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## ***Broadcast Multicast Service for CDMA2000 1x Systems***

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## 1 INTRODUCTION

### 1.1 General Description

This document defines requirements for support of the Broadcast/Multicast Service (BCMCS) capability on cdma2000<sup>®</sup> 1x spread spectrum systems.

### 1.2 Terms, Acronyms, and Abbreviations

**1x.** The cdma2000 air interface defined by [4].

**Base Station (BS).** 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, or other part of the wireless system.

**BCMCS.** Broadcast/Multicast.

**BCMCS.** Broadcast/Multicast Service.

**BCMCSCF.** Broadcast/Multicast Session Control Function.

**BCMCS\_FLOW\_ID.** A value used for identification of a BCMCS Multicast IP Flow.

**BS.** See base station.

**Mobile Station.** A station in the Public Cellular Radio Telecommunications Service intended to be used while in motion or during halts at unspecified points. Mobile stations include portable units (e.g., hand-held personal units) and units installed in vehicles.

**MSB.** Most significant bits.

### 1.3 References

#### 1.3.1 Normative References

The following standards contain provisions which, through references in this text, become provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. ANSI and TIA maintain registers of currently valid standards published by them.

1. **C.S0002-D**, *Physical Layer Standard for cdma2000 Spread Spectrum Systems*
2. **C.S0003-D**, *Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems*

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3. **C.S0004-D**, *Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems*
4. **C.S0005-D**, *Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems*
5. **X.S0022**, *Broadcast and Multicast Service for cdma2000 Wireless IP Network*
6. **RFC 1662**, *PPP in HDLC-like Framing*

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2 1.3.2 Informative References

7. **C.R1001**, *Administration of Parameter Value Assignments for cdma2000 Spread Spectrum Standards*

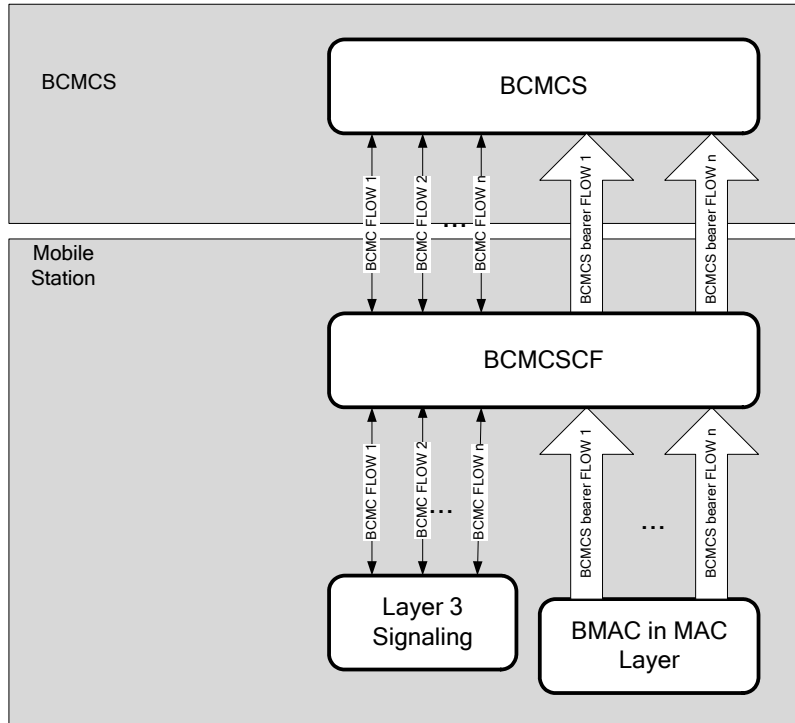
3

4 **1.4 Overview of Broadcast/Multicast Service**

5 Each Broadcast/Multicast flow is identified by a BCMCS\_FLOW\_ID, which is used to  
6 specify a flow between the BCMCS, BCMCSCF (see 2), and Layer 3 Signaling (see Figure  
7 1). See [5] for detailed descriptions.

8 The BCMCS initiates the service by requesting the BCMCSCF to send a request to Layer  
9 3 Signaling to monitor a specific BCMCS flow. Layer 3 Signaling then performs all the  
10 necessary air-interface procedures (e.g., search for a frequency carrying the requested  
11 BCMCS flow) to obtain the bearer data of the flow and deliver the data to the BCMCS.

12 The BCMCS terminates the service by requesting the BCMCSCF to send a request to  
13 Layer 3 Signaling to stop monitoring a specific BCMCS flow. Layer 3 Signaling then  
14 performs all the necessary air-interface procedures to stop delivering the bearer data to  
15 the BCMCS. Layer 3 Signaling will also release any air-interface resources (e.g., a  
16 dedicated traffic channel) associated with the flow.

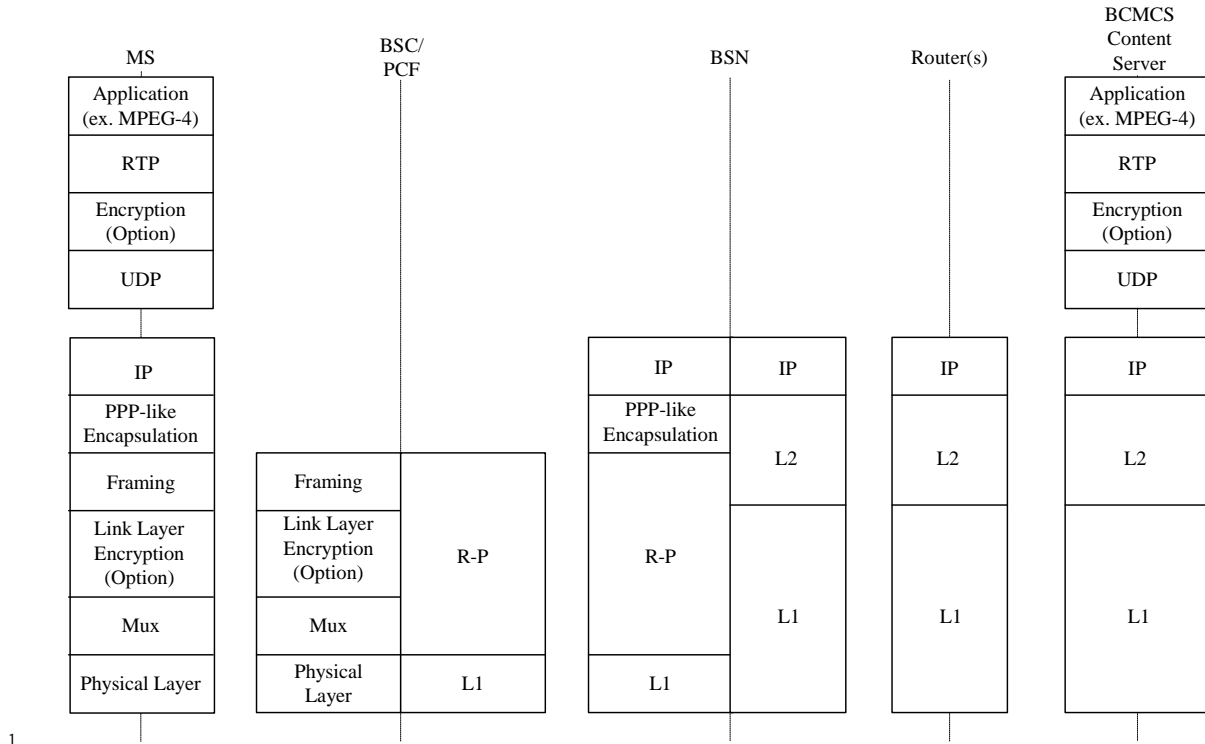


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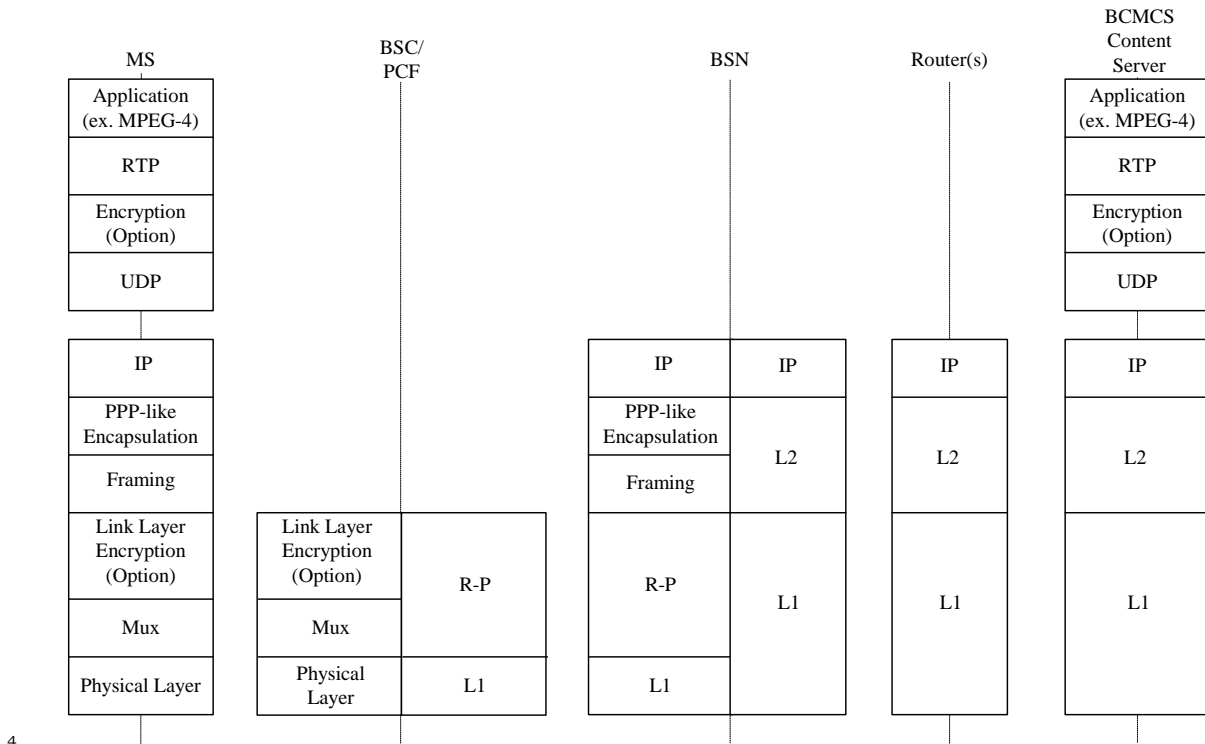
2 **Figure 1. BCMCS, BCMC Session Control Function, and Layer 3 Signaling in the**  
 3 **Mobile Station**

4 There are two kinds of framing used for BCMCS flow - segment-based framing and  
 5 HDLC-like framing. Segment-based framing is defined in section 3 and HDLC-like  
 6 framing is defined in [6]. The base station indicates to the mobile station whether  
 7 segment-based framing is to be used (e.g., via Layer 3 Signaling).

8 The protocol stack when segment-based framing is used is shown in Figure 2 and the  
 9 protocol stack when HDLC-like framing is used is shown in Figure 3.



1  
2 **Figure 2. Protocol Reference Model for Broadcast-Multicast Bearer Path when**  
3 **Segment-based framing is used**



4  
5 **Figure 3. Protocol Reference Model for Broadcast-Multicast Bearer Path when**  
6 **HDLC-Like Framing is used**

## 1.5 Interface to Layer 3 Signaling

All the primitives exchanged between BCMCSCF and Layer 3 Signaling are shown below. All these primitives are defined in Layer 3 Signaling. For complete definition of the primitives and the associated parameters, see [4].

**BCMC-Monitor.Request** (*BCMCS\_FLOW\_ID, priority*) – From the BCMCSCF to Layer 3 Signaling to start receiving BCMCS session corresponding to BCMCS\_FLOW\_ID

**BCMC-Monitor.Response** (*BCMCS\_FLOW\_ID, result, cause, reason\_ind*) – From Layer 3 Signaling to the BCMCSCF to indicate successful or unsuccessful response to the BCMC-Monitor.Request and BCMC-Stop-Monitor.Request

**BCMC-Browse.Request** – From the BCMCSCF to Layer 3 Signaling to request Layer 3 Signaling to report all the BCMCS flows currently available

**BCMC-Browse.Response** (*result, {BCMCS\_FLOW\_IDS}*<sup>1</sup>) – From Layer 3 Signaling to BCMCSCF to indicate the BCMCS flows currently available

**BCMC-Stop-Monitor.Request** (*BCMCS\_FLOW\_ID*) - From the BCMCSCF to Layer 3 Signaling to stop receiving BCMCS session corresponding to BCMCS\_FLOW\_ID

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<sup>1</sup> {BCMCS\_FLOW\_IDS} indicates a list of BCMC flow identifiers.

1

2 No text.

3

## 2 Procedures for BCMCSCF

### 2.1 Mobile Station Procedures for BCMCSCF

The BCMCSCF interfaces the BCMCS with Layer 3 Signaling and the BCMCSCF controls the BCMCS flow monitoring for all BCMCS flows. The BCMCSCF also interfaces the BCMCS with the Broadcast/Multicast multiplex sublayer (BMAC) in the MAC Layer (see [3]) for BCMCS data.

The BCMCSCF shall perform the procedures in this section.

If the BCMCSCF receives a request from the BCMCS to show the BCMCS flows currently available, the BCMCSCF shall send a BMC-Browse.Request to Layer 3 Signaling.

If the BCMCSCF receives the BMC-Browse.Response(*Result*, {*BCMCS\_FLOW\_IDs*}) from Layer 3 Signaling, the BCMCSCF shall relay the response to the BCMCS.

If the BCMCSCF receives a request from the BCMCS to start receiving a BCMCS flow, the BCMCSCF shall send the BMC-Monitor.Request (*BCMCS\_FLOW\_ID*, *priority*) to Layer 3 Signaling with *BCMCS\_FLOW\_ID* set to the BCMCS FLOW ID corresponding to the BCMCS flow and *priority* set to a value specified by the user.

If the BCMCSCF receives the BMC-Monitor.Response (*BCMCS\_FLOW\_ID*, *result*, *cause*, *reason\_ind*) from Layer 3 Signaling with *result* equal to "SUCCESS", the BCMCSCF shall perform the following:

- Relay the response to the BCMCS.
- If segment-based framing is not used, the mobile station shall start delivering the packets corresponding to the BCMCS flow received from the BMAC (see [3]) to the BCMCS.
- If segment-based framing is used, the mobile station shall process the packets received from the BMAC (see [4]) and perform the procedures in accordance with 3.2 for the packets received before delivering to the BCMCS.

If the BCMCSCF receives the BMC-Monitor.Response (*BCMCS\_FLOW\_ID*, *result*, *cause*, *reason\_ind*) from Layer 3 Signaling with *result* equal to "FAILURE", the BCMCSCF shall perform the following:

- Relay the response to BCMCS.

If the BCMCSCF receives an indication to stop monitor the BCMCS flow, the BCMCSCF shall perform the following:

- Send the BMC-Stop-Monitor.Request (*BCMCS\_FLOW\_ID*) indication to Layer 3 Signaling with *BCMCS\_FLOW\_ID* set to the BCMCS FLOW ID corresponding to the BCMCS flow

- 1 • The mobile station shall stop processing the packets corresponding to the  
2 BCMCS flow received from the Broadcast/Multicast multiplex sublayer (see [4]).

3 If the BCMCSCF expects a response from Layer 3 Signaling but does not receive it  
4 within an implementation dependent time, the BCMCSCF shall indicate to the BCMCS  
5 such request has timed out.

6 **2.2 Service Configuration**

7 If the base station provides the BCMCS and the base station is to transmit  
8 Broadcast/Multicast data over a FBSCH, the base station should send an overhead  
9 message describing the service configuration attributes for the FBSCH to be used. The  
10 base station shall not send a service configuration whose attributes are inconsistent  
11 with the valid service configuration attributes for BCMCS (see Table 2-1). The base  
12 station should transmit the BCMCS flow on the FBSCH identified by the service  
13 configuration attributes.

14 **Table 2-1 Valid Service Configuration Attributes for BCMCS**

Service Configuration Attribute	Valid Selections
Forward Multiplex Option	0x01, 0x02
Forward Fundamental Channel Radio Configuration	RC 3, 4, 5, 6, 7, 8, 9
Forward Broadcast Supplemental Channel Radio Configuration	RC 3, 4, 5, 6, 7, 8, 9
Outer Code Rate	11/16, 12/16, 13/16, 14/16
Forward Broadcast Supplemental Channel Multiplex Option	0x3, 0x4, 0x809, 0x80A, 0x811, 0x812, 0x821, 0x822, 0x905, 0x906, 0x909, 0x90A, 0x911, 0x912, 0x921, 0x922, 0xf20

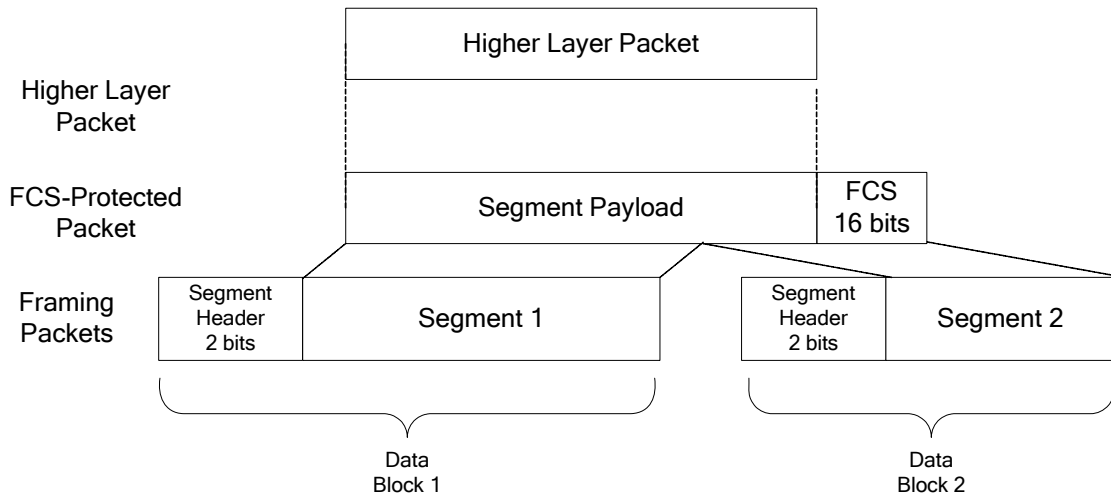
15

### 3 Segment-Based Framing Procedures

By default, segment-based framing is not used. If the mobile station receives an indication from Layer 3 Signaling that segment-based framing is used, the mobile station shall perform the segment-based framing in accordance with 3.2. If the BCMCS multiplex option in use is not 0xf20, the base station shall not ask the mobile station to perform segment-based framing.

When segment-based framing is used, the base station optionally adds a 16-bit Frame Check Sequence (FCS) to each Higher Layer Packet to form an FCS-Protected Packet (see

Figure 4). By default, the FCS is not used. The base station then segments the FCS-Protected Packet, if necessary, to form Framing Packets. Each Framing Packet comprises of a segment header and a segment. Each Framing Packet is delivered to the multiplex sublayer as a data block to be transmitted. The base station shall perform the segment-based framing in accordance with 3.1.



**Figure 4. Segment-Based Framing**

#### 3.1 Base Station Segment-Based Framing Procedures

For each higher layer packet, the base station shall perform the following to construct the Framing Packets:

- If FCS is used, the base station shall add a 16-bit FCS trailer to each Higher Layer Packet in accordance with 3.1.1 to form an FCS-Protected Packet and segment the FCS-Protected Packet, if necessary.
- If FCS is not used, the base station shall segment the Higher Layer Packet, if necessary.



Field	Length (bits)
First	1
Last	1

1

2           First           If the payload field of this segment is the first segment or the only  
3                           segment of an FCS-Protected Packet, then the base station shall  
4                           set this field to '1'. Otherwise, the base station shall set this field  
5                           to '0'.

6           Last           If the payload field of this segment is the last segment or the only  
7                           segment of an FCS-Protected Packet, then the base station shall  
8                           set this field to '1'. Otherwise, the base station shall set this field  
9                           to '0'.

### 10   **3.2 Mobile Station Segment-Based Procedures**

11   The mobile station shall maintain a reassembly buffer for each BCMCS flow and the  
12   mobile station shall perform all of the following procedures in the order listed for each  
13   segment it receives for a specific BCMCS flow:

- 14       • If the segment header is equal to '10', the mobile station shall discard any data in  
15       the reassembly buffer and place the segment in the reassembly buffer.
- 16       • If the segment header is equal to '00', the mobile station shall append the  
17       segment to the reassembly buffer.
- 18       • If the segment header is equal to '11', the mobile station shall discard any data in  
19       the reassembly buffer.
- 20       • If the segment header is equal to '01' or '11', the mobile station shall perform the  
21       following procedures:
  - 22           – Append the segment to the reassembly buffer and treat the data in the  
23           reassembly as an FCS-Protected Packet.
  - 24           – If the mobile station receives an indication from Layer 3 Signaling that FCS  
25           is not used, the mobile station shall perform the following:
    - 26               + The mobile station shall deliver the data in the reassembly buffer to the  
27               corresponding Broadcast/Multicast service instance.
  - 28           – Otherwise, the mobile shall validate the FCS of the FCS-Protected Packet. If  
29           the FCS checks, the mobile station shall remove the FCS from the FCS-  
30           Protected Packet and deliver the rest of the data (a Higher Layer Packet) to  
31           the corresponding Broadcast/Multicast service instance.
  - 32           – Discard the data, if any, in the reassembly buffer.

33

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2 No text.

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#### 4 BCMCS Broadcast Page

BCMCS uses a broadcast page to indicate the availability of a specific broadcast program.

If the base station intends to deliver the program to specific mobile stations by assigning a dedicated traffic channel to those mobile stations, it will request the specific mobile stations to respond to the broadcast page with a page response message.

If the base station intends to deliver the program to any mobile station capable of monitoring the channel being used to broadcast the program, the base station provides the identity of the broadcast channel in a *Broadcast Service Parameters Message* (BSPM). In this case, the broadcast page identifies the program for which delivery information is included in the BSPM.

The BURST\_TYPE used in the broadcast page is identified in [7]. For this BURST\_TYPE, the BC\_ADDR field (see [3]) is defined below.

Field	Length (bits)
BC_ADDR_TYPE	4

If BC\_ADDR\_TYPE = '0001', the base station shall include the following fields

BCMC_FLOW_ID_LENGTH	4
BCMC_FLOW_ID	8, 16, or 32
ORDER	8

BC\_ADDR\_TYPE – Broadcast Address Type.

The base station shall set this field to '0001'.

BCMC\_FLOW\_ID

\_LENGTH – BCMCS flow identifier length.

The BCMCS flow identifier length is defined in the following table. The base station shall set this field to a value between '0000' and '0010' inclusive.

<b>BCMC_FLOW_ID _LENGTH</b>	<b>Description</b>
'0000'	Length of the BCMCS Flow Identifier is equal to 8
'0001'	Length of the BCMCS Flow Identifier is equal to 16
'0010'	Length of the BCMCS Flow Identifier is equal to 32
'0011' – '1111'	Reserved

1  
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4  
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6  
7

BCMC\_FLOW\_ID – BCMCS flow identifier.

The base station shall set this field to the BCMCS flow identifier using the format as described in [5].

ORDER – Order Code.

The base station shall set this field according to the following:

<b>ORDER</b>	<b>Description</b>
'00000000'	Reserved
'00000001'	The base station orders the mobile station to send a page response message. See [4].
'00000010'	The base station orders the mobile station to monitor broadcast message (i.e. BSPM) on Paging Channel or BCCH. See [4].
'00000011' – '11111111'	Reserved

8