

3GPP2 C.S0099-0

Version 1.0

September 2010



3RD GENERATION  
PARTNERSHIP  
PROJECT 2  
"3GPP2"

# **Guidelines for using cdma2000 1x Revision E Features on Earlier Revisions**

## ***COPYRIGHT NOTICE***

*3GPP2 and its Organizational Partners claim copyright in this document and individual Organizational Partners may copyright and issue documents or standards publications in individual Organizational Partner's name based on this document. Requests for reproduction of this document should be directed to the 3GPP2 Secretariat at [secretariat@3gpp2.org](mailto:secretariat@3gpp2.org). Requests to reproduce individual Organizational Partner's documents should be directed to that Organizational Partner. See [www.3gpp2.org](http://www.3gpp2.org) for more information.*

**Revision History**

<b>Revision</b>	<b>Description of Changes</b>	<b>Date</b>
Rev 0 v1.0	Publication	13 September, 2010

**CONTENTS**

1	1	Introduction .....	1
2	1.1	Scope .....	1
3	1.2	Terms and Definitions.....	1
4	1.3	References .....	5
5	1.4	Features of Revision E of cdma2000 1x .....	6
6	1.5	Backwards Compatibility of Features of Revision E of cdma2000 1x .....	9
7	1.5.1	Common Control Channel Messages.....	9
8	1.5.2	Dedicated Control Channel Messages .....	10
9	2	Supporting RL RC 8, FL RC 11/12 .....	1
10	2.1	Using RL RC 8, FL RC 11/12 .....	1
11	2.1.1	Physical Layer Features of Reverse Link RC 8 and Forward Link RC 11/12 .....	1
12	2.1.2	MAC Support for RC 8 and RC 11/12.....	3
13	2.1.3	Service Options Changes.....	4
14	2.2	RL RC8, and FL RC 11/12 and Voice SO based Call Establishment.....	6
15	2.2.1	Call Flow Diagram .....	6
16	2.2.2	Call Flow Details.....	6
17	2.2.3	Recommendations .....	8
18	2.3	Negotiation of SO when MAX_NUM_ALT_SO is set to 0.....	9
19	2.3.1	Call Flow Diagram .....	9
20	2.3.2	Call Flow Details.....	9
21	2.3.3	Recommendations .....	10
22	2.4	Configuring parameters for RL RC 8, FL RC 11/12 using GEM .....	11
23	2.4.1	Call Flow Diagram .....	11
24	2.4.2	Call Flow Details.....	11
25	2.4.3	Recommendations .....	12
26	2.5	Configuring parameters for RL RC 8, FL RC 11/12 using RCPM.....	13
27	2.5.1	Call Flow Diagram .....	13
28	2.5.2	Call Flow Details.....	13
29	2.5.3	Recommendations .....	14
30	2.6	Soft handoff for RL RC 8, FL RC 11/12 using GEM.....	15

1	2.6.1	Call Flow Diagram.....	15
2	2.6.2	Call Flow Details .....	15
3	2.6.3	Recommendations .....	15
4	2.7	Soft handoff for RL RC 8, FL RC 11/12 using RCPM.....	16
5	2.7.1	Call Flow Diagram.....	16
6	2.7.2	Call Flow Details .....	16
7	2.7.3	Recommendations .....	16
8	2.8	Interoperability of RL RC 8 and FL RC 11/12 with Legacy RC and SO.....	18
9	3	Overhead Message Extension.....	1
10	3.1	Extension to System Parameters Message .....	1
11	3.2	Mobile Station Processing of Extension of SPM and MC-RR Parameters Message	5
12	3.3	Revision Dependent Extensions .....	6
13	3.3.1	Base Stations supporting only Revision 0.....	6
14	3.3.2	Base Stations Supporting Revision A, B or C.....	6
15	3.3.3	Base Stations Supporting Revision D .....	7
16	3.4	Feature Dependent Extensions .....	8
17	3.4.1	Call Recovery Request Message (CRRM_MSG_IND) .....	8
18	3.4.2	Optional Message Transmission Indication (NUM_OPT_MSG_BITS).....	8
19	3.4.3	Access Point Pilot Information Message (AP_PILOT_INFO, APPIM_PERIOD_INDEX) .....	10
20	3.4.4	Access Point Identification Message (AP_IDT).....	12
21	3.4.5	Access Point Identification Text Message (AP_IDT_TXT).....	12
22	3.4.6	Active Handoff into Femto Access Point .....	12
23	3.4.7	General Overhead Information Message (GEN_OVHD_INF_IND, GEN_OVHD_CYCLE_INDEX).....	13
24	3.4.8	Frequent General Overhead Information Message (FREQ_GEN_OVHD_INF_IND) .....	14
25	3.4.9	Flex Duplex CDMA Channel List Message (FD_CHAN_LST_IND).....	14
26	3.4.10	Alternative Technologies Information Message (ATIM_IND).....	14
27	3.4.11	Location Parameters (ADD_LOC_INFO_INCL, ADD_LOC_INFO_INCL, LOC_UNC_H, HEIGHT and LOC_UNC_V).....	15
28	3.4.12	MEID_ME Reporting .....	15
29	3.5	Extension to MC-RR Parameters Message .....	16
30			
31			
32			
33			

**Table of Figures**

1  
2  
3  
4  
5  
6  
7  
8  
9  
10

Figure 1 – Voice call establishment using RC 8 and RC11/RC12..... 6

Figure 2 SO negotiation when MAX\_NUM\_ALT\_SO is 0 ..... 9

Figure 3 – Setting Non-default parameters for RL RC 8, FL RC 11/RC12 using GEM..... 11

Figure 4 – Setting Non-default parameters for RC 8, RC 11/RC12 using RCPM ..... 13

Figure 5 – Softhandoff for RL RC 8, FL RC 11/12 using GEM ..... 15

Figure 6 – Softhandoff for RC 8, RC 11/RC12 using RCPM ..... 16

Figure 7 – Active handoff into a FAP..... 13

- 1 This page is intentionally left blank.

**Table of Tables**

1  
2  
3  
4  
5  
6  
7

Table 1. Features of Revision E of cdma2000 1x ..... 6  
Table 2: Valid PC modes with blanking not-activated on RL frame ..... 3  
Table 3: Valid PC modes with blanking activated on RL frame..... 3  
Table 4. Transcoder Free Operation..... 18

- 1 This page is intentionally left blank.

**FOREWORD****(This foreword is not part of this specification)**

This specification was prepared by Technical Specification Group C of the Third Generation Partnership Project 2 (3GPP2). This specification is the first version of the document and provides the recommendations and guidelines for features of Revision E of cdma2000<sup>®1</sup>.

---

<sup>1</sup>cdma2000<sup>®</sup> 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<sup>®</sup> is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United States.

1 This page is intentionally left blank.

# 1 Introduction

## 1.1 Scope

This specification provides recommendations and guideline for various features of Revision E of cdma2000 1x.

## 1.2 Terms and Definitions

**Acknowledgment.** A Layer 2 response by the mobile station or the base station confirming that a signaling message was received correctly.

**Action Time.** The time at which the action implied by a message should take effect.

**Active Set.** The set of pilots associated with the CDMA Channels containing Forward Traffic Channels assigned to a particular mobile station.

**ARQ.** Automatic Repeat Request. The ARQ is an automatic retransmission protocol that ensures the delivery of encoder packets from the sender to the receiver by retransmission of portions of a turbo encoded packet based on the feedback from the receiver that indicates if the encoder packets have been received and decoded successfully (ACK) or not (NAK).

**Assured Mode.** Mode of delivery that guarantees that a PDU will be delivered to the peer. A PDU sent in assured mode is retransmitted by the LAC sublayer, up to a maximum number of retransmissions, until the LAC entity at the sender receives an acknowledgment for the PDU. See also Confirmation of Delivery.

**Bad Frames.** Frames classified as insufficient frame quality or as 9600 bps primary traffic only, with bit errors. See also Good Frames.

**Band Class.** A set of CDMA frequency assignments and a numbering scheme for these channels. See also CDMA Frequency Assignment.

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

**BLOB.** Block of Bits.

**Call Disconnect.** The process that releases the resources handling a particular call. The disconnect process begins either when the mobile station user indicates the end of the call by generating an on-hook condition or other call-release mechanism, or when the base station initiates a release.

**CDMA Channel.** The set of channels transmitted between the base station and the mobile stations within a given CDMA Frequency Assignment. See also Forward CDMA Channel and Reverse CDMA Channel.

**Discontinuous Transmission (DTX).** A mode of operation in which a base station or a mobile station switches its transmitter on and off on a particular code channel autonomously. For the case of DTX operation on the Forward Dedicated Control Channel, the Forward Power Control Subchannel is still transmitted.

1 **f-csch.** Forward common signaling logical channel.

2 **f-dsch.** Forward dedicated signaling logical channel.

3 **Forward CDMA Channel.** A CDMA Channel from a base station to mobile stations. The  
4 Forward CDMA Channel contains one or more code channels that are transmitted on a  
5 CDMA Frequency Assignment using a particular pilot PN offset. The code channels are  
6 associated with the Pilot Channel, Sync Channel, Paging Channels, Broadcast Control  
7 Channel, Forward Common Control Channels, and Traffic Channels. The Forward CDMA  
8 Channel always carries a Pilot Channel and may also carry up to one Sync Channel, up to  
9 seven Paging Channels, up to seven Broadcast Control Channels, up to seven Forward  
10 Common Control Channels and up to the maximum number of channels allowed for the  
11 assigned Radio Configuration minus one Traffic Channels, as long as the total number of  
12 channels, including the Pilot Channel, is no greater than the maximum number of channels  
13 allowed for the assigned Radio Configuration.

14 **Forward Acknowledgment Channel.** A portion of a Forward CDMA Channel used for the  
15 transmission of acknowledgments from a base station to multiple mobile stations in  
16 response to the data received on the Reverse Packet Data Channel or the Reverse  
17 Fundamental Channel.

18 **Forward Common Acknowledgment Channel.** A portion of the Forward CDMA Channel  
19 used for the transmission of Acknowledgments from a base station to multiple mobile  
20 stations in response to the Reverse Supplemental Channel from mobile stations operating  
21 with reverse link Radio Configuration 8. The Forward Common Acknowledgment Channel is  
22 used by the base station to early terminate Reverse Supplemental Channel frames.

23 **Forward Common Acknowledgment Subchannel.** A subchannel on the Forward Common  
24 Acknowledgment Channel used by the base station to early terminate the Reverse  
25 Supplemental Channel from a mobile station operating with Radio Configuration 8.

26 **Forward Common Control Channel.** A control channel used for the transmission of digital  
27 control information from a base station to one or more mobile stations.

28 **Forward Dedicated Control Channel.** A Dedicated Control Channel that is transmitted on  
29 the Forward CDMA Channel.

30 **Forward Fundamental Channel.** A Fundamental Channel that is transmitted on the  
31 Forward CDMA Channel.

32 **FL.** Forward Link. See Forward CDMA Channel.

33 **Forward Supplemental Channel.** A Supplemental Channel that is transmitted on the  
34 Forward CDMA Channel.

35 **Forward Traffic Channel.** One or more code channels used to transport user and  
36 signaling traffic from the base station to the mobile station. See Forward Fundamental  
37 Channel, Forward Dedicated Control Channel, Forward Packet Data Channel, Forward  
38 Supplemental Channel, and Forward Supplemental Code Channel.

39 **Frame.** A basic timing interval in the system. For the Sync Channel, a frame is 26.666...  
40 ms long. For the Access Channel, the Paging Channel, the Forward Supplemental Code  
41 Channel, and the Reverse Supplemental Code Channel, a frame is 20 ms long. For the

1 Forward Supplemental Channel and the Reverse Supplemental Channel, a frame is 20, 40,  
2 or 80 ms long. For the Enhanced Access Channel, the Forward Common Control Channel,  
3 and the Reverse Common Control Channel, a frame is 5, 10, or 20 ms long. For the  
4 Forward Fundamental Channel, Forward Dedicated Control Channel, Reverse Fundamental  
5 Channel, and Reverse Dedicated Control Channel, a frame is 5 or 20 ms long. For the  
6 Common Assignment Channel, a frame is 5 ms long. For the Broadcast Control Channel, a  
7 frame is 40 ms long; the frame may be transmitted once, twice, or four times. For the  
8 Forward Packet Data Control Channel and the Forward Packet Data Channel, a frame could  
9 be 1.25, 2.5, or 5 ms long. For the Reverse Acknowledgment Channel and the Reverse  
10 Channel Quality Indicator Channel, a frame is 1.25 ms long. For the Reverse Packet Data  
11 Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the  
12 Forward Indicator Control Channel, the Forward Grant Channel, and the Forward  
13 Acknowledgment Channel, a frame is 10 ms long.

14 **Frame Number.** CDMA System Time, in integer multiples of 20 ms.

15 **Frame Offset.** A time skewing of Traffic Channel frames from System Time in integer  
16 multiples of 1.25 ms. The maximum frame offset is 18.75 ms.

17 **FCH.** Fundamental Channel. See Forward Fundamental Channel and Reverse Fundamental  
18 Channel.

19 **Handoff.** The act of transferring communication with a mobile station from one base  
20 station to another.

21 **Hard Handoff.** A handoff characterized by a temporary disconnection of the Traffic  
22 Channel. Hard handoffs occur when the mobile station is transferred between disjoint  
23 Active Sets, when the CDMA Frequency Assignment changes, or when the frame offset  
24 changes. See also Soft Handoff.

25 **Idle Handoff.** The act of transferring reception of the Paging Channel, Broadcast Control  
26 Channel or the Forward Common Control Channel from one base station to another, when  
27 the mobile station is in the *Mobile Station Idle State*.

28 **MEID\_ME.** MEID associated with the mobile equipment. See Mobile Equipment Identifier  
29 (MEID) and ME.

30 **Message.** A data structure that conveys control information or application information. A  
31 message consists of a length field (MSG\_LENGTH), a message body (the part conveying the  
32 information), and a CRC.

33 **MIN.** See Mobile Identification Number.

34 **MNC.** See Mobile Network Code.

35 **Mobile Country Code (MCC).** A part of the E.212 IMSI identifying the home country.

36 **Mobile Equipment Identifier (MEID).** A 56-bit number assigned by the mobile station  
37 manufacturer, uniquely identifying the mobile station equipment.

38 **NID.** See Network Identification.

39 **Order.** A type of message that contains control codes for either the mobile station or the  
40 base station.

1 **Paging Channel.** A code channel in a Forward CDMA Channel used for transmission of  
2 control information and pages from a base station to a mobile station.

3 **Power Control Group.** A 1.25 ms interval on the Forward Traffic Channel and the Reverse  
4 Traffic Channel. See also Power Control Bit.

5 **r-csch.** Reverse common signaling logical channel.

6 **r-dsch.** Reverse dedicated signaling logical channel.

7 **Radio Configuration.** A set of Forward Traffic Channel and Reverse Traffic Channel  
8 transmission formats that are characterized by physical layer parameters such as  
9 transmission rates, modulation characteristics and spreading rate.

10 **RC.** See Radio Configuration.

11 **RL.** Reverse Link. See Reverse CDMA Channel.

12 **Registration.** The process by which a mobile station identifies its location and parameters  
13 to a base station.

14 **Reverse Dedicated Control Channel.** A Dedicated Control Channel that is transmitted on  
15 the Reverse CDMA Channel.

16 **Reverse Fundamental Channel.** A Fundamental Channel that is transmitted on the  
17 Reverse CDMA Channel.

18 **Reverse Pilot Channel.** A non-data-bearing direct-sequence spread spectrum signal  
19 transmitted by each CDMA mobile station whenever the Enhanced Access Channel, Reverse  
20 Common Control Channel, or Reverse Traffic Channel is enabled. The Reverse Pilot  
21 Channel allows a base station to acquire the timing of the Reverse CDMA Channel and  
22 provides a phase reference for coherent demodulation. The Reverse Pilot Channel may be  
23 transmitted either continuously or in gated mode.

24 **Reverse Supplemental Channel.** A Supplemental Channel that is transmitted on the  
25 Reverse CDMA Channel.

26 **Service Configuration.** The common attributes used by the mobile station and the base  
27 station to build and interpret Traffic Channel frames. Service configuration corresponds to  
28 the parameters contained in the Service Configuration information record and the Non-  
29 negotiable Service Configuration information record. Examples of such parameters include  
30 Forward and Reverse Traffic Channel multiplex options, Forward and Reverse Traffic  
31 Channel transmission rates, service option connections, and reverse pilot gating rate.

32 **Service Negotiation.** The procedures used by the mobile station and base station to  
33 establish a service configuration. See also Service Option Negotiation.

34 **Service Option.** A service capability of the system. Service options may be applications  
35 such as voice, data, or facsimile.

36 **Service Option Connection.** A particular instance or session in which the service defined  
37 by a service option is used. Associated with a service option connection are a reference,  
38 which is used for uniquely identifying the service option connection, a service option, which  
39 specifies the particular type of service in use, a Forward Traffic Channel traffic type, which

1 specifies what type of Forward Traffic Channel traffic is used to support the service option  
 2 connection, and a Reverse Traffic Channel traffic type, which specifies what type of Reverse  
 3 Traffic Channel traffic is used by the service option connection.

4 **Service Option Connection Reference.** A designator used by the base station and mobile  
 5 station to uniquely identify a particular service option connection.

6 **Service Option Negotiation.** The procedures used by the mobile station and base station  
 7 to establish a service configuration. Service option negotiation is similar to service  
 8 negotiation, but allows less flexibility for specifying the attributes of the service  
 9 configuration. See also Service Negotiation.

10 **Service Redirection.** The process by which the base station alters the system selection  
 11 made by a mobile station. It can be used temporarily during maintenance and testing to  
 12 divert subscribers to an alternate system.

13 **Short Message Services (SMS).** A suite of services such as SMS Text Delivery, Digital  
 14 Paging (i.e., Call Back Number - CBN), and Voice Mail Notification (VMN).

15 **SID.** See System Identification.

16 **Supplemental Channel.** An optional portion of a Traffic Channel (Forward or Reverse  
 17 Radio Configurations 3 and above) that operates in conjunction with a Fundamental  
 18 Channel in that Traffic Channel, and (optionally) with other Supplemental Channels to  
 19 provide higher data rate services.

20 **System Identification (SID).** A number uniquely identifying a wireless system.

## 21 1.3 References

22 The following standards are referenced in this text. At the time of publication, the editions  
 23 indicated were valid documents. All standards are subject to revision, and parties to  
 24 agreements based upon this document are encouraged to investigate the possibility of  
 25 applying the most recent editions of the standards indicated below. ANSI and TIA maintain  
 26 registers of currently valid national standards published within their respective  
 27 organization. All references are informative.

- 29 1. **3GPP2:** C.S0005-E v2.0, *Upper Layer (Layer 3) Signaling Standard for cdma2000*  
 30 *Spread Spectrum Systems.*
- 31 2. **3GPP2:** C.S0087-0 v2.0, *E-UTRAN – cdma2000 HRPD Connectivity and Interworking:*  
 32 *Air Interface Specification.*
- 33 3. **3GPP2:** C.S0086-0 v1.0, *WiMAX™<sup>2</sup> – HRPD Interworking: Air Interface Specification.*
- 34 4. **3GPP2:** C.S0097-0 v1.0, *E-UTRAN – cdma2000 1x Connectivity and Interworking Air*

---

<sup>2</sup> “WiMAX” is a trademark of the WiMAX Forum.

*Interface Specification.*

5. **3GPP2:** C.S0002-E v2.0, *Physical Layer Standard for cdma2000 Spread Spectrum Systems.*
6. **3GPP2:** C.S0003-E v2.0, *Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems.*
7. **3GPP2:** C.S0015-B v2.0, *Short Message Service (SMS) for Wideband Spread Spectrum Systems.*
8. **3GPP2:** C.S0016-D v1.0, *Over-the-Air Service Provisioning of Mobile Stations in Spread Spectrum Standards.*
9. **3GPP2:** C.S0014-D v2.0, *Enhanced Variable Rate Codec, Speech Service Options 3, 68, 70, and 73 for Wideband Spread Spectrum Digital Systems*

## 1.4 Features of Revision E of cdma2000 1x

Various features of Revision E are listed in Table 1. The table highlights the impact of each feature on the overhead and signaling messages. Modifications made to the messages are described in section 3.1 and 3.5. Table 1 also lists the section where the procedures are defined for various features.

**Table 1. Features of Revision E of cdma2000 1x**

<b>Feature</b>	<b>Overhead Messages</b>	<b>Signaling Messages</b>	<b>Section</b>
RC 8, RC 11, RC 12	None.	<i>Origination Message, Page Response Message, Service Connect Message, Radio Configuration Parameters Message, General Extension Message (mobile station), Status Request Message, Status Response Message, Extended Status Response Message.</i>	2

<b>Feature</b>	<b>Overhead Messages</b>	<b>Signaling Messages</b>	<b>Section</b>
Femto	<i>System Parameters Message, MC-RR PM, Access Point Pilot Information Message, Access Point Identification Message, Access Point Identification Text Message</i>	Pilot Strength Measurement Message, Handoff Supplementary Information Notification Message, Handoff Supplementary Information Solicit Message.	3.4.3. 3.4.4, 3.4.5
General Overhead Information	<i>System Parameters Message, MC-RR PM, General Overhead Information Message</i>	None.	3.4.7
Frequent General Overhead Information	<i>System Parameters Message, MC-RR PM, Frequent General Overhead Information Message</i>	None.	3.4.8
Flex Duplex	<i>System Parameters Message, MC-RR PM, Flex Duplex CDMA Channel List Message</i>	<i>General Extension Message</i>	3.4.9
Alternate Technologies Information	<i>System Parameters Message, MC-RR PM, Alternative Technologies Information Message</i>	None.	3.4.10
Location	<i>System Parameters Message, MC-RR PM.</i>	<i>Registration Message, Origination Message.</i>	3.4.11
MEID_ME	None.	<i>Status Request Message, Status Response Message, Extended Status Response Message</i>	3.4.12

1 **RC 8, RC 11, RC12 and SO 73:** RL RC8, and FL RC 11/12 are introduced in the Revision

1 E of cdma2000 1x. SO 73 [9] allows RL RC 8, FL RC 11/12 to be used more efficiently. Call  
2 establishment procedures using RC 8 on the reverse link and RC 11/RC12 on the forward  
3 link are provided in section 2. It should be noted that in order to support the RL RC 8, FL  
4 RC 11/12 and SO 73, the base station does not need to modify the overhead messages. In  
5 order to support the RL RC 8 and FL RC 11/12 the mobile station needs to support the  
6 reception of *Extended Channel Assignment Message* in a *General Extension Message (GEM)*  
7 along with the Radio Configuration Parameters Record (see section 2.4). The mobile station  
8 also needs to send the SO Information record in a *Status Response Message* if the base  
9 station sends the *Status Request Message* querying the SO Information Record (see section  
10 2.3)<sup>3</sup>. If a mobile station indicates support for FL RC 11/12 or RL RC 8, then the mobile  
11 station will support Service Option 73 NB Mode (i.e. Operating Point 1 through 7 of Service  
12 Option 73) and will indicate support for SO 73 to the base station.

13 **Femto:** Broadcast information needed to support femto operation is provided in sections  
14 3.4.3, 3.4.4, and 3.4.5. The *Access Point Pilot Information Message (APPIM)* (section 3.4.3)  
15 can be broadcast either by the macro base station or the femto base station. *Access Point*  
16 *Identification Message (APIDM)* and *Access Point Identification Text Message (APIDTM)* are  
17 transmitted by the femto base station.

18 **General Overhead Information:** The *General Overhead Information Message (GOIM)* (section  
19 3.4.7) contains information that is typically used for display purposes on the mobile station.  
20 The *GOIM* is used to send the overhead information that is not necessary for accessing the  
21 system.

22 **Frequent General Overhead Information:** The *Frequent General Overhead Information*  
23 *Message (FGOIM)* (section 3.4.8) contains information that is typically used for sending non-  
24 essential access related information to the mobile station..

25 **Flex Duplex:** The *Flex Duplex CDMA Channel List Message (FDCCLM)* (3.4.9) is sent by the  
26 base station if it supports flexible separation of forward and reverse channels. The *FDCCLM*  
27 contains information on the pairing of the forward and reverse channels separated by non-  
28 default frequency separation. The mobile station uses *GEM* to send the Band Class - Band  
29 Subclass capabilities information record along with the *Registration Message (RGM)*,  
30 *Origination Message (ORM)* or *Page Response Message (PRM)*.

31 **Alternative Technologies Information:** The *Alternative Technologies Information Message*  
32 *(ATIM)* is sent by a base station to indicate the existence of alternative technologies such as  
33 HRPD, E-UTRAN, and WiMAX. The *ATIM* contains information on the alternate  
34 technologies. The information record for HRPD is defined in [1]. The information record for  
35 E-UTRAN is defined in [2] and [4], and the information record for WiMAX is defined in [3].

36 **Location Enhancements:** The location enhancements (3.4.11) allow base station to  
37 transmit additional location information in the overhead messages.

---

<sup>3</sup> The base station could query Extended Service Option Information record if the P\_REV\_IN\_USE is greater than 10.

1 **MEID\_ME:** The base station can query the MEID\_ME of the mobile station using the *Status*  
 2 *Request Message* with RECORD\_TYPE = '00101110' (MEID\_ME). The mobile station can  
 3 include the MEID\_ME information record in the *Status Response Message* or the *Extended*  
 4 *Status Response Message*.

## 5 **1.5 Backwards Compatibility of Features of Revision E of** 6 **cdma2000 1x**

### 7 1.5.1 Common Control Channel Messages

#### 8 1.5.1.1 Base Station Transmission of Common Control Channel Messages

9 The recommendation and guidelines in this document provide details on supporting the  
 10 features listed in Table 1 on any Revision of cdma2000 1x. Specifically, each feature can be  
 11 supported individually by the base station with any P\_REV value being broadcast in the  
 12 overhead messages. Further, in order to support a feature introduced in Revision E of  
 13 cdma2000 1x, the base station does not need to support any additional features from other  
 14 revisions of cdma2000 1x than the one the base station currently supports. When  
 15 extending an overhead message to support any feature of Revision E, the base station  
 16 would use Revision E of the specification only for the fields that are part of the message  
 17 extensions. For example, for the System Parameters Message, a base station supporting  
 18 Revision 0 of cdma20001x would set the fields up to the EXT\_CHAN\_LIST field as specified  
 19 in the Revision 0 of cdma20001x. System Parameters Message fields that follow  
 20 EXT\_CHAN\_LIST field would be set according to the Revision E of cdma20001x. Specifically,  
 21 the base station would continue to set the P\_REV field in the overhead messages to '0000  
 22 0110' as specified in the Revision 0 of cdma20001x. Similarly, a mobile station can support  
 23 various features introduced in Revision E of cdma2000 1x with any MOB\_P\_REV.

#### 24 1.5.1.2 Mobile Station Transmission of Common Control Channel Messages

25 Base station indicates support for receiving *GEM* for additional geo location records by  
 26 setting the ADD\_LOC\_GEM\_ALLOWED bit to '1' in the *SPM*. If the  
 27 ADD\_LOC\_GEM\_ALLOWED bit in the *SPM* is set to '1' the mobile station can send the  
 28 Additional Geo Location Type Record along with *ORM*, *PRM*, *RGM* in a *GEM*. Otherwise, if  
 29 the ADD\_LOC\_GEM\_ALLOWED bit is not set to '1' or is not included, or if the mobile station  
 30 does not support Additional Geo Location feature then the mobile station will send the  
 31 *ORM*, *PRM*, *RGM* according to the P\_REV\_IN\_USE and section 1.5.2.1.

32 The mobile station indicates the capabilities for various optional features through the  
 33 Capability Information record<sup>4</sup>. If the mobile station supports any of the capabilities  
 34 introduced in Revision E that are indicated through the Capability Information record, then  
 35 the mobile station will include a Capability Information record according to Revision E<sup>5</sup>.

---

<sup>4</sup> The base station can query this record by sending a Status Request Message.

<sup>5</sup> As an example, when the P\_REV\_IN\_USE is 6, the mobile station will need to include an additional  
 (footnote continues on next page)

1 Otherwise, the mobile station will include the record as specified by the P\_REV\_IN\_USE.

## 2 1.5.2 Dedicated Control Channel Messages

### 3 1.5.2.1 P\_REV\_IN\_USE and Reserved Fields

4 The mobile station carries the RC bitmap in many messages such as *ORM* and *PRM*. Even  
5 though according to the P\_REV\_IN\_USE the RL RC 8 and FL RC 11/12 may be reserved,  
6 the mobile station would indicate the support for RL RC 8 and FL RC 11 and/or FL RC 12.

7 The mobile station indicates the capabilities for various optional features through the  
8 Capability Information record<sup>6</sup>. If the mobile station supports any of the optional  
9 capabilities introduced in Revision E that are indicated through the Capability Information  
10 record, then the mobile station will include a Capability Information record according to  
11 Revision E<sup>7</sup>. Otherwise, the mobile station will include the record as specified by the  
12 P\_REV\_IN\_USE.

13 The base station carries the RC in many messages such as *ECAM*, *GHDM*, *UHDM*, and  
14 *EHDM* messages. Even though according to the P\_REV\_IN\_USE the RL RC 8 and FL RC  
15 11/12 may be reserved, the base station can assign RL RC 8 and FL RC 11 and/or FL RC  
16 12 if the mobile station has indicated support for these RC.

17 If the base station supports any of the optional capabilities introduced in Revision E that  
18 are indicated through the Capability Information record, then the base station will parse  
19 the Capability Information record according to Revision E. Otherwise, the base station will  
20 parse the record as specified by the P\_REV\_IN\_USE.

### 21 1.5.2.2 General Extension Message

22 *GEM* can be used to support various features of Revision E of cdma2000 1x. The base  
23 station and mobile station use *GEM* for sending messages such as *ECAM*, *ORM*, etc along  
24 with additional fields that are needed for various features. While using the *GEM* base  
25 station and mobile station would use the message definition according to the  
26 P\_REV\_IN\_USE. For example if the P\_REV\_IN\_USE is 6, the base station will use the  
27 definition of *ECAM* as defined in the Revision 0 of cdma2000 1x. Similarly, the mobile  
28 station can use *ORM* according to the P\_REV\_IN\_USE and use *GEM* to signal additional  
29 records needed for flex duplex or additional Geo-Location features. Thus, *GEM* allows for  
30 extension of messages for new features without the need for supporting future revisions at  
31 the mobile station and base station.

---

11 bits of '0's beyond the Capability Information record specified in Revision 0, followed by the  
capability fields introduced in the Revision E.

<sup>6</sup> The base station can query this record by sending a Status Request Message.

<sup>7</sup> As an example, when the P\_REV\_IN\_USE is 6, the mobile station will need to include an additional  
11 bits of '0's beyond the Capability Information record specified in Revision 0, followed by the  
capability fields introduced in the Revision E.

1 The mobile station and base station can choose to support *GEM* only for the features that  
2 they support. For example, if the mobile station supports only the RL RC8, and FL RC  
3 11/12, then it need not support *GEM* for other features such as flex duplex or Additional  
4 Geo-Location.

5 If the mobile station needs to generate a *Reject Order* for a *GEM* it can generate this  
6 according to the Revision E of cdma2000 1x.

7

- 1 This page is intentionally left blank.

## 2 Supporting RL RC 8, FL RC 11/12

RC 8, RC 11 and RC 12 have been introduced in [1]. Specifically, RC 8 has been proposed for reverse channels and RC 11 and RC 12 have been proposed for forward channels. This section provides an introduction to the main features of RC, SO 73 and the call flows for establishing voice calls based on RL RC8, and FL RC 11/12.

### 2.1 Using RL RC 8, FL RC 11/12

This section provides an introduction to features of RL RC 8 for the reverse channels and FL RC 11/12 for the forward channels. It also highlights the changes needed at the MAC and the services in order to utilize the gains provided by the use of RC 8 on the reverse channels and RC 11/ 12 on the forward channels.

#### 2.1.1 Physical Layer Features of Reverse Link RC 8 and Forward Link RC 11/12

**New Obps frame type and Blanking:** A new 0 bps fundamental channel frame type is introduced in RL RC 8 and FL RC 11/12 in Revision E of cdma2000 1x. In combination with SO73, it leads to lower data rate and improved capacity.

Radio Configurations 7 or earlier for the reverse channels and RC 10 or earlier for the forward channels require physical layer to transmit continuously. Thus, when using these Radio Configurations, if the services and signaling did not provide any SDU to the multiplex sub-layer at MAC, this sub-layer is required to generate a 1/8<sup>th</sup> rate filler frame for the physical layer transmission.

In contrast, RC 8 and RC 11/12 allow discontinuous transmission of frames (blanking) at the physical layer. Thus, with RC 8 and RC 11/12, for certain intervals the MAC does not need to generate the above filler frames<sup>8</sup>. These blanking intervals provide capacity gains at the physical layer.

When blanking is used, RL RC 8 and FL RC 11/12 guarantee periodic transmission of frames at the physical layer. These frames are referred to as *guaranteed physical layer frames*.

When blanking is enabled, the mobile station uses only the guaranteed frames for maintaining counters for bad frames and total frames as well as for detecting supervision failure on the forward link. Specifically, the reverse link transmitter is turned off when FOR\_N2M\_IND consecutive guaranteed frames are received in error. Thus, this duration is dependent on FOR\_N2M\_IND and FOR\_FCH\_BLANKING\_DUTYCYCLE values and hence these attributes are inter-dependent. Similarly, when blanking is enabled the values of PWR\_REP\_FRAMESs, PWR\_REP\_THRESHS attributes that are used for triggering *Power Measurement Report Message* may need to be adjusted accordingly. Outer loop power

---

<sup>8</sup> Certain non-critical frames may also be suppressed by the MAC. Additionally, MAC may generate filler frames at 1/8<sup>th</sup> rate.

1 control will also be maintained using only the guaranteed frames.

2 See sections 2.1.2.3.2, 2.1.3.1.6, 2.1.3.12.1, and 3.1.3.1.6 of [5] for details on 0 bps frame.  
3 See section 2.2.1.1.1.3.1.2 of [6] for MAC changes that enable blanking. See sections  
4 2.1.3.12.1 and 3.1.3.15.1 of [5] for details on generating guaranteed frames at physical  
5 layer.

6 The base station can provide various attribute for the RL RC8, and FL RC 11/12 through  
7 *RCPM* or *GEM* (see section 2.4). When blanking is enabled, i.e.,  
8 *FOR\_FCH\_BLANKING\_DUTYCYCLE* attribute is set to a value other than '000', the mobile  
9 station will use *FOR\_N2M\_IND* for forward link error trigger. In this case the mobile station  
10 will use only guaranteed physical layer frames for evaluating a frame as good or bad. The  
11 base station can disable blanking by setting the *FOR\_FCH\_BLANKING\_DUTYCYCLE*  
12 attribute to a value of '000' using the *RCPM* or *GEM*. In this case the mobile station uses the  
13  $N_{2m}$  and evaluates each frame as good or bad frame.

14 The base station and mobile station will not blank frames at all times on the F-FCH even  
15 though the *FOR\_FCH\_BLANKING\_DUTYCYCLE* and *REV\_FCH\_BLANKING\_DUTYCYCLE* are  
16 negotiated to a value different than '000'. For example, the base station does not start  
17 blanking the frames on the FCH in the Traffic Channel Initialization Substate, i.e. waits for  
18 the traffic channel to be established. Similarly, the mobile station does not blank frames on  
19 the R-FCH for the duration of R-SCH assignment burst<sup>9</sup>.

20 **Frame Early Termination (FET):** Frame Early Termination was introduced in RL RC 8 and  
21 FL RC 11/12 in Revision E of cdma2000 1x. This method is used to terminate transmission  
22 of a frame earlier than the nominal length of the frame (20 ms) if the receiver has  
23 successfully received the frame. The receiver transmits an acknowledgment to the  
24 transmitter following successful reception of the frame. As a response, the transmitter stops  
25 transmission of the remainder of the frame. FET is mandatory for the fundamental channel  
26 for RL RC 8 and FL RC 11/12 and is optional for the supplemental channel. It should be  
27 noted that the higher rate F-FCH frames have less probability to be early decoded than  
28 lower rate F-FCH frames. Thus, vocoders that generate fewer full-rate frames will see higher  
29 capacity benefits with the use of RL RC 8 and FL RC 11/12.

30 See 3.1.3.1.13 of [5] for details on FET for RL RC 8 and 2.1.3.10 of [5] for details of FET on  
31 the FL RC 11/12.

32 **New Power Control Modes:** Slower power control is introduced for RL RC 8 and FL RC  
33 11/12 in Revision E of cdma2000 1x. There are 2 modes: 400Hz power control and 200Hz  
34 power control for both forward link and reverse link fundamental channels. Slower power  
35 control occupies less system resources thus help improve the capacity. It should be noted  
36 that power control modes can be used only with certain combinations of blanking and  
37 supplemental channel assignments. Table 2 lists the valid power control modes with non-  
38 blanked RL frame, while Table 3 lists the valid power control modes with blanked reverse  
39 link frames.

---

<sup>9</sup> The blanking of the FCH, if enabled, is restarted at the end of the R-SCH assignment.

Table 2: Valid PC modes with blanking not-activated on RL frame

RPC Mode	FPC Mode	RLPC Rate	FLPC Rate
'00'	'000'	400Hz	400Hz
'00'	'010'	400Hz	200/200Hz
'01'	'011'	200Hz	200Hz
'01'	'010'	200Hz	200/200Hz

The base station will treat the first blanked frame as a non-blanked frame. The mobile station will ignore the invalid RLPC bits.

Table 3: Valid PC modes with blanking activated on RL frame

RPC Mode	FPC Mode	RLPC Rate	FLPC Rate
'00'	'011'	200 or 400 <sup>10</sup> Hz	200Hz
'01'	'011'	200Hz	200Hz

The base station will treat the first non-blanked frame after blanking period as a blanked frame.

During R-SCH assignment burst, only Table 2 will be used as blanking is not activated. The base station will set the FPC\_MODE to '010' only when the SCH is assigned<sup>11</sup>.

Details on the reverse power control modes can be found in section 2.1.3.1.15.1 of [5]. Details on the forward power control modes can be found in section 3.1.3.1.12 of [5]

**Reverse Link Pilot Channel Gating:** For RC 8, when transmitting the 0 bps frames on the reverse link the pilot channel is gated to 50% duty cycle. This reduces the overhead and improves capacity. However, this also limits the Pilot Control Groups (PCGs) on which an acknowledgement can be sent. For details on these restrictions see section 3.1.3.1.13.

### 2.1.2 MAC Support for RC 8 and RC 11/12

The multiplex sub-layer in the MAC is responsible for providing the SDU to the physical layer. This sub-layer has been modified to utilize the blanking enabled by the RC 8 and RC 11/12 on the reverse and forward channels respectively. In particular, when the services and signaling do not generate any SDU, the multiplex sub-layer does not generate any filler frame for the physical layer unless the physical layer needs to transmit a *guaranteed physical layer frame*.

The interface between the multiplex sub-layer and the services has also been modified. The

<sup>10</sup> For blanked frame 200Hz RLPC is used, while for non-blanked frame 400Hz RLPC is used.

<sup>11</sup> The base station can use ESCAM to set the FPC\_MODE\_SCH to '010'. For power control, the mobile station uses an internal variable FPC\_MODE. This variable is set to FPC\_MODE\_FCH when SCH is not assigned and FPC\_MODE\_SCH when SCH is assigned.

1 modified interface allows the services to mark the submitted SDU as critical vs. non-critical.  
2 The multiplex sub-layer will transmit a SDU marked as critical following the typical rules of  
3 transmission. However, a SDU marked as non-critical will not be transmitted by the  
4 multiplex sublayer, unless it coincides with a *guaranteed physical layer transmission*.

### 5 2.1.3 Service Options Changes

6 Any SO that uses MuxOption 1 at the MAC layer [6] can be supported by the RL RC 8 and  
7 FL RC 11/12. Similarly, newer SO like SO 73 can be supported on legacy RCs that support  
8 MuxOption 1 at the MAC layer [6]. However, certain service options such as SO 3 were  
9 designed with the assumption that physical layer would need to transmit on a continuous  
10 basis. Therefore these SOs generate frames at regular 20 ms interval. Using these service  
11 options will not allow utilization of blanking at the physical layer. Hence, newer SOs are  
12 needed.

#### 13 2.1.3.1 SO for Voice Services with RC 8 and RC 11/12

14 SO 73 and SO 68 allow for discontinuous generation of frames. However, these service  
15 options also generate periodic 1/8<sup>th</sup> rate frames during intervals of silence. SO 73 can mark  
16 the frames as non-critical while SO 68 lacks this ability. For SO 73 the multiplex sub-layer  
17 will not transmit these 1/8<sup>th</sup> rate frames unless these frames coincide with a *guaranteed*  
18 *physical layer transmission*. However, for SO 68, the multiplex sub-layer will transmit any  
19 frame it receives as the frames are not marked as non-critical. Thus, SO 73 is ideally suited  
20 to utilize the blanking provided by the RC 8 and RC 11/12. If a mobile station indicates  
21 support for FL RC 11/12 or RL RC 8, then the mobile station will also support Service  
22 Option 73 NB Mode (i.e. Operating Point 1 through 7 of Service Option 73) and will indicate  
23 support for SO 73 to the base station.

24 SO 73 is used as an example for service negotiation in the following sections. If the mobile  
25 station and base station support other service options, such as SO 68, then these service  
26 options can also be used with RC 8 on the reverse link and RC 11/12 on the forward link<sup>12</sup>.

#### 27 2.1.3.2 Other Services

28 The system capacity for other service options such as SO 6 (SMS), SO 18 (OTASP), SO 35  
29 (Location Services) that use Rate Set 1 [6] can increase significantly when these are used  
30 over the RL RC8, and FL RC 11/12. There are two sources of benefits:

- 31 a) Frame Early Termination: Physical layer transmission of frames carrying the  
32 data for these SO will cause lower interference due to frame early  
33 termination. This lower transmit power can be used by other mobile stations.
- 34 b) Blanking: When these SO are negotiated, useful SO data is transmitted on  
35 the traffic channel only for a small fraction of the time. For example, when  
36 an SMS that requires an end to end acknowledgement is transmitted over

---

<sup>12</sup> The call flows for other SO are similar to the call flow provided for SO 73.

1 the traffic channel, the traffic channel is maintained until such an  
2 acknowledgement is received. This leaves a significant period where the  
3 forward and reverse traffic channel resources are allocated while the SO  
4 generated one-eighth rate filler frames. When RL RC 8 and FL RC 11/12 are  
5 used at the physical layer, the SOs do not need to generate SDU for the  
6 multiplex sub-layer on a continuous basis, rather these SOs can simply  
7 produce the useful traffic. With RL RC 8 and FL RC 11/12, the multiplex  
8 sublayer [6] generates the filler frames when necessary. Thus, when using  
9 these service options, RC 8 and RC 11/12 will provide capacity gains.

10 It is recommended that when RC 8 and RC 11/12 are used the filler frames (for example  
11 null traffic data frame) would only be generated by the multiplex sublayer.

12

## 2.2 RL RC8, and FL RC 11/12 and Voice SO based Call Establishment

### 2.2.1 Call Flow Diagram

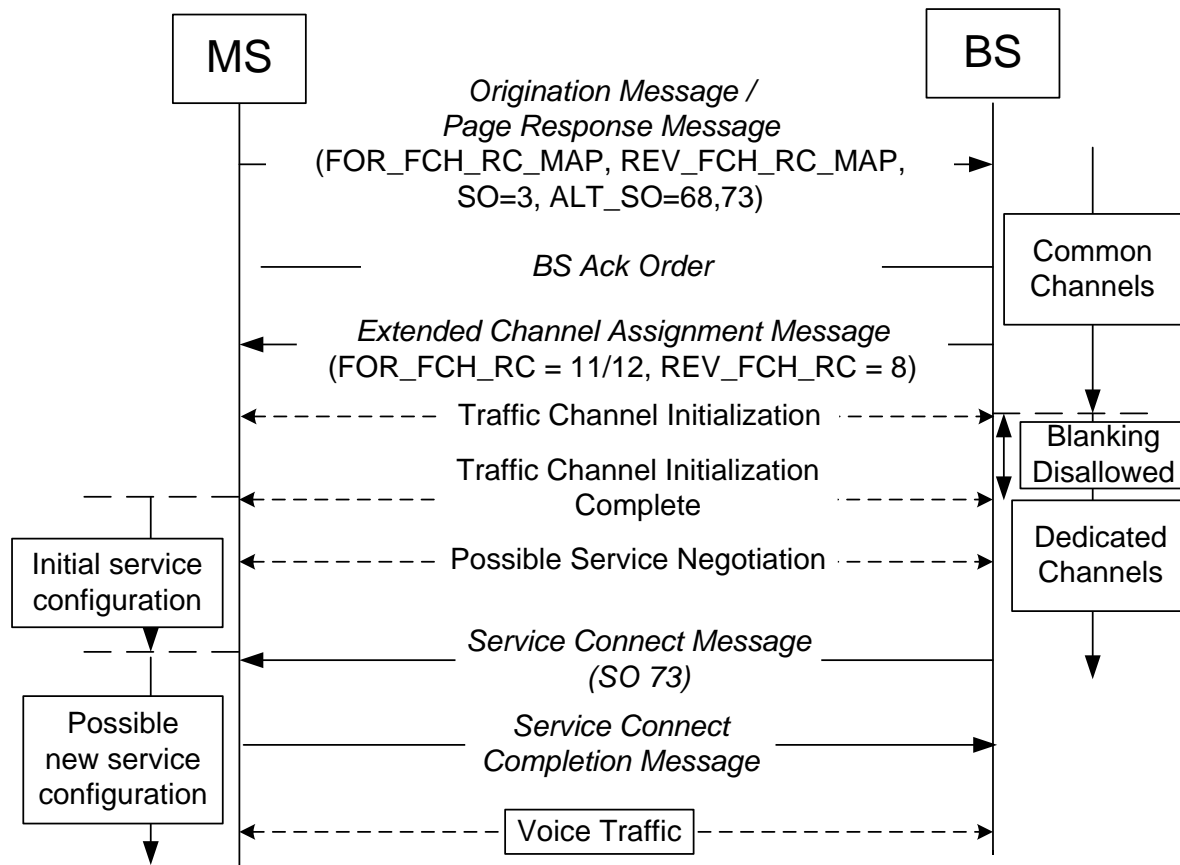


Figure 1 – Voice call establishment using RC 8 and RC11/RC12

### 2.2.2 Call Flow Details

- 1) When sending an *ORM* or a *PRM*, the mobile station includes the RC that it supports. This is independent of the *P\_REV\_IN\_USE*. Thus, a mobile station that supports FL RC 11/RC 12 on the FCH will include support for these RC in the FOR\_FCH\_RC\_MAP field of the Fundamental Channel configuration capability information of the Channel Configuration Capability Information record. The FCH Capability Type-specific fields are included in the *ORM* and *PRM*. Similarly, RL RC 8 support can be indicated in the REV\_FCH\_RC\_MAP field in the same record. If the mobile station indicated support for FL RC 11/12 in the FOR\_FCH\_RC\_MAP or RL RC 8 in the REV\_FCH\_RC\_MAP in the *ORM* or *PRM*, the base station can assume support for SO 73 at the mobile station.

1 The mobile station may explicitly indicate support for SO 73 either in  
 2 SERVICE\_OPTION or ALT\_SO field<sup>13</sup>. The inclusion in ALT\_SO depends on the value  
 3 of MAX\_NUM\_ALT\_SO field of the *Extended System Parameters Message* or *MC-RR*  
 4 *PM* and the value of P\_REV\_IN\_USE.

5 When P\_REV\_IN\_USE is 6 the mobile station will include the following voice service  
 6 options in the *ORM* and *PRM*:

- 7 a) When MAX\_NUM\_ALT\_SO advertized value is 0, SO will be set to 3.
- 8 b) When MAX\_NUM\_ALT\_SO advertized value is 1, SO will be set to 3 and ALT\_SO  
 9 will be set to SO 68.
- 10 c) When MAX\_NUM\_ALT\_SO advertized value is 2, SO will be set to 3 and ALT\_SO  
 11 will include SO 68 and SO 73.

12 When P\_REV\_IN\_USE is greater than 6 the mobile station can include  
 13 SO\_GROUP\_NUM and SO\_BITMAP in the *ORM* and *PRM*. If the mobile station  
 14 includes voice service option group in the *ORM* or *PRM*, the mobile station will  
 15 include SO\_GROUP\_NUM 0..

- 16 2) The base station sends the *BS Ack Order*.
- 17 3) If the base station also supports RL RC 8 and FL RC 11/12, then it sends the  
 18 *Extended Channel Assignment Message* assigning RL RC 8 on the reverse channels  
 19 and FL RC 11 for the forward channel. Note if the mobile station indicates support  
 20 for FL RC 12 and the base station also supports RC 12, then the base station can  
 21 assign FL RC 12 for the forward channels.
- 22 4) After receiving the *Extended Channel Assignment Message*, mobile station  
 23 establishes the traffic channel and starts using the RL RC8, and FL RC 11/12 with  
 24 the default parameters.
- 25 5) It should be noted that while the traffic channel is being established, the base  
 26 station will not blank any frames even if blanking is enabled.
- 27 6) After the traffic channel is established, base station and mobile station could  
 28 undergo service negotiation.
- 29 7) If the base station supports SO 73, then the base station will transmit a *Service*  
 30 *Connect Message* specifying SO 73 in the Service Option field. Similarly, the base  
 31 station could assign SO 68 or SO 3.
- 32 8) The mobile station will send a *Service Connect Completion Message*.
- 33 9) The mobile station will start sending voice frames using SO 73/SO 68/SO 3 and RL  
 34 RC 8. The base station will start sending voice frames using SO 73/SO 68/SO 3 and

---

<sup>13</sup> It is not necessary for the base station to increase the value of MAX\_NUM\_ALT\_SO in order to receive explicit support indication for SO 73. Support for SO 73 is implicit when support for FL RC 11/12 and RL RC 8 is indicated.

1           FL RC 11/12 as per the assignment through the *Extended Channel Assignment*  
2           *Message*.

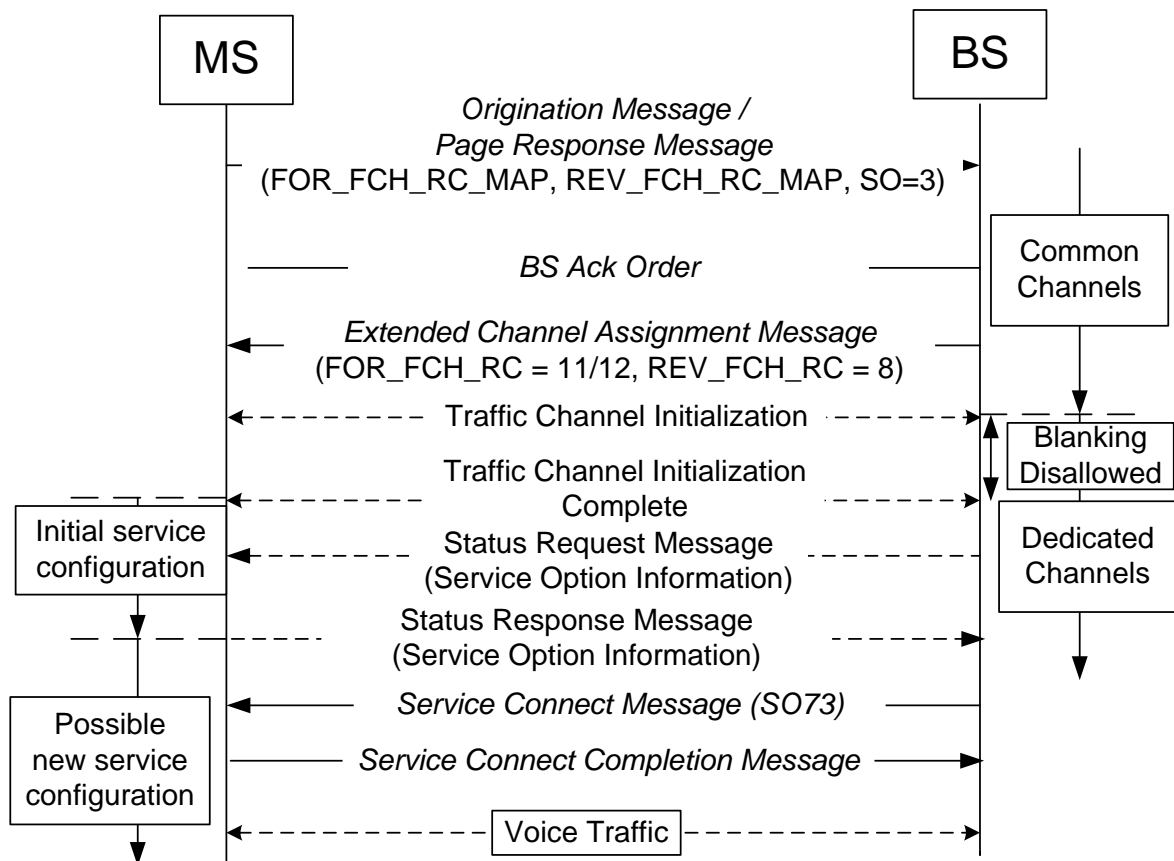
3   2.2.3   Recommendations

4   It is noted that mobile station needs to support SO 73 when supporting the RL RC 8. This  
5   SO utilizes the RL RC 8 efficiently leading to increased air-interface capacity.

6

## 2.3 Negotiation of SO when MAX\_NUM\_ALT\_SO is set to 0

### 2.3.1 Call Flow Diagram



**Figure 2 SO negotiation when MAX\_NUM\_ALT\_SO is 0**

### 2.3.2 Call Flow Details

In the above call flow, the base station has configured MAX\_NUM\_ALT\_SO to 0. As a consequence, the mobile station includes SO 3 in the *ORM* or *PRM*. The base station sends an *ECAM* or *GEM* with RL RC 8 and FL RC 11/12. The mobile station establishes the traffic channel.

If the mobile station indicated support for FL RC 11/12 in the FOR\_FCH\_RC\_MAP or RL RC 8 in the REV\_FCH\_RC\_MAP in the *ORM* or *PRM*, the base station can assign SO 73 in a *Service Connect Message* without querying the support for SO 73. Otherwise, the base station can send a *Status Request Message* querying the SO supported by the mobile station. This query is optional as the network may have queried this information previously. If the mobile station receives the *Status Request Message* it responds with a *Status*

1 *Response Message* and includes the SO Information Record.  
2 Based on the SO supported by the mobile station, the base station will assign a voice SO  
3 through the Service Connect Message.

#### 4 2.3.3 Recommendations

5 It is recommended that if the mobile station indicates support for FL RC 11/12 in the  
6 FOR\_FCH\_RC\_MAP and RL RC 8 in the REV\_FCH\_RC\_MAP in the *ORM* or *PRM*, the base  
7 station use RL RC 8 and FL RC 11/12 on the FCH and assign SO 73 for the voice call.

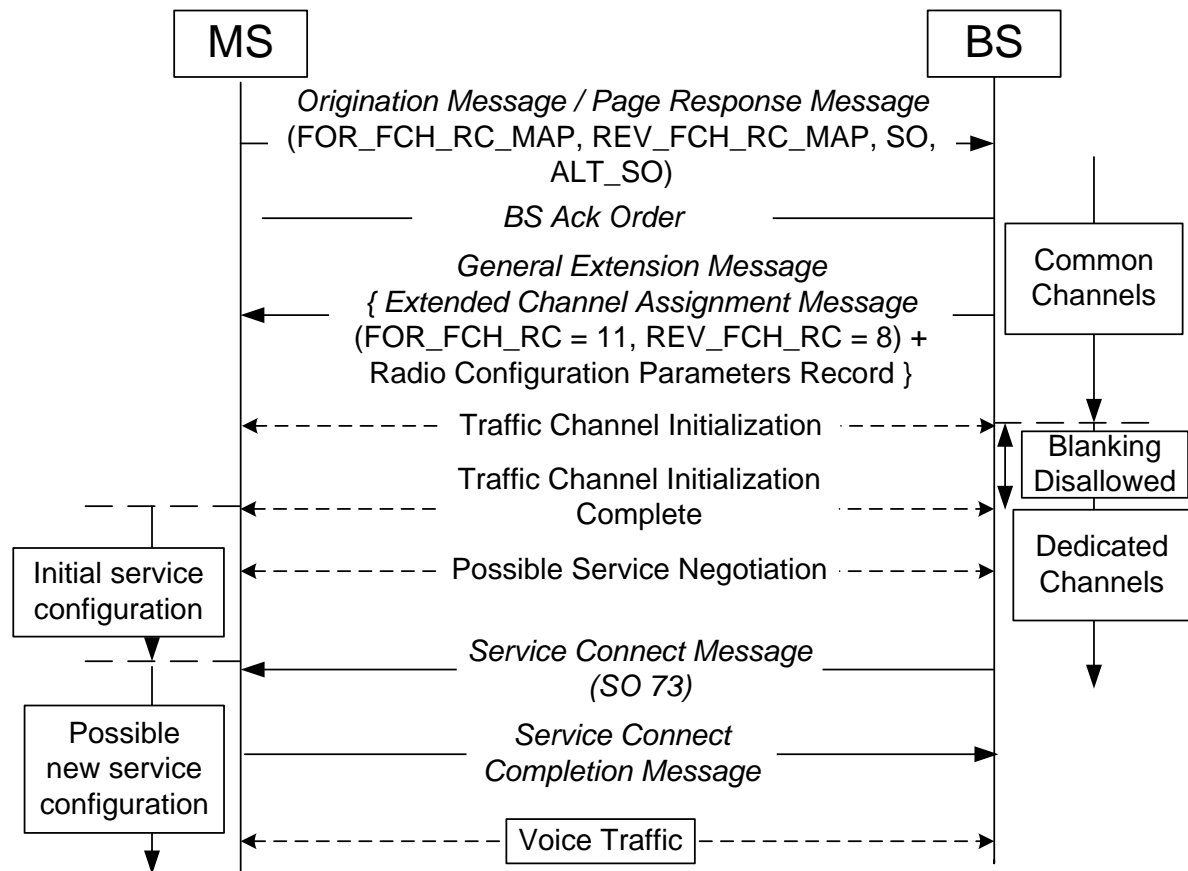
8

9

## 2.4 Configuring parameters for RL RC 8, FL RC 11/12 using GEM

This section provides call flows for changing the RC parameters using the *GEM*.

### 2.4.1 Call Flow Diagram



**Figure 3 – Setting Non-default parameters for RL RC 8, FL RC 11/RC12 using GEM**

### 2.4.2 Call Flow Details

In the above call flow, the base station sends an *Extended Channel Assignment Message* with RL RC 8 and FL RC 11/12 and Radio Configuration Parameters Record using a *GEM*. The *GEM* allows base station to set the parameters of the RL RC8, and FL RC 11/12 along with the channel assignment. Upon receiving *GEM* the mobile station changes the default values of the RL RC 8, FL RC 11/12 (as assigned) using the Radio Configuration Parameters Record. Even if the base station enables blanking on the forward FCH through the Radio Configuration Parameters Record it disables blanking on the FCH until the traffic channel is established. The mobile station establishes the traffic channel and starts using the non-default values for RL RC 8, and FL RC 11/12. The base station also uses the non-default

1 values that the base station had included in the Radio Configuration Parameters Record.

2 2.4.3 Recommendations

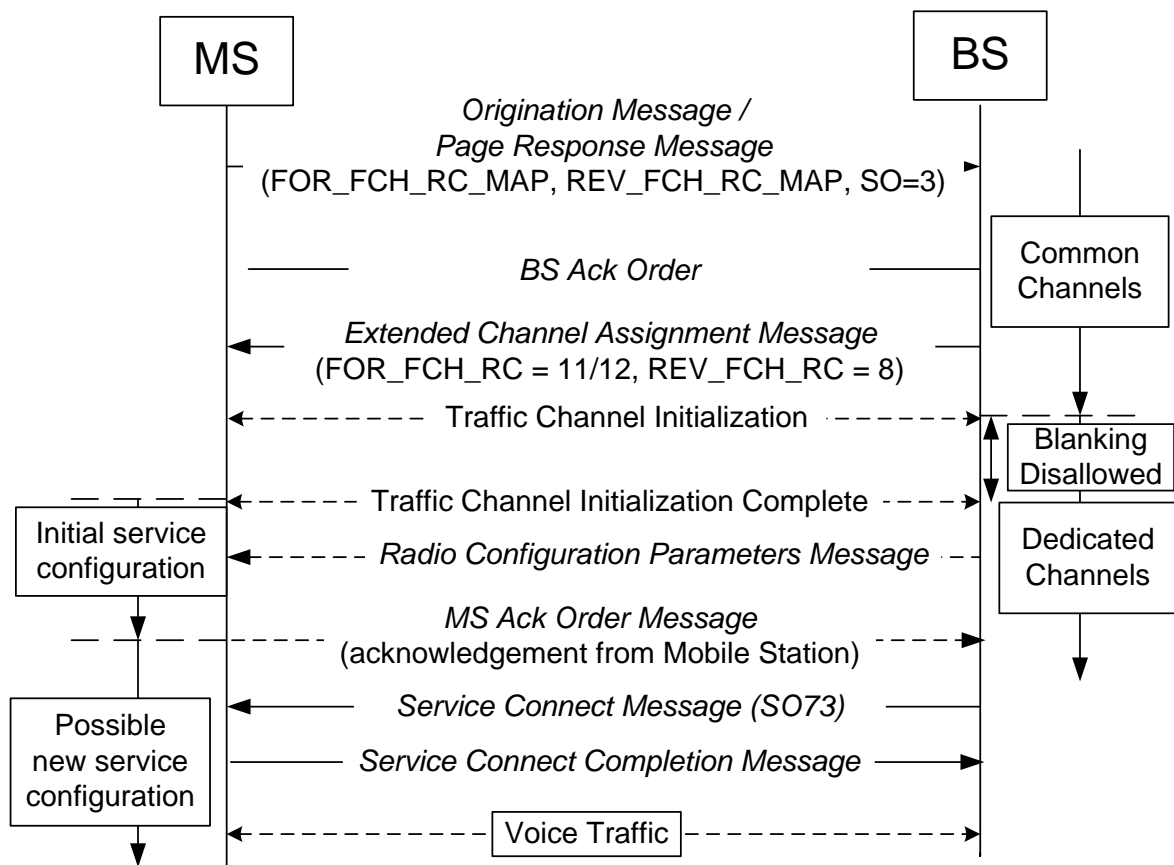
3 During call establishment, if the base station needs to assign non-default values for any RC  
4 8, RC 11/12 parameters, it is recommended that the base station use *GEM* as shown in the  
5 above call flow instead of the *Radio Configuration Parameters Message*. The advantage of  
6 this approach is that it may reduce call set-up time.

7

## 2.5 Configuring parameters for RL RC 8, FL RC 11/12 using RCPM

This section provides call flows for changing the RL RC 8, FL RC 11/12 parameters using the *Radio Configuration Parameters Message*. Note if the *Radio Configuration Parameters Message* is lost over the air, the RC parameters in use at the base station and the mobile station will be different. It is expected that the base station and the mobile station can interoperate with different value of Radio Configuration parameters for a small duration<sup>14</sup>.

### 2.5.1 Call Flow Diagram



**Figure 4 – Setting Non-default parameters for RC 8, RC 11/RC12 using RCPM**

### 2.5.2 Call Flow Details

In the above call flow, the base station sends an *Extended Channel Assignment Message*

<sup>14</sup> The base station could wait for an acknowledgement before changing the parameters.

1 with RL RC 8 and FL RC 11/12. The mobile station establishes the traffic channel and  
2 starts using the default parameters for the RL RC 8 and FL RC 11/12. The base station  
3 could send a *Radio Configuration Parameters Message* with new values for the RL RC 8, FL  
4 RC 11/12. Upon receiving *Radio Configuration Parameters Message* the mobile station will  
5 start using the values included in this message. If the message RCPM was sent using  
6 assured mode of delivery, the mobile station will send an *MS Ack Order* acknowledging the  
7 receipt of *Radio Configuration Parameters Message*. If the base station does not receive an  
8 acknowledgement, it could retransmit the *Radio Configuration Parameters Message*.

### 9 2.5.3 Recommendations

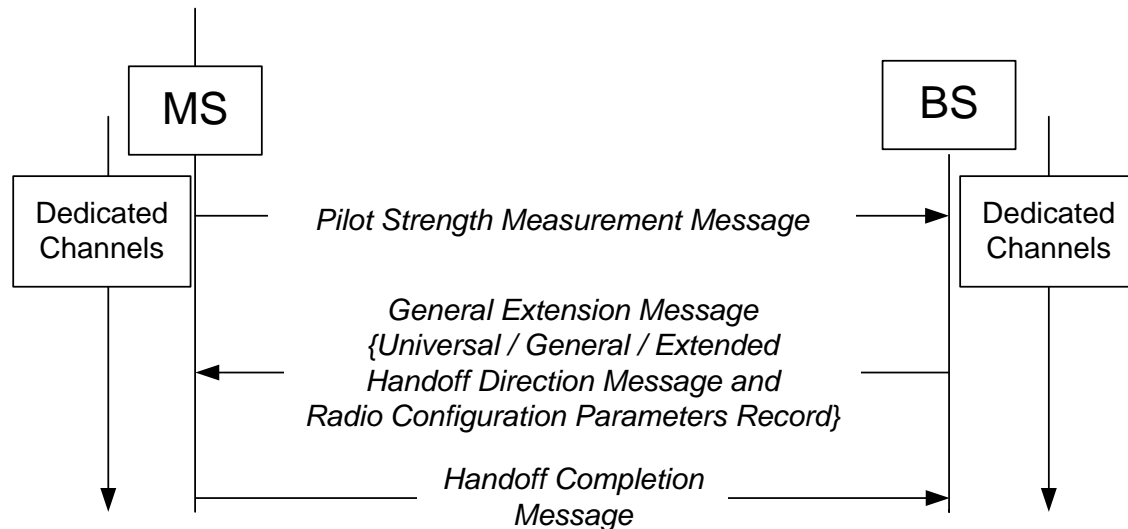
10 It is recommended that the base station transmit Radio Configuration Parameters Message  
11 using the assured mode of delivery at the Layer 2.

12

## 2.6 Soft handoff for RL RC 8, FL RC 11/12 using GEM

This section provides call flows for soft handoff for the RL RC 8, FL RC 11/12 using the GEM.

### 2.6.1 Call Flow Diagram



**Figure 5 – Softhandoff for RL RC 8, FL RC 11/12 using GEM**

### 2.6.2 Call Flow Details

In the above call flow, the mobile station sends a *Pilot Strength Measurement Message* to the base station including a strong pilot from a neighboring base station. The base station sends a *GEM* that includes Radio Configuration Parameters Record and a *Universal Handoff Direction Message* or a *General Handoff Direction Message* or an *Extended Handoff Direction Message*. The mobile station sends the Handoff Completion message.

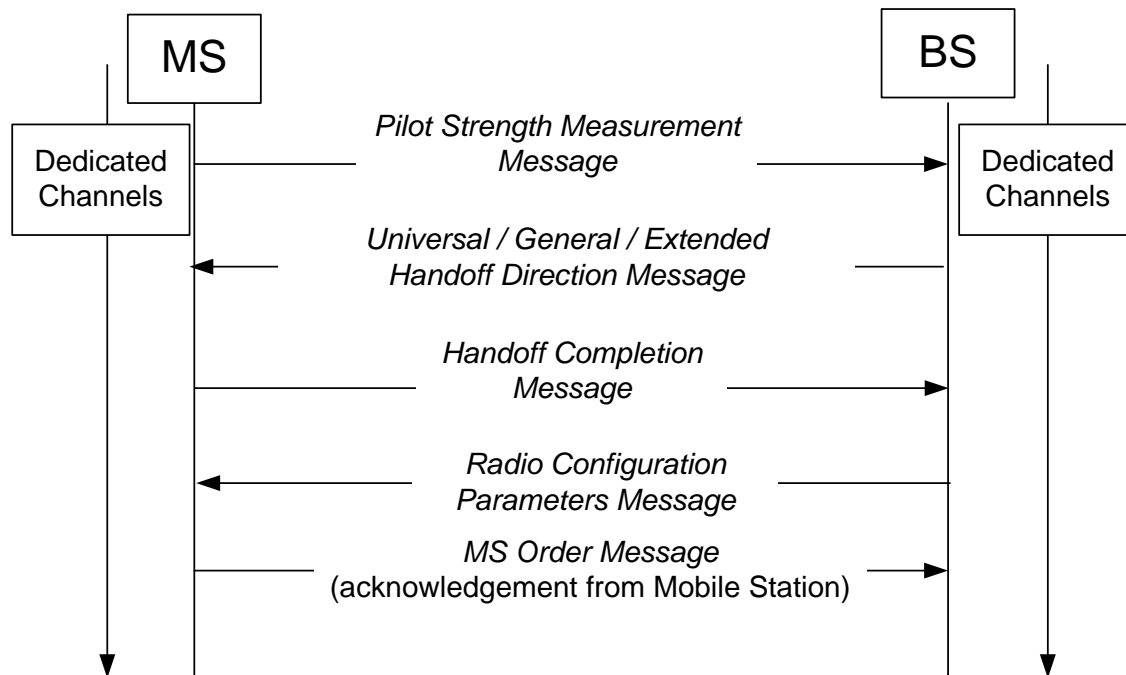
### 2.6.3 Recommendations

It is recommended that the base station does not include the ACTION\_TIME field in the Radio Configuration Parameters record. The ACTION\_TIME contained in the *Universal Handoff Direction Message* or a *General Handoff Direction Message* or an *Extended Handoff Direction Message* will become applicable to the Radio Configuration Parameters record. If ACTION\_TIME is not included in the *Universal Handoff Direction Message* or a *General Handoff Direction Message* or an *Extended Handoff Direction Message*, then implicit action time will become applicable to the Radio Configuration Parameters record. It is also recommended that the base station use the *GEM* for soft handoff as opposed to *Radio Configuration Parameters Message* described in the next section. This avoids the scenarios where either the *Radio Configuration Parameters Message* or the handoff message is lost over the air.

## 2.7 Soft handoff for RL RC 8, FL RC 11/12 using RCPM

This section provides call flows for soft handoff for the RL RC 8, FL RC 11 and FL RC 12 using the *Radio Configuration Parameters Message*.

### 2.7.1 Call Flow Diagram



**Figure 6 – Soft handoff for RC 8, RC 11/RC12 using RCPM**

### 2.7.2 Call Flow Details

In the above call flow, the mobile station sends a *Pilot Strength Measurement Message* to the base station including a strong pilot from a neighboring base station. The base station sends either sends a *Universal Handoff Direction Message* or a *General Handoff Direction Message* or an *Extended Handoff Direction Message*. The mobile station sends the *Handoff Completion Message*.

Once the base station receives a *Handoff Completion Message*, the base station sends a *Radio Configuration Parameters Message* that includes the parameters that need to be changed once the new pilot is added to the active set. The mobile station sends an *MS Ack Order* acknowledging the receipt of *Radio Configuration Parameters Message*.

Note, the *Radio Configuration Parameters Message* will not be sent before the handoff.

### 2.7.3 Recommendations

It is recommended that the base station send the *Radio Configuration Parameters Message* after the handoff is completed.

1 If the base station sends the Radio Configuration Parameters Message before the handoff,  
2 then it is recommended that the base station specify the ACTION\_TIME values in the Radio  
3 Configuration Parameters Message such that these values become applicable at either the  
4 same time or later than the ACTION\_TIME contained in the Universal Handoff Direction  
5 Message or a General Handoff Direction Message or an Extended Handoff Direction Message  
6 sent by the base station.  
7

## 2.8 Interoperability of RL RC 8 and FL RC 11/12 with Legacy RC and SO

Any SO that uses MuxOption 1 at the MAC layer [6] can be supported by the RL RC 8 and FL RC 11/12. Similarly, newer SO like SO 73 can be supported on legacy RCs that support MuxOption 1. Table 4 shows<sup>15</sup> end to end voice call with varying support for SO or RC. Transcoder free operation can be achieved by using the same SO at the two mobile stations<sup>16</sup>. Preferred SO for transcoder free operation are shown in bold in Table 4. It should be noted that even in a voice call to a legacy handset, capacity gains due to FET can be achieved by new handset using the RL RC 8 and FL RC 11/12. Table 4 also shows that SO 73 can be used with legacy RC.

**Table 4. Transcoder Free Operation**

#	Scenario	SO and RC Support at Mobile Station 1	SO and RC Support at Base Station 1	SO and RC Support at Base Station 2	SO and RC Support at Mobile Station 2
1	End to End SO 73 call with RL RC 8 and FL RC 11/12	{SO 3, 68, <b>73</b> , {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }	{SO 3, 68, <b>73</b> , {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }	{SO 3, 68, <b>73</b> , {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }	{SO 3, 68, <b>73</b> , {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }
2	Legacy handset	{SO <b>3</b> , {RL RC <b>legacy</b> }, {FL RC <b>legacy</b> }	{SO <b>3</b> , 68, 73}, {RL RC <b>legacy</b> , 8}, {FL RC <b>legacy</b> , 11/12}	-	-
3	Legacy base station and legacy BSC	{SO <b>3</b> , 68, 73}, {RL RC <b>legacy</b> , 8}, {FL RC <b>legacy</b> , 11/12}	{SO <b>3</b> , {RL RC <b>legacy</b> }, {FL RC <b>legacy</b> }	-	-

<sup>15</sup> Recommended configurations for termination at mobile station 2 are similar to the origination ones and are not included here.

<sup>16</sup> When the base station at one end chooses to use COP 0 of SO 73, it needs to ensure that the base station and mobile station at the other end also supports COP 0. Otherwise, transcoding will be needed.

4	Legacy handset and new handset call	{SO <b>3</b> , 68, 73}, {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }	{SO <b>3</b> , 68, 73}, {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }	{SO <b>3</b> }, {RL RC <b>legacy</b> }, {FL RC <b>legacy</b> }	{SO <b>3</b> }, {RL RC <b>legacy</b> }, {FL RC <b>legacy</b> }
5	Legacy BTS with new SO support at BSC	{SO 3, 68, <b>73</b> }, {RL RC <b>legacy</b> , 8}, {FL RC <b>legacy</b> , 11/12}	{SO 3, 68, <b>73</b> }, {RL RC <b>legacy</b> }, {FL RC <b>legacy</b> }	{SO 3, 68, <b>73</b> }, {RL RC <b>legacy</b> }, {FL RC <b>legacy</b> }	{SO 3, 68, <b>73</b> }, {RL RC <b>legacy</b> , 8}, {FL RC <b>legacy</b> , 11/12}
6	Legacy BTS with new SO support at BSC and new BTS and handset on the other side.	{SO 3, 68, <b>73</b> }, {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }	{SO 3, 68, <b>73</b> }, {RL RC legacy, <b>8</b> }, {FL RC legacy, <b>11/12</b> }	{SO 3, 68, <b>73</b> }, {RL RC <b>legacy</b> }, {FL RC <b>legacy</b> }	{SO 3, 68, <b>73</b> }, {RL RC <b>legacy</b> , 8}, {FL RC <b>legacy</b> , 11/12}

- 1 The recommended configurations for transcoder free operation are also applicable for  
2 handoff scenarios. For example, a handoff to a legacy base station may result in a change  
3 from scenario #1 to #3, i.e. the SO may be renegotiated to SO 3, but one side may continue  
4 to use the RL RC 8 and FL RC 11/12.  
5

1 This page is intentionally left blank.

2

### 3 Overhead Message Extension

This section provides the implementation guidelines for femto, general overhead information, flex duplex, alternate technologies information, and location enhancement features proposed in Revision E of cdma2000 1x. As shown in Table 1, in order to support these features on a base station that supports any of revision 0 through D of cdma2000 1x, the System Parameters Message and MC-RR PM needs to be extended. This section provides the details on these extensions on different revisions of cdma2000 1x base stations.

#### 3.1 Extension to System Parameters Message

This section provides the guidelines on extension of *System Parameters Message*. The extensions are dependent on the revision of cdma2000 1x supported by the base station as well as any given feature of Revision E of cdma2000 1x that the base station supports. The dependence of various fields is shown below.

1

<b>Field</b>	<b>Length (bits)</b>	<b>Recommended Values<sup>17</sup></b>
PILOT_PN	9	-
CONFIG_MSG_SEQ	6	-
SID	15	-
NID	16	-
REG_ZONE	12	-
TOTAL_ZONES	3	-
ZONE_TIMER	3	-
MULT_SIDS	1	-
MULT_NIDS	1	-
BASE_ID	16	-
BASE_CLASS	4	-
PAGE_CHAN	3	-
MAX_SLOT_CYCLE_INDEX	3	-
HOME_REG	1	-
FOR_SID_REG	1	-
FOR_NID_REG	1	-
POWER_UP_REG	1	-
POWER_DOWN_REG	1	-
PARAMETER_REG	1	-
REG_PRD	7	-
BASE_LAT	22	-
BASE_LONG	23	-
REG_DIST	11	-
SRCH_WIN_A	4	-

2

---

<sup>17</sup> If Recommended Values are not specified, then the base stations sets the values as per the current implementation.

1

<b>Field</b>	<b>Length (bits)</b>	<b>Recommended Values</b>
SRCH_WIN_N	4	-
SRCH_WIN_R	4	-
NGHBR_MAX_AGE	4	-
PWR_REP_THRESH	5	-
PWR_REP_FRAMES	4	-
PWR_THRESH_ENABLE	1	-
PWR_PERIOD_ENABLE	1	-
PWR_REP_DELAY	5	-
RESCAN	1	-
T_ADD	6	-
T_DROP	6	-
T_COMP	4	-
T_TDROP	4	-
EXT_SYS_PARAMETER	1	-
EXT_NGHBR_LST	1	-
GEN_NGHBR_LST	1	-
GLOBAL_REDIRECT	1	-
PRI_NGHBR_LST	1	-
USER_ZONE_ID	1	-
EXT_GLOBAL_REDIRECT	1	-
EXT_CHAN_LST	1	-
T_TDROP_RANGE_INCL	0 or 1	BS Revision and Feature support dependent
T_TDROP_RANGE	0 or 4	BS Revision and Feature support dependent
NEG_SLOT_CYCLE_INDEX_SUP	0 or 1	BS Revision and Feature support dependent

2

1

<b>Field</b>	<b>Length (bits)</b>	<b>Recommended Values</b>
CRRM_MSG_IND	0 or 1	BS Feature support dependent.
NUM_OPT_MSG_BITS	0 or 4	BS Feature support dependent.
AP_PILOT_INFO	0 or 1	BS Feature support dependent.
AP_IDT	0 or 1	BS Feature support dependent.
AP_ID_TEXT	0 or 1	BS Feature support dependent.
GEN_OVHD_INF_IND	0 or 1	BS Feature support dependent.
FD_CHAN_LST_IND	0 or 1	BS Feature support dependent.
ATIM_IND	0 or 1	BS Feature support dependent.
FREQ_GEN_OVHD_INF_IND	0 or 1	BS Feature support dependent.
RESERVED	0 or (NUM_OPT_MSG_BITS - 7)	BS Feature support dependent.
APPIM_PERIOD_INDEX	0 or 3	BS Feature support dependent.
GEN_OVHD_CYCLE_INDEX	0 or 3	BS Feature support dependent.
ATIM_CYCLE_INDEX	0 or 3	BS Feature support dependent.
ADD_LOC_INFO_INCL	0 or 1	BS Feature support dependent.
LOC_UNC_H	0 or 4	
HEIGHT	0 or 14	
LOC_UNC_V	0 or 4	
ADD_LOC_GEM_ALLOWED	0 or 1	BS Feature support dependent.

2

## 1 **3.2 Mobile Station Processing of Extension of SPM and MC-** 2 **RR Parameters Message**

3 The mobile station would parse the *SPM* and *MC-RRPM*, if supported, as specified in [1]. In  
4 section 3.4 it is assumed that the mobile station supports features of Revision E of  
5 cdma20001x that require processing of the extensions of the *SPM* or *MC-RRPM*. If, for  
6 example, the mobile station supports only the new radio configurations, then it does not  
7 need to process the extensions of *SPM* or *MC-RRPM*.

8

### 3.3 Revision Dependent Extensions

#### 3.3.1 Base Stations supporting only Revision 0

If the base station does not support any features other than the RL RC8, and FL RC 11/12 and the base station supports only Revision 0 of cdma2000 1x, then it does not need to extend the *System Parameters Message*.

If the base station supports any of the 1x Revision E features that require modification to *System Parameters Message* (see Table 1 for the list of features) and the base station supports Revision 0 of cdma2000 1x, then it sets the T\_TDROP\_RANGE\_INCL to '0' and NEG\_SLOT\_CYCLE\_INDEX\_SUP to '0'. The T\_TDROP\_RANGE field is not included. These fields are shown below:

Field	Length (bits)	Recommended Values
T_TDROP_RANGE_INCL	1	0
T_TDROP_RANGE	0	N/A
NEG_SLOT_CYCLE_INDEX_SUP	1	0

Thus, the mobile station can skip the two bits and continue the processing of the rest of the *System Parameters Message*.

#### 3.3.2 Base Stations Supporting Revision A, B or C

If the base station does not support any of the 1x Revision E features and the base station supports Revision A, Revision B, or Revision C of cdma2000 1x, then it sets the T\_TDROP\_RANGE\_INCL and T\_TDROP\_RANGE as specified by the standard that is supported by the base station and does not extend the *System Parameters Message* to include other fields. These fields are shown below:

Field	Length (bits)	Recommended Values
T_TDROP_RANGE_INCL	1	N/A
T_TDROP_RANGE	0 or 4	N/A

If the base station supports any of the 1x Revision E features that require modification to *System Parameters Message* and the base station supports Revision A, Revision B, or Revision C of cdma2000 1x, then it sets the T\_TDROP\_RANGE\_INCL and T\_TDROP\_RANGE as specified by the standard that is supported by the base station and sets NEG\_SLOT\_CYCLE\_INDEX\_SUP to '0'. These fields are shown below:

Field	Length (bits)	Recommended Values
T_TDROP_RANGE_INCL	1	N/A

T_TDROP_RANGE	0 or 4	N/A
NEG_SLOT_CYCLE_INDEX_SUP	1	0

1 The mobile station parses the TDROP\_RANGE\_INCL, T\_TDROP\_RANGE, and  
 2 NEG\_SLOT\_CYCLE\_INDEX\_SUP fields as specified by the 1x Revision E standard, and  
 3 continues the processing of the rest of the *System Parameters Message*.

#### 4 3.3.3 Base Stations Supporting Revision D

5 If the base station supports Revision D of cdma2000 1x, then it sets the  
 6 T\_TDROP\_RANGE\_INCL, T\_TDROP\_RANGE and NEG\_SLOT\_CYCLE\_INDEX\_SUP fields as  
 7 specified by the standard. If the base station does not support any 1x Revision E features  
 8 that require modification to *System Parameters Message*, then the base station does not  
 9 need to extend the *System Parameters Message* to include fields after the  
 10 NEG\_SLOT\_CYCLE\_INDEX\_SUP field.

11 The mobile station parses the TDROP\_RANGE\_INCL, T\_TDROP\_RANGE, and  
 12 NEG\_SLOT\_CYCLE\_INDEX\_SUP fields as specified 1x Revision E standard, and continues  
 13 the processing of the rest of the *System Parameters Message*.

14

## 3.4 Feature Dependent Extensions

### 3.4.1 Call Recovery Request Message (CRRM\_MSG\_IND)

If the base station supports Call Recovery Request Message transmission by the mobile station, the base station set this bit to '1'. Otherwise, if the base station does not support this feature it sets this bit as follows:

If the base station has to include any of the non-reserved fields after the CRRM\_MSG\_IND field, then the base station sets this field to '0'. Otherwise the base station omits this field.

### 3.4.2 Optional Message Transmission Indication (NUM\_OPT\_MSG\_BITS)

If the base station does not support any 1x Revision E features other than RL RC8, and FL RC 11/12 or the Call Recovery Request Message, the base station omits this field. An example of *System Parameters Message* extension for a base station supporting only Revision 0 of cdma20001x is shown below:

Field	Length (bits)	Values
T_TDROP_RANGE_INCL	1	0
T_TDROP_RANGE	0	N/A
NEG_SLOT_CYCLE_INDEX_SUP	1	0
CRRM_MSG_IND	1	1
NUM_OPT_MSG_BITS	0	N/A

Otherwise, the base station sets this field as follows:

If the base station is sending any of the messages indicated by the AP\_PILOT\_INFO, AP\_IDT, AP\_ID\_TEXT, GEN\_OVHD\_INF\_IND, FD\_CHAN\_LST\_IND, ATIM\_IND, FREQ\_GEN\_OVHD\_INF\_IND bits, the base station sets the NUM\_OPT\_MSG\_BITS to a non-zero value. The value of the NUM\_OPT\_MSG\_BITS field depends on the messages being sent on the paging channel. The following conditions apply on the value of the field:

- If AP\_PILOT\_INFO needs to be set to '1', the NUM\_OPT\_MSG\_BITS will be greater than 0.
- If AP\_IDT needs to be set to '1', the NUM\_OPT\_MSG\_BITS will be greater than 1.
- If AP\_ID\_TEXT needs to be set to '1', the NUM\_OPT\_MSG\_BITS will be greater than 2.
- If GEN\_OVHD\_INF\_IND needs to be set to '1', the NUM\_OPT\_MSG\_BITS will be greater than 3.
- If FD\_CHAN\_LST\_IND needs to be set to '1', the NUM\_OPT\_MSG\_BITS will be greater than 4.
- If ATIM\_IND needs to be set to '1', the NUM\_OPT\_MSG\_BITS will be greater than 5.

- 1 - If `FREQ_GEN_OVHD_INF_IND` needs to be set to '1', the `NUM_OPT_MSG_BITS` will  
2 be greater than 6.

3 An example of *System Parameters Message* extension for a base station supporting only  
4 Revision 0 of *cdma20001x* and *GOIM* is shown below:

5

Field	Length (bits)	Values
<code>T_TDROP_RANGE_INCL</code>	1	0
<code>T_TDROP_RANGE</code>	0	N/A
<code>NEG_SLOT_CYCLE_INDEX_SUP</code>	1	0
<code>CRRM_MSG_IND</code>	1	0
<code>NUM_OPT_MSG_BITS</code>	4	'0100'
<code>AP_PILOT_INFO</code>	1	0
<code>AP_IDT</code>	1	0
<code>AP_ID_TEXT</code>	1	0
<code>GEN_OVHD_INF_IND</code>	1	1
<code>FD_CHAN_LST_IND</code>	0	N/A
<code>ATIM_IND</code>	0	N/A
<code>FREQ_GEN_OVHD_INF_IND</code>	0	N/A
<code>RESERVED</code>	0	N/A
<code>APPIM_PERIOD_INDEX</code>	0	N/A
<code>GEN_OVHD_CYCLE_INDEX</code>	0 or 3	Depends on BS configuration for <i>GOIM</i> Cycle Index
<code>ATIM_CYCLE_INDEX</code>	0	N/A
<code>ADD_LOC_INFO_INCL</code>	0	N/A
<code>LOC_UNC_H</code>	0	N/A
<code>HEIGHT</code>	0	N/A
<code>LOC_UNC_V</code>	0	N/A
<code>ADD_LOC_GEM_ALLOWED</code>	0	N/A

6 In the example configuration, base station sets `NUM_OPT_MSG_BITS` to '0100' because it  
7 supports *GOIM* but does not support transmission of *FDCCLM* or the *ATIM*. The base station  
8 sets the next 3 bits to 0 to indicate that it does not transmit Femto feature related overhead  
9 messages. It sets the `GEN_OVHD_INF_IND` to '1' to indicate the support for *GOIM*  
10 transmission. None of the remainder fields except `GEN_OVHD_CYCLE_INDEX` are included

1 in the extension of the *System Parameters Message*. GEN\_OVHD\_CYCLE\_INDEX field is  
 2 included if the base station needs to set the GEN\_OVHD\_CYCLE\_INDEX to a non-default  
 3 value.

4 In the example above, the mobile station parses the *System Parameters Message* as  
 5 specified in section 3.2. A value of '0100' for NUM\_OPT\_MSG\_BITS indicates that the base  
 6 station has populated the 4 bits following the NUM\_OPT\_MSG\_BITS field. The mobile  
 7 station stores the values of the AP\_PILOT\_INFO, AP\_IDT, AP\_ID\_TEXT and the  
 8 GEN\_OVHD\_INF\_IND fields. If the base station did not include GEN\_OVHD\_CYCLE\_INDEX  
 9 field, the mobile station assumes a default value. If the base station includes  
 10 GEN\_OVHD\_CYCLE\_INDEX field, the mobile station is able to parse to this field as  
 11 FD\_CHAN\_LST\_IND, ATIM\_IND and RESERVED fields are omitted based on  
 12 NUM\_OPT\_MSG\_BITS value of '0100' and APPIM\_PERIOD\_INDEX is omitted based on a  
 13 value of '0' for AP\_PILOT\_INFO.

#### 14 3.4.3 Access Point Pilot Information Message (AP\_PILOT\_INFO, APPIM\_PERIOD\_INDEX)

15 The *APPIM* carries the pilot information for supporting the femto operation. It could be sent  
 16 by a macro or a femto base station. If the base station supports this message it sets the  
 17 AP\_PILOT\_INFO to '1'.

18 If the base station is sending the *APPIM* on the paging channel, then the base station  
 19 indicates the frequency of transmission of this message using the APPIM\_PERIOD\_INDEX  
 20 field. The APPIM\_PERIOD\_INDEX is set at follows:

21 If the base station needs to include any of the fields following the APPIM\_PERIOD\_INDEX  
 22 field, then the base station includes this field and indicates the frequency of transmission of  
 23 the *APPIM* on the paging channel. Otherwise, the base station includes this field only if it  
 24 wants to set this field to value other than '000'.

25 The base station could reduce the frequency of transmission of *APPIM* in order to reduce the  
 26 load on the paging channel. The mobile station does not wait for *APPIM* in order to access  
 27 the system for origination, page response or registration purposes.

28 An example of *System Parameters Message* extension for a base station supporting only  
 29 Revision 0 of cdma20001x and supporting *APPIM*, *GOIM* and *Alternate technologies*  
 30 *Information Message* is shown below:

Field	Length (bits)	Values
T_TDROP_RANGE_INCL	1	0
T_TDROP_RANGE	0	N/A
NEG_SLOT_CYCLE_INDEX_SUP	1	0
CRRM_MSG_IND	1	0
NUM_OPT_MSG_BITS	4	'0110'
AP_PILOT_INFO	1	1

AP_IDT	1	0
AP_ID_TEXT	1	0
GEN_OVHD_INF_IND	1	1
FD_CHAN_LST_IND	1	0
ATIM_IND	1	1
FREQ_GEN_OVHD_INF_IND	0	N/A
RESERVED	0	N/A
APPIM_PERIOD_INDEX	0 or 3	Depends on BS configuration for Access Point Pilot Information Message transmission cycle index.
GEN_OVHD_CYCLE_INDEX	0 or 3	Depends on BS configuration for GOIM Cycle transmission cycle index.
ATIM_CYCLE_INDEX	0 or 3	Depends on BS configuration for Alternate Technologies Information Message transmission cycle index.
ADD_LOC_INFO_INCL	0	N/A
LOC_UNC_H	0	N/A
HEIGHT	0	N/A
LOC_UNC_V	0	N/A
ADD_LOC_GEM_ALLOWED	0	N/A

1 In the example configuration, base station sets NUM\_OPT\_MSG\_BITS to '0110' because it  
2 supports transmission of *Alternate Technologies Information Message* and ATIM\_IND is the  
3 6<sup>th</sup> bit following the NUM\_OPT\_MSG\_BITS field.

4 If the base station is transmitting the *APPIM*, *GOIM* and *Alternate Technologies Information*  
5 *Message* at the default frequency, then the base station does not need to include the  
6 remaining fields. If the base station needs to transmit the *Alternate Technologies Information*  
7 *Message* at a non-default frequency, the base station needs to include the  
8 APPIM\_PERIOD\_INDEX and GEN\_OVHD\_CYCLE\_INDEX fields and indicate the frequency of  
9 transmission of *APPIM* and *GOIM* respectively. This is needed even if the *APPIM* and *GOIM*  
10 are transmitted at the default frequency. The inclusion of APPIM\_PERIOD\_INDEX and

1 GEN\_OVHD\_CYCLE\_INDEX allows the mobile station to parse the *System Parameters*  
2 *Message* correctly.

3 Similarly, in the above example, if the base station supports location enhancements in  
4 addition to the above message transmissions, it would need to set ADD\_LOC\_INFO\_INCL to  
5 1. In this scenario, the base station would need to include APPIM\_PERIOD\_INDEX,  
6 GEN\_OVHD\_CYCLE\_INDEX and ATIM\_CYCLE\_INDEX fields, even if the corresponding  
7 messages are being transmitted at the default frequency.

#### 8 3.4.4 Access Point Identification Message (AP\_IDT)

9 The *APIDM* is typically sent by a femto base station. Hence, a femto base station sets the  
10 AP\_IDT to '1'. A macro base station sets AP\_IDT field to '0' or could omit this field as  
11 described in section 3.4.2.

12 Certain mobile stations may be capable of decoding the paging channel while on the traffic  
13 channel. These mobile stations can use the HO\_INFO\_RECORD of APIDM for active handoff  
14 in the following manner:

- 15 - If the femto base station (target) includes a HO\_INFO\_RECORD with HO\_INFO\_TYPE  
16 field set to '000' and the mobile station reports PSMM with the PN offset of the target  
17 femto base station, the mobile station will send a Handoff Supplementary  
18 Information Notification Message (*HOSINM*) to the source base station and include  
19 the AP\_ID, IOS\_MSC\_ID and IOS\_CELL\_ID fields from the *APIDM* of the target femto  
20 base station. The mobile station will send the *HOSINM* after sending the *PSMM* that  
21 includes the pilot of the target femto base station.
- 22 - If the femto base station (target) includes a HO\_INFO\_RECORD with HO\_INFO\_TYPE  
23 field set to '001' and the mobile station reports PSMM with the PN offset of the target  
24 femto base station, the mobile station can include the PSMM\_SIGNATURE fields  
25 included in the *APPIM* of the target femto base station in the *PSMM* message sent to  
26 the source base station. The 15 MSBs and 6 LSBs of each PSMM\_SIGNATURE are  
27 included as the PILOT\_PN\_PHASE and PILOT\_STRENGTH respectively. The base  
28 station can use this information to identify the target femto base station.

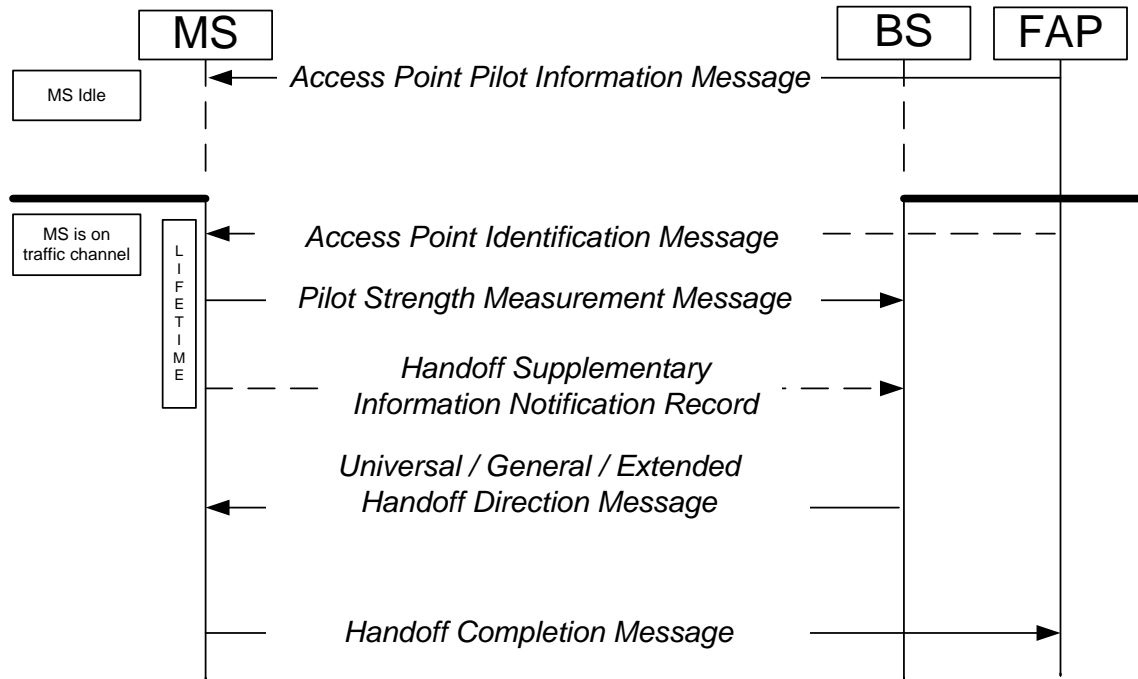
#### 29 3.4.5 Access Point Identification Text Message (AP\_IDT\_TXT)

30 The *APIDTM* is typically sent by a femto base station. Hence, a femto base station could set  
31 the AP\_IDT\_TXT to '1'. A macro base station sets AP\_IDT\_TXT field to '0' or will omit this  
32 field as described in section 3.4.2.

#### 33 3.4.6 Active Handoff into Femto Access Point

34 This section provides call flows for active handoff into a femto cell.

## 1 3.4.6.1 Call Flow



2

3

**Figure 7 – Active handoff into a FAP**

## 4 3.4.6.2 Call Flow Details

5 In the above call flow, the mobile station is initially idle on the FAP. Mobile station receives  
 6 the APPIM message from the FAP. The mobile station uses the information in the APPIM to  
 7 determine if a particular PN is associated with a Femto Access Point.

8 Once the mobile station is connected with the base station it may receive a PN associated  
 9 with a FAP at high strength. The mobile station can receive the APIDM from the FAP. The  
 10 APIDM carries the information that can be used for identification of the FAP by the base  
 11 station. The mobile station may include this identification information in the PSMM or  
 12 HOSINM. Including this information allows the base station to initiate a mobile station  
 13 handoff to the FAP.

14

15 3.4.7 General Overhead Information Message (GEN\_OVHD\_INF\_IND,  
 16 GEN\_OVHD\_CYCLE\_INDEX)

17 The *GOIM* is used to send the overhead information that is not necessary for accessing the  
 18 system. The *GOIM* contains information that is typically used for display purposes on the  
 19 mobile station. If the base station is sending the *GOIM* on the paging channel, it sets the  
 20 GEN\_OVHD\_INF\_IND to '1'. Otherwise, the base station sets this value to '0' or could omit  
 21 this field as described in section 3.4.2.

22 If the base station is sending the *GOIM* on the paging channel, then the base station

1 indicates the frequency of transmission of this message using the  
2 GEN\_OVHD\_CYCLE\_INDEX field. The GEN\_OVHD\_CYCLE\_INDEX is set at follows:

3 If the base station needs to include any of the fields following the  
4 GEN\_OVHD\_CYCLE\_INDEX field, then the base station includes this field and indicates the  
5 frequency of transmission of the *GOIM* on the paging channel. Otherwise, the base station  
6 includes this field only if it wants to set this field to value other than '000'.

7 The base station could reduce the frequency of transmission of *GOIM* in order to reduce the  
8 load on the paging channel load. The mobile station does not wait for *GOIM* in order to  
9 access the system for origination, page response or registration purposes.

#### 10 3.4.8 Frequent General Overhead Information Message (FREQ\_GEN\_OVHD\_INF\_IND)

11 The *FGOIM* is used to send the overhead information that is useful but not necessary for  
12 system access. If the base station is sending the *FGOIM* on the paging channel, it sets the  
13 FREQ\_GEN\_OVHD\_INF\_IND to '1'. Otherwise, the base station sets this value to '0' or could  
14 omit this field as described in section 3.4.2.

15 The *FGOIM* carrying a GOI\_REC\_TYPE of '00000010' (Other Networks Available) can be used  
16 for enhancing mobile station's search for home system and can be useful in roaming  
17 scenarios. For example, system A can advertize the availability of system B by including the  
18 SID-NID pair, or the MCC MNC information of system B in the *FGOIM*. Upon receiving an  
19 Other Networks Available record type in a *FGOIM*, mobile stations that have system B as  
20 the home system can trigger the search for the home system. The mobile station search can  
21 be further aided by the inclusion of the BAND\_CLASS and CHANNEL\_NUMBER fields in the  
22 Other Networks Available record. Under certain conditions, such as unavailability of the  
23 home system due to non-overlapping coverage between home and roaming systems, the  
24 mobile station may continue to receive service from the roaming system.

#### 25 3.4.9 Flex Duplex CDMA Channel List Message (FD\_CHAN\_LST\_IND)

26 The *FDCCLM* is sent by the base station if it supports flexible separation of forward and  
27 reverse channels. The *FDCCLM* contains information on the pairing of the forward and  
28 reverse channels separated by non-default frequency separation. If the base station is  
29 sending the *FDCCLM* on the paging channel, it sets the FD\_CHAN\_LST\_IND to '1'.  
30 Otherwise, the base station could set this value to '0' or could omit this field as described in  
31 section 3.4.2.

32 It should be noted that apart from overhead messages, the support for flex duplex feature  
33 may require support for *GEM*. This support is only needed if the base station or mobile  
34 station does not support Revision D of cdma20001x and the CAND\_BAND\_INFO\_REQ field  
35 in the *FDCCLM* is set to 1. In this scenario the mobile station includes the Band Class –  
36 Band Subclass capabilities information record along with the *RGM* or *ORM* or the *PRM* in a  
37 *GEM*.

#### 38 3.4.10 Alternative Technologies Information Message (ATIM\_IND)

39 The *ATIM* is sent by a base station to indicate the existence of alternative technologies such  
40 as HRPD, E-UTRAN, and WiMAX. The *ATIM* contains information on the alternate

1 technologies. If the base station is sending the *ATIM* on the paging channel, it sets the  
2 *ATIM\_IND* to '1'. Otherwise, the base station could set this value to '0' or could omit this  
3 field as described in section 3.4.2.

4 If the base station is sending the *Alternative Technologies Information* on the paging  
5 channel, then the base station indicates the frequency of transmission of this message  
6 using the *ATIM\_CYCLE\_INDEX* field. The *ATIM\_CYCLE\_INDEX* is set at follows:

7 If the base station needs to include any of the fields following the *ATIM\_CYCLE\_INDEX* field,  
8 then the base station includes this field and indicates the frequency of transmission of the  
9 *ATIM* on the paging channel. Otherwise, the base station includes this field only if it wants  
10 to set this field to value other than '000'.

11 The base station could reduce the frequency of transmission of *ATIM* in order to reduce the  
12 load on the paging channel load. The mobile station does not wait for *ATIM* in order to  
13 access the system for origination, page response or registration purposes.

14 While in traffic the mobile station may move across access network boundaries such that  
15 the contents of *ATIM* change. In this scenario, the base station can send *ATIM* over the  
16 forward dedicated channel before sending the Release Order.

#### 17 3.4.11 Location Parameters (*ADD\_LOC\_INFO\_INCL*, *ADD\_LOC\_INFO\_INCL*, *LOC\_UNC\_H*, 18 *HEIGHT* and *LOC\_UNC\_V*)

19 If the base station supports enhancements to the location information such as the  
20 horizontal location uncertainty, vertical location uncertainty and height, then the base  
21 station sets this field to '1'. Otherwise, the base station omits *ADD\_LOC\_INFO\_INCL*,  
22 *LOC\_UNC\_H*, *HEIGHT*, and *LOC\_UNC\_V* fields.

23 If the base station supports the use of *GEM* for receiving Geo Location Record with *ORM* or  
24 *PRM*, then the base station would set *ADD\_LOC\_GEM\_ALLOWED* field in SPM. The mobile  
25 station that support *GEM* for sending Geo Location record with *ORM* or *PRM*, the mobile  
26 station would send *GEM* with *ORM* or *PRM* and Geo Location record only when  
27 *ADD\_LOC\_GEM\_ALLOWED* is set to '1'. Typically, the mobile station will send *GEM* with  
28 *ORM* or *PRM* and Geo Location record only for emergency call.

#### 29 3.4.12 *MEID\_ME* Reporting

30 A new information record has been added for reporting of *MEID\_ME* in the Revision E of  
31 cdma2000 1x. The base station can send a *Status Request Message* with *RECORD\_TYPE* =  
32 '00101110' (*MEID\_ME*). The mobile station can include the *MEID\_ME* information record in  
33 the *Status Response Message* or the *Extended Status Response Message*.

34

35

### 3.5 Extension to MC-RR Parameters Message

The changes required in this message are similar to the *System Parameters Message*. For example:

- NUM\_OPT\_MSG\_BITS field value needs to be increased to include the message transmission indication bits for messages introduced in Revision E of cdma2000 1x. This is similar to the recommendations for *System Parameters Message* as described in 3.4.2.
- Fields of the MC-RR Parameter Message that are not supported by any particular Revision of cdma2000 1x base station are set to '0'. This is similar to the recommendation for the fields in *System Parameters Message* as specified in section 3.1.
- Fields for the new features that are appended at the end of MC-RR PM message are set according to the same guidelines as section 3.4.3-3.4.11, except that these fields pertain to message transmission over the Primary Broadcast Control Channel rather than the Paging Channel.

The mobile station processing of MC-RR PM is specified in section 3.2.