of this field. The length of this field shall be an integer
9 multiple of an octet.

10 N'th Fill Bit – if needed: Bit positions in the last octet that are not used, if any, are considered fill
11 bits, are set to '0', and occupy the low order bit positions of the last octet.

12 Result Code: This field includes the result of the BCMCS registration sent from the
13 MS/AT. The following table shows available values for this field and
14 corresponding meanings.

¹ **Table 7.4.2.13-2 BCMCS Registration Result - Result Code**

Result Code	Meaning
01H	Registration completed
80H	BCMCS flow/program not available
81H	BCMCS flow/program not transmitted
82H	Invalid authorization signature
83H	BAK not available

² For Session Data Type 04H (Enhanced Session Information), the BCMCS Session Data field is coded as
³ follows. Session Data Type 04H is only used in Revision A and later systems.

0	1	2	3	4	5	6	7	Octet
Reserved				BCMCS Flow ID Length				j
(MSB)	BCMCS Flow ID							j+1
• • •								• • •
							(LSB)	k
Code								k+1
Length of Common Session Info								k+2
(MSB)	Common Session Info							k+3
• • •								• • •
							(LSB)	m
Length of RAN Session Info								m+1
(MSB)	RAN Session Info							m+2
• • •								• • •
							(LSB)	n

⁴ BCMCS Flow ID Length: This field indicates the length of the BCMCS Flow ID field in octets.
⁵   This field shall be set to 02H, 03H or 04H.

⁶ BCMCS Flow ID: This field indicates the flow identifier for BCMCS.

⁷ Code: This field indicates the result of the session discovery procedure or
⁸   specifies sending or removing network initiated session information. The
⁹   MSB of the Code field indicates whether the procedure is successful (the
¹⁰   MSB is set to '0') or not (the MSB is set to '1').

Code	Meaning
01H	Complete information transfer
80H	Information unavailable
81H	Failure caused by other transaction
82H	BSN resource unavailable due to over-session
83H	BSN resource unavailable due to over-MIP address
84H	Invalid session information received
85H	Remove session information
Other values	Reserved

When Code value is 80H-85H, the remaining fields shall be omitted.

Length of Common Session Info: This field indicates the length of the Common Session Info field in octets.

Common Session Info: This field contains the Common Session Info Vendor Specific Attribute (Type = 26, Vendor-Type = 102) formatted as specified in [22] in section 1.4, beginning with the octet "Sub-Type (=1)".

Length of RAN Session Info: This field indicates the length of the RAN Session Info field in octets.

RAN Session Info: This field contains the RAN Session Info Vendor Specific Attribute (Type = 26, Vendor-Type = 104) formatted as specified in [22] in section 1.4, beginning with the octet "Sub-Type (=1)".

7.4.2.14   Reason

This IE identifies the result of processing an A11-BC Service Request message.

0	1	2	3	4	5	6	7	Octet
Reason								1

The supported Reason values are listed in Table 7.4.2.14-1.

1   **Table 7.4.2.14-1 A11 Reason Values**

Hex Value	Decimal Value	A11 Reason
0	0	Request Accepted
80H	128	Request Denied – reason unspecified
83H	131	Request Denied – PCF failed authentication
85H	133	Request Denied – identification mismatch
88H	136	Unknown BSN address
All other values reserved		

2   7.4.2.15   Critical Vendor/Organization Specific Extension (CVSE)

3   This IE may be present in the A11-BC Registration Request message to convey the accounting
4   information from the PCF to the BSN. The accounting records are contained within the Application Data
5   field of this IE. The accounting records conveyed from the PCF to the BSN conform to the specifications
6   in [8]. Each application type 01H (Accounting) CVSE contains one and only one airlink record. For
7   transmission of multiple airlink records in the same A11-BC Registration Request message, multiple
8   instances of accounting type CVSEs are used.

0	1	2	3	4	5	6	7	Octet
A11 Element Identifier (Type)								1
Reserved								2
(MSB)	Length							3
							(LSB)	4
(MSB)	3GPP2 Vendor ID							5
								6
								7
							(LSB)	8
Application Type								9
Application Sub Type								10
(MSB)	Application Data							11
...								...
							(LSB)	k

9   Note that the Application Type and the Application Sub Type together correspond to the Vendor- CVSE-
10   Type as defined in [28].

11   Type: 26H

12   Length: This field indicates the number of octets in this IE following the Length
13   field.

14   3GPP2 Vendor ID: 00 00 15 9FH

1	Application Type:	This field indicates the type of application to which the extension relates.
2		The supported values are listed in Table 7.4.2.15-1.
3	Application Sub Type:	This one octet field indicates the Application sub-type within the
4		Application Type. The supported values are listed in Table 7.4.2.15-1.

Table 7.4.2.15-1 Application Type and Sub Type

Application Type		Application Sub Type		Used in Message	Reference
Name	Value	Name	Value		
Accounting	01H	RADIUS	01H	A11-BC Registration Request	7.3.3
		DIAMETER	02H	Not used	
All other values are reserved					

6	Application Data:	For Application Type 01H (Accounting), this field contains all the
7		accounting parameters contained in one airlink record conveyed from the
8		PCF to the BSN as specified in [8]. In this version of this standard, only
9		Application Sub Type = RADIUS is used. Each of the accounting
10		parameters is structured in the format of RADIUS attributes specified in
11		[25] and [26], refer to the following text for more details.

12 For Application Type 01H (Accounting), all 3GPP2 specific Accounting Parameters are coded using
13 RADIUS Vendor-Specific-Attribute format as follows:

0	1	2	3	4	5	6	7	Octet
Type								1
Length								2
(MSB)		3GPP2 Vendor-Id						3
								4
								5
							(LSB)	6
Vendor-Type								7
Vendor-Length								8
(MSB)		Vendor-Value (variable number of octets)						9
								...
							(LSB)	k

| 14 | Type: | 1AH |

15	Length:	Type (1 octet) + Length (1 octet) + 3GPP2 Vendor Id (4 octets) + {
16		Vendor-Type (1 octet), Vendor-Length (1 octet), Vendor-Value (variable
17		octets) of the 3GPP2 specific parameter comprising the airlink record
18		being coded.}

| 19 | Vendor ID: | 00 00 15 9FH |

| 20 | Vendor Type: | Sub-Type value from the Airlink Record tables. |

1 Vendor-Length: Vendor-Type (1 octet) + Vendor-Length (1 octet) + Payload Length (in
2   octets) from the Airlink Record tables.

3 Vendor-Value: Payload of the accounting parameter.

4

5 For Application Type 01H (Accounting) all RADIUS specific Airlink Record Parameters are coded as
6 follows:

0	1	2	3	4	5	6	7	Octet
Type								1
Length								2
(MSB)	Value (variable number of octets)							3
								...
							(LSB)	k

7 Type: Type value from the Airlink Record tables below.

8 Length: Type (1 octet) + Length (1 octet) + Payload Length (in octets) from the
9   Airlink Record tables.

10 Value: Payload of the accounting parameter.

11 Airlink Record Fields Tables:

12 **Table 7.4.2.15-2 BCMCS A10 Connection Setup Airlink Record**

Parameter	Type	Sub-Type	Max. Payload Length (octet)	Format
Airlink Record Type = 5 (BCMCS A10 Connection Setup)	26	40	4	Integer[6]
R-P Connection ID	26	41	4	Integer[7]
Airlink Sequence Number	26	42	4	Integer
BCMCS_FLOW_ID	26	100	4	Integer
Serving PCF	26	9	4	Ip-addr

13 **Table 7.4.2.15-3 BCMCS Active Start Airlink Record**

Parameter	Type	Sub-Type	Max. Payload Length (octet)	Format
Airlink record type = 6 (BCMCS Active Start)	26	40	4	Integer
R-P Connection ID	26	41	4	Integer
Airlink Sequence number	26	42	4	Integer

---

6 Note all integer formats in this section refer to unsigned integers.

7 This parameter shall be set to the same value as the Key field in the Session Specific Extension IE sent in the
   A11-Registration Request message.

BCMCS_FLOW_ID	26	100	4	Integer
Serving PCF	26	9	4	Ip-addr

Table 7.4.2.15-4   BCMCS Active Stop Airlink Record

Parameter	Type	Sub-Type	Max. Payload Length (octet)	Format
Airlink record type = 7 (BCMCS Active Stop)	26	40	4	Integer
R-P Connection ID	26	41	4	Integer
Airlink Sequence number	26	42	4	Integer
BCMCS_FLOW_ID	26	100	4	Integer
BSID	26	10	12	String[8]
Subnet	26	108	39	String[8]
BCMCS Transmission Time (in seconds)	26	107	8	Integer[8, 9]

7.4.2.16   Normal Vendor/Organization Specific Extension (NVSE)

This IE may be included in the A11-BC Registration Request and A11-BC Registration Reply messages to convey information between the PCF and the BSN.

This IE may be included in the A11-BC Registration Request message to indicate the features enables by the PCF.

This IE may be included in the A11-BC Registration Reply message to indicate the features enabled by the BSN.

0	1	2	3	4	5	6	7	Octet
A11 Element Identifier (Type)								1
Length								2
(MSB)	Reserved							3
							(LSB)	4
(MSB)	3GPP2 Vendor ID							5
								6
								7
							(LSB)	8
Application Type								9

---

[8]   In a cdma2000 system, the PCF shall send a list of pairs of {BSID and BCMCS Transmission Time (in seconds)}. In an HRPD system, the PCF shall send a list of pairs of {Subnet and BCMCS Transmission Time (in seconds)}. The list is encoded by including one or more instances of the BSID or Subnet parameter, with each instance followed by an instance of the BCMCS Transmission Time parameter.

[9]   BCMCS Transmission Time is the accumulated time (in seconds) that the flow has be transmitted on the corresponding BSID or Subnet since the PCF sent the corresponding BCMCS Active Start Airlink Record.

0	1	2	3	4	5	6	7	Octet
Application Sub Type								10
(MSB)	Application Data							11
...								...
							(LSB)	k

1 Note that the Application Type and the Application Sub Type together correspond to the Vendor- NVSE-
2 Type as defined in [24].

3 Type: 86H

4 Length: This field indicates the number of octets in this IE following the Length
5   field.

6 3GPP2 Vendor ID: 00 00 15 9FH.

7 Application Type: This field indicates the type of application to which the extension relates.
8   The supported values are listed in Table 7.4.2.16-1.

9 Application Sub Type: This one octet field indicates the Application sub-type within the
10   Application Type. The supported values are listed in Table 7.4.2.16-1.

11   **Table 7.4.2.16-1   Application Sub Type**

Application Type		Application Sub Type		Used in Message	Reference
Name	Value	Name	Value		
BSN Enabled Features	0AH	Reserved	01H		
		Packet Boundary Enabled	02H	A11-BC Registration Reply	7.3.4
		All other values are reserved			
PCF Enabled Features	0BH	Reserved	01H		
		GRE Segmentation Enabled	02H	A11-BC Registration Request	7.3.3
		All other values are reserved			
System Identifiers	B0H	BSID / HRPD Subnet	01H	A11-BC Service Initiate Request	7.3.7
		All other values are reserved			
All other values are reserved					

12 Application Data: For Application Type 0AH (BSN Enabled Features) and Application
13   Sub-Type 02H (Packet Boundary Enabled), the Application Data field is
14   zero bytes in length. This Application Sub-Type is included if the BSN
15   guarantees packet boundaries either by encapsulating one packet in one
16   GRE frame or by supplying GRE segmentation indication in the GRE
17   frame (if supported by the RAN) for the corresponding A10 connection.

For Application Type 0BH (PCF Enabled Features) and Application Sub-Type 02H (GRE Segmentation Enabled), the Application Data field is zero bytes in length. This Application Sub-Type shall be included if the PCF is capable of receiving the GRE segmentation attribute in the GRE header for the corresponding A10 connection, for packets fragmented over one or more GRE frames.

For Application Type B0H (System Identifiers), Application Sub Type 01H (BSID / HRPD Subnet) the BSID Application Data is the result of the concatenation of SID+NID+Cell Identifier (Type 2), where each item is encoded using four hexadecimal uppercase ASCII characters (octets 12-17). HRPD Subnet Application Data indicates the subnet to which the AN belongs either as Sub Type 1 (octets 18-36) or Sub Type 2 (octets 37-54). Refer to [18].

7.5   Timer Definitions

7.5.1   Timer Values

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

Table 7.5.1-1   Timer Values and Ranges Sorted by Name

Timer Name	Default Value (s)	Range of Values (s)	Granularity (s)	Section Reference
$T_{bcsreq11}$	1	1-60	1	7.5.2.1
$T_{bcreq11}$	1	1-5	1	7.5.2.2
$T_{bcupd11}$	1	1-5	1	7.5.2.3
$T_{bcsireq11}$	4	1-60	1	7.5.2.4

7.5.2   Timer Definitions

7.5.2.1 $T_{bcsreq11}$

This is a PCF timer. The timer is started when an A11-BC Service Request message is sent, and stopped when an A11-BC Service Response message is received.

7.5.2.2 $T_{bcreq11}$

This is a PCF timer. The timer is started when an A11-BC Registration Request message is sent, and stopped when an A11-BC Registration Reply message is received.

7.5.2.3 $T_{bcupd11}$

This is a BSN timer. The timer is started when an A11-BC Registration Update message is sent, and stopped when an A11-BC Registration Acknowledge message is received.

7.5.2.4 $T_{bcsireq11}$

This is a BSN timer. The timer is started when an A11-BC Service Initiate Request message is sent, and stopped when an A11-BC Service Initiate Response message is received.

8. Transport

This section describes the IOS Transport changes and additional requirements to support BCMCS. Therefore, in addition to the descriptions specified in this section, protocols shall support the transport procedures specified in [12].

8.1 GRE Attributes

This section contains the specification of attributes that may be included in a GRE frame when the Protocol Type field is set to '88 D2H' for "3GPP2 Packet".

8.1.1 Segmentation Indication:

If the packet is segmented, sequence numbers shall be required and the overall User Traffic length is identified by an attribute defined as follows:

0	1	2	3	4	5	6	7	Octet
E = [0,1]	Type = '000 0100'							1
Length = 02H								2
Value = '00'-'10'	Reserved							3
Reserved								4

Type: 4 - Segmentation Indication

Length: 02H

Value: The segmentation indication Value is coded as shown below.

'00' - Packet started

'01' - Packet continued

'10' - Packet ended

Other - reserved

1   This page intentionally blank.

2

3

9. A1 Signaling Messages

This section describes the A1 interface changes and additional requirements to support BCMCS. Therefore, in addition to the descriptions specified in this section, the BS and the MSC shall support the A1 interface procedures specified in [14].

9.1 General Considerations

Refer to [14] for A1 interface general considerations.

9.2 A1 Message Procedures

This section describes the message procedures for the A1 interface.

9.2.1 Page Set Maintenance

This section describes the message procedures for page set maintenance.

9.2.1.1 Location Updating Request

The Location Updating Request message is sent from the BS to the MSC to convey the frequency information, to which the MS tunes for receiving a BCMCS flow.

9.2.1.1.1 Successful Operation

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

9.2.1.1.2 Failure Operation

If timer T_{3210} expires, the BS shall proceed according to the specification in [14].

9.2.1.2 Location Updating Accept

No changes from [14].

9.2.1.3 Other Messages Directed to the MS

This section describes the procedure when the MSC sends an MS Directed message to the BS.

9.2.1.3.1 Successful Operation

When the BS receives an A1 signaling message including frequency information, the BS should use the frequency information to determine the frequency(s) on which to send the MS Directed Message(s) over the air. When the A1 signaling message does not include the frequency information, the BS should assume that the MS resides on the hash-to-frequency.

9.2.1.3.2 Failure Operation

None.

9.3 A1 Message Formats

This section describes the message formats for the A1 interface.

9.3.1 Location Updating Request

In addition to the procedure specified in [14], this A1 message is sent by the BS to the MSC to convey the frequency information to which the MS tunes for receiving a BCMCS flow.

Information Element	Section Reference	Element Direction	Type	
	• • •			
MS Designated Frequency	[14]	BS → MSC	O[a]	C

a. This IE is included when the BS receives the frequency information for BCMCS from the MS. This IE shall not be included when the BS assumes that the MS is reachable on its hash-to frequency.

9.3.2 Location Updating Accept

No changes from [14].

9.3.3 Other Messages Directed to the MS

The following change is applied to the Paging Request, Feature Notification, Authentication Request, Status Request, User Zone Reject, Registration Request and ADDS Page messages.

Information Element	Section Reference	Element Direction	Type	
	• • •			
MS Designated Frequency	[14]	MSC → BS	O[a]	C

a. This IE shall be included when the MSC has the information available. This IE shall not be included when the MSC assumes that the MS is reachable on its hash-to frequency.