

3GPP2 C.S0099-0

Version 2.0

July 2011



3RD GENERATION
PARTNERSHIP
PROJECT 2
"3GPP2"

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

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Revision History

Revision	Description of Changes	Date
Rev 0 v1.0	Publication	September, 2010
Rev 0 v2.0	Point Release	July, 2011

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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[®]¹.

¹cdma2000[®] 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.

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1 INTRODUCTION

1.1 Scope

This specification provides recommendations and guideline for various features [introduced in of Revision E of edma2000-1x](#) [1][1].

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
13 channels 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
22 is 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
27 digital control information from a base station to one or more mobile stations.

28 **Forward Dedicated Control Channel.** A Dedicated Control Channel that is transmitted
29 on 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
5 Fundamental Channel, and Reverse Dedicated Control Channel, a frame is 5 or 20 ms
6 long. For the Common Assignment Channel, a frame is 5 ms long. For the Broadcast
7 Control Channel, a frame is 40 ms long; the frame may be transmitted once, twice, or four
8 times. For the Forward Packet Data Control Channel and the Forward Packet Data
9 Channel, a frame could be 1.25, 2.5, or 5 ms long. For the Reverse Acknowledgment
10 Channel and the Reverse Channel Quality Indicator Channel, a frame is 1.25 ms long. For
11 the Reverse Packet Data Channel, the Reverse Packet Data Control Channel, the Reverse
12 Request Channel, the Forward Indicator Control Channel, the Forward Grant Channel, and
13 the Forward 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
18 Fundamental 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 **Legacy Base Station.** [A base station that does not support any features introduced in](#)
29 [\[1\]\[4\].](#)

30 **MEID_ME.** MEID associated with the mobile equipment. See Mobile Equipment Identifier
31 (MEID) and ME.

32 **Message.** A data structure that conveys control information or application information. A
33 message consists of a length field (MSG_LENGTH), a message body (the part conveying the
34 information), and a CRC.

35 **MIN.** See Mobile Identification Number.

36 **MNC.** See Mobile Network Code.

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

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

40 **NID.** See Network Identification.

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

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

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

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

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

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

12 **RC.** See Radio Configuration.

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

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

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

18 **Reverse Fundamental Channel.** A Fundamental Channel that is transmitted on the
19 Reverse CDMA Channel.

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

26 **Reverse Supplemental Channel.** A Supplemental Channel that is transmitted on the
27 Reverse CDMA Channel.

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

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

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

38 **Service Option Connection.** A particular instance or session in which the service defined
39 by a service option is used. Associated with a service option connection are a reference,

1 which is used for uniquely identifying the service option connection, a service option, which
 2 specifies the particular type of service in use, a Forward Traffic Channel traffic type, which
 3 specifies what type of Forward Traffic Channel traffic is used to support the service option
 4 connection, and a Reverse Traffic Channel traffic type, which specifies what type of Reverse
 5 Traffic Channel traffic is used by the service option connection.

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

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

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

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

17 **SID.** See System Identification.

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

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

23 1.3 References

24 The following standards are referenced in this text. At the time of publication, the editions
 25 indicated were valid documents. All standards are subject to revision, and parties to
 26 agreements based upon this document are encouraged to investigate the possibility of
 27 applying the most recent editions of the standards indicated below. ANSI and TIA maintain
 28 registers of currently valid national standards published within their respective
 29 organization. All references are informative.
 30

31 [1] **3GPP2:** C.S0005-E, *Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread*
 32 *Spectrum Systems.*

33 [2] **3GPP2:** C.S0087-0, *E-UTRAN – cdma2000 HRPD Connectivity and Interworking: Air*
 34 *Interface Specification.*

35 [3] **3GPP2:** C.S0086-0, *WiMAX™² – HRPD Interworking: Air Interface Specification.*

² “WiMAX” is a trademark of the WiMAX Forum.

- 1 [4] **3GPP2:** C.S0097-0, *E-UTRAN – cdma2000 1x Connectivity and Interworking Air*
- 2 *Interface Specification.*
- 3 [5] **3GPP2:** C.S0002-E, *Physical Layer Standard for cdma2000 Spread Spectrum*
- 4 *Systems.*
- 5 [6] **3GPP2:** C.S0003-E, *Medium Access Control (MAC) Standard for cdma2000 Spread*
- 6 *Spectrum Systems.*
- 7 [7] **3GPP2:** C.S0015-B v2.0, *Short Message Service (SMS) for Wideband Spread*
- 8 *Spectrum Systems.*
- 9 [8] **3GPP2:** C.S0016-D v1.0, *Over-the-Air Service Provisioning of Mobile Stations in*
- 10 *Spread Spectrum Standards.*
- 11 [9] **3GPP2:** C.S0014-D v2.0, *Enhanced Variable Rate Codec, Speech Service Options 3,*
- 12 *68, 70, and 73 for Wideband Spread Spectrum Digital Systems*

13 **1.4 Features Introduced in ~~of~~ Revision E of cdma2000 1x**

14 Various features ~~of~~that are introduced in Revision E of cdma2000 1x are listed in Table

15 1-1. The table highlights the impact of each feature on the overhead and signaling

16 messages. Modifications made to the messages are described in section 3.1 and 3.5. Table

17 1-1 also lists the section where the procedures are defined for various features.

18 **Table 1-~~1~~1. Features Introduced ~~of~~in Revision E of cdma2000 1x**

Feature	Overhead Messages	Signaling Messages	Section
<p>RL RC 8, FL RC 11/12, RC 12</p>	<p>SPM, MC-RR PM.None.</p>	<p>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, <u>Universal Handoff Direction Message, General Handoff Direction Message, Extended Handoff Direction Message, MEID Universal Handoff Direction Message.</u></p>	<p>2</p>

Feature	Overhead Messages	Signaling Messages	Section
Call Drop Recovery	SPM and MC_RRPM	Call Recovery Request Message	3.4.2
Femto	<i>System Parameters Message, MC-RR PM, Access Point Pilot Information Message, Access Point Identification Message, Access Point Identification Text Message</i>	<i>Pilot Strength Measurement Message, Handoff Supplementary Information Notification Message, Handoff Supplementary Information Solicit Message.</i>	3.4.4, 3.4.5, 3.4.6
General Overhead Information	<i>System Parameters Message, MC-RR PM, General Overhead Information Message</i>	None +	3.4.8
Frequent General Overhead Information	<i>System Parameters Message, MC-RR PM, Frequent General Overhead Information Message</i>	None +	3.4.9
Flex Duplex	<i>System Parameters Message, MC-RR PM, Flex Duplex CDMA Channel List Message</i>	<i>General Extension Message</i>	3.4.10
Alternate Technologies Information	<i>System Parameters Message, MC-RR PM, Alternative Technologies Information Message</i>	None +	3.4.11
Location	<i>System Parameters Message, MC-RR PM+</i>	<i>Registration Message, Origination Message+</i>	3.4.12
MEID_ME	None +	<i>Status Request Message, Status Response Message, Extended Status Response Message</i>	3.4.13

Feature	Overhead Messages	Signaling Messages	Section
ACCOLC for National Security / Emergency Preparedness	None	None	4

RL RC 8, FL RC 11/12, RC12 and SO 73: RL ~~RC8~~ RC 8, and FL RC 11/12 are introduced in ~~the Revision E of edma2000-1x~~ [1][1]. SO 73 [[9]] allows RL RC 8, FL RC 11/12 to be used more efficiently. Call establishment procedures using RL RC 8 on the reverse link and FL RC 11/~~RC12~~ on the forward link are provided in section 2. It should be noted that in order to support the RL RC 8, ~~and FL and RC 11/12 and SO 73~~, the base station ~~does not need to modify the overhead messages~~ will include RC_BITMAP_CAPABILITY_EXT_ALLOWED bit in the MC-RRPM and/or SPM ~~and MC-RRPM~~³ and set this field ~~it to '1'~~. In order to support the RL RC 8 and FL RC 11/12 the mobile station needs to support the reception of Extended Channel Assignment Message or an MEID Extended Channel Assignment Message in a General Extension Message (GEM) along with the Radio Configuration Parameters Record (see section 2.4). The mobile station also needs to send the SO Information record in a Status Response Message if the base station sends the Status Request Message querying the SO Information Record (see section 2.3)⁴. If a mobile station indicates support for FL RC 11/12 or RL RC 8, then the mobile station will support Service Option 73 NB Mode (i.e. Operating Point 1 through 7 of Service Option 73) and will indicate support for SO 73 to the base station.

Call Drop Recovery : Call Recovery Request Message (CRRM_MSG_IND)(Section 3.4.2) is used to recover a dropped call due to fade timer expiration.

Femto: Broadcast information needed to support femto operation is provided in sections 3.4.4, 3.4.5, and 3.4.6. The *Access Point Pilot Information Message (APPIM)* (section 3.4.4) can be broadcast either by the macro base station or the femto base station. *Access Point Identification Message (APIDM)* and *Access Point Identification Text Message (APIDTM)* are transmitted by the femto base station.

General Overhead Information: The *General Overhead Information Message (GOIM)* (section 3.4.8) contains information that is typically used for display purposes on the mobile station. The *GOIM* is used to send the overhead information that is not necessary for accessing the system.

³ A P_REV 6 base station will include RC_BITMAP_CAPABILITY_EXT_ALLOWED bit only in the SPM. Base Station supporting P_REV > 6 will include RC_BITMAP_CAPABILITY_EXT_ALLOWED bit in the SPM and may include RC_BITMAP_CAPABILITY_EXT_ALLOWED bit in the MC-RRPM if the Broadcast Control Channel is being transmitted.

⁴ The base station could query Extended Service Option Information record if the P_REV_IN_USE is greater than 10.

Frequent General Overhead Information: The *Frequent General Overhead Information Message (FGOIM)* (section 3.4.9) contains information that is typically used for sending non-essential access related information to the mobile station..

Flex Duplex: The *Flex Duplex CDMA Channel List Message (FDCCLM)* (3.4.10) is sent by the base station if it supports flexible separation of forward and reverse channels. The *FDCCLM* contains information on the pairing of the forward and reverse channels separated by non-default frequency separation. The mobile station uses *GEM* to send the Band Class - Band Subclass capabilities information record along with the *Registration Message (RGM)*, *Origination Message (ORM)* or *Page Response Message (PRM)*.

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

Location Enhancements: The location enhancements (3.4.12) allow base station to transmit additional location information in the overhead messages.

MEID_ME: The base station can query the MEID_ME of the mobile station using the *Status Request Message* with RECORD_TYPE = '00101110' (MEID_ME). The mobile station can include the MEID_ME information record in the *Status Response Message* or the *Extended Status Response Message*.

ACCOLC for National Security / Emergency Preparedness:- Mobile stations designated for National Security/Emergency Preparedness should be assigned to ACCOLC value as defined in [1].

1.5 Message Transmission and Backwards Compatibility of Features of Revision E of cdma2000 1x

~~1.5.1 Common Control Channel Messages~~

1.5.1 Base Station Transmission of Common Control Channel Messages

The recommendations and guidelines in this document provide details on supporting the features listed in Table 1-1 on any Revision of cdma2000 1x. Specifically, each feature can be supported individually by the base station with any P_REV value being broadcast in the overhead messages. Further, in order to support a feature introduced in Revision E of cdma2000 1x, the base station does not need to support any additional features from other revisions of cdma2000 1x than the one the base station currently supports. When extending an overhead message to support any feature introduced ~~of~~ in Revision E, the base station would use Revision E of the specification only for the fields that are part of the message extensions. For example, for the System Parameters Message, a base station supporting Revision 0 of cdma20001x would set the fields up to the EXT_CHAN_LIST field as specified in the Revision 0 of cdma20001x. System Parameters Message fields that follow EXT_CHAN_LIST field would be set according to the Revision E of cdma20001x. Specifically, the base station would continue to set the P_REV field in the overhead

1 messages to '0000 0110' as specified in the Revision 0 of cdma20001x. Similarly, a mobile
 2 station can support various features introduced in Revision E of cdma2000 1x with any
 3 MOB_P_REV.

4 If the base station supports RL RC 8 and FL RC 11/12, then the base station will set the
 5 RC_BITMAP_CAPABILITY_EXT_ALLOWED field in the ~~SPM and MC-RRPM~~ and/or SPM to
 6 '1'.

7 Base station indicates support for receiving GEM for additional geo location records by
 8 setting the ADD_LOC_GEM_ALLOWED bit in the SPM to '1'.

9 1.5.2 Mobile Station Transmission ~~of Common Control Channel~~ Messages

10 If the mobile station supports RL RC 8 and FL RC 11/12 and the processing of
 11 RC_BITMAP_CAPABILITY_EXT_ALLOWED field, then the mobile station will support the
 12 following:

- 13 - initialization, storage from overhead messages and reset procedures for the
 14 RC_BITMAP_CAPABILITY_EXT_ALLOWED field as defined in [1]
- 15 - transmission of FCH Type-specific Fields record, or FOR SCH Type-Specific
 16 Fields record, or REV SCH Type-Specific Fields record based on the stored value
 17 of RC_BITMAP_CAPABILITY_EXT_ALLOWED as defined in [1]
- 18 - if the stored value of RC_BITMAP_CAPABILITY_EXT_ALLOWED is '1', then the
 19 mobile station will include a Capability Information record according to [1].
 20 Otherwise, the mobile station will include the record as specified by the
 21 P_REV_IN_USE.

22 ~~Base station indicates support for receiving GEM for additional geo location records by~~
 23 ~~setting the ADD_LOC_GEM_ALLOWED bit to '1' in the SPM to '1'.~~ If the
 24 ADD_LOC_GEM_ALLOWED bit in the SPM is set to '1' the mobile station can send the
 25 Additional Geo Location Type Record along with ORM, PRM, RGM in a GEM. Otherwise, if
 26 the ADD_LOC_GEM_ALLOWED bit is not set to '1' or is not included, or if the mobile
 27 station does not support Additional Geo Location feature then the mobile station will send
 28 the ORM, PRM, RGM according to the P_REV_IN_USE and section 1.5.3.

29 ~~The mobile station indicates the capabilities for various optional features through the~~
 30 ~~Capability Information record⁵. If the mobile station supports any of the capabilities~~
 31 ~~introduced in Revision E that are indicated through the Capability Information record, then~~
 32 ~~the mobile station will include a Capability Information record according to Revision E⁶.~~
 33 ~~Otherwise, the mobile station will include the record as specified by the P_REV_IN_USE.~~

~~⁵The base station can query this record by sending a Status Request Message.~~

~~⁷The base station can query this record by sending a Status Request Message.~~

~~1.5.3 Dedicated Control Channel Messages~~

~~1.5.4~~1.5.3 P_REV_IN_USE and Reserved Fields

The mobile station carries the RC bitmap in many messages such as *ORM* and *PRM*. Even though according to the P_REV_IN_USE the RL RC 8 and FL RC 11/12 may be reserved, the mobile station would indicate the support for RL RC 8 and FL RC 11/12 ~~and/or FL RC 12~~ as described in section 1.5.2.

~~The mobile station indicates the capabilities for various optional features through the Capability Information record⁷. If the mobile station supports any of the optional capabilities introduced in Revision E[1] that are indicated through the Capability Information record, then the mobile station will include a Capability Information record according to Revision E⁸. Otherwise, the mobile station will include the record as specified by the P_REV_IN_USE.~~

The base station carries the RC in many messages such as *ECAM*, *GHDM*, *UHDM*, and *EHDM* messages. Even though according to the P_REV_IN_USE the RL RC 8 and FL RC 11/12 may be reserved, the base station can assign RL RC 8 and FL RC 11/12 ~~and/or FL RC 12~~ if the mobile station has indicated support for these RC.

If the base station supports any of the optional capabilities introduced in ~~Revision E[1]~~ that are indicated through the Capability Information record, then the base station will parse the Capability Information record according to ~~Revision E[1]~~. Otherwise, the base station will parse the record as specified by the P_REV_IN_USE.

~~1.5.5~~1.5.4 General Extension Message

GEM can be used to support various features introduced in ~~of Revision E of cdma2000 1x[1]~~. The base station and mobile station use *GEM* for sending messages such as *ECAM*, *ORM*, etc along with additional fields that are needed for various features. While using the *GEM* base station and mobile station would use the message definition according to the P_REV_IN_USE. For example if the P_REV_IN_USE is 6, the base station will use the definition of *ECAM* as defined in the Revision 0 of cdma2000 1x. Similarly, the mobile station can use *ORM* according to the P_REV_IN_USE and use *GEM* to signal additional records needed for flex duplex or additional Geo-Location features. Thus, *GEM* allows for extension of messages for new features without the need for supporting future revisions at the mobile station and base station.

The mobile station and base station can choose to support *GEM* only for the features that they support. For example, if the mobile station supports only the RL ~~RC8~~RC 8, and FL RC 11/12, then it need not support *GEM* for other features such as flex duplex or Additional

⁷~~The base station can query this record by sending a Status Request Message.~~

⁸~~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 [1]the Revision E.~~

- 1 Geo-Location.
- 2 If the mobile station needs to generate a *Reject Order* for a *GEM* it can generate this
- 3 | according to the ~~Revision E~~[\[1\]](#) of cdma2000 1x.

2 SUPPORTING RL RC 8, FL RC 11/12

RL RC 8 and FL RC 11/12 and RC 12 have been introduced in [[1]]. Specifically, RL RC 8 has been proposed for reverse channels and FL RC 11/12 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 RC 8, 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[1] of edma2000-1x~~. 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 1/8th 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 frames⁹. 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 control will also be maintained using only the guaranteed frames.

⁹ Certain non-critical frames may also be suppressed by the MAC. Additionally, MAC may generate filler frames at 1/8th rate.

1 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
 2 frame. See section 2.2.1.1.3.1.2 of [[6]] for MAC changes that enable blanking. See
 3 sections 2.1.3.12.1 and 3.1.3.15.1 of [[5]] for details on generating guaranteed frames at
 4 physical layer.

5 The base station can provide various attribute for the RL ~~RC~~ RC 8, and FL RC 11/12
 6 through *RCPM* or *GEM* (see section 2.4). When blanking is enabled, i.e.,
 7 FOR_FCH_BLANKING_DUTYCYCLE attribute is set to a value other than '000', the mobile
 8 station will use FOR_N2M_IND for forward link error trigger. In this case the mobile station
 9 will use only guaranteed physical layer frames for evaluating a frame as good or bad. The
 10 base station can disable blanking by setting the FOR_FCH_BLANKING_DUTYCYCLE
 11 attribute to a value of '000' using the *RCPM* or *GEM*. In this case the mobile station uses
 12 the N_{2m} and evaluates each frame as good or bad frame.

13 The base station and mobile station will not blank frames at all times on the F-FCH even
 14 though the FOR_FCH_BLANKING_DUTYCYCLE and REV_FCH_BLANKING_DUTYCYCLE
 15 are negotiated to a value different than '000'. For example, the base station does not start
 16 blanking the frames on the FCH in the Traffic Channel Initialization Substate, i.e. waits for
 17 the traffic channel to be established. Similarly, the mobile station does not blank frames on
 18 the R-FCH for the duration of R-SCH assignment burst¹⁰. Similarly, the base station does
 19 not blank frames on the FCH in the interval between the transmission of
 20 UHDM/EHDM/GHDM/MUHDM with a hard handoff and the reception of Handoff
 21 Completion Message¹¹.

22 **Frame Early Termination (FET):** Frame Early Termination was introduced in RL RC 8 and
 23 FL RC 11/12 in ~~Revision E of edma2000-1x~~[1]. This method is used to terminate
 24 transmission of a frame earlier than the nominal length of the frame (20 ms) if the receiver
 25 has successfully received the frame. The receiver transmits an acknowledgment to the
 26 transmitter following successful reception of the frame. As a response, the transmitter
 27 stops transmission of the remainder of the frame. FET is mandatory for the fundamental
 28 channel for RL RC 8 and FL RC 11/12 and is optional for the supplemental channel. It
 29 should be noted that the higher rate F-FCH frames have less probability to be early
 30 decoded than lower rate F-FCH frames. Thus, vocoders that generate fewer full-rate frames
 31 will see higher capacity benefits with the use of RL RC 8 and FL RC 11/12.

32 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
 33 on the FL RC 11/12.

34 **New Power Control Modes:** Slower power control is introduced for RL RC 8 and FL RC
 35 11/12 in ~~Revision E of edma2000-1x~~[1]. There are 2 modes: 400Hz power control and
 36 200Hz power control for both forward link and reverse link fundamental channels. Slower
 37 power control occupies less system resources thus help improve the capacity. It should be
 38 noted that power control modes can be used only with certain combinations of blanking

¹⁰ The blanking of the FCH, if enabled, is restarted at the end of the R-SCH assignment.

¹¹ This may be achieved, for example, by marking the frames as critical.

1 and supplemental channel assignments. Table 2-1 lists the valid power control modes with
 2 non-blanked RL frame, while Table 2-2 lists the valid power control modes with blanked
 3 reverse link frames.

4 Table 2-1~~2~~: Valid PC modes with REV_FCH_BLANKING_DUTYCYCLE_IN_USE = 0~~blanking~~
 5 ~~not activated on RL frame~~

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

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

8 Table 2-2~~3~~: Valid PC modes with REV_FCH_BLANKING_DUTYCYCLE_IN_USE > 0~~blanking~~
 9 ~~activated on RL frame~~

RPC Mode	FPC Mode	RLPC Rate	FLPC Rate
'00'	'011'	200 or 400 ¹² Hz	200Hz
'01'	'011'	200Hz	200Hz

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

12 During R-SCH assignment burst, only Table 2-1 will be used as
 13 REV_FCH_BLANKING_DUTYCYCLE_IN_USE is set to 0~~blanking is not activated~~. The base
 14 station will set the FPC_MODE to '010' only when the F-SCH is assigned¹³.

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

17 **Reverse Link Pilot Channel Gating:** For RC 8, when transmitting the 0 bps frames on the
 18 reverse link the pilot channel is gated to 50% duty cycle. This reduces the overhead and

¹² For blanked frame 200Hz RLPC is used, while for non-blanked frame 400Hz RLPC is used.

¹³ 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 improves capacity. However, this also limits the Pilot Control Groups (PCGs) on which an
2 acknowledgement can be sent. For details on these restrictions see section 3.1.3.1.13.

3 2.1.2 MAC Support for RC 8 and RC 11/12

4 The multiplex sub-layer in the MAC is responsible for providing the SDU to the physical
5 layer. This sub-layer has been modified to utilize the blanking enabled by the RC 8 and RC
6 11/12 on the reverse and forward channels respectively. In particular, when the services
7 and signaling do not generate any SDU, the multiplex sub-layer does not generate any filler
8 frame for the physical layer unless the physical layer needs to transmit a *guaranteed*
9 *physical layer frame*.

10 The interface between the multiplex sub-layer and the services has also been modified. The
11 modified interface allows the services to mark the submitted SDU as critical vs. non-
12 critical. The multiplex sub-layer will transmit a SDU marked as critical following the typical
13 rules of transmission. However, a SDU marked as non-critical will not be transmitted by
14 the multiplex sublayer, unless it coincides with a *guaranteed physical layer transmission*.

15 2.1.3 Service Options Changes

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

23 2.1.3.1 SO for Voice Services with RC 8 and RC 11/12

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

34 SO 73 is used as an example for service negotiation in the following sections. If the mobile
35 station and base station support other service options, such as SO 68, then these service
36 options can also be used with RC 8 on the reverse link and RC 11/12 on the forward link¹⁴.

¹⁴ The call flows for other SO are similar to the call flow provided for SO 73.

2.1.3.2 Other Services

The system capacity for other service options such as SO 6 (SMS), SO 18 (OTASP), SO 35 (Location Services) that use Rate Set 1 [[6]] can increase significantly when these are used over the RL ~~RC~~RC 8, and FL RC 11/12. There are two sources of benefits:

- a) Frame Early Termination: Physical layer transmission of frames carrying the data for these SO will cause lower interference due to frame early termination. This lower transmit power can be used by other mobile stations.
- b) Blanking: When these SO are negotiated, useful SO data is transmitted on the traffic channel only for a small fraction of the time. For example, when an SMS that requires an end to end acknowledgement is transmitted over the traffic channel, the traffic channel is maintained until such an acknowledgement is received. This leaves a significant period where the forward and reverse traffic channel resources are allocated while the SO generated one-eighth rate filler frames. When RL RC 8 and FL RC 11/12 are used at the physical layer, the SOs do not need to generate SDU for the multiplex sub-layer on a continuous basis, rather these SOs can simply produce the useful traffic. With RL RC 8 and FL RC 11/12, the multiplex sublayer [[6]] generates the filler frames when necessary. Thus, when using these service options, RC 8 and RC 11/12 will provide capacity gains.

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

2.2 RL RC 8, and FL RC 11/12 and Voice SO based Call Establishment

2.2.1 Call Flow Diagram

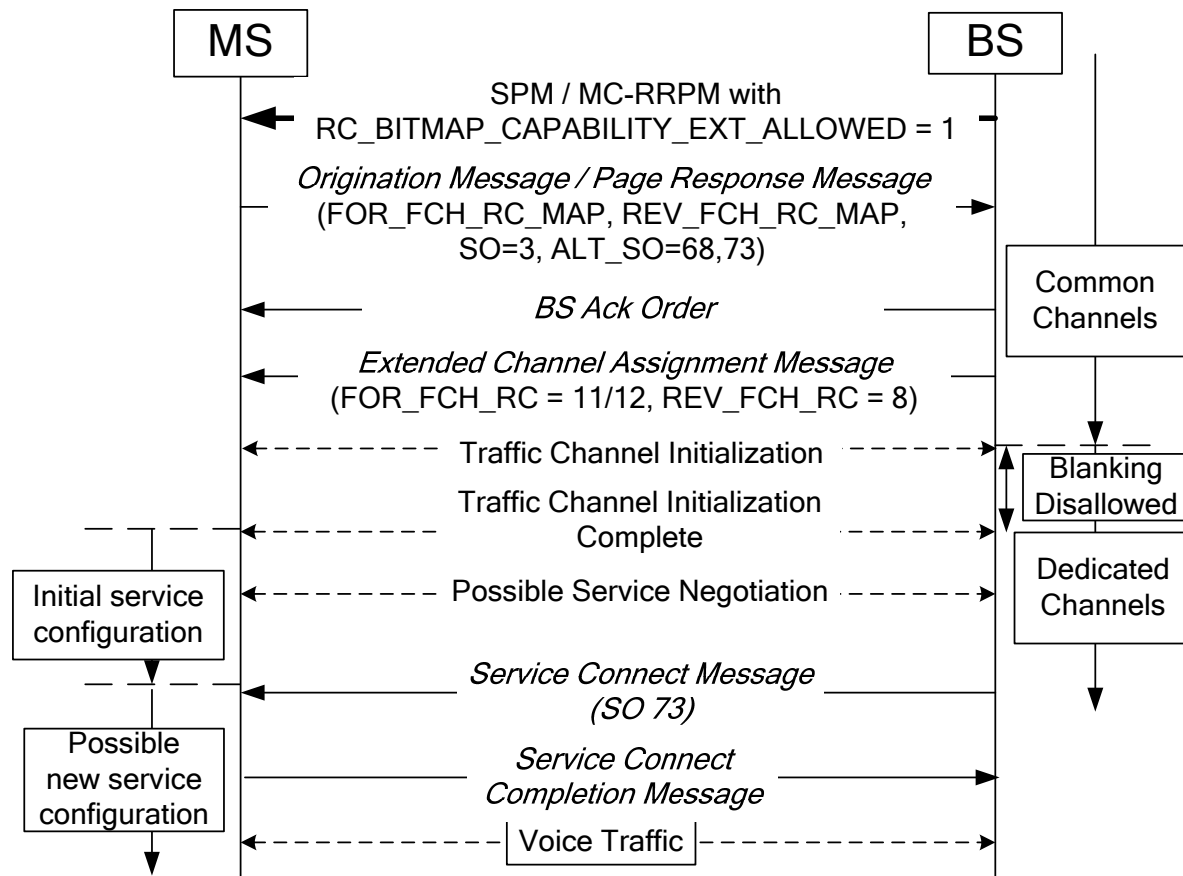


Figure 2-1 - Voice call establishment using RC 8 and RC 11/RC 12

2.2.2 Call Flow Details

1) If the base station includes RC_BITMAP_CAPABILITY_EXT_ALLOWED in the SPM and MC-RRPM and /or SPM and sets it to 1, the mobile station will indicate the support for RL RC 8 and FL RC 11/12 as follows:

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

1 RC 8 in the REV_FCH_RC_MAP in the *ORM* or *PRM*, the base station can assume
2 support for SO 73 at the mobile station.

3 The mobile station may explicitly indicate support for SO 73 either in
4 SERVICE_OPTION or ALT_SO field¹⁵. The inclusion in ALT_SO depends on the value
5 of MAX_NUM_ALT_SO field of the *Extended System Parameters Message* or *MC-RR*
6 *PM* and the value of P_REV_IN_USE.

7 When P_REV_IN_USE is 6 the mobile station will include the following voice service
8 options in the *ORM* and *PRM*:

- 9 a) When MAX_NUM_ALT_SO advertized value is 0, SO will be set to 3.
- 10 b) When MAX_NUM_ALT_SO advertized value is 1, SO will be set to 3 and ALT_SO
11 will be set to SO 68.
- 12 c) When MAX_NUM_ALT_SO advertized value is 2, SO will be set to 3 and ALT_SO
13 will include SO 68 and SO 73.

14 When P_REV_IN_USE is greater than 6 the mobile station can include
15 SO_GROUP_NUM and SO_BITMAP in the *ORM* and *PRM*. If the mobile station
16 includes voice service option group in the *ORM* or *PRM*, the mobile station will
17 include SO_GROUP_NUM 0.

18 ~~1)2)~~_____ The base station sends the *BS Ack Order*.

19 ~~2)3)~~_____ If the base station also supports RL RC 8 and FL RC 11/12, then it sends
20 the *Extended Channel Assignment Message* assigning RL RC 8 on the reverse
21 channels and FL RC 11 for the forward channel. Note if the mobile station indicates
22 support for FL RC 12 and the base station also supports RC 12, then the base
23 station can assign FL RC 12 for the forward channels.

24 ~~3)4)~~_____ After receiving the *Extended Channel Assignment Message*, mobile station
25 establishes the traffic channel and starts using the RL RC 8, and FL RC 11/12 with
26 the default parameters.

27 ~~4)5)~~_____ It should be noted that while the traffic channel is being established, the
28 base station will not blank any frames even if blanking is enabled.

29 ~~5)6)~~_____ After the traffic channel is established, base station and mobile station could
30 undergo service negotiation.

31 ~~6)7)~~_____ If the base station supports SO 73, then the base station will transmit a
32 *Service Connect Message* specifying SO 73 in the Service Option field. Similarly, the
33 base station could assign SO 68 or SO 3.

34 ~~7)8)~~_____ The mobile station will send a *Service Connect Completion Message*.

¹⁵ 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 | ~~8)~~9) _____ The mobile station will start sending voice frames using SO 73/SO 68/SO 3
2 | and RL RC 8. The base station will start sending voice frames using SO 73/SO
3 | 68/SO 3 and FL RC 11/12 as per the assignment through the *Extended Channel*
4 | *Assignment Message*.

5 | 2.2.3 Recommendations

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

2.3 Negotiation of SO when MAX_NUM_ALT_SO is set to 0

2.3.1 Call Flow Diagram

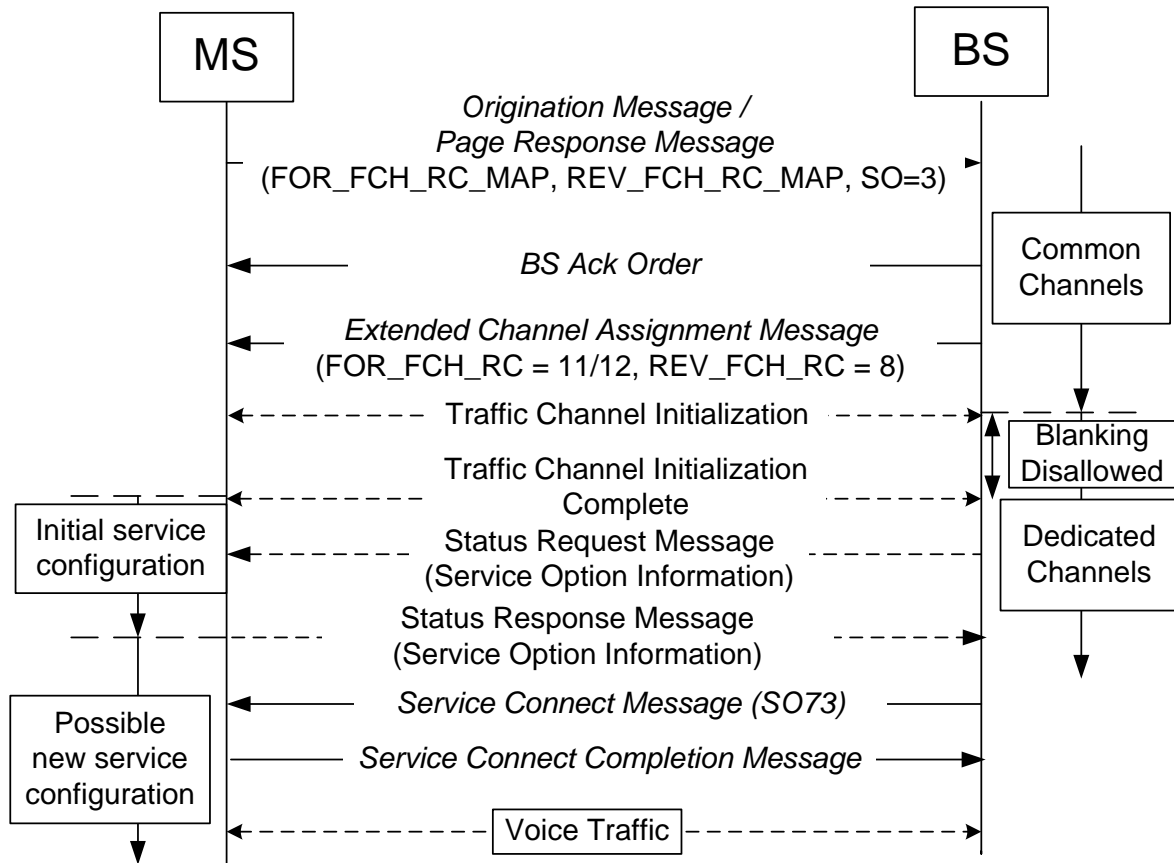


Figure 2-22 SO negotiation when MAX_NUM_ALT_SO is 0

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

- 1 *Status 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 uses s RL RC 8 and FL RC 11/12 on the FCH and assigns s SO 73 for the voice call.

8

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

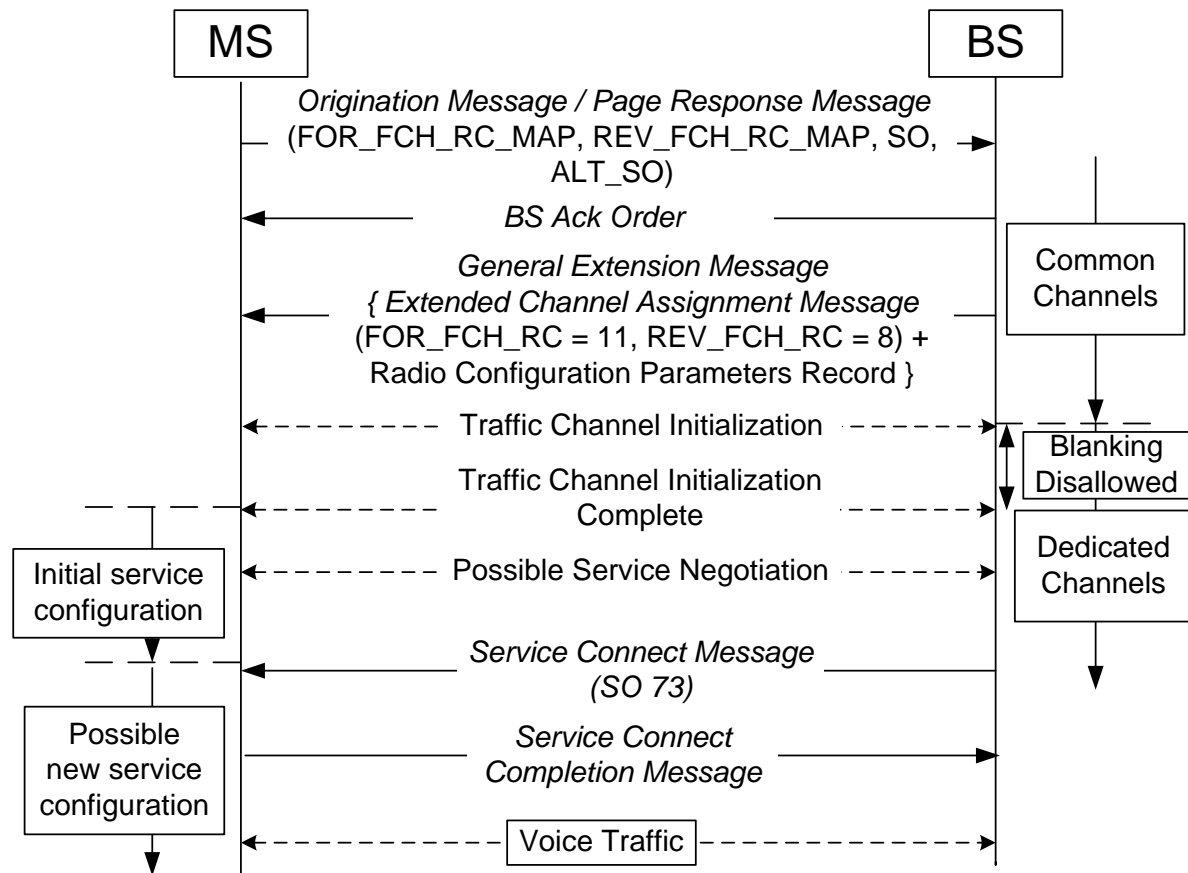


Figure 2-33 – Setting Non-default parameters for RL RC 8, FL RC 11/12 using GEM

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 RC 8, 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 values that the base station had included in the Radio Configuration Parameters Record.

1 2.4.3 Recommendations

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

6

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 duration¹⁶.

2.5.1 Call Flow Diagram

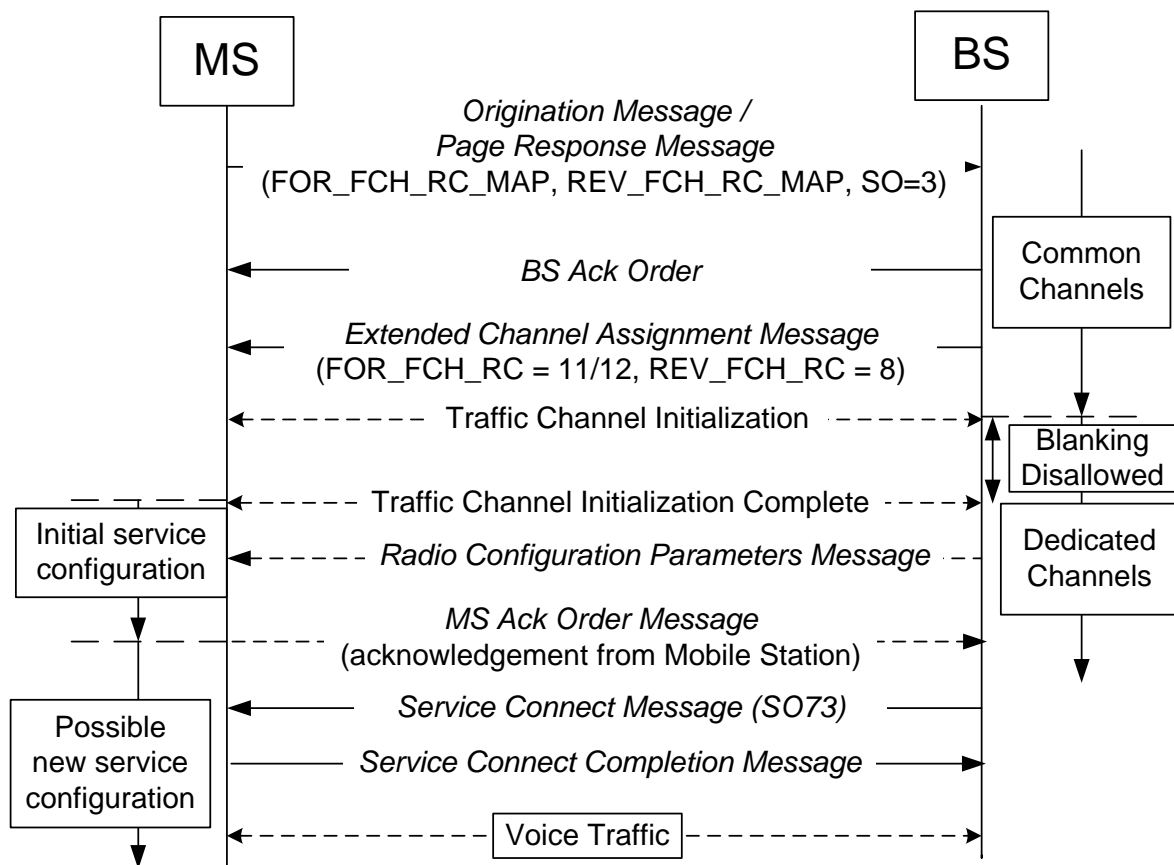


Figure 2-44 – Setting Non-default parameters for RC 8, RC 11/RC12 using RCPM

2.5.2 Call Flow Details

In the above call flow, the base station sends an *Extended Channel Assignment Message* with RL RC 8 and FL RC 11/12. The mobile station establishes the traffic channel and starts using the default parameters for the RL RC 8 and FL RC 11/12. The base station

¹⁶ The base station could wait for an acknowledgement before changing the parameters.

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

7 2.5.3 Recommendations

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

10

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

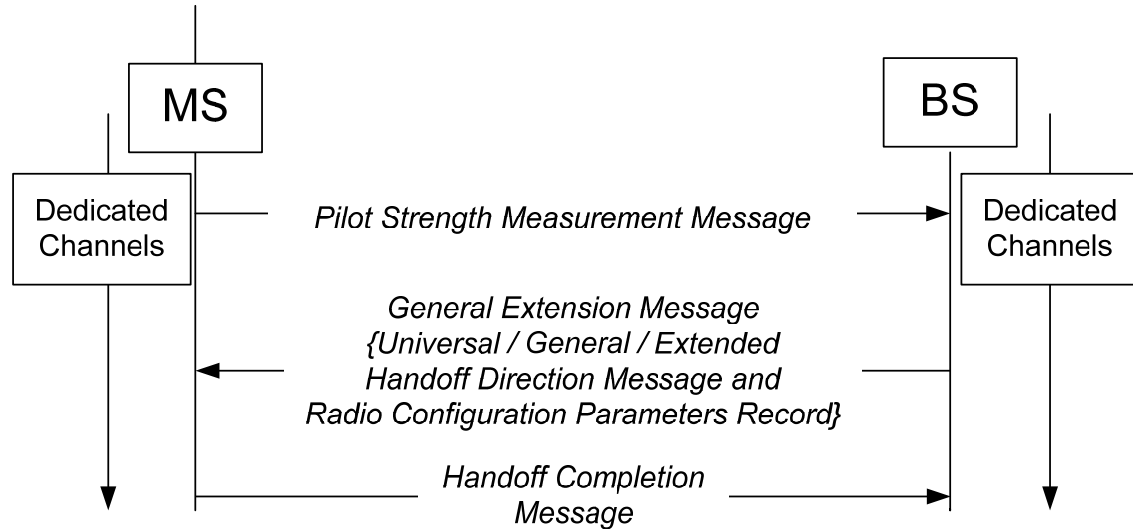


Figure 2-55 - Soft handoff for RL RC 8, FL RC 11/12 using GEM

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 11/12 and FL RC 12 using the *Radio Configuration Parameters Message*.

2.7.1 Call Flow Diagram

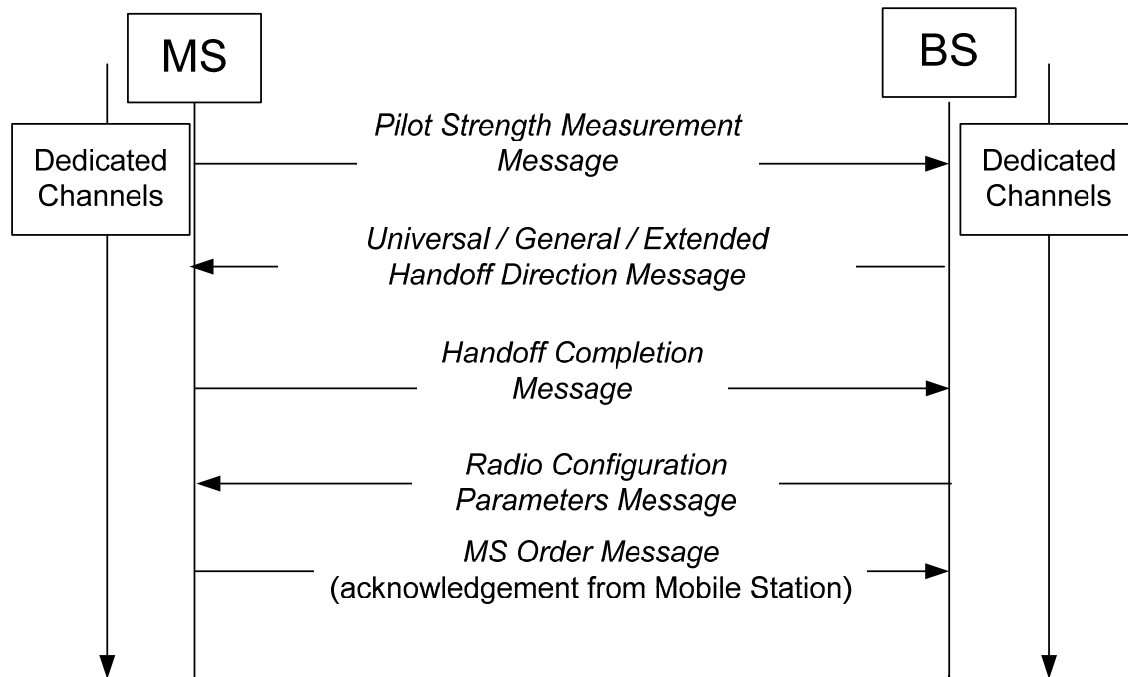


Figure 2-66 - Soft handoff for RC 8, RC 11/RC12 using RCPM

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 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.

2.8 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
6 Message sent by the base station.

7

2.9 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 2-3 shows¹⁷ 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 stations¹⁸. Preferred SO for transcoder free operation are shown in bold in Table 2-3. 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 2-3 also shows that SO 73 can be used with legacy RC.

Table 2-34. 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, 73 , {RL RC legacy, 8 , {FL RC legacy, 11/12}}	{SO 3, 68, 73 , {RL RC legacy, 8 , {FL RC legacy, 11/12}}	{SO 3, 68, 73 , {RL RC legacy, 8 , {FL RC legacy, 11/12}}	{SO 3, 68, 73 , {RL RC legacy, 8 , {FL RC legacy, 11/12}}
2	Legacy handset	{SO 3 , {RL RC legacy }, {FL RC legacy }	{SO 3 , 68, 73}, {RL RC legacy , 8}, {FL RC legacy , 11/12}	-	-
3	Legacy base station and legacy BSC	{SO 3 , 68, 73}, {RL RC legacy , 8}, {FL RC legacy , 11/12}	{SO 3 }, {RL RC legacy }, {FL RC legacy }	-	-

¹⁷ Recommended configurations for termination at mobile station 2 are similar to the origination ones and are not included here.

¹⁸ 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.

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

1 **2.10 Voice call establishment ~~for RL RC 8, FL RC 11/12~~/capable Mobile Stations**
2 **under ~~an~~ Revision 0 Legacy Base stations without support for Extended RC**
3 **Bitmaps**

4 This section provides the call flow for voice call establishment for a mobile station that
5 supports RL RC 8 and FL RC 11/12 under a legacy base station that does not support
6 processing of FOR_FCH_RC_MAP and REV_FCH_RC_MAP with RL RC 8 and FL RC 11/12.

7 2.10.1 Call Flow Diagram
8

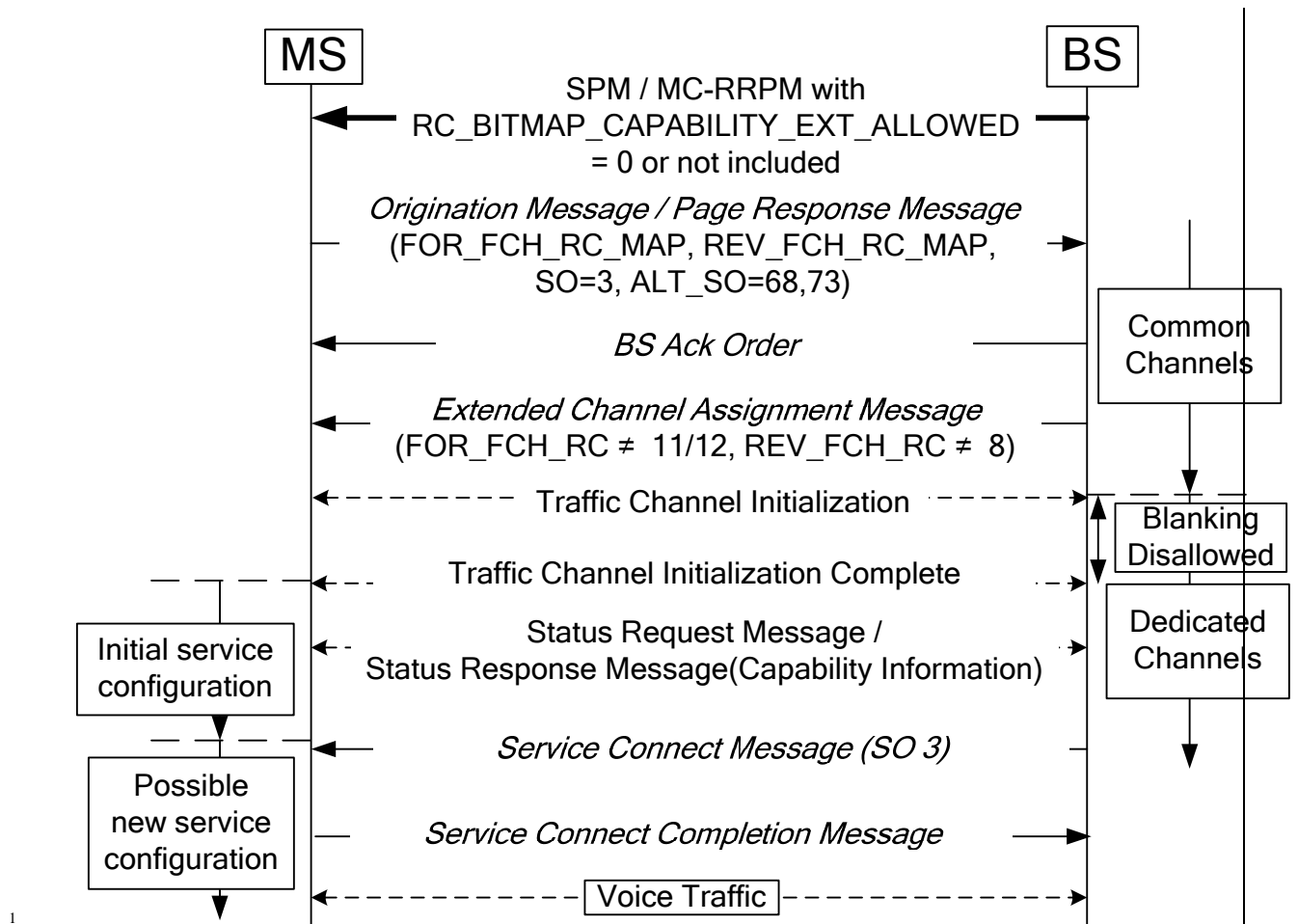


Figure 2-77 – Voice call establishment for RL RC8 and FL RC 11/12 capable mobile station under legacy base station that does not support extended RC bitmaps

2.10.2 Call Flow Details

The base station may exclude RC_BITMAP_CAPABILITY_EXT_ALLOWED in the MC-RRPM SPM and/or -SPMMC-RRPM as described in [1] or may include it and set it to 0¹⁹. In this case the mobile station will perform the following

- Mobile station will not indicate support for RL RC 8 and FL RC 11/12 as follows:

Mobile station will not set the value of FOR_FCH_LEN, FOR_SCH_LEN to greater than 3 and will not set REV_FCH_LEN and REV_SCH_LEN fields to a value greater than 2. When sending an ORM or a PRM or SRM or ESRM, a mobile station that supports FL RC 11/12 on the FCH will not include support for these RC in the FOR_FCH_RC_MAP field of the Fundamental

¹⁹ This field may be part of RESERVED bits that are included for octet alignment and are set to 0.

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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 will not be indicated in the REV_FCH_RC_MAP field in the same record. Since the base station does not support RL RC 8 and FL RC 11/12, the base station assigns RCs included in the FOR_FCH_RC_MAP and REV_FCH_RC_MAP fields.

- Mobile station will not include the capabilities introduced in [1] in the Capability Information record.

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~~[\[1\]](#). As shown in Table 1-1, 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~~ [introduced in \[1\]](#) that the base station supports. The dependence of various fields is shown below.

Field	Length (bits)	Recommended Values ²⁰
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	-

²⁰ If Recommended Values are not specified, then the base stations sets the values as per the current implementation.

Field	Length (bits)	Recommended Values²⁰
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	-
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
RC_BITMAP_CAPABILITY_EXT_ALLOWED	0 or 1	Implementation dependent.
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

Field	Length (bits)	Recommended Values ²⁰
		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.

1

3.2 Mobile Station Processing of Extension of SPM and MC-RR Parameters Message

The mobile station would parse the *SPM* and *MC-RRPM*, if supported, as specified in [[1]]. In section 3.4 it is assumed that the mobile station supports features of ~~Revision E of edma20001x~~[1] that require processing of the extensions of the *SPM* or *MC-RRPM*. If, for example, the mobile station supports only the new radio configurations, then it ~~does not~~ needs to process the extensions of *SPM* or *MC-RRPM* ~~until~~ the RC_BITMAP_CAPABILITY_EXT_ALLOWED bit.

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 [introduced in \[1\]](#) that require modification to *System Parameters Message* (see Table 1_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 [introduced in \[1\]](#) 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 [introduced in \[1\]](#) 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~~[\[1\]](#), 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~~[the](#)
8 features [introduced in \[1\]](#) that require modification to *System Parameters Message*, then the
9 base station does not need to extend the *System Parameters Message* to include fields after
10 the 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 ~~by 1x Revision E standard~~[\[1\]](#), and
13 continues the processing of the rest of the *System Parameters Message*.

14

3.4 Feature Dependent Extensions

3.4.1 RL RC 8 and FL RC 11/12

As described in 1.5.1, when the base station supports RL RC 8 and FL RC 11/12, the base station will set RC_BITMAP_CAPABILITY_EXT_ALLOWED field in MC-RRPM and/or SPM and MC-RRPM to '1'. Otherwise, the base station can omit this field as described in [1].

3.4.2 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.

3.4.3 Optional Message Transmission Indication (NUM_OPT_MSG_BITS)

If the base station does not support any ~~1x Revision E~~ of the features introduced in [1] other than RL RC 8, 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
<u>RC_BITMAP_CAPABILITY_EXT_ALLOWED</u>	<u>1</u>	<u>BS implementation dependednt</u>
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.
- If FREQ_GEN_OVHD_INF_IND needs to be set to '1', the NUM_OPT_MSG_BITS will be greater than 6.

An example of *System Parameters Message* extension for a base station supporting only Revision 0 of cdma20001x and *GOIM* 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
<u>RC BITMAP CAPABILITY EXT ALL OWED</u>	<u>1</u>	<u>BS implementation dependent</u>
CRRM_MSG_IND	1	0
NUM_OPT_MSG_BITS	4	'0100'
AP_PILOT_INFO	1	0
AP_IDT	1	0
AP_ID_TEXT	1	0
GEN_OVHD_INF_IND	1	1
FD_CHAN_LST_IND	0	N/A
ATIM_IND	0	N/A
FREQ_GEN_OVHD_INF_IND	0	N/A
RESERVED	0	N/A
APPIM_PERIOD_INDEX	0	N/A
GEN_OVHD_CYCLE_INDEX	0 or 3	Depends on BS configuration for <i>GOIM</i> Cycle Index
ATIM_CYCLE_INDEX	0	N/A
ADD_LOC_INFO_INCL	0	N/A

Field	Length (bits)	Values
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 '0100' because it
2 supports *GOIM* but does not support transmission of *FDCCLM* or the *ATIM*. The base
3 station sets the next 3 bits to 0 to indicate that it does not transmit Femto feature related
4 overhead messages. It sets the GEN_OVHD_INF_IND to '1' to indicate the support for *GOIM*
5 transmission. None of the remainder fields except GEN_OVHD_CYCLE_INDEX are included
6 in the extension of the *System Parameters Message*. GEN_OVHD_CYCLE_INDEX field is
7 included if the base station needs to set the GEN_OVHD_CYCLE_INDEX to a non-default
8 value.

9 In the example above, the mobile station parses the *System Parameters Message* as
10 specified in section 3.2. A value of '0100' for NUM_OPT_MSG_BITS indicates that the base
11 station has populated the 4 bits following the NUM_OPT_MSG_BITS field. The mobile
12 station stores the values of the AP_PILOT_INFO, AP_IDT, AP_ID_TEXT and the
13 GEN_OVHD_INF_IND fields. If the base station did not include GEN_OVHD_CYCLE_INDEX
14 field, the mobile station assumes a default value. If the base station includes
15 GEN_OVHD_CYCLE_INDEX field, the mobile station is able to parse to this field as
16 FD_CHAN_LST_IND, ATIM_IND and RESERVED fields are omitted based on
17 NUM_OPT_MSG_BITS value of '0100' and APPIM_PERIOD_INDEX is omitted based on a
18 value of '0' for AP_PILOT_INFO.

19 ~~3.4.3~~ 3.4.4 Access Point Pilot Information Message (AP_PILOT_INFO,
20 APPIM_PERIOD_INDEX)

21 The *APPIM* carries the pilot information for supporting the femto operation. It could be sent
22 by a macro or a femto base station. If the base station supports this message it sets the
23 AP_PILOT_INFO to '1'.

24 If the base station is sending the *APPIM* on the paging channel, then the base station
25 indicates the frequency of transmission of this message using the APPIM_PERIOD_INDEX
26 field. The APPIM_PERIOD_INDEX is set at follows:

27 If the base station needs to include any of the fields following the APPIM_PERIOD_INDEX
28 field, then the base station includes this field and indicates the frequency of transmission
29 of the *APPIM* on the paging channel. Otherwise, the base station includes this field only if it
30 wants to set this field to value other than '000'.

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

34 An example of *System Parameters Message* extension for a base station supporting only

1 Revision 0 of cdma20001x and supporting *APPIM*, *GOIM* and *Alternate technologies*
 2 *Information Message* is shown below:

3

Field	Length (bits)	Values
T_TDROP_RANGE_INCL	1	0
T_TDROP_RANGE	0	N/A
NEG_SLOT_CYCLE_INDEX_SUP	1	0
RC_BITMAP_CAPABILITY_EXT_ALLOWED	1	BS implementation dependent.
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 <i>GOIM</i> 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

Field	Length (bits)	Values
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 6th 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
9 of 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
11 GEN_OVHD_CYCLE_INDEX allows the mobile station to parse the *System Parameters*
12 *Message* correctly.

13 Similarly, in the above example, if the base station supports location enhancements in
14 addition to the above message transmissions, it would need to set ADD_LOC_INFO_INCL to
15 1. In this scenario, the base station would need to include APPIM_PERIOD_INDEX,
16 GEN_OVHD_CYCLE_INDEX and ATIM_CYCLE_INDEX fields, even if the corresponding
17 messages are being transmitted at the default frequency.

18 [3.4.43.4.5](#) Access Point Identification Message (AP_IDT)

19 The *APIDM* is typically sent by a femto base station. Hence, a femto base station sets the
20 AP_IDT to '1'. A macro base station sets AP_IDT field to '0' or could omit this field as
21 described in section 3.4.3.

22 Certain mobile stations may be capable of decoding the paging channel while on the traffic
23 channel. These mobile stations can use the HO_INFO_RECORD of APIDM for active handoff
24 in the following manner:

- 25 - If the femto base station (target) includes a HO_INFO_RECORD with
26 HO_INFO_TYPE field set to '000' and the mobile station reports PSMM with the PN
27 offset of the target femto base station, the mobile station will send a Handoff
28 Supplementary Information Notification Message (*HOSINM*) to the source base
29 station and include the AP_ID, IOS_MSC_ID and IOS_CELL_ID fields from the
30 *APIDM* of the target femto base station. The mobile station will send the *HOSINM*
31 after sending the *PSMM* that includes the pilot of the target femto base station.
- 32 - If the femto base station (target) includes a HO_INFO_RECORD with
33 HO_INFO_TYPE field set to '001' and the mobile station reports PSMM with the PN
34 offset of the target femto base station, the mobile station can include the

1 PSMM_SIGNATURE fields included in the APPIM of the target femto base station in
 2 the PSMM message sent to the source base station. The 15 MSBs and 6 LSBs of
 3 each PSMM_SIGNATURE are included as the PILOT_PN_PHASE and
 4 PILOT_STRENGTH respectively. The base station can use this information to
 5 identify the target femto base station.

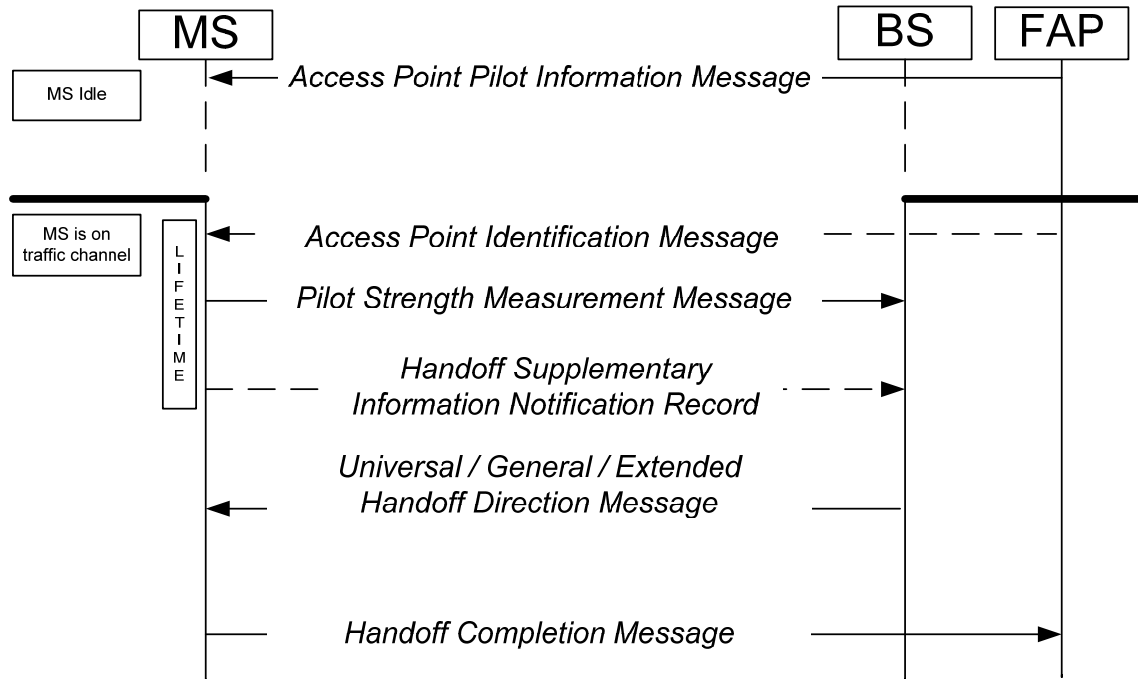
6 [3.4.5.3.4.6](#) Access Point Identification Text Message (AP_IDT_TXT)

7 The APIDTM is typically sent by a femto base station. Hence, a femto base station could set
 8 the AP_IDT_TXT to '1'. A macro base station sets AP_IDT_TXT field to '0' or will omit this
 9 field as described in section 3.4.3.

10 [3.4.6.3.4.7](#) Active Handoff into Femto Access Point

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

12 [3.4.6.13.4.7.1](#) Call Flow



13

14

Figure 3-1887 – Active handoff into a FAP

15 [3.4.6.23.4.7.2](#) Call Flow Details

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

19 Once the mobile station is connected with the base station it may receive a PN associated
 20 with a FAP at high strength. The mobile station can receive the APIDM from the FAP. The
 21 APIDM carries the information that can be used for identification of the FAP by the base

1 station. The mobile station may include this identification information in the PSMM or
 2 HOSINM. Including this information allows the base station to initiate a mobile station
 3 handoff to the FAP.

4
 5 ~~3.4.7~~3.4.8 General Overhead Information Message (GEN_OVHD_INF_IND,
 6 GEN_OVHD_CYCLE_INDEX)

7 The *GOIM* is used to send the overhead information that is not necessary for accessing the
 8 system. The *GOIM* contains information that is typically used for display purposes on the
 9 mobile station. If the base station is sending the *GOIM* on the paging channel, it sets the
 10 GEN_OVHD_INF_IND to '1'. Otherwise, the base station sets this value to '0' or could omit
 11 this field as described in section 3.4.3.

12 If the base station is sending the *GOIM* on the paging channel, then the base station
 13 indicates the frequency of transmission of this message using the
 14 GEN_OVHD_CYCLE_INDEX field. The GEN_OVHD_CYCLE_INDEX is set at follows:

15 If the base station needs to include any of the fields following the
 16 GEN_OVHD_CYCLE_INDEX field, then the base station includes this field and indicates the
 17 frequency of transmission of the *GOIM* on the paging channel. Otherwise, the base station
 18 includes this field only if it wants to set this field to value other than '000'.

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

22 ~~3.4.8~~3.4.9 Frequent General Overhead Information Message
 23 (FREQ_GEN_OVHD_INF_IND)

24 The *FGOIM* is used to send the overhead information that is useful but not necessary for
 25 system access. If the base station is sending the *FGOIM* on the paging channel, it sets the
 26 FREQ_GEN_OVHD_INF_IND to '1'. Otherwise, the base station sets this value to '0' or could
 27 omit this field as described in section 3.4.3.

28 The *FGOIM* carrying a GOI_REC_TYPE of '00000010' (Other Networks Available) can be
 29 used for enhancing mobile station's search for home system and can be useful in roaming
 30 scenarios. For example, system A can advertize the availability of system B by including the
 31 SID-NID pair, or the MCC MNC information of system B in the *FGOIM*. Upon receiving an
 32 Other Networks Available record type in a *FGOIM*, mobile stations that have system B as
 33 the home system can trigger the search for the home system. The mobile station search can
 34 be further aided by the inclusion of the BAND_CLASS and CHANNEL_NUMBER fields in
 35 the Other Networks Available record. Under certain conditions, such as unavailability of
 36 the home system due to non-overlapping coverage between home and roaming systems, the
 37 mobile station may continue to receive service from the roaming system.

38 ~~3.4.9~~3.4.10 Flex Duplex CDMA Channel List Message (FD_CHAN_LST_IND)

39 The *FDCCLM* is sent by the base station if it supports flexible separation of forward and
 40 reverse channels. The *FDCCLM* contains information on the pairing of the forward and

1 reverse channels separated by non-default frequency separation. If the base station is
 2 sending the *FDCCLM* on the paging channel, it sets the `FD_CHAN_LST_IND` to '1'.
 3 Otherwise, the base station could set this value to '0' or could omit this field as described
 4 in section 3.4.3.

5 It should be noted that apart from overhead messages, the support for flex duplex feature
 6 may require support for *GEM*. This support is only needed if the base station or mobile
 7 station does not support Revision D of cdma20001x and the `CAND_BAND_INFO_REQ` field
 8 in the *FDCCLM* is set to 1. In this scenario the mobile station includes the Band Class –
 9 Band Subclass capabilities information record along with the *RGM* or *ORM* or the *PRM* in a
 10 *GEM*.

11 ~~3.4.10~~3.4.11 Alternative Technologies Information Message (*ATIM_IND*)

12 The *ATIM* is sent by a base station to indicate the existence of alternative technologies such
 13 as HRPD, E-UTRAN, and WiMAX. The *ATIM* contains information on the alternate
 14 technologies. If the base station is sending the *ATIM* on the paging channel, it sets the
 15 `ATIM_IND` to '1'. Otherwise, the base station could set this value to '0' or could omit this
 16 field as described in section 3.4.3.

17 If the base station is sending the *Alternative Technologies Information* on the paging
 18 channel, then the base station indicates the frequency of transmission of this message
 19 using the `ATIM_CYCLE_INDEX` field. The `ATIM_CYCLE_INDEX` is set at follows:

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

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

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

30 ~~3.4.11~~3.4.12 Location Parameters (`ADD_LOC_INFO_INCL`, `ADD_LOC_INFO_INCL`, 31 `LOC_UNC_H`, `HEIGHT` and `LOC_UNC_V`)

32 If the base station supports enhancements to the location information such as the
 33 horizontal location uncertainty, vertical location uncertainty and height, then the base
 34 station sets this field to '1'. Otherwise, the base station omits `ADD_LOC_INFO_INCL`,
 35 `LOC_UNC_H`, `HEIGHT`, and `LOC_UNC_V` fields.

36 If the base station supports the use of *GEM* for receiving Geo Location Record with *ORM* or
 37 *PRM*, then the base station would set `ADD_LOC_GEM_ALLOWED` field in SPM. The mobile
 38 station that support *GEM* for sending Geo Location record with *ORM* or *PRM*, the mobile
 39 station would send *GEM* with *ORM* or *PRM* and Geo Location record only when
 40 `ADD_LOC_GEM_ALLOWED` is set to '1'. Typically, the mobile station will send *GEM* with
 41 *ORM* or *PRM* and Geo Location record only for emergency call.

1 ~~3.4.12~~3.4.13 MEID_ME Reporting

2 A new information record has been added for reporting of MEID_ME in ~~the Revision E of~~
3 ~~edma2000-1x~~[1]. The base station can send a *Status Request Message* with RECORD_TYPE
4 = '00101110' (MEID_ME). If the mobile station supports MEID_ME information record, then
5 ~~t~~The mobile station ~~can~~will include the MEID_ME information record in the *Status*
6 *Response Message* or the *Extended Status Response Message*; otherwise, the mobile station
7 will send a *Mobile Station Reject Order*.

1 **3.5 Extension to MC-RR Parameters Message**

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

- 4 - NUM_OPT_MSG_BITS field value needs to be increased to include the message
5 transmission indication bits for messages introduced in ~~Revision E of cdma2000~~
6 ~~1x[1]~~. This is similar to the recommendations for *System Parameters Message* as
7 described in 3.4.3.
- 8 - Fields of the MC-RR Parameter Message that are not supported by any particular
9 Revision of cdma2000 1x base station are set to '0'. This is similar to the
10 recommendation for the fields in *System Parameters Message* as specified in section
11 3.1.
- 12 - Fields for the new features that are appended at the end of MC-RR PM message are
13 set according to the same guidelines as section 3.4.4-3.4.12, except that these fields
14 pertain to message transmission over the Primary Broadcast Control Channel
15 rather than the Paging Channel.

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

17
18

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1 **4 ACCOLC FOR NATIONAL SECURITY/EMERGENCY PREPAREDNESS**

2 The 4-bit access overload class indicator (ACCOLCp) is used to identify which overload
3 class controls access attempts by the mobile station and is used to identify redirected
4 overload classes in global service redirection.

5 ACCOLCp value 12 is allocated for National Security/Emergency Preparedness purposes as
6 defined in [1].

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