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**3RD GENERATION  
PARTNERSHIP  
PROJECT 2  
"3GPP2"**

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## ***Upper Layers for cdma2000 Extended Cell High Rate Packet Data Air Interface Specification***

***Revision 0***

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## Revision History

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**FOREWORD****1 (This foreword is not part of this Standard)**

2 This standard was prepared by Technical Specification Group C of the Third Generation  
3 Partnership Project 2 (3GPP2). This standard is evolved from and is a companion to the  
4 cdma2000<sup>®1</sup> standards. This air interface standard provides Medium Access Control and  
5 Upper Layers part of the extended cell high rate packet data air interface. Other parts of  
6 this standard are:

- 7 • Introduction to cdma2000 Extended Cell High Rate Packet Data Air Interface  
8 Specification
- 9 • Physical Layer for cdma2000 Extended Cell High Rate Packet Data Air Interface  
10 Specification

11  
12

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

**FOREWORD**

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## REFERENCES

The following documents contain provisions, which, through reference in this text, constitute provisions of this document. References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific. For a specific reference, subsequent revisions do not apply. For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP2 document, a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

### Normative References:

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<sup>2</sup> Editor's Note: The above documents are work in progress and should not be referenced unless and until they are approved and published. Until such time as this Editor's Note is removed, the inclusion of the above documents is for informational purposes only.

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## 1 MAC LAYER

### 1.1 Introduction

#### 1.1.1 General Overview

The MAC Layer contains the rules governing operation of the Control Channel, the Access Channel, the Forward Traffic Channel, and the Reverse Traffic Channel.

This section presents the protocols for the MAC Layer. Each of these protocols can be independently negotiated at the beginning of the session.

The MAC Layer contains the following protocols:

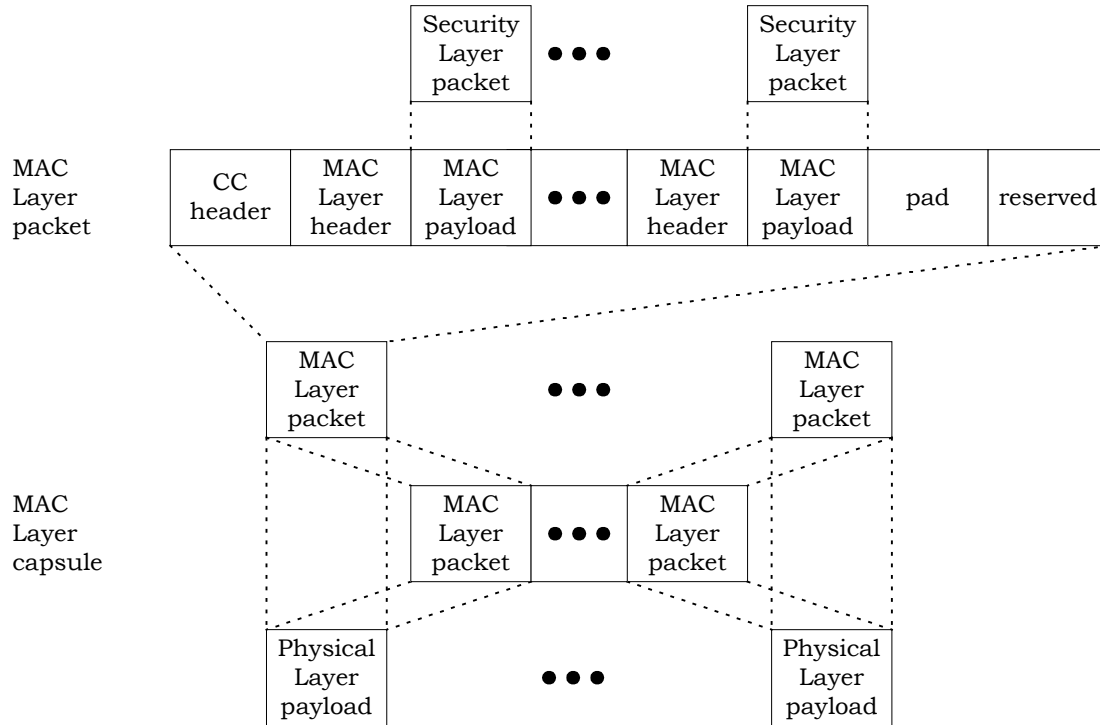
- Control Channel MAC Protocol: This protocol builds Control Channel MAC Layer packets out of one or more Security Layer packets, contains the rules concerning access network transmission and packet scheduling on the Control Channel, access terminal acquisition of the Control Channel, and access terminal Control Channel MAC Layer packet reception. This protocol also adds the access terminal address to transmitted packets.
- Access Channel MAC Protocol: This protocol contains the rules governing access terminal transmission timing and power characteristics for the Access Channel.
- Forward Traffic Channel MAC Protocol: This protocol contains the rules governing operation of the Forward Traffic Channel. It dictates the rules the access terminal follows when transmitting the Channel Quality Indicator Channel, along with the rules the access network uses to interpret this channel. The protocol supports variable rate operation of the Forward Traffic Channel.
- Reverse Traffic Channel MAC Protocol: This protocol contains the rules governing operation of the Reverse Traffic Channel. It dictates the rules the access terminal follows to assist the access network in acquiring the Reverse Traffic Channel. It also indicates the rules the access terminal and the access network use to select the transmission rate used over the Reverse Traffic Channel.

#### 1.1.2 Data Encapsulation for the InUse Instances of the MAC Protocols

In the transmit direction, the MAC Layer receives Security Layer packets, adds layer-related headers, trailers, concatenates them in the order to be processed on the receive side, adds padding where applicable, and forwards the resulting packet for transmission to the Physical Layer.

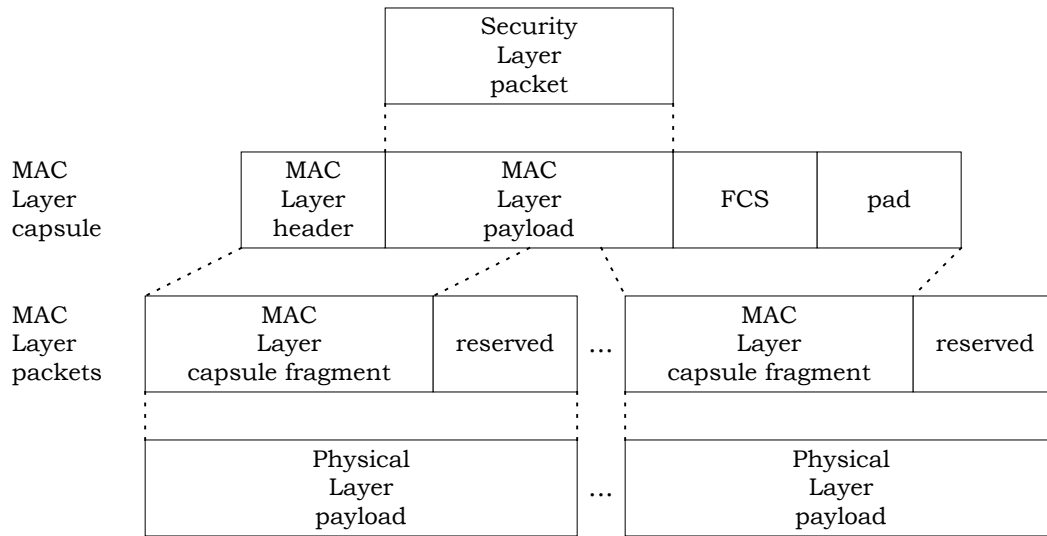
In the receive direction, the MAC Layer receives MAC packets from the Physical Layer and forwards the contained Security Layer packets to the Security Layer in the order received after removing the layer-related headers, trailers, and padding.

Figure 1.1.2-1, Figure 1.1.2-2, Figure 1.1.2-3, and Figure 1.1.2-4 illustrate the relationship between Security Layer packets, MAC packets and Physical Layer packets for the Control Channel, the Access Channel, and the Forward and Reverse Traffic Channels.



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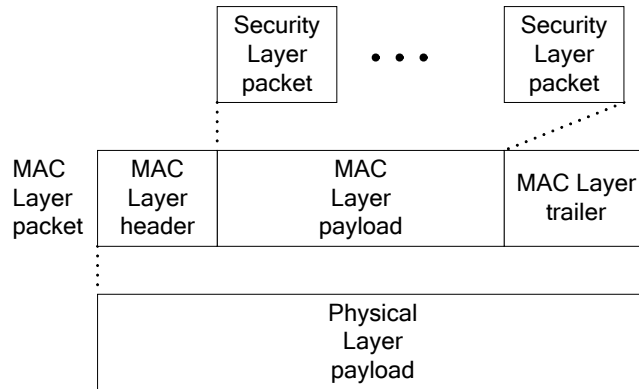
**Figure 1.1.2-1. Control Channel MAC Layer Packet Encapsulation**



3  
4

**Figure 1.1.2-2. Access Channel MAC Layer Packet Encapsulation**

1

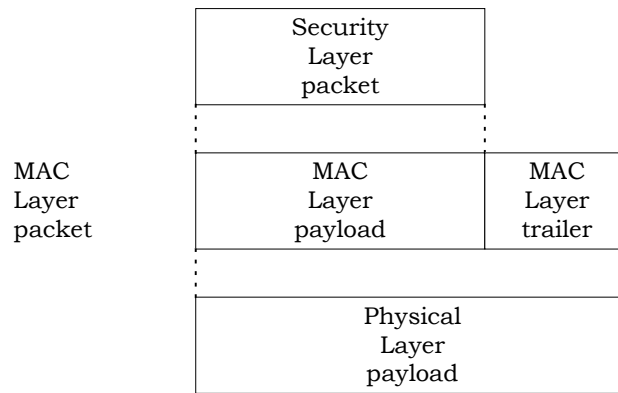


2

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**Figure 1.1.2-3. Forward Traffic Channel MAC Layer Packet Encapsulation**

4



5

6

**Figure 1.1.2-4. Reverse Traffic Channel MAC Layer Packet Encapsulation**

7

**1.2 Default Control Channel MAC Protocol**

8

The Default Control Channel MAC Protocol is same as defined in [3] which also works with xHRPD Subtype 0 Physical Layer Protocol.

9

10

**1.3 Enhanced Control Channel MAC Protocol**

11

The Enhanced Control Channel MAC Protocol is same as defined in [3] which also works with xHRPD Subtype 0 Physical Layer Protocol.

12

13

**1.4 xHRPD Subtype 0 Access Channel MAC Protocol**

14

**1.4.1 Overview**

15

The xHRPD Subtype 0 Access Channel MAC Protocol provides the procedures and messages required for an access terminal to transmit and an access network to receive the Access Channel. This protocol operates with the xHRPD Subtype 0 Physical Layer Protocol.

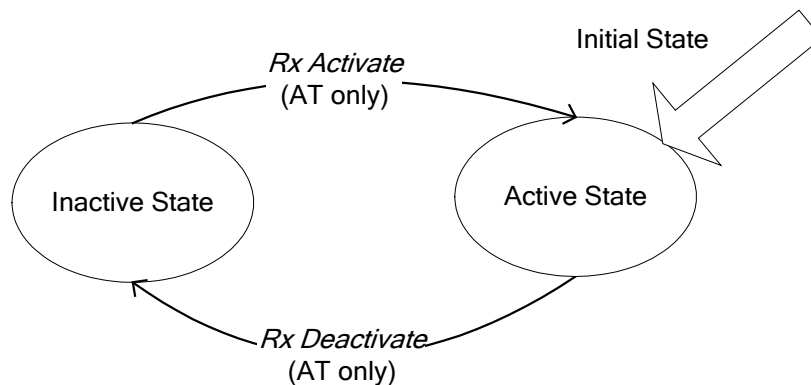
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17

1 This specification assumes that the access network has one instance of this protocol for all  
2 access terminals.

3 This protocol can be in one of two states:

- 4 • Inactive State: In this state the protocol waits for an *Activate* command. This state  
5 applies only to the access terminal and occurs when the access terminal has not  
6 acquired an access network or the access terminal has a connection open.
- 7 • Active State: In this state the access terminal transmits and the access network receives  
8 the Access Channel.



9

10 **Figure 1.4.1-1. xHRPD Subtype 0 Access Channel MAC Protocol State Diagram**

## 11 1.4.2 Primitives and Public Data

### 12 1.4.2.1 Commands

13 This protocol defines the following commands:

- 14 • *Activate*
- 15 • *Deactivate*

### 16 1.4.2.2 Return Indications

17 This protocol returns the following indications:

- 18 • *TransmissionSuccessful*
- 19 • *TransmissionAborted*
- 20 • *TransmissionFailed*
- 21 • *TxStarted*
- 22 • *TxEnded*
- 23 • *SupervisionFailed*
- 24 • *MACLayerCapsuleReceived*

## 1 1.4.2.3 Public Data

2 This protocol shall make the following data public:

- 3 • Subtype for this protocol
- 4 • PowerStep
- 5 • OpenLoopAdjust
- 6 • ProbeInitialAdjust
- 7 • PreambleLength
- 8 • AccessSignature field of the next AccessParameters message to be sent by the access  
9 network
- 10 •  $MI_{ACMAC}$
- 11 •  $MQ_{ACMAC}$

## 12 1.4.3 Protocol Data Unit

13 The transmission unit of this protocol is the Access Channel MAC Layer packet. Each  
14 Access Channel MAC Layer packet contains part or all of a Security Layer packet.

## 15 1.4.4 Protocol Initialization

## 16 1.4.4.1 Protocol Initialization for the InConfiguration Protocol Instance

17 Upon creation, the InConfiguration instance of this protocol in the access terminal and the  
18 access network shall perform the following in the order specified:

- 19 • The fall-back values of the attributes for this protocol instance shall be set to the  
20 default values specified for each attribute.
- 21 • If the InUse instance of this protocol has the same protocol subtype as this  
22 InConfiguration protocol instance, then the fall-back values of the attributes defined by  
23 the InConfiguration protocol instance shall be set to the values of the corresponding  
24 attributes associated with the InUse protocol instance.
- 25 • The value for each attribute for this protocol instance shall be set to the fall-back value  
26 for that attribute.

## 27 1.4.4.2 Protocol Initialization for the InUse Protocol Instance

28 Upon creation, the InUse instance of this protocol in the access terminal and the access  
29 network shall perform the following:

- 30 • The value of the attributes for this protocol instance shall be set to the default values  
31 specified for each attribute.
- 32 • The protocol at the access terminal shall enter the Inactive State.
- 33 • The protocol at the access network shall enter the Active State.

## 1.4.5 Procedures and Messages for the InConfiguration Instance of the Protocol

### 1.4.5.1 Procedures

This protocol uses the Generic Configuration Protocol (see [1]) to define the processing of the configuration messages.

### 1.4.5.2 Commit Procedures

The access terminal and the access network shall perform the procedures specified in this section, in the order specified, when directed by the InUse instance of the Session Configuration Protocol to execute the Commit procedures:

- All the public data that are defined by this protocol, but are not defined by the InUse protocol instance shall be added to the public data of the InUse protocol.
- If the InUse instance of this protocol has the same subtype as this protocol instance, then
  - The access terminal and the access network shall set the attribute values associated with the InUse instance of this protocol to the attribute values associated with the InConfiguration instance of this protocol.
  - The access terminal and the access network shall purge the InConfiguration instance of the protocol.
- If the InUse instance of this protocol does not have the same subtype as this protocol instance, then:
  - The access terminal shall set the initial state for the InConfiguration instance of this protocol to the Active State.
  - The access network shall set the state for the InConfiguration instance of this protocol to the Active State.
  - The InConfiguration protocol instance shall become the InUse protocol instance for the Access Channel MAC Protocol.
- All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

### 1.4.5.3 Message Formats

#### 1.4.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 1 MessageID            The sender shall set this field to 0x50.
- 2 TransactionID        The sender shall increment this value for each new
- 3 ConfigurationRequest message sent.
- 4 AttributeRecord      The format of this record is specified in [1].

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

6 1.4.5.3.2 ConfigurationResponse

7 The ConfigurationResponse message format is as follows:

8

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 9 MessageID            The sender shall set this field to 0x51.
- 10 TransactionID        The sender shall set this value to the TransactionID field of the
- 11                            corresponding ConfigurationRequest message.
- 12 AttributeRecord      An attribute record containing a single attribute value. If this
- 13                            message selects a complex attribute, only the ValueID field of the
- 14                            complex attribute shall be included in the message. The format of the
- 15                            AttributeRecord is given in [1]. The sender shall not include more
- 16                            than one attribute record with the same attribute identifier.
- 17

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
-----------------	------------	------------	----------

<b>Addressing</b>	unicast	<b>Priority</b>	40
-------------------	---------	-----------------	----

## 1.4.6 Procedures and Messages for the InUse Instance of the Protocol

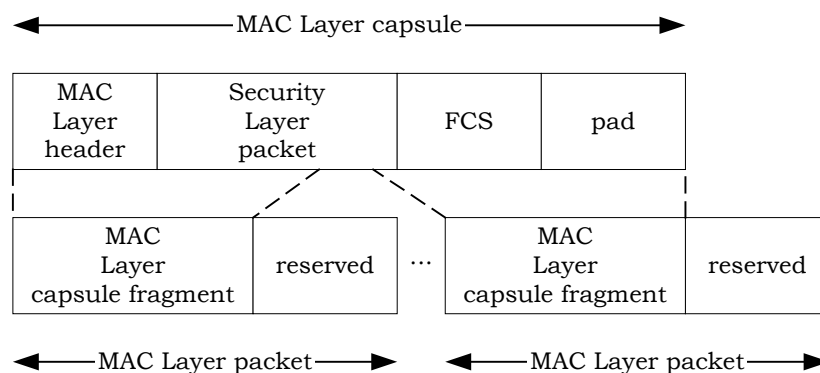
### 1.4.6.1 Procedures

The protocol constructs one or more packets out of the Security Layer packet as follows:

- The protocol adds the MAC Layer header specified in 1.4.6.2.1 in front of the Security Layer packet,
- The protocol adds the FCS as defined in 1.4.6.2.2,
- The protocol pads the result as defined in 1.4.6.2.3,
- The protocol splits the result into one or more Access Channel MAC Layer capsule fragments,
- The protocol adds the reserved bits, as defined in 1.4.6.2.4, to the capsule fragments to construct the Access Channel MAC Layer packets.

This protocol passes the packets for transmission to the Physical Layer. An example of the packet structure is shown in Figure 1.4.6.1-1.

Received packets are passed for further processing to the Security Layer after concatenation, removing the padding, FCS checking, and removing the MAC layer headers. The value of the SecurityLayerFormat and ConnectionLayerFormat fields shall be passed to the Security Layer with the Security Layer packet.



**Figure 1.4.6.1-1. Access Channel MAC Packet Structure**

#### 1.4.6.1.1 Command Processing

The access network shall ignore all commands.

##### 1.4.6.1.1.1 Activate

If this protocol receives an *Activate* command in the Inactive State,

- The access terminal shall transition to the Active State.
- The access network shall ignore it.

1 If this protocol receives the command in the Active State it shall be ignored.

2 1.4.6.1.1.2 Deactivate

3 If this protocol receives a *Deactivate* command in the Inactive State, it shall be ignored.

4 If this protocol receives the command in the Active State,

- 5 • The access terminal shall transition to the Inactive State.
- 6 • The access network shall ignore it.

7 1.4.6.1.2 Access Channel Structure

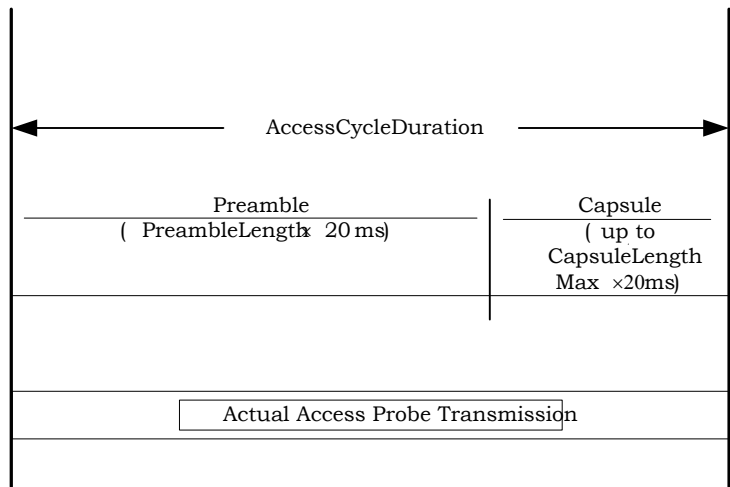
8 The Access Channel consists of one or more reverse link narrowband channels. The  
 9 number of narrowband channels and the corresponding frequencies designated for Access  
 10 Channel are specified by the AccessParameter message. The access terminal randomly  
 11 selects one of the narrowband channels from the designated set of channels to send its  
 12 access probe. Figure 1.4.6.1.2-1 and Figure 1.4.6.1.2-3 illustrate the access probe  
 13 structure and the access probe sequence.

14 The Access Channel Cycle specifies the time instants at which the access terminal may  
 15 start an access probe. An Access Channel probe may only begin at times T such that

16  $(T - 12 * \text{AccessChannelOffset}) \bmod \text{AccessCycleDuration} = 0,$

17 where T is CDMA System Time in slots and AccessChannelOffset is time offset of individual  
 18 narrowband Access Channel in 20 msec frame. The Access Channel Cycle for each  
 19 narrowband Access Channel is staggered in time by its AccessChannelOffset as shown in  
 20 Figure 1.4.6.1.2-2.

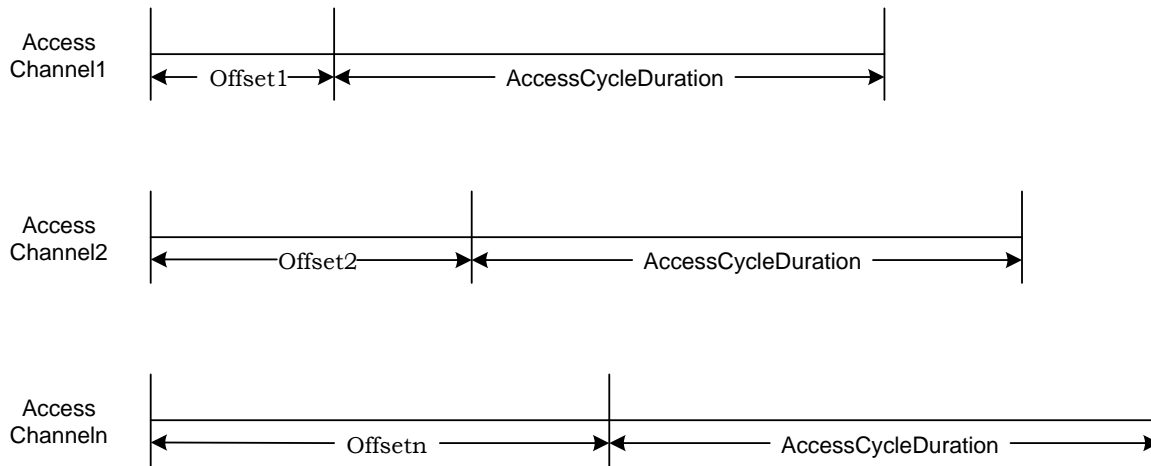
21 The structure of an individual access probe is shown in Figure 1.4.6.1.2-1. In each access  
 22 probe, the preamble which consists of only the pilot symbols is first transmitted. After  
 23 PreambleLength frames (of duration PreambleLength × 20 msec), the probe data is enabled  
 24 for up to CapsuleLengthMax × 20 msec.



25

1  
2

**Figure 1.4.6.1.2-1. Access Probe Structure**



3

**Figure 1.4.6.1.2-2. Time Staggering of Access Channel Cycle of Individual Narrowband Access Channel**

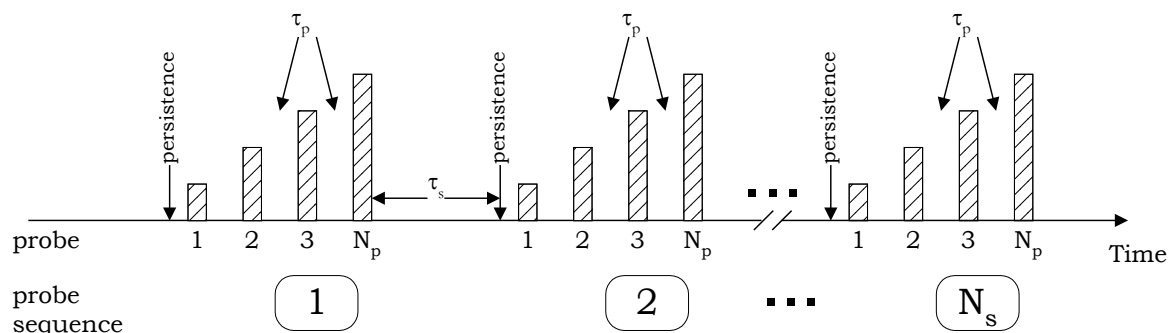
Each probe in a sequence is transmitted at increased power until any of the following conditions are met:

- The access terminal receives an ACack message,
- Transmission is aborted because the protocol received a *Deactivate* command, or
- Maximum number of probes per sequence (ProbeNumStep) has been transmitted.

Prior to the transmission of the first probe, the access terminal performs a persistence test which is used to control congestion on the Access Channel.

Additionally the access terminal performs a persistence test in between probe sequences.

14



**Figure 1.4.6.1.2-3. Access Probe Sequences**

1.4.6.1.3 Inactive State

This state applies only to the access terminal.

In this state the access terminal waits for an *Activate* command.

## 1 1.4.6.1.4 Active State

2 In this state the access terminal is allowed to transmit on the Access Channel and the  
3 access network is monitoring the Access Channel.

4 If the protocol receives a *Deactivate* command,

- 5 • Access terminal shall:
- 6 – Immediately cease transmitting on the Access Channel if it is in the process of  
7 sending a probe.
  - 8 – Return a *TransmissionAborted* indication if it was in the process of sending an  
9 Access Channel MAC Layer capsule.
  - 10 – Transition to the Inactive State.
- 11 • Access network shall ignore this command.

12 All other commands shall be ignored in this state.

## 13 1.4.6.1.4.1 Access Terminal Requirements

14 This protocol enforces a stop-and-wait packet transmission policy over the Access Channel.  
15 That is, the access terminal shall not send a new Access Channel MAC Layer capsule before  
16 either:

- 17 • Receipt of an *ACAck* message for the previous capsule, or
- 18 • Transmission of the previous capsule failed after transmitting *ProbeSequenceMax* probe  
19 sequences for it.

20 The access terminal shall return a *TxStarted* indication before transmitting the first probe  
21 for an Access Channel MAC Layer capsule.<sup>3</sup>

22 The access terminal shall return a *TxEnded* indication either:

- 23 • Simultaneous with a *TransmissionAborted* or a *TransmissionFailed* indication, or
- 24 •  $T_{ACMPT_{transaction}}$  seconds after a *TransmissionSuccessful* indication.

## 25 1.4.6.1.4.1.1 Probe Transmission

26 The access terminal shall conform to the following rules when sending a probe:

- 27 1. Current *SectorParameters*. The access terminal shall verify that the value of  
28 *SectorSignature* field of the latest *QuickConfig* message is the same as  
29 *SectorSignature* field of the latest *SectorParameters* message prior to sending the  
30 first probe of the first probe sequence. Both *SectorSignature* values (one belonging  
31 to the *QuickConfig* message and one belonging to the *SectorParameters* message)  
32 are public data of the Overhead Messages Protocol.

---

<sup>3</sup> Higher layer protocols use this indication as a notification that there may be an outstanding transaction on the Access Channel; and, therefore, the access terminal should not go to sleep.

- 1        2. Current AccessParameters. Prior to sending the first probe of the first probe  
 2        sequence, the access terminal shall verify that the last AccessParameters message it  
 3        received is current, according to the last AccessSignature value given as public data  
 4        by the Overhead Messages Protocol. If the AccessParameters message is not current,  
 5        the access terminal shall start the AccessParameters supervision timer for  
 6         $T_{ACMPAPSupervision}$ . If the timer expires before it receives the current AccessParameters  
 7        message, the access terminal shall return a *SupervisionFailed* indication and  
 8        transition to the Inactive State.
- 9        3. ATI Record. The access terminal shall set the ATI and ATIType fields of the ATI  
 10       Record in the MAC Layer header to TransmitATI.ATI and TransmitATI.ATIType,  
 11       respectively (TransmitATI is provided as public data by the Address Management  
 12       Protocol).
- 13       4. Probe Power Control. The access terminal shall send the  $i$ th probe in the probe  
 14       sequence at a power level given by  $X_0 + (i-1) \times \text{PowerStep}$ , where  $X_0$  represents the  
 15       access terminal's open-loop mean output power of the Pilot Channel and is given by  
 16        $X_0 = - \text{Mean } R_X \text{ Power (dBm)} + \text{OpenLoopAdjust} + \text{ProbeInitialAdjust}$   
 17       and the Mean  $R_X$  Power is estimated throughout the transmission of each probe.
- 18       5. Probe Structure. When sending a probe, the access terminal shall transmit  
 19       PreambleLength frames of pilot only, followed by up to CapsuleLengthMax frames of  
 20       probe data and pilot. The access terminal shall transmit a single Access Channel  
 21       Capsule per probe. The access terminal shall not change the probe data contents in  
 22       between probes.
- 23       6. PN Code Cover. The access terminal shall use the Access Channel long codes masks  
 24       for generating the PN sequence to cover the entire probe. The Access Channel PN  
 25       sequence is specified in[7].
- 26       7. Inter-Probe Backoff. If the access terminal receives an ACack message or it has  
 27       already transmitted ProbeNumStep ( $N_P$  in Figure 1.4.6.1.2-3) probes in this probe  
 28       sequence, then it shall not send the next probe in this probe sequence. Otherwise,  
 29       after sending an access probe within an access probe sequence, the access terminal  
 30       shall perform the following procedures:
- 31            a. Set  $y_{Total}$  to 0,  
 32            b. Generate a pseudo random number  $y$  which is a uniformly distributed  
 33            integer random number between 0 and ProbeBackoff,  
 34            c. Add  $y$  to  $y_{Total}$  (i.e.,  $y_{Total} = y_{Total} + y$ ),  
 35            d. Compute  $P = T_{ACMPATProbeTimeout} + (y_{Total} \times \text{AccessCycleDuration})$

- 1 e. Consider the access probe that would start at the first Access Channel  
 2 Cycle instance that occurs at least P slots after the end of the previous  
 3 access probe. If any portion of the access probe plus the time interval that  
 4 is required to receive the corresponding ACAck message (as estimated by  
 5 the access terminal)<sup>4</sup> overlaps with slots when the access terminal does not  
 6 receive the Forward Channel, then the access terminal shall transmit the  
 7 next access probe at the first Access Channel Cycle instance that occurs at  
 8 least P + T × AccessCycleDuration) slots after the end of the previous access  
 9 probe where T is the minimum number of intervals of length  
 10 AccessCycleDuration that are needed to be added to P in order to ensure  
 11 that the access probe does not overlap with the slots when the access  
 12 terminal does not receive the Forward Channel.
- 13 f. Otherwise, if condition ‘e’ is not satisfied, the access terminal shall transmit  
 14 the next access probe at the first Access Channel Cycle instance that occurs  
 15 at least P slots after the end of the previous access probe.

16 1.4.6.1.4.1.2 Access Channel Long Code Mask

17 The access terminal shall set the Access Channel long masks, MI<sub>ACMAC</sub> and MQ<sub>ACMAC</sub> as  
 18 follows.

19 The 42-bit mask MI<sub>ACMAC</sub> shall be as specified in Table 1.4.6.1.4.1.2-1.

20 **Table 1.4.6.1.4.1.2-1. Access Channel Long Code Masks**

BIT	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
MI <sub>ACMAC</sub>	1	1	AccessCycleNumber									Permuted (ColorCode   SectorID[23:0])																														

22 The 42-bit mask MQ<sub>ACMAC</sub> shall be derived from the mask MI<sub>ACMAC</sub> as follows:

23  $MQ_{ACMAC}[k] = MI_{ACMAC}[k-1], \text{ for } k = 1, \dots, 41$

24  $MQ_{ACMAC}[0] = MI_{ACMAC}[0] \oplus MI_{ACMAC}[1] \oplus MI_{ACMAC}[2] \oplus MI_{ACMAC}[4] \oplus MI_{ACMAC}[5] \oplus$

25  $MI_{ACMAC}[6] \oplus MI_{ACMAC}[9] \oplus MI_{ACMAC}[15] \oplus MI_{ACMAC}[16] \oplus MI_{ACMAC}[17] \oplus$

26  $MI_{ACMAC}[18] \oplus MI_{ACMAC}[20] \oplus MI_{ACMAC}[21] \oplus MI_{ACMAC}[24] \oplus MI_{ACMAC}[25] \oplus$

27  $MI_{ACMAC}[26] \oplus MI_{ACMAC}[30] \oplus MI_{ACMAC}[32] \oplus MI_{ACMAC}[34] \oplus MI_{ACMAC}[41]$

28 where the  $\oplus$  denotes the Exclusive OR operation, and MQ<sub>ACMAC</sub>[i] and MI<sub>ACMAC</sub>[i] denote the  
 29 i<sup>th</sup> least significant bit of MQ<sub>ACMAC</sub> and MI<sub>ACMAC</sub>, respectively.

30 In Table 1.4.6.1.4.1.2-1:

- 31 • SectorID is given as public data of Overhead Messages Protocol and corresponds to the  
 32 sector to which the access terminal is sending the access probe.

---

<sup>4</sup> The turn-around time between the access network receiving an access probe and sending an ACAck message is determined by the access network implementation, but the access terminal may estimate such time interval.

- 1 • ColorCode is given as public data of Overhead Messages Protocol and corresponds to
- 2 the sector to which the access terminal is sending the access probe.
- 3 • AccessCycleNumber is defined as follows:

$$4 \quad \text{AccessCycleNumber} = \text{SystemTime} \bmod 256$$

5 Where:

- 6 • SystemTime is the CDMA System Time in slots corresponding to the slot in which the
- 7 first access probe preamble for this access probe is sent. Permuted(ColorCode |
- 8 SectorID[23:0]) is a permutation of the bits in ColorCode | SectorID[23:0] and is defined
- 9 as follows:

$$10 \quad \text{ColorCode} \mid \text{SectorID}[23:0] = (S_{31}, S_{30}, S_{29}, \dots, S_0)$$

$$11 \quad \text{Permuted}(\text{ColorCode} \mid \text{SectorID}[23:0]) =$$

$$12 \quad (S_0, S_{31}, S_{22}, S_{13}, S_4, S_{26}, S_{17}, S_8, S_{30}, S_{21}, S_{12}, S_3, S_{25}, S_{16}, S_7, S_{29}, S_{20}, S_{11}, S_2, S_{24},$$

$$13 \quad S_{15}, S_6, S_{28}, S_{19}, S_{10}, S_1, S_{23}, S_{14}, S_5, S_{27}, S_{18}, S_9).$$

#### 14 1.4.6.1.4.1.3 Probe Sequence Transmission

15 The access terminal shall conform to the following rules when sending a probe sequence:

- 16 1. The access terminal shall randomly select one of the narrowband channels
- 17 designated as Access Channel.
- 18 2. Transmission of the First Probe.
  - 19 – Prior to sending the first probe of the sequence, the access terminal shall
  - 20 perform the following:

- 21 + Persistence Test : For this test, the access terminal shall use the value  $p$  as
- 22 specified by APersistence[ $i$ ] where  $i$  is the class of the access terminal and
- 23 APersistence[ $i$ ] is the  $(i+1)^{\text{st}}$  occurrence of the APersistence field in the
- 24 AccessParameters message.<sup>5</sup> The value  $i=2$  is reserved for test access
- 25 terminals. If the access terminal does not have a class defined, it shall use  $i=0$ ,
- 26 corresponding to non-emergency access terminals. All other values of  $i$  are
- 27 reserved.

28 When  $p$  is not zero, the persistence test consists of comparing a uniformly

29 distributed random number  $x$ ,  $0 < x < 1$ , (using the procedure specified in [1])

30 with  $p$ . If  $x < p$  the test is said to succeed. If the persistence test succeeds or if

31 the number of consecutive unsuccessful persistence tests exceeds  $4/p$ , the

32 access terminal may transmit in the first upcoming Access Channel Cycle such

33 that no portion of the access probe plus the time interval that is required to

---

<sup>5</sup> The access terminal's class is configured through means that are outside the scope of this specification.

- 1 receive the corresponding ACK message (as estimated by the access terminal)<sup>6</sup>  
 2 will overlap with slots when the access terminal does not receive the Forward  
 3 Channel. If  $p$  is equal to zero, the access terminal shall return a  
 4 *TransmissionFailed* indication and end the access.
- 5 3. Probe Contents. The access terminal shall not change the data portion of the probe  
 6 contents between probe sequences.
  - 7 4. Success Condition. If the access terminal receives an ACK message it shall stop  
 8 the probe sequence, including any transmission in progress, and shall return a  
 9 *TransmissionSuccessful* indication.
  - 10 5. Failure Condition. If the access terminal has already sent ProbeSequenceMax probe  
 11 sequences for this access ( $N_S$  in Figure 1.4.6.1.2-3), and if it does not receive an  
 12 ACK message acknowledging its receipt within ( $T_{ACMPATProbeTimeout} + T_{ACMPCycleLen}$ )  
 13 slots after the end of the last access probe, or if the interval between two adjacent  
 14 probes in the access attempt is greater than  $T_{ACMPATProbeTimeout} + \max(\text{ProbeBackoff},$   
 15  $\text{ProbeSequenceBackoff}) \times \text{AccessCycleDuration} + T_{ACMPMaxDelayPrevProbe}$  slots<sup>7</sup>, then the  
 16 access terminal shall return a *TransmissionFailed* indication and abort the access.
  - 17 6. Inter-Sequence Backoff. The access terminal shall generate a uniformly distributed  
 18 integer random number  $k$  between 0 and ProbeSequenceBackoff. The access  
 19 terminal shall wait for  $\tau_S = (k \times \text{AccessCycleDuration}) + T_{ACMPATProbeTimeout}$  slots from  
 20 the end of the last probe of the previous sequence before repeating this sequence.

#### 21 1.4.6.1.4.2 Access Network Requirements

22 The access network should send an AccessParameters message at least once every  
 23  $N_{ACMPAccessParameters}$  slots.

24 The access network should send an ACK message in response to every Access Channel  
 25 MAC Layer capsule it receives. The message should be sent within  $T_{ACMPANProbeTimeout}$  slots of  
 26 receipt of the packet. The access network shall return a *MACLayerCapsuleReceived*  
 27 indication upon sending an ACK message.

28 The access network should monitor and control the load on the Access Channel. The access  
 29 network may control the load by adjusting the access persistence vector, APersistence, sent  
 30 as part of the AccessParameters message.

#### 31 1.4.6.2 Header and Message Formats

##### 32 1.4.6.2.1 MAC Layer Header

33 The access terminal shall place the following header in front of the Security Layer packet:  
 34

---

<sup>6</sup> The turn-around time between the access network receiving an access probe and sending an ACK message is determined by the access network implementation, but the access terminal may estimate such time interval.

<sup>7</sup> E.g., because the access terminal has tuned to the frequency associated with another air-interface.

Field	Length (bits)
Length	8
SessionConfigurationToken	16
SecurityLayerFormat	1
ConnectionLayerFormat	1
Reserved	4
ATI Record	34

- 1 Length                    The access terminal shall set this field to the combined length, in  
2                                    octets, of the Security Layer packet and this MAC Layer header.  
3                                    excluding the Length field.
- 4 SessionConfigurationToken  
5                                    The access terminal shall set this field to the value of the  
6                                    SessionConfigurationToken which is public data of the Session  
7                                    Configuration Protocol.
- 8 SecurityLayerFormat  
9                                    The access terminal shall set this field to '1' if security layer packet is  
10                                    either authenticated or encrypted; otherwise, the access terminal  
11                                    shall set this field to '0'.
- 12 ConnectionLayerFormat  
13                                    The access terminal shall set this field to '1' if the connection layer  
14                                    packet is Format B; otherwise, the access terminal shall set this field  
15                                    to '0'.
- 16 Reserved                    The access terminal shall set this field to zero. The access network  
17                                    shall ignore this field.
- 18 ATI Record                    Access Terminal Identifier Record. The access terminal shall set this  
19                                    field to the record specifying the access terminal's ID specified by  
20                                    TransmitATI.ATI and TransmitATI.ATIType. This record is defined in  
21                                    [1].

#### 22 1.4.6.2.2 FCS

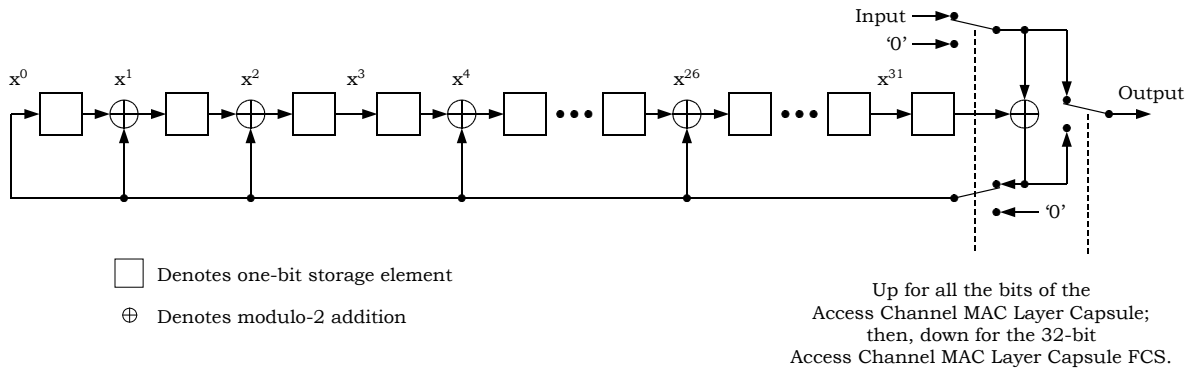
23 The FCS shall be calculated using the standard CRC-CCITT generator polynomial:

$$24 \quad g(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x^1 + 1$$

25 The FCS shall be equal to the value computed by the following procedure and the logic  
26 shown below:

- 27 • All shift register elements shall be initialized to logical zeros.
- 28 • Switches shall be set in the up position.

- 1 • Register shall be clocked once for each bit of Access Channel MAC Layer Capsule, excluding the FCS and padding bits. The Access Channel MAC Layer Capsule is read in order from MSB to LSB, starting with the MSB of the MAC Layer header
- 2
- 3
- 4 • Switches shall be set in the down position so that the output is a modulo-2 addition with a '0' and the successive shift register inputs are '0'.
- 5
- 6 • Register shall be clocked an additional 32 times for the 32 FCS bits.



**Figure 1.4.6.2-1. Access Channel MAC Layer Capsule FCS**

1.4.6.2.3 Padding Bits

The access terminal shall add sufficient padding so that the Access Channel MAC capsule, including all payload, FCS, padding, and headers, is the smallest possible integer multiple of 232 bits. The access terminal shall set the padding bits to '0'. The access network shall ignore the padding bits.

1.4.6.2.4 Reserved Bits

The access terminal shall add 2 reserved bits to each Access Channel capsule fragment. The access terminal shall set the reserved bits to '0'. The access network shall ignore the reserved bits.

1.4.6.2.5 ACAck

The access network sends the ACAck message to acknowledge receipt of an Access Channel MAC Layer capsule.

Field	Length (bits)
MessageID	8

MessageID                      The access network shall set this field to 0x00.

<b>Channels</b>	CC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	10

1 1.4.6.2.6 AccessParameters

2 The AccessParameters message is used to convey Access Channel information to the access  
3 terminals.

4

Field	Length (bits)
MessageID	8
AccessCycleDuration	8
AccessSignature	16
OpenLoopAdjust	8
ProbeInitialAdjust	5
ProbeNumStep	4
PowerStep	4
PreambleLength	3
CapsuleLengthMax	4

N<sub>ACMPAPersist</sub> occurrences of the following field:

{

APersistence	6
--------------	---

}

AccessChannelRecordCount	4
--------------------------	---

AccessChannelRecordCount occurrences of the following field:

{0

AccessChannelRecord	24
---------------------	----

NumOfNarrowBandChannels (see [6]) occurrences of the following field:

{1

AccessChannelOffset	8
---------------------	---

}1

}0

MaxPathDelay	0 or 8
Reserved	variable

5 MessageID

The access network shall set this field to 0x01.

1	AccessCycleDuration	
2		The access network shall set this field to the duration of an Access
3		Channel Cycle in units of 20 msec frames.
4	AccessSignature	AccessParameters message signature. The access network shall
5		change this field if the contents of the AccessParameters message
6		change.
7	OpenLoopAdjust	The access network shall set this field to the negative of the nominal
8		power to be used by access terminals in the open loop power
9		estimate, expressed as an unsigned value in units of 1 dB. The value
10		used by the access terminal is -1 times the value of this field.
11	ProbeInitialAdjust	The access network shall set this field to the correction factor to be
12		used by access terminals in the open loop power estimate for the
13		initial transmission on the Access Channel, expressed as a two's
14		complement value in units of 1 dB.
15	ProbeNumStep	The access network shall set this field to the maximum number of
16		access probes access terminals are to transmit in a single access
17		probe sequence. The access network shall set this field to a value in
18		the range [1 ... 15].
19	PowerStep	Probe power increase step. The access network shall set this field to
20		the increase in power between probes, in resolution of 0.5 dB. The
21		access terminal shall support all the valid values specified by this
22		field.
23	PreambleLength	The access network shall set this field to the length in 20 msec
24		frames of the access probe preamble in the range [4 ... 7]. The access
25		terminal shall support all the valid values specified by this field.
26	CapsuleLengthMax	Access Channel Max Capsule length. The access network shall set
27		this field to the maximum number of frames in an Access Channel
28		Capsule. The access network shall set this field to a value in the
29		range [2 ... 15]. The access terminal shall support all the valid values
30		specified by this field.
31	APersistence	Access persistence vector. If a value in this vector is 0x3F, the access
32		terminal shall use zero as the corresponding persistence probability;
33		otherwise, if the value of this field, n, not equal to 0x3F, the access
34		terminal shall use $2^{-n/4}$ as the corresponding persistence probability.
35	AccessChannelRecordCount	
36		Number of access channel records. Access network shall set this field
37		to the number of access channel records supported by a sector. Each

1 channel record may contain more than one (up to 15 channels for a  
 2 single 1.25MHz carrier) consecutive narrowband access channels.

3 **AccessChannelRecord**

4 Access Channel record. Access network shall set this field to channel  
 5 record (see [6]) corresponding to the narrowband access channel  
 6 frequency in this sector.

7 **AccessChannelOffset**

8 AccessChannelOffset in time. The offset is specified as an array of  
 9 size equal to the number of narrowband access channels in a  
 10 channel record. Each 8-bit entry of the array denotes the time offset  
 11 of the access channel cycle for each narrowband access channel in  
 12 units of 20 msec frames (12 slots).

13 **MaxPathDelay** Maximum round-trip path delay in unit of 4 slots period. This is the  
 14 optional field and shall contain a non-zero value if included.

15 **Reserved** Number of bits in this field is equal to the number needed to make  
 16 the message length an integer number of octets. The access network  
 17 shall set this field to zero. The access terminal shall ignore this field.  
 18

<b>Channels</b>	CC	<b>SLP</b>	Best Effort
<b>Addressing</b>	Broadcast	<b>Priority</b>	30

19 1.4.6.3 Interface to Other Protocols

20 1.4.6.3.1 Commands

21 This protocol does not issue any commands.

22 1.4.6.3.2 Indications

23 This protocol does not register to receive any indications.

24 1.4.7 Configuration Attributes

25 The following complex attributes and default values are defined (see [1] for attribute record  
 26 definition).

1 1.4.7.1 InitialConfiguration Attribute  
 2

Field	Length (bits)	Default
Length	8	N/A
AttributeID	8	N/A

One or more of the following attribute value record:

{

ValueID	8	N/A
ProbeSequenceMax	4	3
ProbeBackoff	4	4
ProbeSequenceBackoff	4	8
Reserved	4	N/A

}

3 Length Length of the complex attribute in octets. The access network shall  
 4 set this field to the length of the complex attribute excluding the  
 5 Length field.

6 AttributeID Parameter set identifier. The access network shall set this field to  
 7 0x00.

8 ValueID The access network shall set this field to an identifier assigned to this  
 9 complex attribute. The access network should change this field for  
 10 each set of values for this complex attribute.

11 ProbeSequenceMax Maximum number of probe sequences. The access network shall set  
 12 this field to the maximum number of probe sequences for a single  
 13 access attempt. The access network shall set this field to a value in  
 14 the range [1 ... 15]. The access terminal shall support all the valid  
 15 values specified by this field.

16 ProbeBackoff Inter-probe backoff. The access network shall set this field to the  
 17 upper limit of the backoff range (in units of AccessCycleDuration)  
 18 that the access terminal is to use between probes. The access  
 19 terminal shall support all the valid values specified by this field.

20 ProbeSequenceBackoff  
 21 Inter-probe sequence backoff. The access network shall set this field  
 22 to the upper limit of the backoff range (in units of  
 23 AccessCycleDuration) that the access terminal is to use between  
 24 probe sequences. The access terminal shall support all the valid  
 25 values specified by this field.

1 Reserved                      The access network shall set this field to zero. The access terminal  
2 shall ignore this field.

3 1.4.8 Protocol Numeric Constants  
4

<b>Constant</b>	<b>Meaning</b>	<b>Value</b>
$N_{ACMPType}$	Type field for this protocol	[5]
$N_{ACMPxHRPDS0}$	Subtype field for this protocol	0x0000
$N_{ACMPAPersist}$	Number of different persistence values	4
$N_{ACMPAccessParameters}$	The recommended maximum number of slots between transmission of two consecutive AccessParameters message.	$3 * T_{ACMPCycleLen}$
$T_{ACMPAPSupervision}$	AccessParameters supervision timer	$12 * T_{ACMPCycleLen}$
$T_{ACMPATProbeTimeout}$	Time to receive an acknowledgment at the access terminal for a probe before sending another probe	$128 + 4 * MaxPathDelay$ slots
$T_{ACMPANProbeTimeout}$	Maximum time to send an acknowledgment for a probe at the access network	96 slots
$T_{ACMPTransaction}$	Time for access terminal to wait after a successful transmission before returning a <i>TxEnded</i> indication	1 second
$T_{ACMPCycleLen}$	Length of Control Channel Cycle used by the Access Channel MAC Protocol	256 slots
$T_{ACMPMaxDelayPrevProbe}$	A constant that determines the time for the access terminal to wait until after transmitting an access probe in the access attempt before returning a <i>TransmissionFailed</i> indication	300 slots

5 1.4.9 Session State Information

6 The Session State Information record (see [1]) consists of parameter records.

7 The parameter records for this protocol consist of only the configuration attributes of this  
8 protocol.

## 1.5 xHRPD Subtype 0 Forward Traffic Channel MAC Protocol

### 1.5.1 Overview

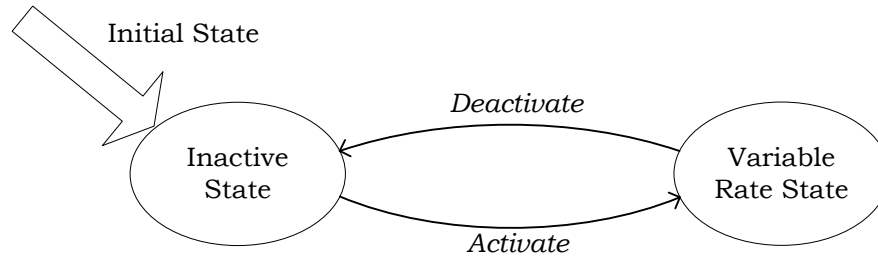
The xHRPD Subtype 0 Forward Traffic Channel MAC Protocol provides the procedures and messages required for an access network to transmit and an access terminal to receive the Forward Traffic Channel. Specifically, this protocol addresses Forward Traffic Channel addressing and Forward Traffic Channel rate control. This protocol operates with the xHRPD Subtype 0 Physical Layer Protocol.

The access network maintains an instance of this protocol for every access terminal.

This protocol operates in one of two states:

- **Inactive State:** In this state, the access terminal is not assigned a Forward Traffic Channel. When the protocol is in this state, it waits for an *Activate* command.
- **Variable Rate State:** In this state, the access network transmits the Forward Traffic Channel at a variable rate, as a function of the access terminal's CQI value.

The protocol states and allowed transitions between the states are shown in Figure 1.5.1-1. The rules governing these transitions are provided in sections 1.5.6.1.3, and 1.5.6.1.4 for transitions out of the Inactive State, and Variable Rate State.



**Figure 1.5.1-1. xHRPD Subtype 0 Forward Traffic Channel MAC Protocol State Diagram**

### 1.5.2 Primitives and Public Data

#### 1.5.2.1 Commands

This protocol defines the following commands:

- *Activate*
- *Deactivate*

#### 1.5.2.2 Return Indications

This protocol returns the following indication:

- *SupervisionFailed*

### 1.5.2.3 Public Data

This protocol shall make the following data public:

- Subtype for this protocol

### 1.5.3 Protocol Data Unit

The transmission unit of this protocol is a Forward Traffic Channel MAC Layer packet. Each packet consists of one Security Layer packet.

### 1.5.4 Protocol Initialization

#### 1.5.4.1 Protocol Initialization for the InConfiguration Protocol Instance

Upon creation, the InConfiguration instance of this protocol in the access terminal and the access network shall perform the following in the order specified:

- The fall-back values of the attributes for this protocol instance shall be set to the default values specified for each attribute.
- If the InUse instance of this protocol has the same protocol subtype as this InConfiguration protocol instance, then the fall-back values of the attributes defined by the InConfiguration protocol instance shall be set to the values of the corresponding attributes associated with the InUse protocol instance.
- The value for each attribute for this protocol instance shall be set to the fall-back value for that attribute.

#### 1.5.4.2 Protocol Initialization for the InUse Protocol Instance

Upon creation, the InUse instance of this protocol in the access terminal and the access network shall perform the following:

- The value of the attributes for this protocol instance shall be set to the default values specified for each attribute.
- The protocol at the access terminal and the access network shall enter the Inactive State.

### 1.5.5 Procedures and Messages for the InConfiguration Instance of the Protocol

#### 1.5.5.1 Procedures

This protocol uses the Generic Configuration Protocol (see [1]) to define the processing of the configuration messages.

#### 1.5.5.2 Commit Procedures

The access terminal and the access network shall perform the procedures specified in this section, in the order specified, when directed by the InUse instance of the Session Configuration Protocol to execute the Commit procedures:

- 1 • All the public data that are defined by this protocol, but are not defined by the InUse  
2 protocol instance shall be added to the public data of the InUse protocol.
- 3 • If the InUse instance of this protocol has the same subtype as this protocol instance,  
4 then
  - 5 – The access terminal and the access network shall set the attribute values  
6 associated with the InUse instance of this protocol to the attribute values  
7 associated with the InConfiguration instance of this protocol.
  - 8 – The access terminal and the access network shall purge the InConfiguration  
9 instance of the protocol.
- 10 • If the InUse instance of this protocol does not have the same subtype as this protocol  
11 instance, then the access network and the access terminal shall perform the following  
12 in the order specified:
  - 13 – The access terminal and the access network shall set the initial state for the  
14 InConfiguration instance of this protocol to the Inactive State.
  - 15 – The InConfiguration protocol instance shall become the InUse protocol  
16 instance for the Forward Traffic Channel MAC Protocol.
- 17 • All the public data not defined by this protocol shall be removed from the public data of  
18 the InUse protocol.

19 1.5.5.3 Message Formats

20 1.5.5.3.1 ConfigurationRequest

21 The ConfigurationRequest message format is as follows:

22

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 23 MessageID            The sender shall set this field to 0x50.
- 24 TransactionID        The sender shall increment this value for each new  
25 ConfigurationRequest message sent.
- 26 AttributeRecord      The format of this record is specified in [1].

27

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
-----------------	------------	------------	----------

<b>Addressing</b>	unicast	<b>Priority</b>	40
-------------------	---------	-----------------	----

1.5.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:

Field	Length (bits)
MessageID	8
TransactionID	8
Zero or more instances of the following record	
AttributeRecord	Attribute dependent

- 4 MessageID            The sender shall set this field to 0x51.
- 5 TransactionID        The sender shall set this value to the TransactionID field of the
- 6                            corresponding ConfigurationRequest message.
- 7 AttributeRecord      An attribute record containing a single attribute value. If this
- 8                            message selects a complex attribute, only the ValueID field of the
- 9                            complex attribute shall be included in the message. The format of the
- 10                            AttributeRecord is given in [1]. The sender shall not include more
- 11                            than one attribute record with the same attribute identifier.

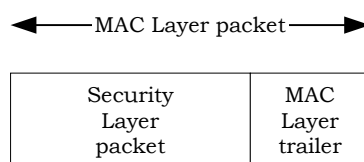
<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

1.5.6 Procedures and Messages for the InUse Instance of the Protocol

1.5.6.1 Procedures

The protocol constructs a Forward Traffic Channel MAC Layer packet out of the Security Layer packet by adding the MAC Layer trailer as defined in 1.5.6.2.1.

The protocol then sends the packet for transmission to the Physical Layer. The packet structure is shown in Figure 1.5.6-1.



**Figure 1.5.6-1. Forward Traffic Channel MAC Layer Packet Structure**

If the MACLayerFormat field of the MAC Layer trailer is equal to '1', received packets are passed for further processing to the Security Layer after removing the layer-related trailer.

1 The access terminal shall discard the MAC packet if the MACLayerFormat field of the MAC  
2 Layer trailer is equal to '0'. The ConnectionLayerFormat field within the MAC Layer trailer  
3 shall be passed to the Security Layer with the Security Layer packet.

#### 4 1.5.6.1.1 Command Processing

##### 5 1.5.6.1.1.1 Activate

6 If this protocol receives an *Activate* command in the Inactive State, the access terminal and  
7 the access network shall transition to the Variable Rate State.

8 If this protocol receives the command in any other state it shall be ignored.

##### 9 1.5.6.1.1.2 Deactivate

10 If the protocol receives a *Deactivate* command in the Variable Rate State,

- 11 • The access terminal shall cease monitoring the Forward Traffic Channel, shall cease  
12 transmitting the CQI Channel, and shall transition to the Inactive State.
- 13 • The access network should cease transmitting the Forward Traffic Channel to this  
14 access terminal, should cease receiving the CQI channel from this access terminal, and  
15 should transition to the Inactive State.

16 If this command is received in the Inactive State it shall be ignored.

#### 17 1.5.6.1.2 Forward Traffic Channel Addressing

18 Transmission on the Forward Traffic Channel is time division multiplexed. At any given  
19 time, the channel is either being transmitted or not; and, if it is being transmitted, it is  
20 addressed to a single user. When transmitting the Forward Traffic Channel, the access  
21 network uses the MACIndex to identify the target access terminal.

22 Requirements for Forward Traffic Channel addressing are part of the Physical Layer.

#### 23 1.5.6.1.3 Inactive State

24 When the protocol is in the Inactive State, the access terminal and the access network wait  
25 for an *Activate* command.

#### 26 1.5.6.1.4 Variable Rate State

27 In the Variable Rate State, the access network transmits at the rate dictated by the CQI  
28 Channel transmitted by the access terminal.

29 The access terminal shall perform the supervision procedures described in 1.5.6.1.5.1 in  
30 the Variable Rate State.

##### 31 1.5.6.1.4.1 CQI and Packet Transmission Requirements

32 The access terminal uses the CQI value to specify the requested transmission rate. Two  
33 types of CQI formats shall be supported. The first type is the 4-bit CQI format. Using this  
34 CQI format, an access terminal can request a data rate from the entire set of forward link  
35 data rates ranging from 38.4 kbps to 3.072 Mbps. The second type of CQI format uses two

1 bits for CQI. It is intended for those terminals whose link budget can support only a subset  
 2 of forward link data rates and/or whose return link rates are low, i.e., 640 bps or 1.2 kbps.  
 3 The choice of CQI format is based on the terminal capability indicated in the RouteUpdate  
 4 message.

#### 5 4-bit CQI Format

6 The access terminal shall set the CQI value to a 4-bit CQI index, ranging from 0x0 to 0xe.  
 7 The CQI index 0 is also known as the null-rate CQI. Each CQI index is associated with a  
 8 Rate Metric, a Span and a list of Single User transmission formats, as shown in Table  
 9 1.5.6.1.4.1-1.

#### 10 2-bit CQI Format

11 The access terminal shall set the CQI value to a 2-bit CQI index, ranging from 0x0 to 0x3.  
 12 Each CQI index is associated with a Rate Metric, a Span and a list of Single User  
 13 transmission formats, as shown in Table 1.5.6.1.4.1-1 where the CQI values 0x0 to 0x3 in  
 14 2-bit format map to CQI values 0x1 to 0x4 in 4-bit format.

#### 15 1.5.6.1.4.1.1 Access Terminal Requirements

16 The access terminal shall obey the following rules when transmitting the CQI:

- 17 • Access terminal shall use CQIPeriod number of 20-ms reverse link frames to send a  
 18 single CQI value. The CQI value is defined to take effect after CQIDelay number of  
 19 frames from the frame boundary that the access terminal sends this new CQI value at ,  
 20 and stay in effect for CQIPeriod frames (see [7]).
- 21 • For an access terminal, the CQI value it transmits shall not change in slots other than  
 22 T such that:

$$23 \quad (T_{AT} - \text{FrameOffset} - \text{CQIDelay in slots}) \bmod (\text{CQIPeriod} * 12 \text{ slots/frame}) = 0,$$

24 where  $T_{AT}$  is the CDMA system time in slots observed at the access terminal.

25 The forward link serving data rate to this access terminal shall not change in slots  
 26 other than T such that

$$27 \quad (T - \text{FrameOffset}) \bmod (\text{CQIPeriod} * 12 \text{ slots/frame}) = 0$$

28 where T the local CDMA system time observed either at access network or access  
 29 terminal.

- 30 • Access terminal shall set the CQI to one of the valid values in Table 1.5.6.1.4.1-1,  
 31 corresponding to the rate it requests.
- 32 • Access terminal shall set the CQI to the maximum value that channel conditions  
 33 permit. The access terminal uses the null rate if the channel conditions do not permit  
 34 even the lowest non-null rate.

1

**Table 1.5.6.1.4.1-1. CQI Value Specification**

<b>CQI value</b>	<b>Rate (kbps)</b>	<b>Packet Length (Slots)</b>
0x0	null rate	N/A
0x1	38.4	16
0x2	76.8	8
0x3	153.6	4
0x4	307.2	2
0x5	307.2	4
0x6	614.4	1
0x7	614.4	2
0x8	921.6	2
0x9	1228.8	1
0xa	1228.8	2
0xb	1843.2	1
0xc	2457.6	1
0xd	1536	2
0xe	3072	1
0xf	Invalid	N/A

## 2 1.5.6.1.4.1.2 Access Network Requirements

3 The access network shall obey the following rules when processing the CQI and sending a  
4 packet to the access terminal:

- 5 • If the access network transmits a MAC Layer packet to the access terminal starting in  
6 slot T, it shall use a packet type and transmission format compatible with the CQI value  
7 in effect at slot T.

## 8 1.5.6.1.5 Supervision Procedures

## 9 1.5.6.1.5.1 CQI Supervision

10 The access terminal shall perform supervision on the CQI as follows:

- 11 • The access terminal shall set the CQI supervision timer for  $T_{FTCMQISupervision}$  when it  
12 transmits a null rate CQI.
- 13 • The access terminal shall disable the timer if the CQI supervision timer is active and  
14 any of the following conditions is true:
- 15 – the access terminal requests a non-null rate

- 1       – the access terminal successfully receives a Forward Traffic Channel packet  
 2       addressed to the access terminal's unicast address and the value of the  
 3       NullRateCQI38.4Enable attribute is equal to 0x0001.
- 4       • The access terminal may disable the timer if the CQI supervision timer is active and the  
 5       access terminal successfully receives a Control Channel packet.
  - 6       • If the CQI supervision timer expires, the access terminal shall disable the Reverse  
 7       Traffic Channel transmitter and set the Reverse Traffic Channel Restart timer for time  
 8        $T_{FTCMPRestartTx}$ .
  - 9       • If the access terminal generates consecutive non-null rate CQI values for more than  
 10        $N_{FTCMPRestartTx}$  slots or successfully receives a packet, the access terminal shall disable  
 11       the Reverse Traffic Channel Restart timer and shall enable the Reverse Traffic Channel  
 12       transmitter.
  - 13       • If the Reverse Traffic Channel Restart timer expires, the access terminal shall return a  
 14       *SupervisionFailed* indication and transition to the Inactive State.

#### 15   1.5.6.1.5.2 ForwardTrafficValid Monitoring

16   The access terminal shall monitor the bit associated with its MACIndex in the  
 17   ForwardTrafficValid63To0 field made available by the Overhead Messages Protocol. If the  
 18   Overhead Messages Protocol does not provide a ForwardTrafficValid63To0 field associated  
 19   with the access terminal, then the access terminal shall behave as if the field were set to '0'.  
 20   If this bit is set to 0, the access terminal shall return a *SupervisionFailed* indication and  
 21   transition to the Inactive State.

#### 22   1.5.6.2 Trailer and Message Formats

##### 23   1.5.6.2.1 MAC Layer Trailer

24   The access network shall set the MAC Layer Trailer as follows:

25

Field	Length (bits)
ConnectionLayerFormat	1
MACLayerFormat	1

##### 26   ConnectionLayerFormat

27       The access network shall set this field to '1' if the connection layer  
 28       packet is Format B; otherwise, the access network shall set this field  
 29       to '0'.

##### 30   MACLayerFormat

31       The access network shall set this field to '1' if the MAC layer packet  
 32       contains a valid payload; otherwise, the access network shall set this  
       field to '0'.

## 1 1.5.6.3 Interface to Other Protocols

## 2 1.5.6.3.1 Commands Sent

3 This protocol does not issue any commands.

## 4 1.5.6.3.2 Indications

5 This protocol registers to receive the following indication:

- 6
- *PhysicalLayer.ForwardTrafficCompleted*

## 7 1.5.7 Configuration Attributes

8 The following attributes and default values are defined (see [1] for attribute record  
9 definition).

## 10 1.5.7.1 Simple Attributes

11 The negotiable simple attribute for this protocol is listed in Table 1.5.7.1-1. The access  
12 terminal shall use as defaults the values in Table 1.5.7.1-1 that are typed in ***bold italics***.13 **Table 1.5.7.1-1. Configurable Values**

<b>Attribute ID</b>	<b>Attribute</b>	<b>Values</b>	<b>Meaning</b>
0xfd	NullRateCQI38.4Enable	<b><i>0x0000</i></b>	The access network will not serve an access terminal requesting the null rate.
		0x0001	The access network may serve an access terminal requesting the null rate at 38.4 kbps.
		All other values	Reserved

14

15 The access terminal shall support the default value of these attributes.

## 16 1.5.8 Protocol Numeric Constants

17

Constant	Meaning	Value
N <sub>FTCMPType</sub>	Type field for this protocol	[5]
N <sub>FTCMPxHRPDS0</sub>	Subtype field for this protocol	0x0000
N <sub>FTCMPRestartTx</sub>	Number of consecutive slots of non-null rate CQIs to re-enable the Reverse Traffic Channel transmitter once it is disabled due to CQI supervision failure.	16
T <sub>FTCMCQISupervision</sub>	CQI supervision timer	240 ms
T <sub>FTCMPRestartTx</sub>	Reverse Channel Restart Timer	12 Control Channel cycles

### 1.5.9 Session State Information

The Session State Information record (see [1]) consists of parameter records.

The parameter records for this protocol consist of only the configuration attributes of this protocol.

## 1.6 xHRPD Subtype 1 Forward Traffic Channel MAC Protocol

### 1.6.1 Overview

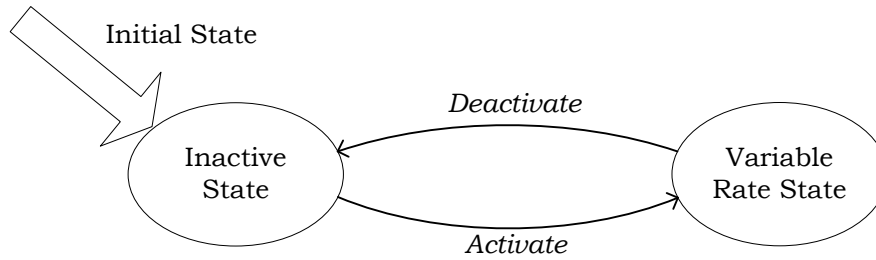
The xHRPD Subtype 1 Forward Traffic Channel MAC Protocol provides the procedures and messages required for an access network to transmit and an access terminal to receive the Forward Traffic Channel. Specifically, this protocol addresses Forward Traffic Channel addressing and Forward Traffic Channel rate control. This protocol operates with the xHRPD Subtype 0 Physical Layer Protocol.

The access network maintains an instance of this protocol for every access terminal.

This protocol operates in one of two states:

- **Inactive State:** In this state, the access terminal is not assigned a Forward Traffic Channel. When the protocol is in this state, it waits for an *Activate* command.
- **Variable Rate State:** In this state, the access network transmits the Forward Traffic Channel to the access terminal, in accordance with the CQI Channel received from the access terminal.

The protocol states and allowed transitions between the states are shown in Figure 1.6.1-1. The rules governing these transitions are provided in sections 1.6.6.1.7, and 1.6.6.1.8 for transitions out of the Inactive State, and Variable Rate State.



**Figure 1.6.1-1. xHRPD Subtype 1 Forward Traffic Channel MAC Protocol State Diagram**

## 1.6.2 Primitives and Public Data

### 1.6.2.1 Commands

This protocol defines the following commands:

- *Activate*
- *Deactivate*

### 1.6.2.2 Return Indications

This protocol returns the following indication:

- *SupervisionFailed*

### 1.6.2.3 Public Data

This protocol shall make the following data public:

- Subtype for this protocol
- CQIPeriod
- CQIDelay
- MultiUserPacketsEnabled
- State of the xHRPD Subtype 1 Forward Traffic Channel MAC Protocol (Inactive State or Variable Rate State)

## 1.6.3 Protocol Data Unit

The transmission unit of this protocol is a Forward Traffic Channel MAC Layer packet. Each Forward Traffic Channel MAC Layer packet consists of zero or more Security Layer packets.

## 1.6.4 Protocol Initialization

### 1.6.4.1 Protocol Initialization for the InConfiguration Protocol Instance

Upon creation, the InConfiguration instance of this protocol in the access terminal and the access network shall perform the following in the order specified:

- 1 • The fall-back values of the attributes for this protocol instance shall be set to the  
2 default values specified for each attribute.
- 3 • If the InUse instance of this protocol has the same protocol subtype as this  
4 InConfiguration protocol instance, then the fall-back values of the attributes defined by  
5 the InConfiguration protocol instance shall be set to the values of the corresponding  
6 attributes associated with the InUse protocol instance.
- 7 • The value for each attribute for this protocol instance shall be set to the fall-back value  
8 for that attribute.

### 9 1.6.5 Procedures and Messages for the InConfiguration Instance of the Protocol

#### 10 1.6.5.1 Procedures

11 This protocol uses the Generic Configuration Protocol (see [1]) to define the processing of  
12 the configuration messages.

#### 13 1.6.5.2 Commit Procedures

14 The access terminal and the access network shall perform the procedures specified in this  
15 section, in the order specified, when directed by the InUse instance of the Session  
16 Configuration Protocol to execute the Commit procedures:

- 17 • All the public data that are defined by this protocol, but are not defined by the InUse  
18 protocol instance shall be added to the public data of the InUse protocol.
- 19 • The value of the following public data of the InUse protocol shall be set to the  
20 corresponding attribute value of the InConfiguration protocol instance:
  - 21 – MultiUserPacketsEnabled
- 22 • If the InUse instance of this protocol has the same subtype as this protocol instance,  
23 then
  - 24 – The access terminal and the access network shall set the attribute values  
25 associated with the InUse instance of this protocol to the attribute values  
26 associated with the InConfiguration instance of this protocol.
  - 27 – The access terminal and the access network shall purge the InConfiguration  
28 instance of the protocol.
- 29 • If the InUse instance of this protocol does not have the same subtype as this protocol  
30 instance, then the access network and the access terminal shall perform the following  
31 in the order specified:
  - 32 – The access terminal and the access network shall set the initial state for the  
33 InConfiguration instance of this protocol to the Inactive State.
  - 34 – The InConfiguration protocol instance shall become the InUse protocol  
35 instance for the Forward Traffic Channel MAC Protocol.
- 36 • All the public data not defined by this protocol shall be removed from the public data of  
37 the InUse protocol.

1 1.6.5.3 Message Formats

2 1.6.5.3.1 ConfigurationRequest

3 The ConfigurationRequest message format is as follows:

4

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

5 MessageID The sender shall set this field to 0x50.

6 TransactionID The sender shall increment this value for each new  
7 ConfigurationRequest message sent.

8 AttributeRecord The format of this record is specified in [1].

9

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

10 1.6.5.3.2 ConfigurationResponse

11 The ConfigurationResponse message format is as follows:

12

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

13 MessageID The sender shall set this field to 0x51.

14 TransactionID The sender shall set this value to the TransactionID field of the  
15 corresponding ConfigurationRequest message.

16 AttributeRecord An attribute record containing a single attribute value. If this  
17 message selects a complex attribute, only the ValueID field of the  
18 complex attribute shall be included in the message. The format of the  
19 AttributeRecord is given in [1]. The sender shall not include more  
20 than one attribute record with the same attribute identifier.  
21

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

1.6.6 Procedures and Messages for the InUse Instance of the Protocol

1.6.6.1 Procedures

At the access network, the Forward Traffic Channel MAC Protocol encapsulates zero or more Security Layer packets into a MAC Layer packet and passes the MAC Layer packet for transmission to the Physical Layer Protocol, along with the Preamble MAC Index and Transmission Format of the Forward Traffic Channel. The choice of Transmission Format is governed by the CQI information received from the access terminal.

1.6.6.1.1 MAC Layer Packet

The MAC Layer packet is the basic unit of data provided by the Forward Traffic Channel MAC protocol to the Physical Layer Protocol. The MAC Layer packets shall be of one of the following two types:

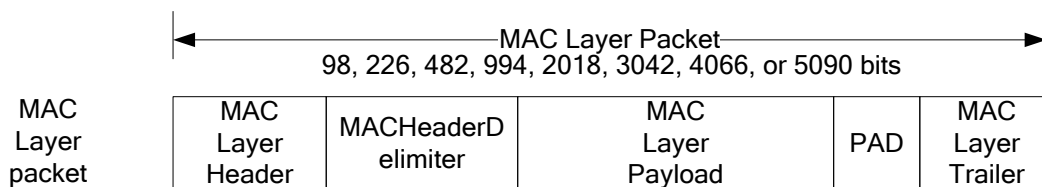
- Single User Simplex
- Multi-User

The access network shall not transmit a Multi-User packet to the access terminal if the MultiUserPacketsEnabled attribute is set to 0x00.

Single User Simplex packets are also referred to as Single User packets. The structure of a MAC Layer packet is shown in Figure 1.6.6.1.1-1. The MAC Layer packet consists of the following (in order):

- MAC Layer Header (which may be empty)
- MACHeaderDelimiter (if required)
- MAC Layer Payload
- PAD (if required)
- MAC Layer Trailer

The size of a MAC Layer packet takes on a discrete set of values, as shown in Figure 1.6.6.1.1-1.



**Figure 1.6.6.1.1-1. xHRPD Subtype 1 Forward Traffic Channel MAC Layer Packet Structure**

1 The MAC Layer payload consists of zero or more Security Layer packets addressed to zero  
2 or more access terminals. The MAC Layer Header (if included), MACHeaderDelimiter (if  
3 included), and MAC Layer Trailer are used to provide information needed to parse the  
4 contents of the MAC Layer Payload and to specify the type of the MAC Layer packet (Single  
5 User Simplex, or Multi-User).

6 The MAC Layer payload may be followed by padding, which consists of a sequence of all  
7 '0's. The size of the padding sequence is chosen such that the overall size of the MAC Layer  
8 packet is one of 98, 226, 482, 994, 2018, 3042, 4066, or 5090 bits.

#### 9 1.6.6.1.1.1 Description of MAC Layer packet types

10 A Single User Simplex MAC Layer packet is used to carry one Security Layer packet in its  
11 payload and is addressed to one access terminal. The MAC Layer Payload size equals the  
12 size of the MAC Layer Packet minus the size of the MAC Layer Trailer. A Single User  
13 Simplex packet consists of the following (in order):

- 14 • An empty MAC Layer Header
- 15 • A MAC Layer Payload consisting of one Security Layer packet
- 16 • No PAD

17 The Security Layer packet in a Single User Simplex packet contains a Format A or Format  
18 B Connection Layer packet.

19 A Multi-User MAC Layer Packet is used to carry in its payload, zero or more Security Layer  
20 packets addressed to zero or more access terminals. A Multi-User packet consists of the  
21 following (in order):

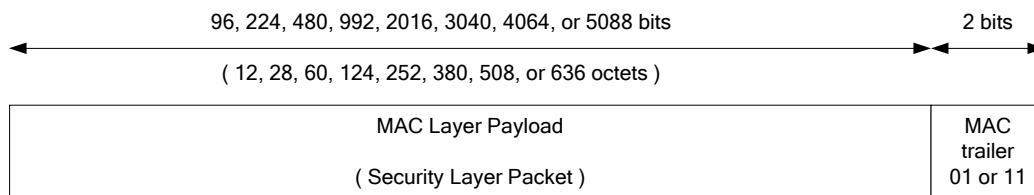
- 22 • Non-empty MAC Layer Header
- 23 • MACHeaderDelimiter (if required)
- 24 • MAC Layer Payload consisting of zero or more (max of eight) Security Layer packets
- 25 • PAD (if required)
- 26 • MAC Layer Trailer

27 Each Security Layer packet in a Multi-User packet contains a Format A or Format B  
28 Connection Layer packet.

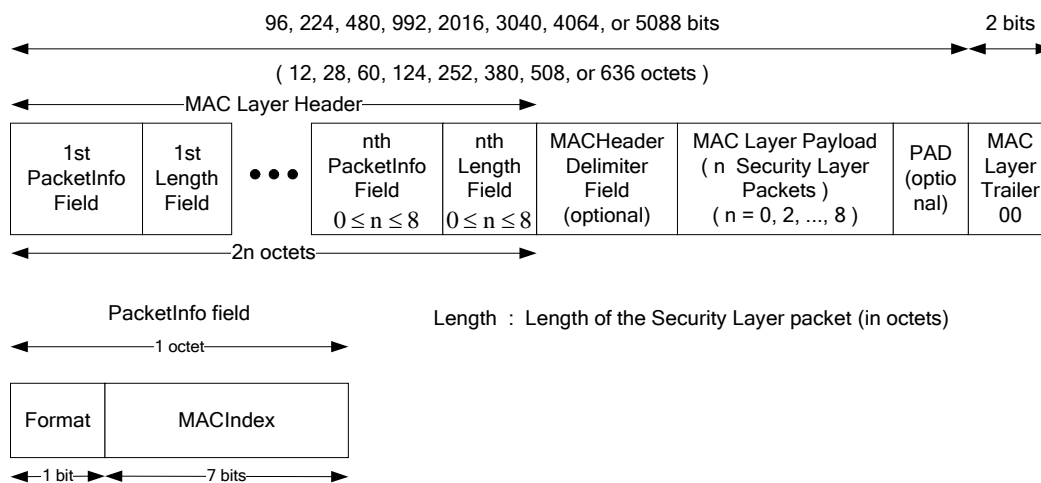
#### 29 1.6.6.1.1.2 Construction of MAC Layer packets

30 The structure of Single User Simplex MAC packets and Multi-User MAC packets are shown  
31 in Figure 1.6.6.1.1.2-1, and Figure 1.6.6.1.1.2-2 respectively. The type of MAC Layer packet  
32 may be inferred from the Preamble MAC Index and the MAC Layer Trailer. When the  
33 Preamble MAC Index is set to the MAC Index assigned to the access terminal, the MAC  
34 Layer Trailer field indicates a Single User Simplex packet if equal to '01' or '11'. For Single-  
35 User MAC packets, the values of '00' and '10' for the MAC Trailer are reserved. The access  
36 terminal shall not pass the payload of the Single-User Simplex MAC packet to the higher  
37 layer if the MAC Layer Trailer is set to '00' or '10'.

1 When the Preamble MAC Index is set to a Multi-User Preamble MAC Index as specified in  
 2 1.6.6.1.2, the access network shall set the MAC Trailer to '00'. For Multi-User MAC packets,  
 3 the values for the MAC Trailer other than '00' are reserved. The access terminal shall not  
 4 pass the payload of the Multi-User MAC packet to the higher layer if the MAC Layer Trailer  
 5 associated with the Multi-User packet is set to any value other than '00'.



6  
 7 **Figure 1.6.6.1.1.2-1 Format of Forward Traffic Channel Single User Simplex MAC**  
 8 **Layer Packet**



9  
 10 **Figure 1.6.6.1.1.2-2 Format of Forward Traffic Channel Multiuser MAC Layer Packet**

11 The access network shall construct a Single User Simplex MAC Layer packet as shown  
 12 below:

Field	Length (bits)
Security Layer Packet	96, 224, 480, 992, 2016, 3040, 4064, or 5088
MAC Layer Trailer	2

14 Security Layer Packet

15 The access network shall set this field to a Security Layer packet  
 16 from the Security Protocol, containing a Format A or a Format B  
 17 Connection Layer packet.

1 MAC Layer Trailer If the Security Layer packet contains a Format B Connection Layer  
 2 Packet, the access network shall set this field to '11'. Otherwise, the  
 3 access network shall set this field to '01'.

4 The access network shall construct a Multi-User MAC Layer packet as shown below.

5

Field	Length (bits)
n occurrences ( $0 \leq n \leq 8$ ) of the following two fields:	
PktInfo	8
Length	8
MACHeaderDelimiter	0 or 8
n occurrences ( $0 \leq n \leq 8$ ) of the following field:	
Security Layer Packet	$8 \times i$ , where $i$ is the value of the corresponding Length field
Pad	As needed
MAC trailer	2

6

7 PktInfo For  $1 \leq i \leq n$ , the  $i^{\text{th}}$  occurrence of this field as shown below.

8

Field	Length (bits)
Format	1
MACIndex	7

9 Format If the  $i^{\text{th}}$  Security Layer packet contains a Format B Connection  
 10 Layer packet, the access network shall set the  $i^{\text{th}}$  occurrence of this  
 11 field to '1'. Otherwise, the access network shall set the  $i^{\text{th}}$  occurrence  
 12 of this field to '0'.

13 MACIndex The  $i^{\text{th}}$  occurrence of this field shall be set to MACIndex of the access  
 14 terminal to which the  $i^{\text{th}}$  Security Layer packet is addressed. The  
 15 access network shall use the MACIndex assigned to the access  
 16 terminal by the sector transmitting this MAC Layer packet.

17 Length The  $i^{\text{th}}$  occurrence of this field shall be set to the length, in octets, of  
 18 the  $i^{\text{th}}$  Security Layer packet in this MAC Layer payload.

1	<b>MACHeaderDelimiter</b>	
2		This field shall not be included if the sum of the lengths of the
3		Security Layer Packets, MAC header, and MAC trailer equals the size
4		of the corresponding MAC Layer packet. This field shall be included if
5		the MAC Layer Packet size exceeds the sum of the length of the
6		Security Layer Packets, MAC header, and MAC trailer by one or more
7		octets. If included this field shall be set to '00000000'.
8	<b>Security Layer Packet</b>	
9		Security Layer packet from the Security Protocol, containing a
10		Format A or Format B Connection Layer packet.
11	<b>Pad</b>	
12		The access network shall set the size of this field to the size of the
13		MAC Layer packet minus the size of MAC Layer header (2n octets),
14		MACHeaderDelimiter (if included), payload and trailer (2 bits). The
15		access network shall set the value of this field to all '0's. The receiver
16		shall ignore this field.
17	<b>MAC trailer</b>	
18		Forward Traffic Channel Medium Access Control trailer. The access
19		network shall set this field to '00'.

20 The MAC Layer payload consists of n Security Layer packets, where n is an integer from  
 21 zero to eight. The MAC Layer header consists of n PktInfo fields and n Length fields The  
 22 MACHeaderDelimiter is included if the MAC Layer Packet size exceeds the sum of the  
 23 length of the Security Layer Packets, MAC header, and MAC trailer by one or more octets. If  
 24 included this field shall be set to '00000000'. The Pad bits are included if the size of the MAC  
 Layer Packet exceeds the sum of the lengths of the Security Layer packets, MAC header,  
 MACHeaderDelimiter (if included), and MAC trailer.

#### 25 1.6.6.1.2 Preamble MAC Index

26 The Forward Traffic Channel transmits at most one MAC Layer Packet at any given time.  
 27 The transmission of a MAC Layer packet on the Forward Traffic Channel is preceded by the  
 28 transmission of a Preamble MAC Index. The Preamble MAC Index preceding a Single User  
 29 MAC Layer packet specifies the address of the Single User MAC Layer packet. The Preamble  
 30 MAC Index preceding a Multi-User MAC Layer packet specifies the MAC Layer Packet Size  
 31 of the Multi-User MAC Layer packet.

32 When transmitting a Single User MAC Layer packet to an access terminal on the Forward  
 33 Traffic Channel, the access network shall set the Preamble MAC Index to the MACIndex  
 34 assigned to the access terminal by the transmitting sector. When transmitting a Multi-User  
 35 MAC Layer packet on the Forward Traffic Channel, the access network shall set the  
 36 Preamble MAC Index based on the size of the packet, in accordance with Table 1.6.6.1.2-1.

1 **Table 1.6.6.1.2-1 Preamble MAC Index of Multi-User MAC packets**

MAC Layer Packet Size (bits)	Preamble MAC Index
98, 226, 482, or 994	66
2018	67
3042	68
4066	69
5090	70

2 1.6.6.1.3 Forward Traffic Channel Addressing

3 A Single User Simplex MAC Layer packet is addressed to one access terminal, while  
 4 different Security Layer packets embedded in a Multi-User MAC Layer packet may be  
 5 addressed to different access terminals. When transmitting a Single User Simplex packet,  
 6 the MACIndex of the access terminal is indicated by the Preamble MAC Index. When  
 7 transmitting a Multi-User packet, the MACIndex of the access terminal is specified in the  
 8 PktInfo field of the MAC Layer Header, corresponding to the Security Layer packet being  
 9 addressed to the access terminal.

10 1.6.6.1.4 Transmission Format of the Forward Traffic Channel

11 After constructing a MAC Layer packet, the protocol sends the MAC Layer packet along  
 12 with a preamble MAC Index and a transmission format to the Physical Layer. The Physical  
 13 Layer protocol encapsulates the MAC Layer packet in a Physical Layer packet and embeds  
 14 the preamble MAC Index in a packet preamble. The packet preamble and the Physical Layer  
 15 packet are transmitted on the Forward Traffic Channel in accordance with the transmission  
 16 format specified by the Forward Traffic Channel MAC protocol.

17 The transmission format of the Forward Traffic Channel is represented by an 3-tuple of  
 18 numbers, whose components are defined as follows:

- 19 • Physical Layer Packet Size: the total number of bits in the Physical Layer packet, which  
 20 encapsulates the MAC Layer packet.
- 21 • Transmit Duration: the maximum number of slots over which the Physical Layer packet  
 22 is transmitted on the Forward Link.
- 23 • Preamble Length: the number of chips of the packet preamble, which precedes the  
 24 transmission of the Physical Layer packet.

25 The Data Rate of a transmission format may be computed by dividing the Physical Layer  
 26 Packet Size by the Transmit Duration. For example, the transmission format represented by  
 27 the 3-tuple (512, 4, 256) has a Data Rate of 76.8 kbps.

28 A transmission format is defined to be consistent with a MAC Layer packet if the size of the  
 29 MAC Layer packet is equal to the Physical Layer Packet Size of the transmission format,  
 30 less 30 bits (FCS + Tail). Table 1.6.6.1.4-1 provides the set of all transmission formats

1 defined by the Forward Traffic Channel MAC protocol, as well as the list of all transmission  
 2 formats consistent with MAC Layer packets of each size.

3 **Table 1.6.6.1.4-1 List of all Transmission Formats Consistent with each MAC Layer**  
 4 **Packet Size**

<b>MAC Layer Packet Size (bits)</b>	<b>List of consistent Transmission Formats (Physical Layer Packet Size (bits), Transmit Duration (slots), Preamble Length (chips))</b>
98	(128, 16, 1024), (128, 8, 512), (128, 4, 256), (128, 2, 128), (128, 1, 64)
226	(256, 16, 1024), (256, 8, 512), (256, 4, 256), (256, 2, 128), (256, 1, 64)
482	(512, 16, 1024), (512, 8, 512), (512, 4, 256), (512, 2, 128), (512, 1, 64), (512, 2, 64), (512, 4, 128)
994	(1024, 16, 1024), (1024, 8, 512), (1024, 4, 256), (1024, 2, 128), (1024, 1, 64), (1024, 2, 64), (1024, 4, 128)
2018	(2048, 4, 128), (2048, 2, 64), (2048, 1, 64)
3042	(3072, 2, 64), (3072, 1, 64)
4066	(4096, 2, 64), (4096, 1, 64)
5090	(5120, 2, 64), (5120, 1, 64)

5 When passing the MAC Layer packet and Transmission Format from the MAC Layer  
 6 Protocol to the Physical Layer Protocol, the access network shall specify a Transmission  
 7 Format that is consistent with the MAC Layer packet.

#### 8 1.6.6.1.5 CQI Channel

9 The access terminal transmits the CQI Channel in the Variable Rate State. The CQI  
 10 Channel transmission consists of a CQI value. The access terminal uses the CQI value to  
 11 specify the requested data rate on the Forward Traffic Channel. Two types of CQI formats  
 12 shall be supported. The first type is the 4-bit CQI format. Using this CQI format, an access  
 13 terminal can request a data rate from the entire set of forward link data rates ranging from  
 14 38.4 kbps to 3.072 Mbps. The second type of CQI format uses two bits for CQI. It is  
 15 intended for those terminals whose link budget can support only a subset of forward link  
 16 data rates and/or whose return link rates are low, i.e., 640 bps or 1.2 kbps. The choice of  
 17 CQI format is based on the terminal capability indicated in the RouteUpdate message.

#### 18 4-bit CQI Format

19 The access terminal shall set the CQI value to a 4-bit CQI index, ranging from 0x0 to 0xe.  
 20 The CQI index 0 is also known as the null-rate CQI. Each CQI index is associated with a  
 21 Rate Metric, a Span, a list of Single User transmission formats and a list of Multi-User  
 22 transmission formats, as shown in Table 1.6.6.1-2. Among the Single User transmission  
 23 formats associated with a CQI index, the transmission format with the largest Physical  
 24 Layer Packet Size is defined to be the canonical transmission format of the CQI index. In  
 25 Table 1.6.6.1-2, the canonical transmission format of each CQI index is typed in **bold**  
 26 **italics**. The Rate Metric and Span of a non-zero CQI index are equal to the Data Rate (in

- 1 kbps) and Transmit Duration (in slots) respectively, of the canonical transmission format of
- 2 the CQI index.

1 **Table 1.6.6.1-2 Rate Metric, Span and Lists of Associated Transmission Formats**

<b>CQI Index</b>	<b>Rate Metric (kbps)</b>	<b>Span (slots)</b>	<b>List of Associated Single User Transmission Formats</b>	<b>List of Associated Multi-User Transmission Formats</b>
0x0	0	16	(128, 16, 1024), (256, 16, 1024), (512, 16, 1024), <b>(1024, 16, 1024)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)
0x1	38.4	16	(128, 16, 1024), (256, 16, 1024), (512, 16, 1024), <b>(1024, 16, 1024)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)
0x2	76.8	8	(128, 8, 512), (256, 8, 512), (512, 8, 512), <b>(1024, 8, 512)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)
0x3	153.6	4	(128, 4, 256), (256, 4, 256), (512, 4, 256), <b>(1024, 4, 256)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)
0x4	307.2	2	(128, 2, 128), (256, 2, 128), (512, 2, 128), <b>(1024, 2, 128)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)
0x5	307.2	4	(512, 4, 128), (1024, 4, 128), <b>(2048, 4, 128)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128)
0x6	614.4	1	(128, 1, 64), (256, 1, 64), (512, 1, 64), <b>(1024, 1, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)
0x7	614.4	2	(512, 2, 64), (1024, 2, 64), <b>(2048, 2, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128)
0x8	921.6	2	(1024, 2, 64), <b>(3072, 2, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64)
0x9	1228.8	1	(512, 1, 64),	(128, 4, 256), (256, 4, 256),

<b>CQI Index</b>	<b>Rate Metric (kbps)</b>	<b>Span (slots)</b>	<b>List of Associated Single User Transmission Formats</b>	<b>List of Associated Multi-User Transmission Formats</b>
			(1024, 1, 64), <b>(2048, 1, 64)</b>	(512, 4, 256), (1024, 4, 256), (2048, 4, 128)
0xa	1228.8	2	<b>(4096, 2, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64)
0xb	1843.2	1	(1024, 1, 64), <b>(3072, 1, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64)
0xc	2457.6	1	<b>(4096, 1, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64)
0xd	1536	2	<b>(5120, 2, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64), (5120, 2, 64)
0xe	3072	1	<b>(5120, 1, 64)</b>	(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64), (5120, 2, 64)

1 2-bit CQI Format

2 The access terminal shall set the CQI value to a 2-bit CQI index, ranging from 0x0 to 0x3.  
3 Each CQI index is associated with a Rate Metric, a Span, a list of Single User transmission  
4 formats and a list of Multi-User transmission formats, as shown in Table 1.6.6.1-2 where  
5 the CQI values 0x0 to 0x3 in 2-bit format map to CQI values 0x1 to 0x4 in 4-bit format.

6 The canonical packet size of a CQI index is defined to be the Physical Layer Packet Size of  
7 the canonical transmission format of that CQI index. A Single User Transmission Format  
8 associated with a CQI index shown in Table 1.6.6.1-2 is defined to be compatible with the  
9 CQI index, if at least one of the following conditions is met:

- 10 • The given transmission format coincides with the canonical transmission format of the  
11 CQI index, or
- 12 • The canonical packet size of the CQI index is strictly less than the value of the  
13 ShortPacketsEnabledThresh attribute.

14 A Multi-User transmission format associated with a CQI index is defined to be compatible  
15 with the CQI index, if the value of the MultiUserPacketsEnabled attribute is 0x01.

1 The access terminal shall obey the following rules when transmitting the CQI Channel:

- 2 • Access terminal shall use CQIPeriod number of 20-ms reverse link frames to send a  
3 single CQI value. The CQI value is defined to take effect after CQIDelay number of  
4 frames from the frame boundary that the access terminal sends this new CQI value at ,  
5 and stay in effect for CQIPeriod frames (see [7]).
- 6 • For an access terminal, the CQI value it transmits shall not change in slots other than  
7 T such that:

$$8 \quad (T_{AT} - \text{FrameOffset} - \text{CQIDelay in slots}) \bmod (\text{CQIPeriod} * 12 \text{ slots/frame}) = 0,$$

9 where  $T_{AT}$  is the CDMA system time in slots observed at the access terminal.

10 The forward link serving data rate to this access terminal shall not change in slots  
11 other than T such that

$$12 \quad (T - \text{FrameOffset}) \bmod (\text{CQIPeriod} * 12 \text{ slots/frame}) = 0$$

13 where T the local CDMA system time observed either at access network or access  
14 terminal.

- 15 • When transmitting the CQI Channel, the access terminal shall set the CQI value  
16 according to the following rule:
  - 17 – The access terminal shall set the CQI value to a CQI index that corresponds to  
18 a sustainable forward link data rate to the terminal.

19 An access terminal is defined to be a potential target of a Single User MAC Layer packet if  
20 the packet is addressed to the access terminal, and is received using a transmission  
21 format, transmitting sector, and the start time that could be used to receive a Single-User  
22 packet to the access terminal. An access terminal is defined to be a potential target of a  
23 Multi-User MAC Layer packet if the packet is received using a transmission format,  
24 transmitting sector, and the start time that could be used to receive a Multi-User packet.

25 A slot t is defined to be a continuation of an earlier slot s, if the following conditions are  
26 met:

- 27 • The access terminal is a potential target of a packet for which the reception began in  
28 slot s.
- 29 • The slot t is in the same forward link interlace as the slot s; i.e.,  $(t - s) \bmod 4 = 0$ .
- 30 •  $s < t < s + 4 \times \min(N_1, N_2, \text{MinimumContinuationSpan})$ , where  $N_1$  denotes the  
31 Transmit Duration of the packet whose reception began in slot s and  $N_2$  denotes the  
32 Span of the CQI index corresponding to the CQI value that is in effect during slot s  
33 (according to Table 1.6.6.1-2).

34 If the access terminal is a potential target of a packet transmitted by a sector starting in  
35 slot s, the access network shall not transmit a new packet from the same Forward Link  
36 Data Source to the access terminal in any slot t that is a continuation of slot s.

## 1 1.6.6.1.6 Command Processing

## 2 1.6.6.1.6.1 Activate

3 If this protocol receives an *Activate* command in the Inactive State, the access terminal and  
4 the access network shall transition to the Variable Rate State.

5 If this protocol receives the command in any other state it shall be ignored.

## 6 1.6.6.1.6.2 Deactivate

7 If the protocol receives a *Deactivate* command in the Variable Rate State State,

- 8 • The access terminal shall cease monitoring the Forward Traffic Channel, shall cease  
9 transmitting the CQI Channel, and shall transition to the Inactive State.
- 10 • The access network should cease transmitting the Forward Traffic Channel to this  
11 access terminal, should cease receiving the CQI channel- from this access terminal, and  
12 should transition to the Inactive State.

13 If this command is received in the Inactive State it shall be ignored.

## 14 1.6.6.1.7 Inactive State

15 When the protocol is in the Inactive State, the access terminal and the access network wait  
16 for an *Activate* command.

## 17 1.6.6.1.8 Variable Rate State

18 In the Variable Rate State, the access network transmits the Forward Traffic Channel using  
19 transmission format determined by the CQI Channel transmitted by the access terminal.

20 The access terminal shall perform the supervision procedures described in 1.6.6.1.9.1 in  
21 the Variable Rate State.

## 22 1.6.6.1.8.1 Packet Transmission and CQI Requirements

## 23 1.6.6.1.8.1.1 Access Terminal Requirements

24 In the Variable Rate State, a slot *t* is defined to be open at the access terminal, if slot *t* is  
25 not the continuation of any previous slot. In any open slot *T*, the access terminal shall  
26 attempt to receive a MAC Layer packet from the serving sector, whose transmission begins  
27 in slot *T* and whose packet type and transmission format are compatible with the CQI value  
28 in effect at slot *T*.

## 29 1.6.6.1.8.1.2 Access Network Requirements

30 The access network shall obey the following rule when processing the CQI and sending a  
31 packet to the access terminal:

32

- If the access network transmits a MAC Layer packet to the access terminal starting in slot T, it shall use a packet type and transmission format compatible with the CQI value in effect at slot T.

#### 1.6.6.1.9 Supervision Procedures

##### 1.6.6.1.9.1 CQI Supervision

The access terminal shall perform supervision on the CQI as follows:

- The access terminal shall set the CQI supervision timer for  $(CQISupervisionTimer \times 10) + 240$  ms when its CQI is a null rate CQI.
- The access terminal shall disable the timer if the CQI supervision timer is active and any of the following conditions is true:
  - the access terminal's CQI indicates a non-null rate
  - the access terminal successfully receives a Forward Traffic Channel packet or a Control Channel packet
- If the CQI supervision timer expires, the access terminal shall disable the Reverse Traffic Channel transmitter and set the Reverse Traffic Channel Restart timer for time  $T_{FTCMPRestartTx}$ .
- If the access terminal generates consecutive CQI values that correspond to non-null rates for more than  $N_{FTCMPRestartTx}$  slots or the access terminal successfully receives a Forward Traffic Channel packet or a Control Channel packet, the access terminal shall disable the Reverse Traffic Channel Restart timer and shall enable the Reverse Traffic Channel transmitter.
- If the Reverse Traffic Channel Restart timer expires, the access terminal shall return a *SupervisionFailed* indication and transition to the Inactive State.

##### 1.6.6.1.9.2 ForwardTrafficValid Monitoring

The access terminal shall monitor the bit associated with its MACIndex in the ForwardTrafficValid63To0 or ForwardTrafficValid127To64 field made available by the Overhead Messages protocol. If the Overhead Messages Protocol does not provide a ForwardTrafficValid63To0 or ForwardTrafficValid127To64 field associated with the access terminal, then the access terminal shall behave as if the field were set to '0'. If this bit is set to 0, the access terminal shall return a *SupervisionFailed* indication and transition to the Inactive State.

#### 1.6.6.2 Message Formats

##### 1.6.6.2.1 AttributeUpdateRequest

The sender sends an AttributeUpdateRequest message to offer an attribute-value for a given attribute.

Field	Length (bits)
MessageID	8
TransactionID	8

One or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 1 MessageID The sender shall set this field to 0x52.
- 2 TransactionID The sender shall increment this value for each new
- 3 AttributeUpdateRequest message sent.
- 4 AttributeRecord The format of this record is specified in [1].

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

6 1.6.6.2.2 AttributeUpdateAccept

7 The sender sends an AttributeUpdateAccept message in response to an  
 8 AttributeUpdateRequest message to accept the offered attribute values.

Field	Length (bits)
MessageID	8
TransactionID	8

- 10 MessageID The sender shall set this field to 0x53.
- 11 TransactionID The sender shall set this value to the TransactionID field of the
- 12 corresponding AttributeUpdateRequest message.

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

14 1.6.6.2.3 AttributeUpdateReject

15 The access network sends an AttributeUpdateReject message in response to an  
 16 AttributeUpdateRequest message to reject the offered attribute values.

<b>Field</b>	<b>Length (bits)</b>
MessageID	8
TransactionID	8

1 MessageID The access network shall set this field to 0x54.

2 TransactionID The sender shall set this value to the TransactionID field of the  
3 corresponding AttributeUpdateRequest message.

<b>Channels</b>	FTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 5 1.6.6.3 Interface to Other Protocols

#### 6 1.6.6.3.1 Commands Sent

7 This protocol does not issue any commands.

#### 8 1.6.6.3.2 Indications

9 This protocol does not register to receive any indications.

### 10 1.6.7 Configuration Attributes

11 Unless specified otherwise, the access terminal and the access network shall not use the  
12 Generic Attribute Update Protocol to update configurable attributes belonging to the  
13 Forward Traffic Channel MAC Protocol. The access terminal and the access network shall  
14 support the use of the Generic Attribute Update Protocol to update values of the following  
15 attributes belonging to the Forward Traffic Channel MAC Protocol:

- 16 • MultiUserPacketsEnabled
- 17 • ShortPacketsEnabledThresh
- 18 • CQISupervisionTimer

#### 19 1.6.7.1 Simple Attributes

20 The negotiable simple attributes for this protocol are listed in Table 1.6.7.1-1. The access  
21 terminal shall use as defaults the values in Table 1.6.7.1-1 that are typed in ***bold italics***.

1

**Table 1.6.7.1-1. Configurable Values**

<b>Attribute ID</b>	<b>Attribute</b>	<b>Values</b>	<b>Meaning</b>
0xfd	MultiUserPacketsEnabled	<b>0x00</b>	Use of Multi-User MAC packets is disabled
		0x01	Use of Multi-User MAC packets is enabled
		All other values	Reserved
0xfa	ShortPacketsEnabledThresh	<b>0x01</b>	ShortPacketsEnabledThresh is 2048 bits.
		0x00	ShortPacketsEnabledThresh is 1024 bits.
		0x02	ShortPacketsEnabledThresh is 3072 bits.
		0x03	ShortPacketsEnabledThresh is 4096 bits.
		All other values	Reserved
0xf8	CQISupervisionTimer	<b>0x00</b>	CQI Supervision Timer is 0
		0x01-0xff	Value of CQI Supervision Timer
0xf7	MinimumContinuationSpan	<b>0x04</b>	Minimum continuation span is 4 sub-packets
		0x01-0x03 and 0x05-0x10	Value of Minimum continuation span in sub-packets
		All other values	Reserved

2

## 1.6.8 Protocol Numeric Constants

Constant	Meaning	Value
$N_{FTCMPType}$	Type field for this protocol	[5]
$N_{FTCMPxHRPDS1}$	Subtype field for this protocol	0x0001
$N_{FTCMPRestartTx}$	Number of consecutive slots of non-null rate CQIs to re-enable the Reverse Traffic Channel transmitter once it is disabled due to CQI supervision failure.	16
$T_{FTCMPRestartTx}$	Reverse Channel Restart Timer	12 Control Channel cycles

## 1.6.9 Session State Information

The Session State Information record (see [1]) consists of parameter records.

The parameter records for this protocol consist of only the configuration attributes of this protocol.

## 1.7 xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol

### 1.7.1 Overview

The xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol provides the procedures and messages required for an access terminal to transmit, and for an access network to receive the Reverse Traffic Channel. Specifically, this protocol addresses Reverse Traffic Channel transmission rules and rate control. This protocol operates with xHRPD Subtype 0 Physical Layer Protocol. It supports intra-access terminal Quality of Service (QoS) for multiple concurrent active MAC flows at the access terminal. Maximum of 8 MAC flows are supported. QoS is achieved through priority mechanism. As part of session negotiation, the access network assigns a priority value (simple attribute) to each MAC flow. The access terminal determines physical layer packet size based on reverse link power and data rate control and applies absolute priority scheme to fill the packet from various flows (data from the highest priority flow is filled first).

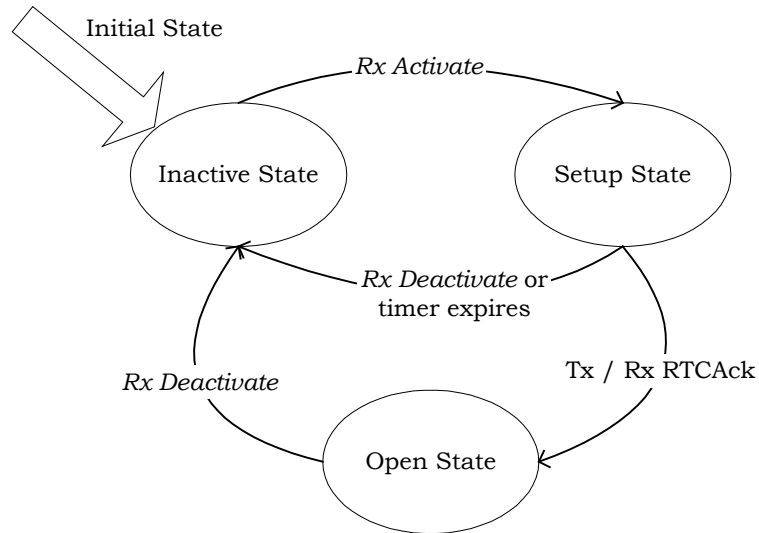
This specification assumes that the access network has one instance of this protocol for every access terminal.

This protocol operates in one of three states:

- **Inactive State:** In this state, the access terminal is not assigned a Reverse Traffic Channel. When the protocol is in this state, it waits for an *Activate* command.
- **Setup State:** In this state, the access terminal obeys the power control commands that it receives from the access network. Data transmission on the Reverse Traffic Channel is not allowed in this state.

- 1 • Open State: In this state, the access terminal obeys the power control commands that it  
 2 receives from the access network. In this state, the access terminal may negotiate  
 3 different xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol parameters and  
 4 attributes per MAC flow and transmit data on the Reverse Traffic Channel.

5 The protocol states and the indications and events causing the transition between the  
 6 states are shown in Figure 1.7.1-1.



7  
 8 **Figure 1.7.1-1. xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol State**  
 9 **Diagram**

10 The xHRPD Subtype 0 Reverse Traffic Channel MAC protocol allows updating Reverse  
 11 Traffic Channel MAC attributes (access terminal specific and MAC flow specific) using the  
 12 Generic Attribute Update Protocol.

### 13 1.7.2 Primitives and Public Data

#### 14 1.7.2.1 Commands

15 This protocol defines the following commands:

- 16 • *Activate*  
 17 • *Deactivate*

#### 18 1.7.2.2 Return Indications

19 This protocol returns the following indications:

- 20 • *LinkAcquired*  
 21 • *SupervisionFailed*

#### 22 1.7.2.3 Public Data

23 This protocol shall make the following data public:

- 1 • Subtype for this protocol
- 2 • RPCStep

### 3 1.7.3 Protocol Data Unit

4 The transmission unit of this protocol is a Reverse Traffic Channel MAC Layer packet. Each  
5 Reverse Traffic Channel MAC Layer packet contains one Security Layer packet.

### 6 1.7.4 Protocol Initialization

#### 7 1.7.4.1 Protocol Initialization for the InConfiguration Protocol Instance

8 Upon creation, the InConfiguration instance of this protocol in the access terminal and the  
9 access network shall perform the following in the order specified:

- 10 • The fall-back values of the attributes for this protocol instance shall be set to the  
11 default values specified for each attribute.
- 12 • If the InUse instance of this protocol has the same protocol subtype as this  
13 InConfiguration protocol instance, then the fall-back values of the attributes defined by  
14 the InConfiguration protocol instance shall be set to the values of the corresponding  
15 attributes associated with the InUse protocol instance.
- 16 • The value for each attribute for this protocol instance shall be set to the fall-back value  
17 for that attribute.
- 18 • The value of the public data for the InConfiguration protocol instance shall be set to the  
19 value of the public data for the InUse protocol instance.

### 20 1.7.5 Procedures and Messages for the InConfiguration Instance of the Protocol

#### 21 1.7.5.1 Procedures

22 This protocol uses the Generic Configuration Protocol (see [1]) to define the processing of  
23 the configuration messages.

24 The access network shall not initiate negotiation of the MaxMACFlows attribute.

#### 25 1.7.5.2 Commit Procedures

26 The access terminal and the access network shall perform the procedures specified in this  
27 section, in the order specified, when directed by the InUse instance of the Session  
28 Configuration Protocol to execute the Commit procedures:

- 29 • All the public data that are defined by this protocol, but are not defined by the InUse  
30 protocol instance shall be added to the public data of the InUse protocol.
- 31 • The value of the following public data of the InUse protocol shall be set to the  
32 corresponding attribute value of the InConfiguration protocol instance:
  - 33 – RPCStep
- 34 • If the InUse instance of this protocol has the same subtype as this protocol instance,  
35 then

- 1           – The access terminal and the access network shall set the attribute values
- 2           associated with the InUse instance of this protocol to the attribute values
- 3           associated with the InConfiguration instance of this protocol.
- 4           – The access terminal and the access network shall purge the InConfiguration
- 5           instance of the protocol.
- 6           • If the InUse instance of this protocol does not have the same subtype as this protocol
- 7           instance, then the access network and the access terminal shall perform the following
- 8           in the order specified:
  - 9           – The access terminal and the access network shall set the initial state for the
  - 10           InConfiguration instance of this protocol to the Inactive State.
  - 11           – The InConfiguration protocol instance shall become the InUse protocol
  - 12           instance for the Reverse Traffic Channel MAC Protocol.
- 13           • All the public data not defined by this protocol shall be removed from the public data of
- 14           the InUse protocol.

15 1.7.5.3 Message Formats

16 1.7.5.3.1 ConfigurationRequest

17 The ConfigurationRequest message format is as follows:

18

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

19 MessageID           The sender shall set this field to 0x50.

20 TransactionID       The sender shall increment this value for each new

21 ConfigurationRequest message sent.

22 AttributeRecord     The format of this record is specified in [1].

23

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	Unicast	<b>Priority</b>	40

24 1.7.5.3.2 ConfigurationResponse

25 The ConfigurationResponse message format is as follows:

26

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 1 MessageID The sender shall set this field to 0x51.
- 2 TransactionID The sender shall set this value to the TransactionID field of the  
3 corresponding ConfigurationRequest message.
- 4 AttributeRecord An attribute record containing a single attribute value. If this  
5 message selects a complex attribute, only the ValueID field of the  
6 complex attribute shall be included in the message. The format of the  
7 AttributeRecord is given in [1]. The sender shall not include more  
8 than one attribute record with the same attribute identifier.
- 9

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	Unicast	<b>Priority</b>	40

## 10 1.7.6 Procedures and Messages for the InUse Instance of the Protocol

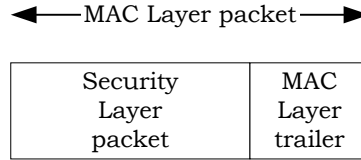
### 11 1.7.6.1 Procedures

12 The protocol constructs a xHRPD Subtype 0 Reverse Traffic Channel MAC Layer packet out  
13 of a Security Layer packet and passes the packet for transmission to the Physical Layer  
14 Protocol.

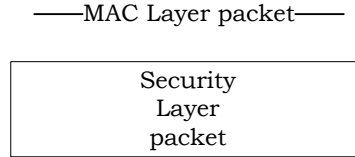
15 The xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol supports multiple MAC Flows.  
16 The FlowPriority attribute is used for defining priority for each MAC flow. The flow priority  
17 value is used by the QoS algorithm for prioritization and resource management. MAC flow  
18 *N* is defined to be active if its FlowPriority has non-zero value. The number of active MAC  
19 Flows shall not exceed the value of the MaxNumActiveMACFlows parameter of the  
20 MaxMACFlows attribute.

#### 21 1.7.6.1.1 MAC Layer Packet

22 The MAC Layer packet is the basic unit of data provided by the Reverse Traffic Channel  
23 MAC protocol to the Physical Layer Protocol. The structure of a MAC Layer packet is shown  
24 in Figure 1.7.6.1.1-1 and Figure 1.7.6.1.1-2. The MAC Layer packet consists of a Security  
25 Layer packet followed by the MAC Layer trailer for the data packet flow and only the  
26 Security Layer packet for the voice packet flow.



**Figure 1.7.6.1.1-1.Reverse Traffic Channel MAC Layer Packet Structure**



**Figure 1.7.6.1.1-2.Reverse Traffic Channel MAC Layer Packet Structure For Voice Flow**

The maximum size payload this protocol can support (i.e., the maximum size Security Layer packet that can be carried) is a function of the traffic type (voice or data), reverse transmit format (see [7]) and transmission rate used on the Reverse Traffic Channel and can be obtained from Table 1.3.1.3.1.1-1 in [7].

1.7.6.1.2 Command Processing

1.7.6.1.2.1 Activate

If the protocol receives an *Activate* command in the Inactive State, the access terminal and the access network shall perform the following:

- Set  $ATI_{LCM}$  to TransmitATI.ATI
- Transition to the Setup State

If the protocol receives this command in any other state it shall be ignored.

1.7.6.1.2.2 Deactivate

If the protocol receives a *Deactivate* command in the Setup State or the Open State,

- Access terminal shall cease transmitting the Reverse Traffic Channel and shall transition to the Inactive State.
- Access network shall cease monitoring the Reverse Traffic Channel from this access terminal and shall transition to the Inactive State.

If the protocol receives a *Deactivate* command in the Inactive State, it shall be ignored.

1.7.6.1.3 Reverse Traffic Channel Long Code Mask

The access terminal shall set the long code masks for the reverse traffic channel ( $MI_{RTCMAC}$  and  $MQ_{RTCMAC}$ ) as follows. The 42-bit mask  $MI_{RTCMAC}$  shall be specified as shown in Table 1.7.6.1.3-1.

**Table 1.7.6.1.3-1.Reverse Traffic Channel Long Code Masks**

BIT	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
MI <sub>RTCMAC</sub>	1	1	1	1	1	1	1	1	1	1	Permuted (ATI <sub>LCM</sub> )																															

Permuted (ATI<sub>LCM</sub>) is defined as follows:

$$ATI_{LCM} = (A_{31}, A_{30}, A_{29}, \dots, A_0)$$

$$\text{Permuted } (ATI_{LCM}) =$$

$$(A_0, A_{31}, A_{22}, A_{13}, A_4, A_{26}, A_{17}, A_8, A_{30}, A_{21}, A_{12}, A_3, A_{25}, A_{16}, A_7, A_{29}, A_{20}, A_{11}, A_2, A_{24}, A_{15}, A_6, A_{28}, A_{19}, A_{10}, A_1, A_{23}, A_{14}, A_5, A_{27}, A_{18}, A_9).$$

The 42-bit mask MQ<sub>RTCMAC</sub> shall be derived from the mask MI<sub>RTCMAC</sub> as follows:

$$MQ_{RTCMAC}[k] = MI_{RTCMAC}[k-1], \quad \text{for } k = 1, \dots, 41$$

$$MQ_{RTCMAC}[0] = MI_{RTCMAC}[0] \oplus MI_{RTCMAC}[1] \oplus MI_{RTCMAC}[2] \oplus MI_{RTCMAC}[4] \oplus MI_{RTCMAC}[5] \oplus$$

$$MI_{RTCMAC}[6] \oplus MI_{RTCMAC}[9] \oplus MI_{RTCMAC}[15] \oplus MI_{RTCMAC}[16] \oplus MI_{RTCMAC}[17] \oplus$$

$$MI_{RTCMAC}[18] \oplus MI_{RTCMAC}[20] \oplus MI_{RTCMAC}[21] \oplus MI_{RTCMAC}[24] \oplus MI_{RTCMAC}[25] \oplus$$

$$MI_{RTCMAC}[26] \oplus MI_{RTCMAC}[30] \oplus MI_{RTCMAC}[32] \oplus MI_{RTCMAC}[34] \oplus MI_{RTCMAC}[41]$$

where the  $\oplus$  denotes the Exclusive OR operation, and MQ<sub>RTCMAC</sub>[i] and MI<sub>RTCMAC</sub>[i] denote the i<sup>th</sup> least significant bit of MQ<sub>RTCMAC</sub> and MI<sub>RTCMAC</sub>, respectively.

#### 1.7.6.1.4 Inactive State

When the protocol is in the Inactive State the access terminal and the access network wait for an *Activate* command.

#### 1.7.6.1.5 Setup State

##### 1.7.6.1.5.1 Access Terminal Requirements

The access terminal shall set a timer for T<sub>RTCMPATSetup</sub> seconds when it enters this state. If the protocol is still in the Setup State when the timer expires, the access terminal shall return a *SupervisionFailed* indication.

The access terminal shall start transmitting 40-bit packets consisting of arbitrary 40-bit sequence at 2.4 kbps on the Reverse Traffic Channel upon entering this state, and shall obey the Reverse Power Control Channel. The access terminal shall set the CQI value as specified by the Forward Traffic Channel MAC Protocol (see 1.5).

The access terminal shall not transmit any data on the Reverse Traffic Data Channel while in this state.

If the access terminal receives an RTCAck message it shall return a *LinkAcquired* indication and transition to the Open State.

1 1.7.6.1.5.2 Access Network Requirements

2 The access network shall set a timer for  $T_{RTCMPANSetup}$  seconds when it enters this state. If  
 3 the protocol is still in the Setup State when the timer expires, the access network shall  
 4 return a *SupervisionFailed* indication.

5 The access network shall attempt to acquire the Reverse Traffic Channel in this state. If the  
 6 access network acquires the Reverse Traffic Channel, it shall send an RTCAck message to  
 7 the access terminal, return a *LinkAcquired* indication, and shall transition to the Open  
 8 State.

9 1.7.6.1.6 Open State

10 1.7.6.1.6.1 Access Terminal Requirements

11 In this state, the access terminal may negotiate different xHRPD Subtype 0 Reverse Traffic  
 12 Channel MAC Protocol parameters and attributes per MAC flow and transmit data on the  
 13 Reverse Traffic Channel.

14 1.7.6.2 Trailer and Message Formats

15 1.7.6.2.1 MAC Layer Trailer

16 The access terminal shall set the MAC Layer trailer as follows:

17

Field	Length (bits)
ConnectionLayerFormat	1
TransmissionMode	1

18 ConnectionLayerFormat

19 If the Security Layer packet contains a Format B Connection Layer  
 20 packet, then the access terminal shall set this field to '1'. Otherwise,  
 21 the access terminal shall set this field to '0'.

22 TransmissionMode If the MAC flow is associated to link flow 2, then the access terminal  
 23 shall set this field to '1'. Otherwise, the access terminal shall set this  
 24 field to '0'.

25 1.7.6.2.2 RTCAck

26 The access network sends the RTCAck message to notify the access terminal that it has  
 27 acquired the Reverse Traffic Channel. The access network shall send this message using  
 28 the access terminal's current ATI.  
 29

Field	Length (bits)
MessageID	8

1 MessageID The access network shall set this field to 0x00.

<b>Channels</b>	FTC	<b>SLP</b>	Reliable
<b>Addressing</b>	Unicast	<b>Priority</b>	10

### 3 1.7.6.2.3 AttributeUpdateRequest

4 The sender sends an AttributeUpdateRequest message to offer an attribute-value for a given  
5 attribute.

Field	Length (bits)
MessageID	8
TransactionID	8

6 One or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

7 MessageID The sender shall set this field to 0x52.

8 TransactionID The sender shall increment this value for each new  
9 AttributeUpdateRequest message sent.

10 AttributeRecord The format of this record is specified in [1].

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 12 1.7.6.2.4 AttributeUpdateAccept

13 The sender sends an AttributeUpdateAccept message in response to an  
14 AttributeUpdateRequest message to accept the offered attribute values.

Field	Length (bits)
MessageID	8
TransactionID	8

16 MessageID The sender shall set this field to 0x53.

17 TransactionID The sender shall set this value to the TransactionID field of the  
18 corresponding AttributeUpdateRequest message.

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

1    1.7.6.2.5 AttributeUpdateReject

2    The access network sends an AttributeUpdateReject message in response to an  
 3    AttributeUpdateRequest message to reject the offered attribute values.

4

Field	Length (bits)
MessageID	8
TransactionID	8

5    MessageID                      The access network shall set this field to 0x54.

6    TransactionID                 The access network shall set this value to the TransactionID field of  
 7    the corresponding AttributeUpdateRequest message.

8

<b>Channels</b>	FTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

9    1.7.6.3 Interface to Other Protocols

10    1.7.6.3.1 Commands Sent

11    This protocol does not issue any commands.

12    1.7.6.3.2 Indications

13    This protocol does not register to receive any indications.

14    1.7.7 Configuration Attributes

15    The following attributes and default values are defined (see [1] for attribute record  
 16    definition).

17    1.7.7.1 Simple Attributes

18    The negotiable simple attribute for this protocol is listed in Table 1.7.7.1-1. The access  
 19    network and the access terminal shall use the default value that is typed in ***bold italics***.

20

**Table 1.7.7.1-1.Configurable Simple Attributes**

<b>Attribute ID</b>	<b>Attribute</b>	<b>Values</b>	<b>Meaning</b>
0xffNN	FlowPriority	0x00-0x07	Priority of MAC flow 0x00: MAC Flow is not active 0x01 – 0x07: Lower the number, higher the priority
		<b>0x08</b>	Priority of MAC flow 0x08 – Lowest priority
		All other values	Reserved

### 1.7.7.2 Complex Attributes

The following configurable complex attributes are defined:

#### 1.7.7.2.1 AssociatedFlows*NN* Attribute

This attribute is used for associating MAC flow with application and RLP flows. *NN* is the two-digit hexadecimal number that identifies the MAC Flows in the range 0x01 through MaxNumMACFlows – 1, inclusive.

<b>Field</b>	<b>Length(bits)</b>	<b>Default for <i>NN</i> between 0x02 and (MaxNumMACFlows – 1), inclusive</b>	<b>Default for <i>NN</i> = 0x01</b>
Length	8	N/A	N/A
AttributeID	8	N/A	N/A

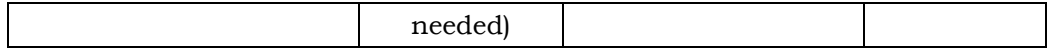
One or more occurrences of the following attribute value record:

{			
ValueID	8	N/A	N/A
FlowCount	8	0	1

FlowCount occurrences of the following two fields:

{			
Stream	9	N/A	511
SubStream	8	N/A	0

}			
Reserved	0 – 7 (as	N/A	N/A



}

1	Length	Length of the complex attribute in octets. The sender shall set this field to the length of the complex attribute excluding the Length field.
2		
3	AttributeID	The sender shall set this field to 0x01NN, where NN is the two-digit hexadecimal number that identifies the MAC Flow in the range 0x01 through MaxNumMACFlows – 1, inclusive.
4		
5		
6	ValueID	The sender shall set this field to an identifier assigned to this complex value.
7		
8	FlowCount	The sender shall set this field to the number of higher layer flows associated with this MAC Flow.
9		
10	Stream	If this flow is generated by an application bound to a stream, then the sender shall set this field to the stream number. If this flow is generated by an application bound to a virtual stream, then the sender shall set this field to 3 more than the virtual stream number. If this MAC flow is to be associated with all higher layer flow not associated with a MAC flow, then the sender shall set this field to '11111111'.
11		
12		
13		
14		
15		
16		
17	SubStream	If the application bound generating this flow defines sub-streams, then the sender shall set this field to the number of the sub-stream associated with this MAC flow <sup>8</sup> . Otherwise, the sender shall set this field to '00000000'. If Stream is '11111111', then the sender shall set this field to '00000000'.
18		
19		
20		
21		
22	Reserved	The sender shall add reserved bits to make the length of each attribute value record an integer number of octets. The receiver shall ignore this field.
23		
24		

25 1.7.7.2.2 MaxMACFlows Attribute

26

---

<sup>8</sup> For example, in case of the Multi-flow Packet Application, this field is set to the RLP flow number corresponding to the RLP flow associated with this MAC flow.

<b>Field</b>	<b>Length (bits)</b>	<b>Default</b>
Length	8	N/A
AttributeID	16	N/A

One or more occurrences of the following record:

ValueID	8	N/A
MaxNumMACFlows	8	<b>0x08</b>
MaxNumActiveMACFlows	8	<b>0x08</b>

- 1 Length Length of the complex attribute in octets. The sender shall set this  
2 field to the length of the complex attribute excluding the Length field.
- 3 AttributeID The sender shall set this field to 0x02.
- 4 ValueID The sender shall set this field to an identifier assigned to this  
5 complex value.
- 6 MaxNumMACFlows The sender shall set this field to indicate the maximum total number  
7 of activated and deactivated MAC flows supported. The value shall be  
8 in the range of 0x04 to 0x10, inclusive
- 9 MaxNumActiveMACFlows  
10 The sender shall set this field to indicate the maximum number of  
11 active MAC flows supported. The value shall be in the range of 0x04  
12 to MaxNumMACFlows, inclusive.

### 13 1.7.8 Protocol Numeric Constants

<b>Constant</b>	<b>Meaning</b>	<b>Value</b>
$N_{\text{RTCMPTType}}$	Type field for this protocol	[5]
$N_{\text{xHRPDSORTCMP}}$	Subtype field for this protocol	0x0000
$T_{\text{RTCMPATSetup}}$	Maximum time for the access terminal to transmit the Reverse Traffic Channel in the Setup State	2.5 sec
$T_{\text{RTCMPANSetup}}$	Maximum time for the access network to acquire the Reverse Traffic Channel and send a notification to the access terminal.	2 sec

### 15 1.7.9 Session State Information

16 The Session State Information record (see [1]) consists of parameter records.

17 This protocol defines the following parameter record in addition to the configuration  
18 attributes for this protocol.

## 1 1.7.9.1 LongCodeMask Parameter

2 The following parameter shall be included in the Session State Information record only if  
 3 the Session State Information is being transferred while the connection is open.

4 **Table 1.7.9.1-1.The Format of the Parameter Record for the LongCodeMask**  
 5 **Parameter**

Field	Length (bits)
ParameterType	8
Length	8
MIRTCMAC	42
MQRTCMAC	42
Reserved	4

6 ParameterType This field shall be set to 0x01 for this parameter record.

7 Length This field shall be set to the length of this parameter record in units  
 8 of octets excluding the Length field.

9 MIRTCMAC This field shall be set to the value of the reverse traffic channel in-  
 10 phase long code mask associated with the access terminal's session.

11 MQRTCMAC This field shall be set to the value of the reverse traffic channel  
 12 quadrature-phase long code mask associated with the access  
 13 terminal's session.

14 Reserved This field shall be set to zero.

15

1 This page intentionally left blank.

2

- 1 **2 SECURITY LAYER**
- 2 Same as defined in [4].
- 3

1

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3

## 3 CONNECTION LAYER

### 3.1 Introduction

#### 3.1.1 General Overview

The Connection Layer controls the state of the air-link, and it prioritizes the traffic that is sent over it.

This section presents the default protocols for the Connection Layer. With the exception of the Overhead Messages Protocol, each of these protocols can be independently negotiated at the beginning of the session.

The access terminal and the access network maintain a connection whose state dictates the form in which communications between these entities can take place. The connection can be either closed or open:

- **Closed Connection:** When a connection is closed, the access terminal is not assigned any dedicated air-link resources. Communications between the access terminal and the access network are conducted over the Access Channel and the Control Channel.
- **Open Connection:** When a connection is open, the access terminal can be assigned the Forward Traffic Channel, and is assigned a Reverse Power Control Channel, Reverse Frequency Control Channel and a Reverse Traffic Channel. Communications between the access terminal and the access network are conducted over these assigned channels, as well as over the Control Channel.

The Connection Layer provides the following connection-related functions:

- Manages initial acquisition of the network.
- Manages opening and closing of connections.
- Manages communications when connection is closed and when a connection is open.
- Maintains approximate access terminal's location in either connection states.
- Manages radio link between the access terminal and the access network when a connection is open.
- Performs supervision both when the connection is open and when it is closed.
- Prioritizes and encapsulates transmitted data received from the Session Layer and forwards it to the Security Layer.
- De-capsulates data received from the Security Layer and forwards it to the Session Layer.

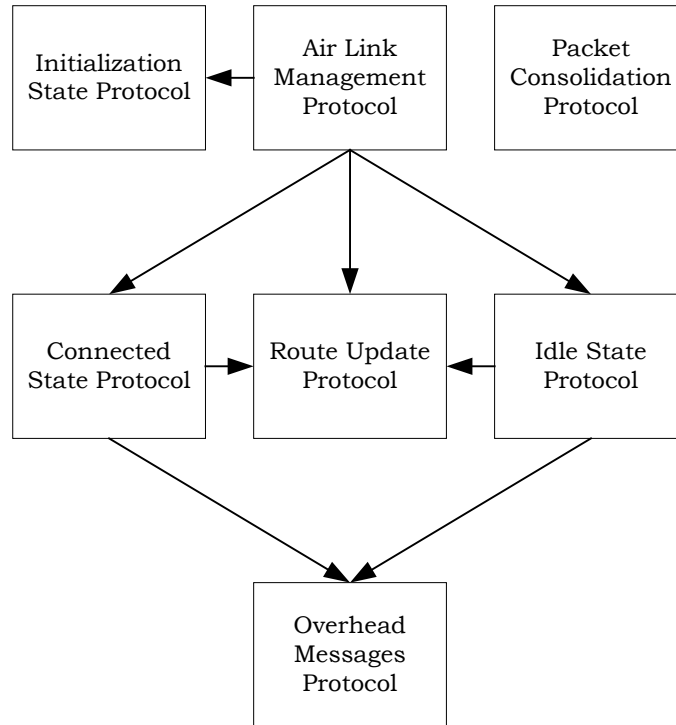
The Connection Layer performs these functions through the following protocols:

- 1 • Air Link Management Protocol: This protocol maintains the overall connection state in  
2 the access terminal and the access network. The protocol can be in one of three states,  
3 corresponding to whether the access terminal has yet to acquire the network  
4 (Initialization State), has acquired the network but the connection is closed (Idle State),  
5 or has an open connection with the access network (Connected State). This protocol  
6 activates one of the following three protocols as a function of its current state.
- 7 • Initialization State Protocol: This protocol performs the actions associated with  
8 acquiring an access network.
- 9 • Idle State Protocol: This protocol performs the actions associated with an access  
10 terminal that has acquired the network, but does not have an open connection. Mainly,  
11 these are keeping track of the access terminal's approximate location in support of  
12 efficient Paging (using the Route Update Protocol), the procedures leading to the  
13 opening of a connection, and support of access terminal power conservation.
- 14 • Connected State Protocol: This protocol performs the actions associated with an access  
15 terminal that has an open connection. Mainly, these are managing the radio link  
16 between the access terminal and the access network (handoffs, handled via the Route  
17 Update Protocol), and the procedures leading to the close of the connection.

18 In addition to the above protocols, which deal with the state of the connection, the  
19 Connection Layer also contains the following protocols:

- 20 • Route Update Protocol: This protocol performs the actions associated with keeping track  
21 of an access terminal's location and maintaining the radio link between the access  
22 terminal and the access network. This protocol performs supervision on the pilots.
- 23 • Overhead Messages Protocol: This protocol broadcasts essential parameters over the  
24 Control Channel. These parameters are shared by protocols in the Connection Layer as  
25 well as protocols in other layers. This protocol also performs supervision on the  
26 messages necessary to keep the Connection Layer functioning.
- 27 • Packet Consolidation Protocol: This protocol consolidates and prioritizes packets for  
28 transmission as a function of their assigned priority and the target transmission  
29 channel.

30 Figure 3.1.1-1 illustrates the relationship between all the Connection Layer protocols. An  
31 arrow between two protocols implies that the source sends commands to the target.



1  
2  
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15  
16

**Figure 3.1.1-1. Connection Layer Protocols**

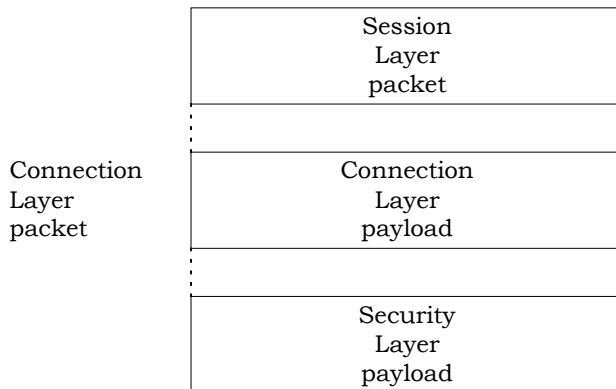
The Air Link Management Protocol, its descendants and the Overhead Messages Protocol are control protocols. The Packet Consolidation Protocol operates on transmitted and received data.

3.1.2 Data Encapsulation for the InUse Protocol Instance

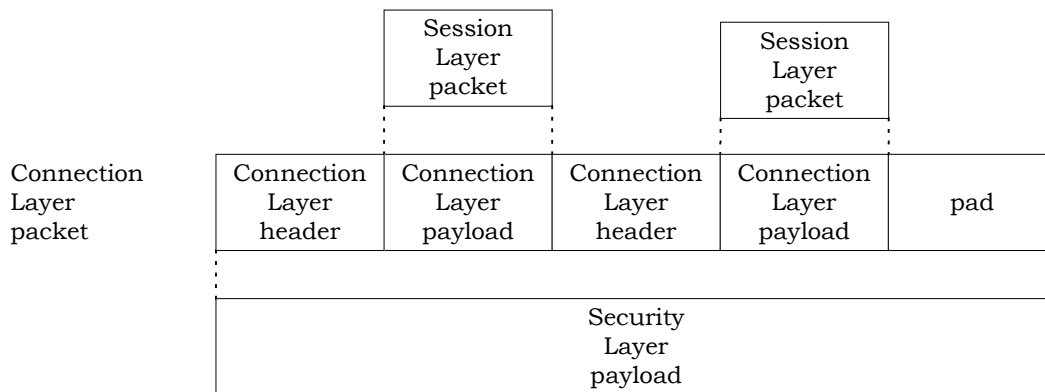
In the transmit direction, the Connection Layer receives Session Layer packets, adds Connection Layer header(s), concatenates them in the order to be processed on the receive side, adds padding, where applicable, and forwards the resulting packet for transmission to the Security Layer.

In the receive direction, the Connection Layer receives Security Layer packets from the Security Layer, and forwards the Session Layer packets to the Session Layer in the order received after removing the Connection Layer headers and padding.

Figure 3.1.2-1 and Figure 3.1.2-2 illustrate the relationship between Session Layer packets, Connection Layer packets and Security Layer payloads for Format A (maximum size) and Format B Connection Layer packets.



**Figure 3.1.2-1. Connection Layer Encapsulation (Format A)**



**Figure 3.1.2-2. Connection Layer Encapsulation (Format B)**

**3.2 Default Air-Link Management Protocol**

The Default Air-Link Management Protocol is same as defined in [4].

**3.3 Default Initialization State Protocol**

The Default Initialization State Protocol is same as defined in [4].

**3.4 xHRPD Subtype 0 Idle State Protocol**

3.4.1 Overview

The xHRPD Subtype 0 Idle State Protocol provides the procedures and messages used by the access terminal and the access network when the access terminal has acquired a network and a connection is not open.

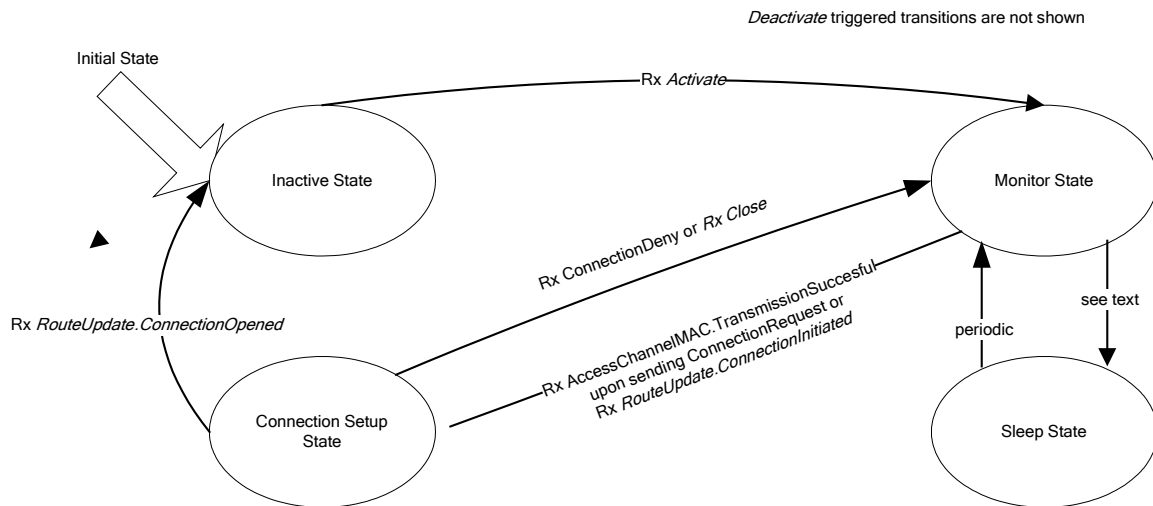
This protocol operates in one of the following four states:

- Inactive State: In this state the protocol waits for an *Activate* command.

- 1 • Sleep State: In this state the access terminal may shut down part of its subsystems to
- 2 conserve power. The access terminal does not monitor the Forward Channel, and the
- 3 access network is not allowed to transmit unicast packets to it.
- 4 • Monitor State: In this state the access terminal monitors the Control Channel, listens
- 5 for Page messages and if necessary, updates the parameters received from the Overhead
- 6 Messages Protocol. The access network may transmit unicast packets to the access
- 7 terminal in this state.
- 8 • Connection Setup State: In this state the access terminal and the access network set-up
- 9 a connection.

10 Protocol states and events causing the transition between the states are shown in Figure  
 11 3.4.1-1 and Figure 3.4.1-2.

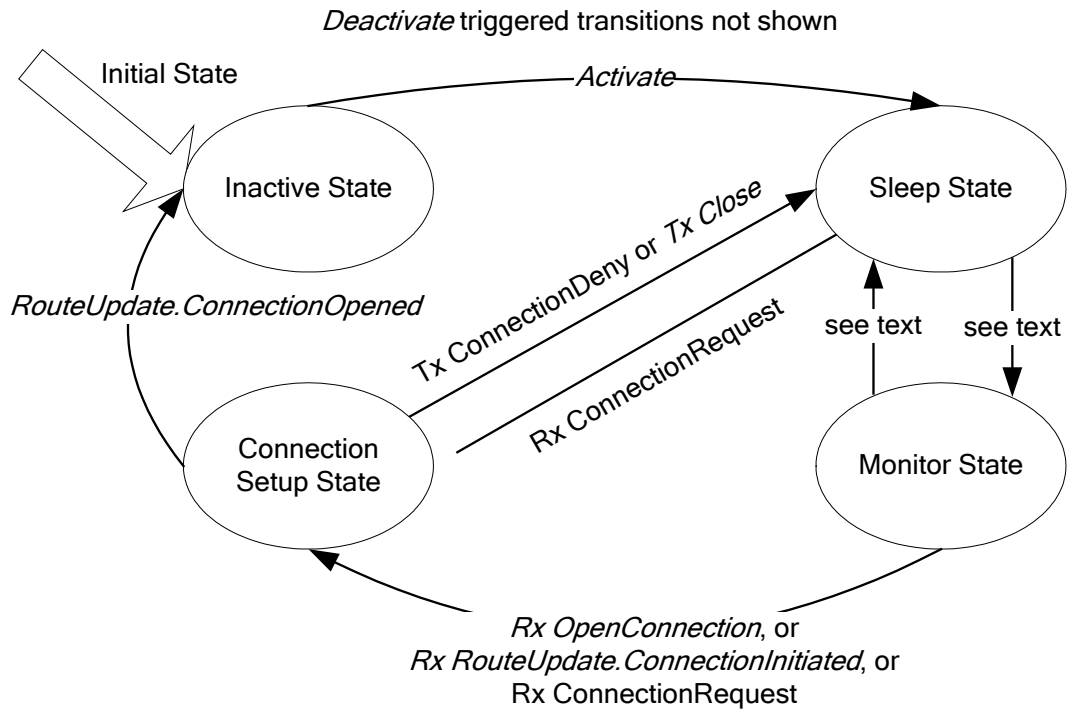
12



13

14 **Figure 3.4.1-1. xHRPD Subtype 0 Idle State Protocol State Diagram (Access Terminal)**

1



2

3 **Figure 3.4.1-2. xHRPD Subtype 0 Idle State Protocol State Diagram (Access Network)**

4 This protocol supports periodic network monitoring by the access terminal, allowing for  
5 significant power savings. The following access terminal operation modes are supported:

- 6
- 7 • Continuous operation, in which the access terminal continuously monitors the Control Channel.
  - 8 • Suspended mode operation, in which the access terminal monitors the Control Channel  
9 continuously for a period of time and then proceeds to operate in the slotted mode.  
10 Suspended mode follows operation in the Air-Link Management Protocol Connected  
11 State and allows for quick network-initiated reconnection.
  - 12 • Slotted mode operation, in which the access terminal monitors only selected slots.

13 This protocol supports two types of connection set-ups:

- 14 • Normal setup: this procedure is always performed at the initiative of the access  
15 terminal.<sup>9</sup> It consists of the access terminal sending a ConnectionRequest message  
16 which in turn causes the lower layers to open the connection. The Connection Setup  
17 State contains the requirements for normal setup.

---

<sup>9</sup> The access network may transmit a Page message to the access terminal directing it to initiate the procedure.

- 1 • Fast Connect: this procedure is always performed at the initiative of the access network  
2 and consists of the access network opening the connection directly via a  
3 *RouteUpdate.Open* command.<sup>10</sup> Fast Connect eliminates the need for the Page /  
4 ConnectionRequest exchange when the access network has pending data to transmit to  
5 an access terminal, and is especially useful when the access terminal is in suspended  
6 mode. Support for Fast Connect at the access network is optional. Support for Fast  
7 Connect at the access terminal is mandatory. The Monitor State contains the  
8 requirements for Fast Connect.

### 9 3.4.2 Primitives and Public Data

#### 10 3.4.2.1 Commands

11 This protocol defines the following commands:

- 12 • *Activate*
- 13 • *Deactivate*
- 14 • *OpenConnection*
- 15 • *Close*

#### 16 3.4.2.2 Return Indications

17 This protocol returns the following indications:

- 18 • *ConnectionOpened*
- 19 • *ConnectionFailed*

#### 20 3.4.2.3 Public Data

21 This protocol shall make the following data public:

- 22 • Subtype for this protocol

### 23 3.4.3 Protocol Data Unit

24 The transmission unit of this protocol is a message. This is a control protocol; and,  
25 therefore, it does not carry payload on behalf of other layers or protocols.

26 This protocol uses the Signaling Application to transmit and receive messages.

### 27 3.4.4 Protocol Initialization

#### 28 3.4.4.1 Protocol Initialization for the InConfiguration Protocol Instance

29 Upon creation, the InConfiguration instance of this protocol in the access terminal and the  
30 access network shall perform the following in the order specified:

---

<sup>10</sup> This command triggers a transmission of a TrafficChannelAssignment message based on the last RouteUpdate message received from the access terminal.

- 1 • The fall-back values of the attributes for this protocol instance shall be set to the  
2 default values specified for each attribute.
- 3 • If the InUse instance of this protocol has the same protocol subtype as this  
4 InConfiguration protocol instance, then the fall-back values of the attributes defined by  
5 the InConfiguration protocol instance shall be set to the values of the corresponding  
6 attributes associated with the InUse protocol instance.
- 7 • The value for each attribute for this protocol instance shall be set to the fall-back value  
8 for that attribute.

#### 9 3.4.4.2 Protocol Initialization for the InUse Protocol Instance

10 Upon creation, the InUse instance of this protocol in the access terminal and access  
11 network shall perform the following:

- 12 • The value of the attributes for this protocol instance shall be set to the default values  
13 specified for each attribute.
- 14 • The protocol shall enter the Inactive State.

#### 15 3.4.5 Procedures and Messages for the InConfiguration Instance of the Protocol

##### 16 3.4.5.1 Procedures

17 This protocol uses the Generic Configuration Protocol (see [6]) to define the processing of  
18 the configuration messages.

##### 19 3.4.5.2 Commit Procedures

20 The access terminal and the access network shall perform the procedures specified in this  
21 section, in the order specified, when directed by the InUse instance of the Session  
22 Configuration Protocol to execute the Commit procedures:

- 23 • All the public data that are defined by this protocol, but are not defined by the InUse  
24 protocol instance shall be added to the public data of the InUse protocol.
- 25 • If the InUse instance of any of the Connection Layer protocols does not have the same  
26 subtype as the corresponding InConfiguration protocol instance, then
  - 27 – the access terminal shall set the initial state of the InConfiguration and InUse  
28 protocol instances of the Idle State protocol to the Inactive State.
  - 29 – the access network shall set the initial state of the InConfiguration and InUse  
30 protocol instances of the Idle State protocol to the Sleep State.
- 31 • If the InUse instance of this protocol has the same subtype as this protocol instance,  
32 then
  - 33 – The access terminal and the access network shall set the attribute values  
34 associated with the InUse instance of this protocol to the attribute values  
35 associated with the InConfiguration instance of this protocol, and

- 1           – The access terminal and the access network shall purge the InConfiguration
- 2           instance of the protocol.
- 3       • If the InUse instance of this protocol does not have the same subtype as this protocol
- 4       instance, then the access terminal and the access network shall perform the following:
- 5           – The InConfiguration protocol instance shall become the InUse protocol
- 6           instance for the Idle State Protocol at the access terminal and the access
- 7           network.
- 8       • All the public data not defined by this protocol shall be removed from the public data of
- 9       the InUse protocol.

10 3.4.5.3 Message Formats

11 3.4.5.3.1 ConfigurationRequest

12 The ConfigurationRequest message format is as follows:

13

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 14 MessageID           The sender shall set this field to 0x50.
- 15 TransactionID       The sender shall increment this value for each new
- 16                       ConfigurationRequest message sent.
- 17 AttributeRecord     The format of this record is specified in [6].

18

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

19 3.4.5.3.2 ConfigurationResponse

20 The ConfigurationResponse message format is as follows:

21

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 1 MessageID The sender shall set this field to 0x51.
- 2 TransactionID The sender shall set this value to the TransactionID field of the  
3 corresponding ConfigurationRequest message.
- 4 AttributeRecord An attribute record containing a single attribute value. If this  
5 message selects a complex attribute, only the ValueID field of the  
6 complex attribute shall be included in the message. The format of the  
7 AttributeRecord is given in [6]. The sender shall not include more  
8 than one attribute record with the same attribute identifier.
- 9

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 10 3.4.6 Procedures and Messages for the InUse Instance of the Protocol

#### 11 3.4.6.1 Procedures

##### 12 3.4.6.1.1 Command Processing

###### 13 3.4.6.1.1.1 Activate

14 When the protocol receives an *Activate* command in the Inactive State:

- 15 • The access terminal shall transition to the Monitor State.
- 16 • The access network shall transition to the Sleep State.<sup>11</sup>

17 If the protocol receives this command in any other state it shall be ignored.

###### 18 3.4.6.1.1.2 Deactivate

19 When the protocol receives a *Deactivate* command in the Inactive State it shall be ignored.

20 When the protocol receives this command in any other state:

- 21 • The access terminal shall transition to the Inactive State.

---

<sup>11</sup> Since the transitions happen asynchronously, this requirement guarantees that the access network will not transmit unicast packets to the access terminal over the Control Channel when the access terminal is not monitoring the channel.

- 1 • The access network shall transition to the Inactive State.

2 3.4.6.1.1.3 OpenConnection

3 When the protocol receives an *OpenConnection* command in the Inactive State or the  
4 Connection Setup State, the command shall be ignored.

5 When the protocol receives this command in the Sleep State:

- 6 • The access terminal shall transition to the Monitor state and perform the procedures in  
7 3.4.6.1.2 for sending a ConnectionRequest message.
- 8 • The access network shall queue the command and execute it when it is in the Monitor  
9 State.

10 When the protocol receives this command in the Monitor State:

- 11 • The access terminal shall perform the procedures in 3.4.6.1.2 for sending a  
12 ConnectionRequest message.
- 13 • The access network shall send a Page message to the access terminal and transition to  
14 the Connection Setup State.

15 3.4.6.1.1.4 Close

16 When the protocol receives a *Close* command in the Inactive State it shall be ignored.

17 When the protocol receives a *Close* command in any other state:

- 18 • The access terminal shall transition to the Monitor State.
- 19 • The access network shall transition to the Sleep State.

20 3.4.6.1.2 Access Terminal Procedures for Sending a ConnectionRequest Message

21 When procedures in this section are invoked, the access terminal shall perform the  
22 following:

- 23 • Send a ConnectionRequest message,
- 24 • If an *AccessChannelMAC.TransmissionSuccessful* indication is received, it shall  
25 transition to the Connection Setup State,
- 26 • If an *AccessChannelMAC.TransmissionFailed* indication is received, it shall return a  
27 *ConnectionFailed* indication.

28 3.4.6.1.3 Inactive State

29 When the protocol is in the Inactive State it waits for an *Activate* command.

30 If the access terminal receives an *OverheadMessages.Updated* indication in this state, then  
31 the access terminal shall queue the latest *OverheadMessages.Updated* indication for  
32 processing in the Monitor state.

#### 3.4.6.1.4 Sleep State

When the access terminal is in the Sleep State it may stop monitoring the Control Channel by issuing the following commands:

- *OverheadMessages.Deactivate*
- *ControlChannelMAC.Deactivate*

The access terminal may shut down processing resources to reduce power consumption.

In order to transmit on the Access Channel in this state, the access terminal shall first transition from the Sleep State to the Monitor State. If the access terminal requires opening a connection, it shall transition to the Monitor state and perform the procedures in 3.4.6.1.2 for sending a ConnectionRequest message. When the access network is in the Sleep State, it is prohibited from sending unicast packets to the access terminal.

If the access network receives a ConnectionRequest message, it shall transition to the Connection Setup State.

If the access terminal advertised a suspend period that is current, the access network may transition to the Monitor State.

The access network and the access terminal shall transition from the Sleep State to the Monitor State in time to send and receive, respectively, the synchronous capsule sent in each Control Channel cycle  $C$  satisfying

$$(C + R) \bmod N_{IDPSleep} = 0$$

where  $C$  is the number of Control Channel cycles since the beginning of CDMA System Time and  $R$  is obtained as follows:

- If PreferredControlChannelCycleEnabled is equal to '0', then  $R$  is the result of applying the hash function (see [6]) using the following parameters:
  - Key = SessionSeed
  - Decorrelate =  $6 \times \text{SessionSeed}[11:0]$
  - $N = N_{IDPSleep}$
  - where SessionSeed is given as public data of the Address Management Protocol.
- If PreferredControlChannelCycleEnabled is equal to '1', then  $R$  is set to PreferredControlChannelCycle.

#### 3.4.6.1.5 Monitor State

When the access terminal is in the Monitor State, it continuously monitors the Control Channel.

When the access network is in the Monitor State, it may send unicast packets to the access terminal.

#### 3.4.6.1.5.1 Access Terminal Requirements

Upon entering the Monitor State, the access terminal shall issue the following commands:

- *OverheadMessages.Activate*
- *ControlChannelMAC.Activate*

The access terminal shall comply with the following requirements when in the Monitor State:

- If the access terminal has queued an *OverheadMessages.Updated* indication or upon receiving an *OverheadMessages.Updated* indication, the access terminal shall tune to the CDMA Channel selected as specified in 3.4.6.1.5.1.1.
- The access terminal shall monitor the overhead messages as specified in the Overhead Messages Protocol (see 3.9).
- If the access terminal receives a Page message, it shall perform the procedures in 3.4.6.1.2 for sending a ConnectionRequest message.
- If the access terminal requires opening a connection, it shall perform the procedures in 3.4.6.1.2 for sending a ConnectionRequest message.
- If the access terminal receives a *RouteUpdate.ConnectionInitiated* indication it shall transition to the Connection Setup State.<sup>12</sup>
- Access terminal may transition to the Sleep State if the requirements specified in 3.4.6.1.5.1.2 are satisfied.

##### 3.4.6.1.5.1.1 CDMA Channel Selection

The access terminal shall select a CDMA Channel from the list of channels in the SectorParameters message. If no channels are listed, the access terminal shall use the channel it is currently monitoring. If one or more channels are available, the access terminal shall use the hash function (see [6]) to compute an index into the channel list provided in the message. The access terminal shall use the following hash function parameters to obtain this index:

- Key = SessionSeed
- Decorrelate = 0
- N = ChannelCount field of the SectorParameters message

Where SessionSeed is provided as public data by the Address Management Protocol.

##### 3.4.6.1.5.1.2 Transition to Sleep State

The access terminal may transition to the Sleep State if all of the following requirements are met:

---

<sup>12</sup> This requirement provides Fast Connect on the access terminal side.

- 1 • Access terminal has received a Control Channel synchronous Sleep State capsule in the  
2 current Control Channel Cycle and has determined that the SectorParameters message  
3 is up to date. The current Control Channel Cycle is defined to be the Control Channel  
4 Cycle that started at slot  $\lfloor T/256 \rfloor$ , where T is the current CDMA System Time in slots.
- 5 • Access terminal received an *AccessChannelMAC.TxEnded* indication for every  
6 *AccessChannelMAC.TxStarted* indication it received since entering the Monitor State.<sup>13</sup>
- 7 • Access terminal has not advertised a suspend period that is current (see 3.6). The  
8 suspend period is current if the time advertised in the associated ConnectionClose  
9 message is greater than the current CDMA System Time.<sup>14</sup>

#### 10 3.4.6.1.5.2 Access Network Requirements

##### 11 3.4.6.1.5.2.1 General Requirements

- 12 • Access network shall select the CDMA Channel following the same specifications as the  
13 access terminal, see 3.4.6.1.5.1.1.
- 14 • If the access network receives a ConnectionRequest message, it shall transition to the  
15 Connection Setup State.
- 16 • If the access network requires opening a connection with the access terminal and does  
17 not use an accelerated procedure to set-up a connection, the access network shall send  
18 a Page message to the access terminal over the Control Channel.
- 19 • The access network may use an accelerated procedure to set-up a connection with the  
20 access terminal by bypassing the paging process. The access network should only use  
21 this procedure if it has a reasonable estimate of the access terminal's current location.  
22 To set-up a connection in an accelerated fashion (Fast Connect) the access network  
23 shall:
  - 24 – Issue a *RouteUpdate.Open* command.
  - 25 – Transition to the Connection Setup State, when the protocol receives a  
26 *RouteUpdate.ConnectionInitiated* indication.
- 27 • The access network shall transition to the Sleep State if the access terminal did not  
28 advertise a suspend period that is current.

##### 29 3.4.6.1.6 Connection Setup State

30 The access terminal and the access network use the Connection Setup State to perform a  
31 normal connection set-up.

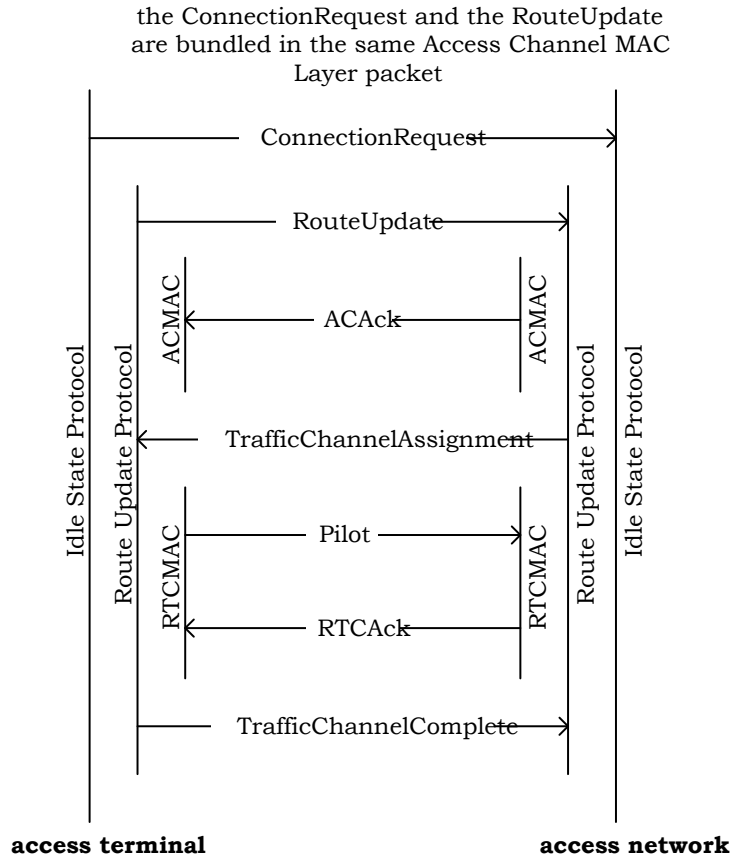
---

<sup>13</sup> This pairing ensures that the access terminal does not have any outstanding messages waiting for an answer.

<sup>14</sup> The access terminal monitors the Control Channel continuously during a suspend period thus avoiding the delay in opening access network initiated connections due to the sleep period.

1 Figure 3.4.6.1.6-1 illustrates the process of opening a connection between the access  
 2 terminal and the access network when this protocol is used along with the default Route  
 3 Update and the default Reverse Traffic Channel MAC protocols.<sup>15</sup>

4



5

6

**Figure 3.4.6.1.6-1. Connection Setup Exchange**

7 3.4.6.1.6.1 Access Terminal Requirements

8 Upon entering the Connection Setup State the access terminal shall:

- 9
- 10 • Issue an *OverheadMessages.Activate* command,
  - 11 • Issue a *ControlChannelMAC.Activate* command,
  - 12 • Set a state timer for  $T_{IDPATSetup}$  seconds,

12 If the access terminal receives a ConnectionDeny message, the access terminal shall return  
 13 a *ConnectionFailed* indication,

14 If the state timer expires, the access terminal shall return a *ConnectionFailed* indication,

---

<sup>15</sup> The Fast Connect message exchange is identical except for not having the Idle State Protocol ConnectionRequest message and the Route Update Protocol RouteUpdate message.

1 If the access terminal receives a *RouteUpdate.ConnectionOpened* indication, it shall return a  
2 *ConnectionOpened* indication and transition to the Inactive State.

### 3 3.4.6.1.6.2 Access Network Requirements

4 If the access network entered this state due to receiving a *RouteUpdate.ConnectionInitiated*  
5 indication, it shall perform the following:

- 6 • Set state timer for  $T_{IDPANSetup}$  seconds.
- 7 • If the protocol receives a *RouteUpdate.ConnectionOpened* indication, the access  
8 network shall return a *ConnectionOpened* indication and transition to the Inactive  
9 State.
- 10 • If the state timer expires, the access network shall return a *ConnectionFailed*  
11 indication and shall transition to the Sleep State.

12 Otherwise, the access network shall perform the following:

13 Upon reception of a *ConnectionRequest* message while in this state or if the access network  
14 entered this state due to reception of a *ConnectionRequest* message, the access network  
15 shall perform the following:

- 16 • If the access network denies the connection request, it should send the access terminal  
17 a *ConnectionDeny* message, shall return a *ConnectionFailed* indication, and shall  
18 transition to the Sleep State.
- 19 • Otherwise, the access network shall perform the following:
  - 20 – Set state timer for  $T_{IDPANSetup}$  seconds.
  - 21 – Issue a *RouteUpdate.Open* command.
  - 22 – If the protocol receives a *RouteUpdate.ConnectionOpened* indication, the access  
23 network shall return a *ConnectionOpened* indication and transition to the  
24 Inactive State.
  - 25 – If the state timer expires, the access network shall return a *ConnectionFailed*  
26 indication and shall transition to the Sleep State.
- 27 • If the access network did not enter this state as a result of receiving a  
28 *ConnectionRequest* message, and if the access network does not receive a  
29 *ConnectionRequest* message within an implementation dependent time interval, then  
30 the access network shall return a *ConnectionFailed* indication, and shall transition to  
31 the Sleep State.

### 32 3.4.6.2 Message Formats

#### 33 3.4.6.2.1 Page

34 The access network sends the *Page* message to direct the access terminal to request a  
35 connection.  
36

Field	Length (bits)
MessageID	8

1 MessageID The access network shall set this field to 0x00.

2

<b>Channels</b>	CCsynSS	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	20

3 3.4.6.2.2 ConnectionRequest

4 The access terminal sends the ConnectionRequest message to request a connection.

Field	Length (bits)
MessageID	8
TransactionID	8
RequestReason	4
PreferredChannelCount	5

PreferredChannelCount occurrences of the following field:

{

PreferredChannel	24
------------------	----

}

PreferTwoRevNBChannel	1
LowRateType	2
Reserved	0-7 (as needed)

5

6 MessageID The access terminal shall set this field to 0x01.

7 TransactionID The access terminal shall increment this value for each new  
8 ConnectionRequest message sent.

9 RequestReason The access terminal shall set this field to one of the request reasons  
10 as shown in Table 3.4.6.2-1.

**Table 3.4.6.2-1. Encoding of the RequestReason Field**

Field value	Description
0x0	Access Terminal Initiated
0x1	Access Network Initiated
All other values are invalid	

2 PreferredChannelCount

3 The access terminal shall set this field to the number of occurrences  
4 of the forward link PreferredChannel field in this message.

5 PreferredChannel

6 The access terminal shall set this field to the Channel record  
7 specification for the forward link CDMA channel on which the access  
terminal prefers to be assigned a Traffic Channel (see [6]).

8 PreferTwoRevNBChannel

9 The access terminal shall set this field to '0' to request one (6.4 kHz)  
10 reverse link narrowband channel and to '1' to request two (12.8 kHz)  
11 reverse link narrowband channels.

12 LowRateType

13 The access terminal shall set this field to one of the low data rates  
14 (640 bps or 1.28 kbps) for a low-rate terminal: '1' for 640 bps; '2' for  
1.28 kbps. Access network shall ignore this field, if it is set to '0'.

15 Reserved

16 The access terminal shall add reserved bits to make the length of the  
17 entire message an integer number of octets. The access terminal shall  
18 set these bits to '0'. The access network shall ignore this field.

<b>Channels</b>	AC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	40

19 3.4.6.2.3 ConnectionDeny

20 The access network sends the ConnectionDeny message to deny a connection.  
21

Field	Length (bits)
MessageID	8
TransactionID	8
DenyReason	4
Reserved	4

22 MessageID

The access network shall set this field to 0x02.

1 TransactionID The access network shall set this value to the TransactionID field of  
 2 the corresponding ConnectionRequest message.

3 DenyReason The access network shall set this field to indicate the reason it is  
 4 denying the connection, as shown in Table 3.4.6.2-2.

5 **Table 3.4.6.2-2. Encoding of the DenyReason Field**

Field value	Description
0x0	General
0x1	Network Busy
0x2	Authentication or billing failure
All other values are reserved	

6 Reserved The access network shall set this field to zero. The access terminal  
 7 shall ignore this field.

<b>Channels</b>	CC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	40

9 3.4.6.3 Interface to Other Protocols

10 3.4.6.3.1 Commands Sent

11 This protocol issues the following commands:

- 12 • *RouteUpdate.Open* (access network only)
- 13 • *OverheadMessages.Activate*
- 14 • *OverheadMessages.Deactivate*
- 15 • *ControlChannelMAC.Activate*
- 16 • *ControlChannelMAC.Deactivate*

17 3.4.6.3.2 Indications

18 This protocol registers to receive the following indications:

- 19 • *RouteUpdate.ConnectionOpened*
- 20 • *RouteUpdate.ConnectionInitiated*
- 21 • *AccessChannelMAC.TxStarted*
- 22 • *AccessChannelMAC.TxEnded*
- 23 • *AccessChannelMAC.TransmissionSuccessful*
- 24 • *AccessChannelMAC.TransmissionFailed*
- 25 • *OverheadMessages.Updated*

### 3.4.7 Configuration Attributes

The following complex attribute and default values are defined (see [6] for attribute record definition).

#### 3.4.7.1 PreferredControlChannelCycle Attribute

Field	Length (bits)	Default
Length	8	N/A
AttributeID	8	N/A

One or more of the following attribute value record:

{

ValueID	8	N/A
PreferredControlChannelCycleEnabled	1	'0'
PreferredControlChannelCycle	0 or 15	N/A
Reserved	7 or 0	N/A

}

**Length** Length of the complex attribute in octets. The sender shall set this field to the length of the complex attribute excluding the Length field.

**AttributeID** The sender shall set this field to 0x00.

**ValueID** The sender shall set this field to an identifier assigned to this complex value.

#### PreferredControlChannelCycleEnabled

The sender shall set this field to '1' if PreferredControlChannelCycle field is included in this attribute; otherwise, the sender shall set this field to '0'.

#### PreferredControlChannelCycle

If PreferredControlChannelCycleEnabled is set to '1', the sender shall include this field and set it to specify the Control Channel Cycle in which the access terminal transitions out of the Sleep State (see 0) in order to monitor the Control Channel. The sender shall omit this field if PreferredControlChannelCycleEnabled is set to '0'.

**Reserved** The length of this field shall be such that the attribute value record is octet-aligned. The sender shall set this field to zero. The receiver shall ignore this field.

### 3.4.8 Protocol Numeric Constants

Constant	Meaning	Value	Comments
N <sub>IDPType</sub>	Type field for this protocol	See [5]	
N <sub>IDPxHRPDSO</sub>	Subtype field for this protocol	0x0000	
N <sub>IDPSleep</sub>	Number of control channel cycles constituting a sleep period	0x0c	5.12 seconds
T <sub>IDPATSetup</sub>	Maximum access terminal time in the Connection Setup State	2.5 seconds	
T <sub>IDPANSetup</sub>	Maximum access network time in the Connection Setup State	1 second	

### 3.4.9 Session State Information

The Session State Information record (see [6]) consists of parameter records.

The parameter records for this protocol consist of only the configuration attributes of this protocol.

## 3.5 xHRPD Subtype 1 Idle State Protocol

### 3.5.1 Overview

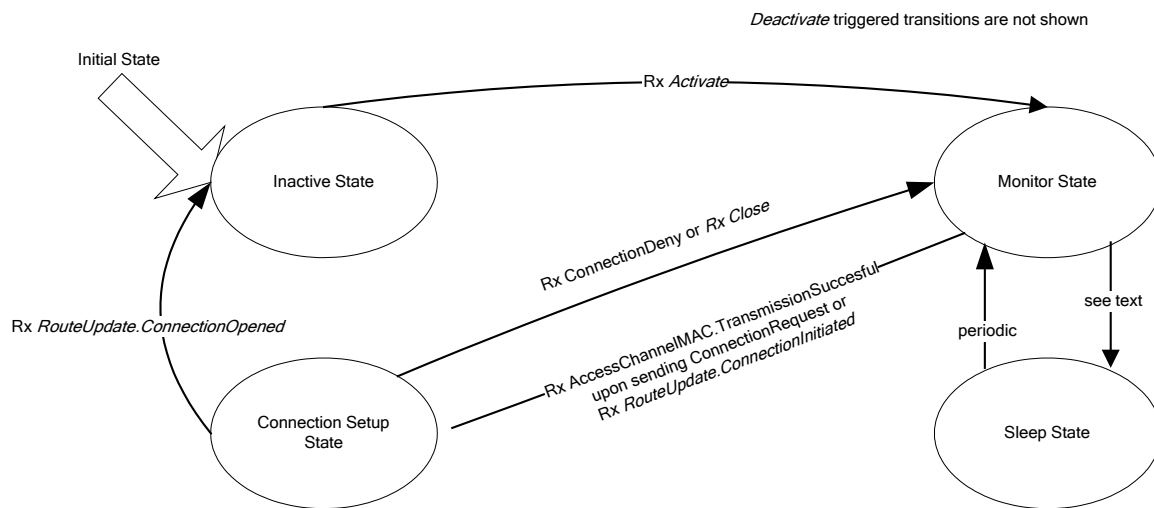
The xHRPD Subtype 1 Idle State Protocol provides the procedures and messages used by the access terminal and the access network when the access terminal has acquired a network and a connection is not open.

This protocol operates in one of the following four states:

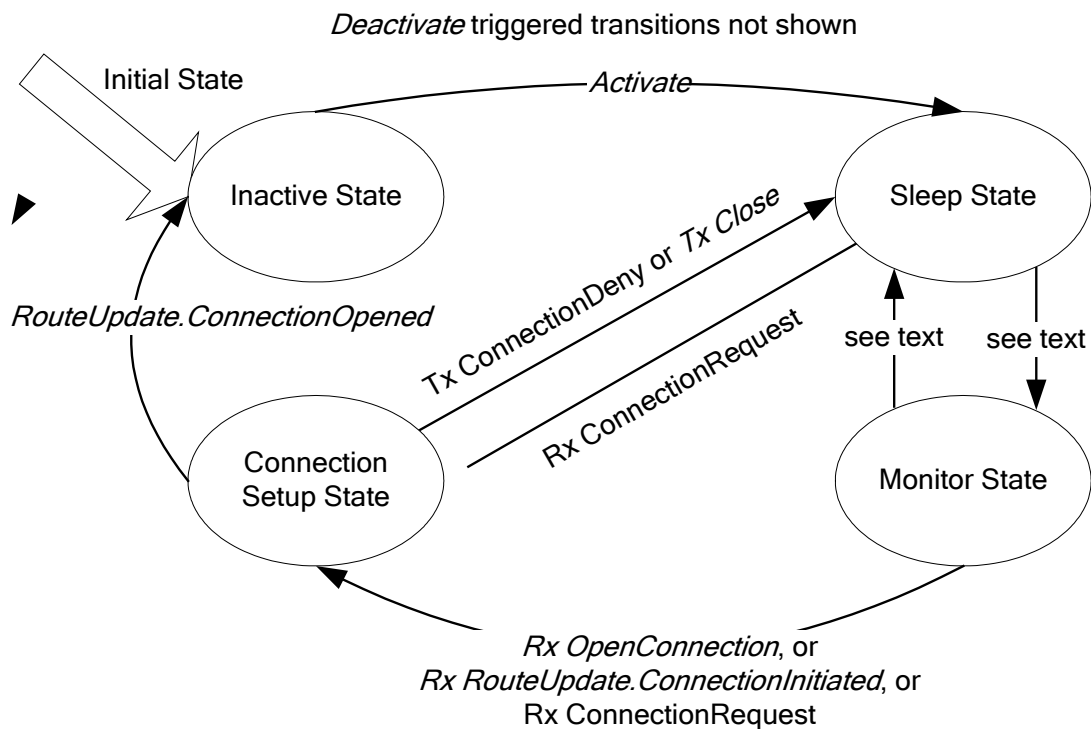
- **Inactive State:** In this state the protocol waits for an *Activate* command.
- **Sleep State:** In this state the access terminal may shut down part of its subsystems to conserve power. The access terminal does not monitor the Forward Channel, and the access network is not allowed to transmit unicast packets to it.
- **Monitor State:** In this state the access terminal monitors the Control Channel, listens for Page and if necessary, updates the parameters received from the Overhead Messages Protocol. The access network may transmit unicast packets to the access terminal in this state.
- **Connection Setup State:** In this state the access terminal and the access network set-up a connection.

Protocol states and events causing the transition between the states are shown in Figure 3.5.1-1 and

Figure 3.5.1-2.



1  
2 **Figure 3.5.1-1. xHRPD Subtype 1 Idle State Protocol State Diagram (Access Terminal)**



4  
5 **Figure 3.5.1-2. xHRPD Subtype 1 Idle State Protocol State Diagram (Access Network)**

6 This protocol supports periodic network monitoring by the access terminal, allowing for  
7 significant power savings. The following access terminal operation modes are supported:

- 8 • Continuous operation, in which the access terminal continuously monitors the Control  
9 Channel.

- 1 • Suspended mode operation, in which the access terminal monitors the Control Channel  
2 continuously for a period of time and then proceeds to operate in the slotted mode.  
3 Suspended mode follows operation in the Air-Link Management Protocol Connected  
4 State and allows for quick network-initiated reconnection.
- 5 • Slotted mode operation, in which the access terminal monitors only selected slots.

6 This protocol supports two types of connection set-ups:

- 7 • Normal setup: this procedure is always performed at the initiative of the access  
8 terminal.<sup>16</sup> It consists of the access terminal sending a ConnectionRequest message  
9 which in turn causes the lower layers to open the connection. The Connection Setup  
10 State contains the requirements for normal setup.
- 11 • Fast Connect: this procedure is always performed at the initiative of the access network  
12 and consists of the access network opening the connection directly via a  
13 *RouteUpdate.Open* command.<sup>17</sup> Fast Connect eliminates the need for the Page /  
14 ConnectionRequest exchange when the access network has pending data to transmit to  
15 an access terminal, and is especially useful when the access terminal is in suspended  
16 mode. Support for Fast Connect at the access network is optional. Support for Fast  
17 Connect at the access terminal is mandatory. The Monitor State contains the  
18 requirements for Fast Connect.

### 19 3.5.2 Primitives and Public Data

#### 20 3.5.2.1 Commands

21 This protocol defines the following commands:

- 22 • *Activate*
- 23 • *Deactivate*
- 24 • *OpenConnection*
- 25 • *Close*

#### 26 3.5.2.2 Return Indications

27 This protocol returns the following indications:

- 28 • *ConnectionOpened*
- 29 • *ConnectionFailed*

#### 30 3.5.2.3 Public Data

31 This protocol shall make the following data public:

---

<sup>16</sup> The access network may transmit a Page message to the access terminal directing it to initiate the procedure.

<sup>17</sup> This command triggers a transmission of a TrafficChannelAssignment message based on the last RouteUpdate message received from the access terminal.

- 1 • Subtype for this protocol
- 2 • PageResponseAPersistence

### 3 3.5.3 Protocol Data Unit

4 The transmission unit of this protocol is a message. This is a control protocol; and,  
5 therefore, it does not carry payload on behalf of other layers or protocols.

6 This protocol uses the Signaling Application to transmit and receive messages.

### 7 3.5.4 Protocol Initialization

#### 8 3.5.4.1 Protocol Initialization for the InConfiguration Protocol Instance

9 Upon creation, the InConfiguration instance of this protocol in the access terminal and the  
10 access network shall perform the following in the order specified:

- 11 • The fall-back values of the attributes for this protocol instance shall be set to the  
12 default values specified for each attribute.
- 13 • If the InUse instance of this protocol has the same protocol subtype as this  
14 InConfiguration protocol instance, then the fall-back values of the attributes defined by  
15 the InConfiguration protocol instance shall be set to the values of the corresponding  
16 attributes associated with the InUse protocol instance.
- 17 • The value for each attribute for this protocol instance shall be set to the fall-back value  
18 for that attribute.

#### 19 3.5.4.2 Protocol Initialization for the InUse Protocol Instance

20 Upon creation, the InUse instance of this protocol in the access terminal and access  
21 network shall perform the following:

- 22 • The value of the attributes for this protocol instance shall be set to the default values  
23 specified for each attribute.
- 24 • The protocol shall enter the Inactive State.

### 25 3.5.5 Procedures and Messages for the InConfiguration Instance of the Protocol

#### 26 3.5.5.1 Procedures

27 This protocol uses the Generic Configuration Protocol (see [1]) to define the processing of  
28 the configuration messages.

#### 29 3.5.5.2 Commit Procedures

30 The access terminal and the access network shall perform the procedures specified in this  
31 section, in the order specified, when directed by the InUse instance of the Session  
32 Configuration Protocol to execute the Commit procedures:

- 33 • All the public data that are defined by this protocol, but are not defined by the InUse  
34 protocol instance shall be added to the public data of the InUse protocol.

- 1 • If the InUse instance of any of the Connection Layer protocols does not have the same  
2 subtype as the corresponding InConfiguration protocol instance, then
  - 3 – the access terminal shall set the initial state of the InConfiguration and InUse  
4 protocol instances of the Idle State protocol to the Inactive State.
  - 5 – the access network shall set the initial state of the InConfiguration and InUse  
6 protocol instances of the Idle State protocol to the Sleep State.
- 7 • If the InUse instance of this protocol has the same subtype as this protocol instance,  
8 then
  - 9 – The access terminal and the access network shall set the attribute values  
10 associated with the InUse instance of this protocol to the attribute values  
11 associated with the InConfiguration instance of this protocol, and
  - 12 – The access terminal and the access network shall purge the InConfiguration  
13 instance of the protocol.
- 14 • If the InUse instance of this protocol does not have the same subtype as this protocol  
15 instance, then the access terminal and the access network shall perform the following:
  - 16 – The InConfiguration protocol instance shall become the InUse protocol  
17 instance for the Idle State Protocol at the access terminal and the access  
18 network.
- 19 • All the public data not defined by this protocol shall be removed from the public data of  
20 the InUse protocol.

21 3.5.5.3 Message Formats

22 3.5.5.3.1 ConfigurationRequest

23 The ConfigurationRequest message format is as follows:

24

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 25 MessageID            The sender shall set this field to 0x50.
- 26 TransactionID        The sender shall increment this value for each new  
27 ConfigurationRequest message sent.
- 28 AttributeRecord      The format of this record is specified in [1].  
29

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 3.5.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:

Field	Length (bits)
MessageID	8
TransactionID	8
Zero or more instances of the following record	
AttributeRecord	Attribute dependent

- 4 MessageID            The sender shall set this field to 0x51.
- 5 TransactionID        The sender shall set this value to the TransactionID field of the  
6 corresponding ConfigurationRequest message.
- 7 AttributeRecord      An attribute record containing a single attribute value. If this  
8 message selects a complex attribute, only the ValueID field of the  
9 complex attribute shall be included in the message. The format of the  
10 AttributeRecord is given in [6]. The sender shall not include more  
11 than one attribute record with the same attribute identifier.

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

## 3.5.6 Procedures and Messages for the InUse Instance of the Protocol

### 3.5.6.1 Procedures

#### 3.5.6.1.1 Command Processing

##### 3.5.6.1.1.1 Activate

When the protocol receives an *Activate* command in the Inactive State:

- The access terminal shall transition to the Monitor State.
- The access network shall transition to the Sleep State.<sup>18</sup>

---

<sup>18</sup> Since the transitions happen asynchronously, this requirement guarantees that the access network will not transmit unicast packets to the access terminal over the Control Channel when the access terminal is not monitoring the channel.

1 If the protocol receives this command in any other state it shall be ignored.

#### 2 3.5.6.1.1.2 Deactivate

3 When the protocol receives a *Deactivate* command in the Inactive State it shall be ignored.

4 When the protocol receives this command in any other state:

- 5 • The access terminal shall transition to the Inactive State.
- 6 • The access network shall transition to the Inactive State.

#### 7 3.5.6.1.1.3 OpenConnection

8 When the protocol receives an *OpenConnection* command in the Inactive State or the  
9 Connection Setup State, the command shall be ignored.

10 When the protocol receives this command in the Sleep State:

- 11 • The access terminal shall transition to the Monitor state and perform the procedures in  
12 3.5.6.1.2 for sending a ConnectionRequest message.
- 13 • The access network shall queue the command and execute it when it is in the Monitor  
14 State.

15 When the protocol receives this command in the Monitor State:

- 16 • The access terminal shall perform the procedures in 3.5.6.1.2 for sending a  
17 ConnectionRequest message.
- 18 • The access network shall send a Page using Page message to the access terminal and  
19 transition to the Connection Setup State.

#### 20 3.5.6.1.1.4 Close

21 When the protocol receives a *Close* command in the Inactive State it shall be ignored.

22 When the protocol receives a *Close* command in any other state:

- 23 • The access terminal shall transition to the Monitor State.
- 24 • The access network shall transition to the Sleep State.

#### 25 3.5.6.1.2 Access Terminal Procedures for Sending a ConnectionRequest Message

26 When procedures in this section are invoked, the access terminal shall perform the  
27 following:

- 28 • If the access terminal received a ConnectionDeny message with the DenyReason set to  
29 'Traffic Channel Assignment Pending', then the access terminal shall not send the  
30 ConnectionRequest message on the sector where the access terminal received the  
31 ConnectionDeny message until the number of control channel cycles since receiving the  
32 ConnectionDeny message is greater than or equal to the value specified by the  
33 TCAPendingDuration.

- 1 • If the access terminal invokes these procedures in response to an access terminal-  
2 initiated event and the *ConnectionDenyBackoff* attribute is set to a value in the range  
3 0x00 to 0x78, then the access terminal should perform the following:
  - 4 – If the access terminal determines that the number of control channel cycles  
5 that have passed since receiving a *ConnectionDeny* message with *DenyReason*  
6 set to 0x01 is less than the value of the *ConnectionDenyBackoff* attribute, then  
7 the access terminal shall postpone sending the *ConnectionRequest* message  
8 until the number of control channel cycles since receiving the *ConnectionDeny*  
9 message is greater than or equal to the value specified by the  
10 *ConnectionDenyBackoff* attribute.
- 11 • Send a *ConnectionRequest* message,
- 12 • If an *AccessChannelMAC.TransmissionSuccessful* indication is received, it shall  
13 transition to the *Connection Setup State*,
- 14 • If an *AccessChannelMAC.TransmissionFailed* indication is received, it shall return a  
15 *ConnectionFailed* indication.

#### 16 3.5.6.1.3 $T_{12}$ and $T_{23}$ Computation

17 The access terminal shall compute  $T_{12}$  and  $T_{23}$  when an  
18 *AccessChannelMAC.TransmissionSuccessful* indication or a  
19 *ConnectedState.ConnectionClosed* indication is received. The access network shall compute  
20  $T_{12}$  and  $T_{23}$  when an *AccessChannelMAC.MACLayerCapsuleReceived* indication, a  
21 *ConnectedState.ConnectionClosed*, or a *RouteUpdate.ConnectionLost* indication is received.  
22 The access terminal and the access network shall compute  $T_{12}$  and  $T_{23}$  as follows:

$$23 \quad T_{12} = T_c + PagePeriod1 - [(T_c + 256 \times R) \bmod PagePeriod1] + PagePeriod1 \times [WCU \times (WakeCount1 + 1) - 1]$$

$$24 \quad T_{23} = T_{12} + PagePeriod2 - [(T_{12} + 256 \times R) \bmod PagePeriod2] + PagePeriod2 \times [WCU \times (WakeCount2 + 1) - 1]$$

25 where *Period1* and *Period2* are specified in units of slots,  $T_c$  is the current CDMA system  
26 time, *WCU* is value of the *WakeCountUnits* attribute.

#### 27 3.5.6.1.4 Inactive State

28 When the protocol is in the *Inactive State* it waits for an *Activate* command.

29 If at the access terminal receives an *OverheadMessages.Updated* indication in this state,  
30 then the access terminal shall queue the latest *OverheadMessages.Updated* indication for  
31 processing in the *Monitor* state.

#### 32 3.5.6.1.5 Sleep State

33 When the access terminal is in the *Sleep State* it may stop monitoring the *Control Channel*  
34 by issuing the following commands:

- 35 • *OverheadMessages.Deactivate*
- 36 • *ControlChannelMAC.Deactivate*

1 The access terminal may shut down processing resources to reduce power consumption.  
 2 In order to transmit on the Access Channel in this state, the access terminal shall first  
 3 transition from the Sleep State to the Monitor State. If the access terminal requires opening  
 4 a connection, it shall transition to the Monitor state and perform the procedures in  
 5 3.5.6.1.2 for sending a ConnectionRequest message.

6 When the access network is in the Sleep State, it is prohibited from sending unicast  
 7 packets to the access terminal.

8 If the access network receives a ConnectionRequest message, it shall transition to the  
 9 Connection Setup State.

10 If the access terminal advertised a suspend period that is current, the access network may  
 11 transition to the Monitor State.

12 The access network and the access terminal shall transition from the Sleep State to the  
 13 Monitor State in time to send and receive, respectively, the sub-synchronous capsule or the  
 14 synchronous capsule sent at time  $T$  satisfying the following condition:

$$15 \quad [T+256 \times R] \bmod \text{Period} = \text{Offset},$$

16 where  $T$  is the CDMA System Time in slots, and Offset is public data of the Control Channel  
 17 MAC protocol.

18  $R$  shall be obtained as follows:

- 19 • If PreferredControlChannelCycleEnabled is equal to '0', then  $R$  is the result of applying  
 20 the hash function (see [6]) using the following parameters:
  - 21 – Key = SessionSeed
  - 22 – Decorrelate =  $6 \times \text{SessionSeed}[11:0]$
  - 23 –  $N = \text{Max}(\text{Period3}/256, 1)$
  - 24 – where SessionSeed is given as public data of the Address Management  
 25 Protocol.
- 26 • If PreferredControlChannelCycleEnabled is equal to '1', then  $R$  is set to  
 27 PreferredControlChannelCycle.

28 Period shall be computed as follows:

$$29 \quad \text{Period} = \begin{cases} \text{Period1}, & \text{CDMA System Time in slots} < T_{12} \\ \text{Period2}, & T_{12} \leq \text{CDMA System Time in slots} < T_{23}. \\ \text{Period3}, & \text{Otherwise} \end{cases}$$

30 The access network and the access terminal shall compute  $\text{Period}_i$  according to Table  
 31 3.5.6.1.5-1.

**Table 3.5.6.1.5-1. Computation of Period*i* from SlotCycle*i***

SlotCycle <i>i</i>	Period <i>i</i>
0x00 to 0x06	$2^{\text{SlotCycle}i} \times 4$ slots
0x07 to 0x1c	$2^{(\text{SlotCycle}i - 0x7)} \times 768$ slots

### 3.5.6.1.6 Monitor State

A paging mask is defined as a periodic interval with period and duty cycle defined by three associated fields PreMaskDuration, MaskDuration, and PostMaskDuration in the PagingMask attribute (see 3.5.7.3).

When the access terminal is in the Monitor State, it shall continuously monitor the Control Channel if MaskCount is equal to 0x00 or one of the following conditions is true for all MaskCount paging masks specified by the PagingMask attribute:

$$T \bmod [(\text{PreMaskDuration} + \text{MaskDuration} + \text{PostMaskDuration}) \times 4] < \text{PreMaskDuration} \times 4, \text{ or}$$

$$T \bmod [(\text{PreMaskDuration} + \text{MaskDuration} + \text{PostMaskDuration}) \times 4] \geq (\text{PreMaskDuration} + \text{MaskDuration}) \times 4,$$

where T is the CDMA System Time in slots, and PreMaskDuration, MaskDuration, and PostMaskDuration are parameters of the PagingMask complex attribute.

When the access network is in the Monitor State, it may send unicast packets to the access terminal. When the access network is in the Monitor State, it should not send unicast packets to the access terminal unless one of the following conditions is true for all MaskCount paging masks specified by the PagingMask attribute:

$$T \bmod [(\text{PreMaskDuration} + \text{MaskDuration} + \text{PostMaskDuration}) \times 4] < \text{PreMaskDuration} \times 4, \text{ or}$$

$$T \bmod [(\text{PreMaskDuration} + \text{MaskDuration} + \text{PostMaskDuration}) \times 4] \geq (\text{PreMaskDuration} + \text{MaskDuration}) \times 4.$$

where T is the CDMA System Time in slots, and PreMaskDuration, MaskDuration, and PostMaskDuration are parameters of the PagingMask complex attribute.

#### 3.5.6.1.6.1 Access Terminal Requirements

Upon entering the Monitor State, the access terminal shall issue the following commands:

- *OverheadMessages.Activate*
- *ControlChannelMAC.Activate*

The access terminal shall comply with the following requirements when in the Monitor State:

- If the access terminal has queued an *OverheadMessages.Updated* indication or upon receiving an *OverheadMessages.Updated* indication, the access terminal shall tune to the CDMA Channel selected as specified in □

- 1 • If the access terminal entered Monitor State to receive the synchronous capsule, it shall  
2 monitor the overhead messages as specified in the Overhead Messages.
- 3 • If the access terminal receives a Page message, it shall perform the procedures in  
4 3.5.6.1.2 for sending a ConnectionRequest message.
- 5 • If the access terminal requires opening a connection, it shall perform the procedures in  
6 3.5.6.1.2 for sending a ConnectionRequest message.
- 7 • If the access terminal receives a *RouteUpdate.ConnectionInitiated* indication it shall:
- 8     – If the access terminal had previously received a ConnectionDeny message with  
9     the DenyReason set to ‘Traffic Channel Assignment Pending’, then the access  
10     terminal shall reset TCAPendingDuration to zero, and
- 11     – transition to the Connection Setup State.<sup>19</sup>
- 12 • Access terminal may transition to the Sleep State if the requirements specified in  
13 3.5.6.1.6.1.2 are satisfied.
- 14 • If the access terminal had previously received a ConnectionDeny message with the  
15 DenyReason set to ‘Traffic Channel Assignment Pending’, and if the number of control  
16 channel cycles since receiving the ConnectionDeny message is greater than or equal to  
17 the value specified by the TCAPendingDuration, then the access terminal shall return a  
18 *ConnectionFailed* indication.

#### 19 3.5.6.1.6.1.1 CDMA Channel Selection

20 The access terminal shall select a CDMA Channel from the list of channels or extended  
21 channels in the SectorParameters message. If no channels or extended channels are listed,  
22 the access terminal shall use the channel it is currently monitoring. If one or more  
23 channels are available, the access terminal shall use a hash function (see [6]) to compute  
24 an index into the subset of a subset of advertised CDMA Channels according to the  
25 following procedures.

26 The access terminal shall create a combined channel list as follows:

- 27 • If the extended channel list is included in the SectorParameters message, the access  
28 terminal shall create a combined channel list by appending each CDMA Channel in the  
29 extended channel list (in order) to the set of CDMA Channels in the channel list (in  
30 order). Otherwise, the access terminal shall set the combined channel list to the set of  
31 CDMA Channels in the channel list.
- 32 • If the SupportedCDMAChannels public data of the Route Update Protocol lists any  
33 channels, then the access terminal shall remove from the combined channel list the  
34 following CDMA Channels:
- 35     – All forward CDMA Channels that are not supported by the access terminal as  
36     indicated by the SupportedCDMAChannels public data of the Route Update  
37     Protocol.

---

<sup>19</sup> This requirement provides Fast Connect on the access terminal side.

- 1           – All the forward CDMA Channels whose associated reverse CDMA Channel is  
2           not supported by the access terminal as indicated by the  
3           SupportedCDMAChannels public data of the Route Update Protocol.

4 The set,  $S$ , of CDMA Channels is determined as follows:

- 5     • If the AccessHashingChannelMaskIncluded field in the SectorParameters message is  
6     not included or is included and set to '0', the access terminal shall set  $S$  to the subset of  
7     CDMA Channels in the combined channel list.
- 8     • If the AccessHashingChannelMaskIncluded field in the SectorParameters message is  
9     included and is set to '1', the access terminal shall set  $S$  to the subset of CDMA  
10    Channels in the combined channel list for which:

- 11           –  $N_i$  is equal to  $N_{\max}$ , where  $i$  is the index of the CDMA Channel in the  
12           combined channel list,

13           where  $N_j = \text{bitcount}(\text{AccessHashingClassMask}$   
14            $[\text{AccessHashingMaskLength}:0] \otimes M_j)$ , where  $M_j$  is the  
15           AccessHashingChannelMask field in the SectorParameters message  
16           corresponding to the  $j^{\text{th}}$  CDMA Channel in the combined channel list;

17            $N_{\max}$  is the maximum value of  $N_k$  for all  $k$ , where  $k$  is the index of the  
18           CDMA Channel in the combined channel list; and

19            $\text{bitcount}(x)$  is the number of '1' bits in the binary representation of  $x$ .

20 The CDMA Channels supported by the access terminal are public data of the Route Update  
21 Protocol. The access terminal shall use the following hash function parameters to obtain  
22 the index into set  $S$ :

- 23     • Key = SessionSeed  
24     • Decorrelate = 0  
25     • N = Number of CDMA Channels in set  $S$

26 where SessionSeed is provided as public data by the Address Management Protocol.

### 27 3.5.6.1.6.1.2 Transition to Sleep State

28 The access terminal may transition to the Sleep State if all of the following requirements are  
29 met:

- 30     • One of the following requirements is met:
- 31           – The access terminal entered the Monitor State to receive the synchronous  
32           capsule and has received a Control Channel synchronous Sleep State capsule  
33           in the current Control Channel Cycle and has determined that the  
34           SectorParameters message is up to date. The current Control Channel Cycle is  
35           defined to be the Control Channel Cycle that started at slot  $\lfloor T/256 \rfloor$ , where  $T$  is  
36           the current CDMA System Time in slots.

- 1           – The access terminal entered the Monitor State to receive a sub-synchronous  
2 capsule, and has received the sub-synchronous capsule, or did not receive the  
3 sub-synchronous capsule in the expected slots.
- 4           – The access terminal entered the Monitor State as a result of receiving a  
5 ConnectionDeny message with the DenyReason set to ‘Traffic Channel  
6 Assignment Pending’, and the number of control channel cycles since receiving  
7 the ConnectionDeny message is greater than or equal to the value specified by  
8 the TCAPendingDuration.
- 9           • Access terminal received an *AccessChannelMAC.TxEnded* indication for every  
10 *AccessChannelMAC.TxStarted* indication it received since entering the Monitor State.<sup>20</sup>
- 11          • Access terminal has not advertised a suspend period that is current (see 3.6). The  
12 suspend period is current if the time advertised in the associated ConnectionClose  
13 message is greater than the current CDMA System Time.<sup>21</sup>

#### 14 3.5.6.1.6.2 Access Network Requirements

##### 15 3.5.6.1.6.2.1 General Requirements

- 16           • Access network shall select the CDMA Channel following the same specifications as the  
17 access terminal, see 3.5.6.1.6.1.1.
- 18           • If the access network receives a ConnectionRequest message, it shall transition to the  
19 Connection Setup State.
- 20           • If the access network requires opening a connection with the access terminal and does  
21 not use an accelerated procedure to set-up a connection, the access network shall send  
22 a Page message to the access terminal over the Control Channel.
- 23           • Access network may use an accelerated procedure to set-up a connection with the  
24 access terminal by bypassing the paging process. The access network should only use  
25 this procedure if it has a reasonable estimate of the access terminal’s current location.  
26 To set-up a connection in an accelerated fashion (Fast Connect) the access network  
27 shall:
  - 28           – If the access network had previously sent a ConnectionDeny message with the  
29 DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of  
30 control channel cycles since sending the ConnectionDeny message is less the  
31 value specified by the TCAPendingDuration, then the access network shall  
32 reset TCAPendingDuration to zero.
  - 33           – Issue a *RouteUpdate.Open* command.

---

<sup>20</sup>This pairing ensures that the access terminal does not have any outstanding messages waiting for an answer.

<sup>21</sup> The access terminal monitors the Control Channel continuously during a suspend period thus avoiding the delay in opening access network initiated connections due to the sleep period.

- 1           – Transition to the Connection Setup State, when the protocol receives a  
2           *RouteUpdate.ConnectionInitiated* indication.
- 3 • Access network shall transition to the Sleep State if all of the following conditions are  
4 met:
- 5           – the access terminal did not advertise a suspend period that is current.
- 6           – The access network entered the Monitor State as a result of sending a  
7           ConnectionDeny message with the DenyReason set to ‘Traffic Channel  
8           Assignment Pending’, and the number of control channel cycles since sending  
9           the ConnectionDeny message is greater than or equal to the value specified by  
10          the TCAPendingDuration.
- 11 • If the access network had previously sent a ConnectionDeny message with the  
12       DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control  
13       channel cycles since sending the ConnectionDeny message is greater than or equal to  
14       the value specified by the TCAPendingDuration, then the access network shall return a  
15       *ConnectionFailed* indication.

#### 16 3.5.6.1.7 Connection Setup State

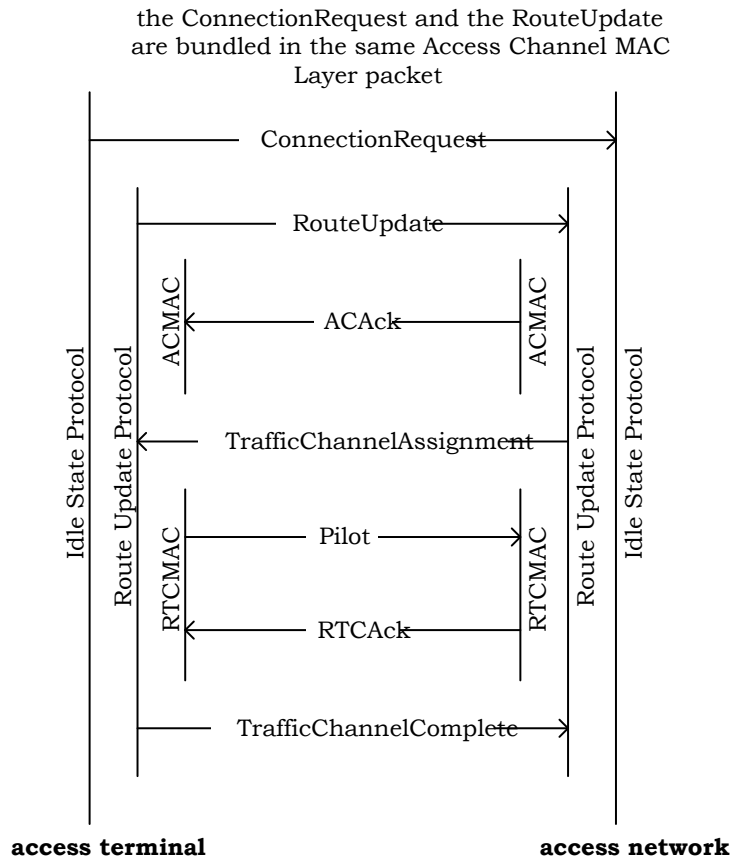
17 The access terminal and the access network use the Connection Setup State to perform a  
18 normal connection set-up.

19 Figure 3.5.6.1.7-1 illustrates the process of opening a connection between the access  
20 terminal and the access network when this protocol is used along with the default Route  
21 Update and the default Reverse Traffic Channel MAC protocols.<sup>22</sup>

---

<sup>22</sup> The Fast Connect message exchange is identical except for not having the Idle State Protocol ConnectionRequest message and the Route Update Protocol RouteUpdate message.

1



2

3

**Figure 3.5.6.1.7-1. Connection Setup Exchange**

4 3.5.6.1.7.1 Access Terminal Requirements

5 The access terminal shall comply with the following requirements.

- 6 • Upon entering the Connection Setup State the access terminal shall:
- 7     – Issue an *OverheadMessages.Activate* command,
  - 8     – Issue a *ControlChannelMAC.Activate* command,
  - 9     – Set a state timer for  $T_{IDPATSetup}$  seconds,
- 10 • If the access terminal receives a ConnectionDeny message with the DenyReason not
- 11 included, or included and is not set to 'Traffic Channel Assignment Pending', the access
- 12 terminal shall return a *ConnectionFailed* indication,
- 13 • If the access terminal receives a ConnectionDeny message with the DenyReason set to
- 14 'Traffic Channel Assignment Pending', then the access terminal shall transition to the
- 15 Monitor state,
- 16 • If the state timer expires, the access terminal shall return a *ConnectionFailed*
- 17 indication,

- 1 • If the access terminal receives a *RouteUpdate.ConnectionOpened* indication, it shall  
2 return a *ConnectionOpened* indication and transition to the Inactive State.

### 3 3.5.6.1.7.2 Access Network Requirements

4 If the *ConnectionRequest* message contains one or more preferred CDMA channels, then  
5 the access network should assign a Traffic Channel on one of the preferred CDMA  
6 channels.

7 If all of the following conditions are met:

- 8 • The traffic channel resource is not available,  
9 • The *ConnectionQueuingSupported* attribute is set to '0x01', and  
10 • One of the following conditions is met:  
11 – The received *ConnectionRequest* message has the *ConnectionQueuingReq* field  
12 set to '1', or  
13 – The access network determines that queuing should be applied<sup>23</sup>,

14 then the access network should:

- 15 • Send *ConnectionDeny* message with the *DenyReason* set to 'Traffic Channel Assignment  
16 Pending',  
17 • Queue the *ConnectionRequest* for *TCAPendingDuration* in units of number of control  
18 channel cycles after sending the *ConnectionDeny* message, and  
19 • Transition to the Monitor state

20 The access network shall not send *ConnectionDeny* message with the *DenyReason* set to  
21 'Traffic Channel Assignment Pending' if the *ConnectionQueuingSupported* attribute is set to  
22 '0x00'.

23 The access network should deny the connection request if all of the following conditions are  
24 true:

- 25 • the *ConnectionRequest* message from the access terminal contains one or more  
26 preferred CDMA channels, and  
27 • none of the preferred CDMA channels in the *ConnectionRequest* message can be used  
28 to assign a Traffic Channel.

29 If the access network entered this state due to receiving a *RouteUpdate.ConnectionInitiated*  
30 indication, it shall perform the following:

- 31 • Set state timer for  $T_{IDPANSetup}$  seconds.

---

<sup>23</sup> The *ConnectionRequest* Queuing function is enabled when the priority treatment is required by the application service such as the priority service

- 1 • If the protocol receives a *RouteUpdate.ConnectionOpened* indication, the access  
2 network shall return a *ConnectionOpened* indication and transition to the Inactive  
3 State.
- 4 • If the state timer expires, the access network shall return a *ConnectionFailed*  
5 indication and shall transition to the Sleep State.

6 Otherwise, the access network shall perform the following:

7 Upon reception of a *ConnectionRequest* message while in this state or if the access network  
8 entered this state due to reception of a *ConnectionRequest* message, the access network  
9 shall perform the following:

- 10 • If the access network denies the connection request, it should send the access terminal  
11 a *ConnectionDeny* message, shall return a *ConnectionFailed* indication, and shall  
12 transition to the Sleep State.
- 13 • Otherwise, the access network shall perform the following:
  - 14 – Set state timer for  $T_{IDPANSetup}$  seconds.
  - 15 – Issue a *RouteUpdate.Open* command.
  - 16 – If the protocol receives a *RouteUpdate.ConnectionOpened* indication, the access  
17 network shall return a *ConnectionOpened* indication and transition to the  
18 Inactive State.
  - 19 – If the state timer expires, the access network shall return a *ConnectionFailed*  
20 indication and shall transition to the Sleep State.
- 21 • If the access network did not enter this state as a result of receiving a  
22 *ConnectionRequest* message, and if the access network does not receive a  
23 *ConnectionRequest* message within an implementation dependent time interval, then  
24 the access network shall return a *ConnectionFailed* indication, and shall transition to  
25 the Sleep State.

26 3.5.6.2 Message Formats

27 3.5.6.2.1 Page

28 The access network sends the Page message to direct the access terminal to request a  
29 connection.

30

Field	Length (bits)
MessageID	8
PageResponseAPersistenceIncluded	0 or 1
PageResponseAPersistence	0 or 6
Reserved	0 – 7 (as needed)

31 MessageID                      The access network shall set this field to 0x00.

1 PageResponseAPersistenceIncluded

2 The access network shall include this field if any of the non-reserved  
 3 fields that follow this field are included in the message. If included,  
 4 the access network shall set this field as follows:

5 The access network shall set this field to '0' if the  
 6 PageResponseAPersistenceSupported attribute is set to 0x00.  
 7 Otherwise, the access network shall set this field as follows:  
 8 The access network shall set this field to '1' if the  
 9 PageResponseAPersistence field is included in this message.  
 10 Otherwise, the access network shall set this field to '0'.

11 PageResponseAPersistence

12 The access network shall omit this field if the  
 13 PageResponseAPersistenceIncluded is not included, or if the  
 14 PageResponseAPersistenceIncluded field is included and set to '0'.  
 15 Otherwise, the access network shall include this field and set it as  
 16 follows:

17 The access network shall set this field  $n$  such that  $2^{-n/4}$  is the access  
 18 persistence probability that the access terminal is to use when  
 19 responding to this Page message. The access network shall not set  
 20 this field to 0x3f.

21 Reserved

22 The access network shall include Reserved bits to make the length of  
 23 the entire message equal to an integer number of octets. The access  
 24 network shall set these bits to '0'.

<b>Channels</b>	CCsynSS CCsubsyn	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	20

25 3.5.6.2.2 ConnectionRequest

26 The access terminal sends the ConnectionRequest message to request a connection.  
 27

Field	Length (bits)
MessageID	8
TransactionID	8
RequestReason	4
PreferredChannelCount	5

PreferredChannelCount occurrences of the following field:

{

PreferredChannel	24
------------------	----

}

PreferTwoRevNBChannel	1
LowRateType	2
Reserved	0-7 (as needed)

- 1 MessageID            The access terminal shall set this field to 0x01.
- 2 TransactionID        The access terminal shall increment this value for each new
- 3                            ConnectionRequest message sent.
- 4 RequestReason        The access terminal shall set this field to one of the request reasons
- 5                            as shown in Table 3.5.6.2-1.

**Table 3.5.6.2-1. Encoding of the RequestReason Field**

Field value	Description
0x0	Access Terminal Initiated
0x1	Access Network Initiated
All other values are invalid	

- 7 PreferredChannelCount
- 8                            The access terminal shall set this field to the number of occurrences
- 9                            of the forward link PreferredChannel field in this message.
- 10 PreferredChannel     The access terminal shall set this field to the Channel record
- 11                            specification for the forward link CDMA channel on which the access
- 12                            terminal prefers to be assigned a Traffic Channel (see [6]).
- 13 PreferTwoRevNBChannel
- 14                            The access terminal shall set this field to '0' to request one (6.4 kHz)
- 15                            reverse link narrowband channel and to '1' to request two (12.8 kHz)
- 16                            reverse link narrowband channels.

- 1 LowRateType The access terminal shall set this field to one of the low data rates  
 2 (640 bps or 1.28 kbps) for a low-rate terminal: '1' for 640 bps; '2' for  
 3 1.28 kbps. Access network shall ignore this field, if it is set to '0'.
- 4 Reserved The access terminal shall add reserved bits to make the length of the  
 5 entire message an integer number of octets. The access terminal shall  
 6 set these bits to '0'. The access network shall ignore this field.

<b>Channels</b>	AC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 8 3.5.6.2.3 ConnectionDeny

9 The access network sends the ConnectionDeny message to deny a connection.  
 10

Field	Length (bits)
MessageID	8
TransactionID	8
DenyReason	4
TCAPendingDuration	0 or 6
Reserved	0-7 (as needed)

- 11 MessageID The access network shall set this field to 0x02.
- 12 TransactionID The access network shall set this value to the TransactionID field of  
 13 the corresponding ConnectionRequest message.
- 14 DenyReason The access network shall set this field to indicate the reason it is  
 15 denying the connection, as shown in Table 3.5.6.2-2.

16 **Table 3.5.6.2-2. Encoding of the DenyReason Field**

Field value	Description
0x0	General
0x1	Network Busy
0x2	Authentication or billing failure
0x3	Preferred channel not available
0x4	Traffic Channel Assignment Pending
All other values are reserved	

- 17 TCAPendingDuration  
 18 The access network shall include this field if DenyReason field is

1 included and is set to 0x04 (Traffic Channel Assignment Pending). If  
 2 this field is included, the access network shall set this field to the  
 3 pending duration in units of control channel cycles.

4 **Reserved** The access network shall add reserved bits to make the length of the  
 5 entire message an integer number of octets. The access network shall  
 6 set these bits to '0'. The access terminal shall ignore this field.  
 7

<b>Channels</b>	CC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	40

8 3.5.6.2.4 AttributeUpdateRequest

9 The sender sends an AttributeUpdateRequest message to offer a set of attribute values for a  
 10 given attribute.  
 11

Field	Length (bits)
MessageID	Protocol dependent
TransactionID	8

One or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

12 **MessageID** The sender shall set this field to 0x52.

13 **TransactionID** The sender shall increment this value for each new  
 14 AttributeUpdateRequest message sent.

15 **AttributeRecord** The format of this record is specified in [6].  
 16

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

17 3.5.6.2.5 AttributeUpdateAccept

18 The sender sends an AttributeUpdateAccept message in response to an  
 19 AttributeUpdateRequest message to accept the offered attribute values.  
 20

Field	Length (bits)
MessageID	Protocol dependent
TransactionID	8

21 **MessageID** The sender shall set this field to 0x53.

1 TransactionID The sender shall set this value to the TransactionID field of the  
 2 corresponding AttributeUpdateRequest message.

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

#### 4 3.5.6.2.6 AttributeUpdateReject

5 The access network sends an AttributeUpdateReject message in response to an  
 6 AttributeUpdateRequest message to reject the offered attribute values.

Field	Length (bits)
MessageID	Protocol dependent
TransactionID	8

8 MessageID The access network shall set this field to 0x54.

9 TransactionID The access network shall set this value to the TransactionID field of  
 10 the corresponding AttributeUpdateRequest message.

<b>Channels</b>	FTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

#### 12 3.5.6.3 Interface to Other Protocols

##### 13 3.5.6.3.1 Commands Sent

14 This protocol issues the following commands:

- 15 • *RouteUpdate.Open* (access network only)
- 16 • *OverheadMessages.Activate*
- 17 • *OverheadMessages.Deactivate*
- 18 • *ControlChannelMAC.Activate*
- 19 • *ControlChannelMAC.Deactivate*

##### 20 3.5.6.3.2 Indications

21 This protocol registers to receive the following indications:

- 22 • *RouteUpdate.ConnectionOpened*
- 23 • *RouteUpdate.ConnectionInitiated*
- 24 • *AccessChannelMAC.TxStarted*
- 25 • *AccessChannelMAC.TxEnded*

- 1 • *AccessChannelMAC.TransmissionSuccessful*
- 2 • *AccessChannelMAC.MACLayerCapsuleReceived*
- 3 • *AccessChannelMAC.TransmissionFailed*
- 4 • *OverheadMessages.Updated*
- 5 • *ConnectedState.ConnectionClosed*
- 6 • *RouteUpdate.ConnectionLost*

### 7 3.5.7 Configuration Attributes

8 Unless specified otherwise, the access terminal and the access network shall not use the  
9 Generic Attribute Update Protocol to update configurable attributes belonging to the  
10 Enhanced Idle State Protocol. The access terminal and the access network shall support  
11 the use of the Generic Attribute Update Protocol to update values of the following attributes  
12 belonging to the Enhanced Idle State Protocol:

- 13 • PreferredControlChannelCycle
- 14 • SlottedMode
- 15 • PagingMask
- 16 • AccessHashingClassMask
- 17 • WakeCountUnitsSupported
- 18 • WakeCountUnits
- 19 • ConnectionQueuingSupported

20 The access terminal shall not include the AccessHashingClassMask in an  
21 AttributeUpdateRequest message.

22 The access network shall not send an AttributeUpdateRequest message containing the  
23 PreferredControlChannelCycle, the PagingMask, WakeCountUnitsSupported, or the  
24 ConnectionQueuingSupported attribute.

25 If the SmallSlotCycleAllowed attribute is set to 0x00, then the access network and the  
26 access terminal shall not send an AttributeUpdateRequest message proposing a value of  
27 the SlotCycle1 field of the SlottedMode attribute that is less than 0x06.

28 If the WakeCountUnitsSupported attribute is set to 0x00, then the access network and the  
29 access terminal shall not send an AttributeUpdateRequest message containing the  
30 WakeCountUnits attribute.

#### 31 3.5.7.1 Simple Attributes

32 The simple configurable attributes are listed in Table 3.5.7.1-1. The access network and the  
33 access terminal shall use the default values that are typed in ***bold italics***.

1

**Table 3.5.7.1-1 Configurable Simple Attributes**

<b>Attribute ID</b>	<b>Attribute</b>	<b>Values</b>	<b>Meaning</b>
0xff	SmallSlotCycleAllowed	0x00	Access terminal and access network will not propose a value of SlotCycle1 that is less than 0x06.
		<b>0x01</b>	Access terminal and access network can propose a value of SlotCycle1 that is less than 0x06.
		0x02 to 0xff	Reserved
0xfe	AccessHashingClassMask	<b>0x0000</b>	Access terminal and access network will hash to channels with any access hashing class.
		0x0001 to 0xffff	Access terminal and access network will hash to channels with designated access hashing classes (see 3.5.6.1.6.1.1).
0xfd	ConnectionDenyBackoff	0x00-0x78	Access terminal is to observe a back off period specified by this attribute (in units of control channel cycles) after receiving a ConnectionDeny message with DenyReason field set to 0x01 before sending an access terminal-initiated ConnectionRequest message
		0x79-0xfe	Reserved
		<b>0xff</b>	Access terminal is to observe an implementation-specific back off period after receiving a ConnectionDeny message with DenyReason field set to 0x01 before sending an access terminal-initiated ConnectionRequest message
0xfc	PageResponseAPersistenceSupported	<b>0x00</b>	Access terminal does not support PageResponseAPersistence.
		0x01	Access terminal supports PageResponseAPersistence.
		All other values	Reserved
0xfa	WakeCountUnitsSupported	<b>0x00</b>	Access terminal does not support negotiation of WakeCountUnits attribute
		0x01	Access terminal supports negotiation of WakeCountUnits attribute
		All other values	Reserved

Attribute ID	Attribute	Values	Meaning
0xf9	WakeCountUnits	<b>0x18</b>	Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.
		0x01-0x17	Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.
		All other values	Reserved
0xf3	ConnectionQueuingSupported	<b>0x00</b>	Access terminal does not support ConnectionRequest queuing.
		0x01	Access terminal supports ConnectionRequest queuing.
		All other values	Reserved

1 3.5.7.2 Complex Attributes

2 3.5.7.2.1 PreferredControlChannelCycle Attribute

3

Field	Length (bits)	Default
Length	8	N/A
AttributeID	8	N/A

One or more of the following attribute value record:

{

ValueID	8	N/A
PreferredControlChannelCycleEnabled	1	'0'
PreferredControlChannelCycle	0 or 15	N/A
Reserved	7 or 0	N/A

}

4 Length Length of the complex attribute in octets. The sender shall set this  
5 field to the length of the complex attribute excluding the Length field.

6 AttributeID The sender shall set this field to 0x00.

7 ValueID The sender shall set this field to an identifier assigned to this  
8 complex value.

9 PreferredControlChannelCycleEnabled  
10 The sender shall set this field to '1' if PreferredControlChannelCycle  
11 field is included in this attribute; otherwise, the sender shall set this  
12 field to '0'.

- 1 PreferredControlChannelCycle  
 2 If PreferredControlChannelCycleEnabled is set to '1', the sender shall  
 3 include this field and set it to specify the Control Channel Cycle in  
 4 which the access terminal transitions out of the Sleep State (see 0) in  
 5 order to monitor the Control Channel. The sender shall omit this field  
 6 if PreferredControlChannelCycleEnabled is set to '0'.
- 7 Reserved The length of this field shall be such that the attribute value record is  
 8 octet-aligned. The sender shall set this field to zero. The receiver shall  
 9 ignore this field.

### 10 3.5.7.2.2 SlottedMode Attribute

11

Field	Length (bits)	Default
Length	8	N/A
AttributeID	8	N/A

One or more of the following attribute value record:

{

ValueID	8	N/A
SlotCycle1	5	0x9
SlotCycle2	5	0x9
SlotCycle3	5	0x9
WakeCount1	4	0x0
WakeCount2	4	0x0
Reserved	1	N/A

}

- 12 Length Length of the complex attribute in octets. The sender shall set this  
 13 field to the length of the complex attribute excluding the Length field.
- 14 AttributeID The sender shall set this field to 0x01.
- 15 ValueID The sender shall set this field to an identifier assigned to this  
 16 complex value.
- 17 SlotCycle1 The sender shall set this field to SlotCycle1. The sender shall not set  
 18 this field to more than 0x1c.
- 19 SlotCycle2 The sender shall set this field to SlotCycle2. SlotCycle2 shall be  
 20 greater than or equal to SlotCycle1. The sender shall not set this field  
 21 to more than 0x1c.

- 1 SlotCycle3            The sender shall set this field to SlotCycle3. SlotCycle3 shall be
- 2                            greater than or equal to SlotCycle2. The sender shall not set this field
- 3                            to more than 0x1c.
  
- 4 WakeCount1            The sender shall set this field to WakeCount1.
  
- 5 WakeCount2            The sender shall set this field to WakeCount2. WakeCount2 shall be
- 6                            greater or equal to than WakeCount1.
  
- 7 Reserved              The sender shall set this field to '0'. The receiver shall ignore this
- 8                            field.

9 3.5.7.3 PagingMask Attribute

10

Field	Length (bits)	Default
Length	8	N/A
AttributeID	8	N/A

One or more of the following record:

ValueID	8	N/A
MaskCount	8	0x00

MaskCount occurrences of the following four fields:

MaskPurpose	8	N/A
PreMaskDuration	16	N/A
MaskDuration	16	N/A
PostMaskDuration	16	N/A

- 11 Length                Length of the complex attribute in octets. The sender shall set this
- 12                            field to the length of the complex attribute excluding the Length field.
  
- 13 AttributeID            The sender shall set this field to 0x02.
  
- 14 ValueID                The sender shall set this field to an identifier assigned to this
- 15                            complex value.
  
- 16 MaskCount              The sender shall set this field to the number of paging masks
- 17                            specified in this complex attribute.
  
- 18 MaskPurpose            The sender shall set this field to indicate the purpose of the mask
- 19                            according to Table 3.5.7.3-1.

**Table 3.5.7.3-1. Definition of MaskPurpose Field of a Paging Mask**

<b>MaskPurpose Value</b>	<b>Meaning</b>
0x00	Unspecified purpose.
0x01	The paging mask is associated with monitoring the cdma2000 1x system (see [11]).
0x02-0xff	Specified by [18].

PreMaskDuration The sender shall set this field to the length of the pre-mask duration in units of four slots.

MaskDuration The sender shall set this field to the length of the masked duration in units of four slots.

PostMaskDuration The sender shall set this field to the length of the post-mask duration in units of four slots.

### 3.5.8 Protocol Numeric Constants

<b>Constant</b>	<b>Meaning</b>	<b>Value</b>	<b>Comments</b>
N <sub>IDPType</sub>	Type field for this protocol	See [5]	
N <sub>IDPxHRPDS1</sub>	Subtype field for this protocol	0x0001	
T <sub>IDPATSetup</sub>	Maximum access terminal time in the Connection Setup State	2.5 seconds	
T <sub>IDPANSetup</sub>	Maximum access network time in the Connection Setup State	1 second	

### 3.5.9 Session State Information

The Session State Information record (see [6]) consists of parameter records.

The parameter records for this protocol consist of only the configuration attributes of this protocol.

## 3.6 Default Connected State Protocol

The Default Connected State Protocol is same as defined in [4].

## 3.7 xHRPD Subtype 0 Route Update Protocol

### 3.7.1 Overview

The xHRPD Subtype 0 Route Update Protocol provides the procedures and messages used by the access terminal and the access network to keep track of the access terminal's approximate location.

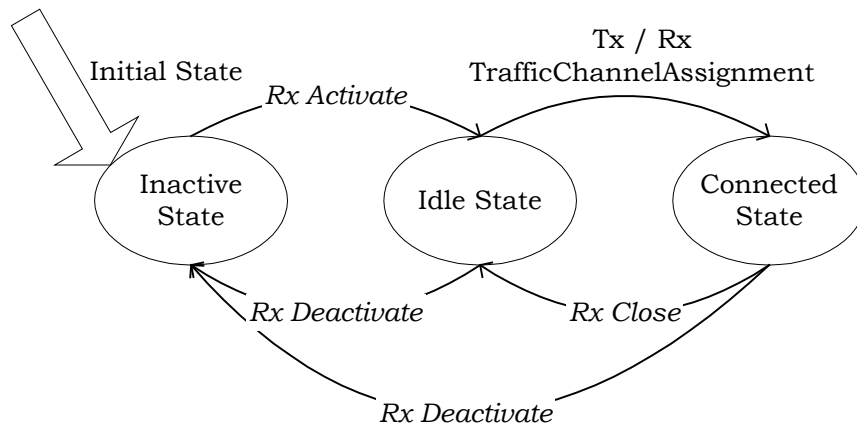
This protocol can be in one of three states:

- Inactive State: In this state the protocol waits for an *Activate* command.

- 1 • Idle State: This state corresponds to the Air-Link Management Protocol Idle State. In  
2 this state, the access terminal autonomously maintains the Active Set. Route update  
3 messages from the access terminal to the access network are based on the distance  
4 between the access terminal's current serving sector and the serving sector at the time  
5 the access terminal last sent an update.
- 6 • Connected State: In this state the access network dictates the access terminal's Active  
7 Set. Route update messages from the access terminal to the access network are based  
8 on changing radio link conditions.

9 Transitions between states are driven by commands received from Connection Layer  
10 protocols and the transmission and reception of the TrafficChannelAssignment message.

11 The protocol states, messages and commands causing the transition between the states are  
12 shown in Figure 3.7.1-1.



13

14 **Figure 3.7.1-1. xHRPD Subtype 0 Route Update Protocol State Diagram**

15 This protocol uses parameters that are provided, as public data by the Overhead Messages  
16 Protocol, configured attributes, or protocol constants.

17 Table 3.7.1-1 lists all of the protocol parameters obtained from the public data of the  
18 Overhead Messages Protocol.

**Table 3.7.1-1. Route Update Protocol Parameters that are Public Data of the Overhead Messages Protocol**

<b>RU Parameter</b>	<b>Comment</b>
Latitude	Latitude of sector in units of 0.25 second
Longitude	Longitude of sector in units of 0.25 second
RouteUpdateRadiusOverhead	Distance (unless modified by the RouteUpdateRadiusMultiply and/or RouteUpdateRadiusAdd attributes) between the serving sector and the sector in which location was last reported which triggers a new report. If this field is set to zero, then distance triggered reporting is disabled
NumNeighbors	Number of neighbors specified in the message
NeighborPN	PN Offset of each neighbor in units of 64 PN chips
NeighborChannelIncluded	Set to '1' if a Channel Record is included for the neighbor
NeighborChannel	Neighbor Channel Record specifying network type and frequency

### 3.7.2 Primitives and Public Data

#### 3.7.2.1 Commands

This protocol defines the following commands:

- *Activate*
- *Deactivate*
- *Open*
- *Close*
- *SendRouteUpdate*

#### 3.7.2.2 Return Indications

This protocol returns the following indications:

- *ConnectionLost* (access network only)
- *NetworkLost*
- *IdleHO*
- *ActiveSetUpdated*
- *AssignmentRejected*
- *ConnectionInitiated*
- *ConnectionOpened*

### 1 3.7.2.3 Public Data

2 This protocol shall make the following data public:

- 3 • Subtype for this protocol
- 4 • Active Set
- 5 • Pilot PN for every pilot in the Active Set
- 6 • MACIndex for every pilot in the Active Set
- 7 • Channel record specified in the TrafficChannelAssignment message
- 8 • FrameOffset specified in the TrafficChannelAssignment message
- 9 • Current RouteUpdate message
- 10 • Information listed in SupportedCDMAChannels attribute
- 11 • Pilot strength of all pilots in the Active Set

### 12 3.7.3 Protocol Data Unit

13 The transmission unit of this protocol is a message. This is a control protocol and,  
14 therefore, it does not carry payload on behalf of other layers or protocols.

15 This protocol uses the Signaling Application to transmit and receive messages.

### 16 3.7.4 Protocol Initialization

#### 17 3.7.4.1 Protocol Initialization for the InConfiguration Protocol Instance

18 Upon creation, the InConfiguration instance of this protocol in the access terminal and the  
19 access network shall perform the following in the order specified:

- 20 • The fall-back values of the attributes for this protocol instance shall be set to the  
21 default values specified for each attribute.
- 22 • If the InUse instance of this protocol has the same protocol subtype as this  
23 InConfiguration protocol instance, then the fall-back values of the attributes defined by  
24 the InConfiguration protocol instance shall be set to the values of the corresponding  
25 attributes associated with the InUse protocol instance.
- 26 • The value for each attribute for this protocol instance shall be set to the fall-back value  
27 for that attribute.

#### 28 3.7.4.2 Protocol Initialization for the InUse Protocol Instance

29 Upon creation, the InUse instance of this protocol in the access terminal and the access  
30 network shall perform the following:

- 31 • The value of the attributes for this protocol instance shall be set to the default values  
32 specified for each attribute.
- 33 • The protocol shall enter the Inactive State.

### 3.7.5 Procedures and Messages for the InConfiguration Instance of the Protocol

#### 3.7.5.1 Procedures

This protocol uses the Generic Configuration Protocol (see [6]) to define the processing of the configuration messages. The access terminal should send a ConfigurationRequest message containing the SupportedCDMAChannels attribute. If the access terminal sends a ConfigurationRequest message containing the SupportedCDMAChannels attribute, then the access terminal shall include in the attribute all Band Classes and Band Sub-classes supported by the access terminal.

#### 3.7.5.2 Commit Procedures

The access terminal and the access network shall perform the procedures specified in this section, in the order specified, when directed by the InUse instance of the Session Configuration Protocol to execute the Commit procedures:

- All the public data that are defined by this protocol, but are not defined by the InUse protocol instance shall be added to the public data of the InUse protocol.
- The value of the following public data of the InUse instance of the protocol shall be set to the corresponding attribute value of the InConfiguration protocol instance:
  - SupportedCDMAChannels
- If the InUse instance of the Route Update Protocol has the same subtype as this protocol instance, but the InUse instance of any other protocol in the Connection Layer does not have the same subtype as the corresponding InConfiguration protocol instance, then
  - The access terminal and the access network shall set the attribute values associated with the InUse instance of this protocol to the attribute values associated with the InConfiguration instance of this protocol, and
  - The access terminal shall set the initial state of the InConfiguration and InUse protocol instances of the Route Update protocol to the Inactive State.
  - The access network shall set the initial state of the InConfiguration and InUse protocol instances of the Route Update protocol to the Idle State.
  - The access terminal and the access network shall purge the InConfiguration instance of the protocol.
- If the InUse instance of all protocols in the Connection Layer have the same subtype as the corresponding InConfiguration protocol instance, then
  - The access terminal and the access network shall set the attribute values associated with the InUse instance of this protocol to the attribute values associated with the InConfiguration instance of this protocol, and
  - The InUse protocol instance at the access terminal shall perform the procedures specified in 3.7.6.1.2.1.

- 1           – The access terminal and the access network shall purge the InConfiguration
- 2           instance of the protocol.
- 3       • If the InUse instance of the Route Update Protocol does not have the same subtype as
- 4       this protocol instance, then the access terminal and the access network shall perform
- 5       the following:
  - 6           – The access terminal shall set the initial state of the InConfiguration and InUse
  - 7           protocol instances of the Route Update protocol to the Inactive State.
  - 8           – The access network shall set the initial state of the InConfiguration and InUse
  - 9           protocol instances of the Route Update protocol to the Idle State.
  - 10          – The InConfiguration protocol instance shall become the InUse protocol
  - 11          instance for the Route Update Protocol at the access terminal and the access
  - 12          network.
- 13       • All the public data that are not defined by this protocol shall be removed from the list of
- 14       public data for the InUse protocol instance.

15   3.7.5.3 Message Formats

16   3.7.5.3.1 ConfigurationRequest

17   The ConfigurationRequest message format is as follows:

18

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

19   MessageID           The sender shall set this field to 0x50.

20   TransactionID       The sender shall increment this value for each new

21                           ConfigurationRequest message sent.

22   AttributeRecord     The format of this record is specified in [6].

23

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

24   3.7.5.3.2 ConfigurationResponse

25   The ConfigurationResponse message format is as follows:

26

Field	Length (bits)
MessageID	8
TransactionID	8

Zero or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

- 1 MessageID The sender shall set this field to 0x51.
- 2 TransactionID The sender shall set this value to the TransactionID field of the  
3 corresponding ConfigurationRequest message.
- 4 AttributeRecord An attribute record containing a single attribute value. If this  
5 message selects a complex attribute, only the ValueID field of the  
6 complex attribute shall be included in the message. The format of the  
7 AttributeRecord is given in [6]. The sender shall not include more  
8 than one attribute record with the same attribute identifier.

<b>Channels</b>	FTC RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 10 3.7.6 Procedures and Messages for the InUse Instance of the Protocol

#### 11 3.7.6.1 Procedures

##### 12 3.7.6.1.1 Command Processing

###### 13 3.7.6.1.1.1 Activate

14 If the protocol receives an *Activate* command in the Inactive State, the access terminal and  
15 the access network shall perform the following:

- 16 • Issue an *AccessChannelMAC.Activate* command,
- 17 • Transition to the Idle State.

18 If this command is received in any other state, it shall be ignored.

###### 19 3.7.6.1.1.2 Deactivate

20 If the protocol receives a *Deactivate* command in the Inactive State, it shall be ignored.

21 If the protocol receives this command in any other state, the access terminal and the access  
22 network shall:

- 23 • Issue a *ReverseTrafficChannelMAC.Deactivate* command,
- 24 • Issue a *ForwardTrafficChannelMAC.Deactivate* command,
- 25 • Issue an *AccessChannelMAC.Deactivate* command,

- 1 • Transition to the Inactive State.

2 3.7.6.1.1.3 Open

3 If the protocol receives an *Open* command in the Idle State,

- 4 • The access terminal shall ignore it.
- 5 • The access network shall:
- 6 – Transmit a *TrafficChannelAssignment* message as follows:
    - 7 + The access network should base the *TrafficChannelAssignment* message on the
    - 8 last *RouteUpdate* message it received from the access terminal.
    - 9 + If the *SupportedCDMAChannels* attribute contains one or more band classes,
    - 10 then the access network shall assign a Traffic Channel on a CDMA Channel
    - 11 supported by the access terminal as indicated by the value of the
    - 12 *SupportedCDMAChannels* attribute.
  - 13 – Return a *ConnectionInitiated* indication,
  - 14 – Issue a *ReverseTrafficChannelMAC.Activate* command,
  - 15 – Issue a *ForwardTrafficChannelMAC.Activate* command,
  - 16 – Issue an *AccessChannelMAC.Deactivate* command,
  - 17 – Transition to the Connected State.

18 If this command is received in any other state it shall be ignored.

19 3.7.6.1.1.4 Close

20 If the protocol receives a *Close* command in the Connected State the access terminal and  
21 the access network shall:

- 22 • Issue a *ReverseTrafficChannelMAC.Deactivate* command,
- 23 • Issue a *ForwardTrafficChannelMAC.Deactivate* command,
- 24 • Issue an *AccessChannelMAC.Activate* command,
- 25 • Transition to the Idle State.

26 If this command is received in any other state it shall be ignored.

27 3.7.6.1.2 Pilots and Pilot Sets

28 The access terminal estimates the strength of the Forward Channel transmitted by each  
29 sector in its neighborhood. This estimate is based on measuring the strength of the  
30 Forward Pilot Channel (specified by the pilot's PN offset and the pilot's CDMA Channel),  
31 henceforth referred to as the pilot.

32 When this protocol is in the Connected State, the access terminal may use pilot strengths  
33 to decide when to generate *RouteUpdate* messages. When this protocol is in the Idle State,  
34 the access terminal uses pilot strengths to decide which sector's Control Channel it  
35 monitors.

1 The following pilot sets are defined to support the Route Update process:<sup>24</sup>

- 2 • Active Set: The set of pilots (specified by the pilot's PN offset and the pilot's CDMA  
3 Channel) associated with the sectors currently serving the access terminal. When a  
4 connection is open, a sector is considered to be serving an access terminal when there  
5 is a Forward Traffic Channel, Reverse Traffic Channel and Reverse Power Control  
6 Channel assigned to the access terminal. When a connection is not open, a sector is  
7 considered to be serving the access terminal when the access terminal is monitoring  
8 that sector's control channel.
- 9 • Candidate Set: The pilots (specified by the pilot's PN offset and the pilot's CDMA  
10 Channel) that are not in the Active Set, but are received by the access terminal with  
11 sufficient strength to indicate that the sectors transmitting them are good candidates  
12 for inclusion in the Active Set.
- 13 • Neighbor Set: The set of pilots (specified by the pilot's PN offset and the pilot's CDMA  
14 Channel) that are not in either one of the two previous sets, but are likely candidates for  
15 inclusion in the Active Set.
- 16 • Remaining Set: The set of all possible pilots (specified by the pilot's PN offset and the  
17 pilot's CDMA Channel) on the current channel assignment, excluding the pilots that are  
18 in any of the three previous sets.

19 At any given instant a pilot in the current CDMA Channel is a member of exactly one set.

20 The access terminal maintains all four sets. The access network maintains only the Active  
21 Set.

22 The access terminal complies with the following rules when searching for pilots, estimating  
23 the strength of a given pilot, and moving pilots between sets.

#### 24 3.7.6.1.2.1 Neighbor Set Search Window Parameters Update

25 The access terminal shall maintain RouteUpdateNeighborList which is a list of structures of  
26 type Neighbor (defined below). For each pilot (specified by the pilot's PN offset and the  
27 pilot's CDMA Channel) in the Neighbor Set, the access terminal shall maintain a structure  
28 in the RouteUpdateNeighborList.

29 A Neighbor structure consists of four fields: PilotPN, Channel, SearchWindowSize, and  
30 SearchWindowOffset.

31 The RouteUpdateNeighborList is used by the access terminal to perform pilot search on a  
32 pilot in the Neighbor Set.

33 When this set of procedures is invoked, the access terminal shall perform the following  
34 steps in the order specified:

- 35 • For each pilot (specified by its pilot PN and its channel) in the Neighbor Set, the access  
36 terminal shall first initialize the corresponding Neighbor structure in  
37 RouteUpdateNeighborList as follows:

---

<sup>24</sup> In this context, a pilot identifies a sector.

- 1           – Set the structure’s PilotPN field to the neighbor pilot’s PN.
- 2           – Set the structure’s Channel field to the neighbor pilot’s channel record.
- 3           – Set the structure’s SearchWindowSize field to the configurable attribute
- 4           SearchWindowNeighbor.
- 5           – Set the structure’s SearchWindowOffset to zero.
- 6           • For each pilot (specified by the pilot’s PN offset and the pilot’s CDMA Channel) listed in
- 7           the OverheadMessagesNeighborList, the access terminal shall set the non-NULL fields
- 8           of the corresponding Neighbor structure in the RouteUpdateNeighborList to the fields of
- 9           the Neighbor structure in the OverheadMessagesNeighborList for this pilot.
- 10          • For each pilot (specified by the pilot’s PN offset and the pilot’s CDMA Channel) listed in
- 11          the NeighborListMessageNeighborList, the access terminal shall set the non-NULL fields
- 12          of the corresponding Neighbor structure in the RouteUpdateNeighborList to the fields of
- 13          the Neighbor structure in the NeighborListMessageNeighborList for this pilot.

#### 14 3.7.6.1.2.2 Pilot Search

15 The access terminal shall continually search for pilots in the Connected State and  
16 whenever it is monitoring the Control Channel in the Idle State. The access terminal shall  
17 search for pilots in all pilot sets. This search shall be governed by the following rules:

18       Search Priority: The access terminal should use the same search priority for pilots in  
19       the Active Set and Candidate Set. In descending order of search rate, the access  
20       terminal shall search, most often, the pilots in the Active Set and Candidate Set,  
21       then shall search the pilots in the Neighbor Set, and lastly shall search the pilots in  
22       the Remaining Set.

23       Search Window Size: The access terminal shall use the search window size specified by  
24       the configurable attribute SearchWindowActive for pilots in the Active Set and  
25       Candidate Set. For each pilot in the Neighbor Set, the access terminal shall use the  
26       search window size specified by Table 3.7.6.2.8-1Table and SearchWindowSize field  
27       of the corresponding Neighbor structure in the RouteUpdateNeighborList. The  
28       access terminal shall use search window size specified by configurable attribute  
29       SearchWindowRemaining for pilots in the Remaining Set.

30       Search Window Center: The access terminal should center the search window around  
31       the earliest usable multipath component for pilots in the Active Set. The access  
32       terminal should center the search window for each pilot in the Neighbor Set around  
33       the pilot’s PN sequence offset plus the search window offset specified by Table  
34       3.7.6.2.8-2Table and SearchWindowOffset field of the corresponding Neighbor  
35       structure in the RouteUpdateNeighborList using timing defined by the access  
36       terminal’s time reference (see [2]). The access terminal should center the search  
37       window around the pilot’s PN sequence offset using timing defined by the access  
38       terminal’s time reference (see [2]) for the Remaining Set.

### 3.7.6.1.2.3 Pilot Strength Measurement

The access terminal shall measure the strength of every pilot it searches. The strength estimate formed by the access terminal shall be computed as the sum of the ratios of received pilot energy per chip,  $E_c$ , to total received spectral density,  $I_0$  (signal and noise) for at most  $k$  multipath components, where  $k$  is the maximum number of multipath components that can be demodulated simultaneously by the access terminal.

### 3.7.6.1.2.4 Pilot Drop Timer Maintenance

For each pilot, the access terminal shall maintain a pilot drop timer.

If DynamicThresholds is equal to '0', the access terminal shall perform the following:

- The access terminal shall start a pilot drop timer for each pilot in the Candidate Set or the Active Set whenever the strength becomes less than the value specified by PilotDrop. The access terminal shall consider the timer to be expired after the time specified by PilotDropTimer.
- The access terminal shall reset and disable the timer whenever the strength of the pilot becomes greater than the value specified by PilotDrop.

If DynamicThresholds is equal to '1', the access terminal shall perform the following:

- The access terminal shall start a pilot drop timer for each pilot in the Candidate Set whenever the strength of the pilot becomes less than the value specified by PilotDrop. The access terminal shall consider the timer value to be expired after the time specified by PilotDropTimer. The access terminal shall reset and disable the timer if the strength of the pilot becomes greater than the value specified by PilotDrop.
- For each pilot in the Active Set, the access terminal shall sort pilots in the Active Set in order of increasing strengths, i.e.,  $PS_1 < PS_2 < PS_3 < \dots < PS_{N_A}$ , where  $N_A$  is the number of the pilots in the Active Set. The access terminal shall start the Pilot drop timer for each pilot  $PS_i$  in the Active Set whenever the strength  $PS_i$  satisfies the following inequality:

$$10 \times \log_{10} PS_i < \max \left( \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{j>1} PS_j + \frac{\text{DropIntercept}}{2}, -\frac{\text{PilotDrop}}{2} \right)$$

$$i = 1, 2, \dots, N_A - 1$$

The access terminal shall reset and disable the timer whenever the above inequality is not satisfied for the corresponding pilot.

Sections 3.7.6.1.2.6 and 3.7.6.1.6.5 specify the actions the access terminal takes when the pilot drop timer expires.

### 3.7.6.1.2.5 Active Set Management

The access terminal shall support a maximum Active Set size of  $N_{RUPActive}$  pilots.

Rules for maintaining the Active Set are specific to each protocol state (see 3.7.6.1.5.1 and 3.7.6.1.6.1).

#### 1 3.7.6.1.2.6 Candidate Set Management

2 The access terminal shall support a maximum Candidate Set size of  $N_{RUPCandidate}$  pilots.

3 The access terminal shall add a pilot to the Candidate Set if one of the following conditions  
4 is met:

- 5 • Pilot is not already in the Active Set or Candidate Set and the strength of the pilot  
6 exceeds the value specified by PilotAdd.
- 7 • Pilot is deleted from the Active Set, its pilot drop timer has expired, DynamicThresholds  
8 is equal to '1', and the pilot strength is above the threshold specified by PilotDrop.
- 9 • Pilot is deleted from the Active Set but its pilot drop timer has not expired.

10 The access terminal shall delete a pilot from the Candidate Set if one of the following  
11 conditions is met:

- 12 • Pilot is added to the Active Set.
- 13 • Pilot's drop timer has expired.
- 14 • Pilot is added to the Candidate Set; and, as a consequence, the size of the Candidate  
15 Set exceeds  $N_{RUPCandidate}$ . In this case, the access terminal shall delete the weakest pilot  
16 in the set. Pilot A is considered weaker than pilot B:
  - 17 – If pilot A has an active drop timer but pilot B does not,
  - 18 – If both pilots have an active drop timer and pilot A's drop timer is closer to  
19 expiration than pilot B's, or
  - 20 – If neither of the pilots has an active drop timer and pilot A's strength is less  
21 than pilot B's.

#### 22 3.7.6.1.2.7 Neighbor Set Management

23 The access terminal shall support a minimum Neighbor Set size of  $N_{RUPNeighbor}$  pilots.

- 24 • The access terminal shall maintain a counter, AGE, for each pilot in the Neighbor Set as  
25 follows.

26 The access terminal shall perform the following in the order specified:

- 27 • If a pilot is added to the Active Set or Candidate Set, it shall be deleted from the  
28 Neighbor Set.
- 29 • If a pilot is deleted from the Active Set, but not added to the Candidate Set, then it shall  
30 be added to the Neighbor Set with the AGE of 0.
- 31 • If a pilot is deleted from the Candidate Set, but not added to the Active Set, then it shall  
32 be added to the Neighbor Set with the AGE of 0.

- 1 • If the size of the Neighbor Set is greater than the maximum Neighbor Set supported by  
2 the access terminal, the access terminal shall delete enough pilots from the Neighbor  
3 Set such that the size of the Neighbor Set is the maximum size supported by the access  
4 terminal and pilots with higher AGE are deleted first<sup>25</sup>.
- 5 • If the access terminal receives an *OverheadMessages.Updated* indication, then:
- 6     – The access terminal shall increment the AGE for every pilot in the Neighbor  
7     Set.
- 8     – For each pilot in the neighbor list given as public data by the Overhead  
9     Messages Protocol that is a member of the Neighbor Set, the access terminal  
10     shall perform the following:
- 11         + The access terminal shall set the AGE of this neighbor list pilot to the minimum  
12         of its current AGE and NeighborMaxAge.
- 13     – For each pilot in the neighbor list given as public data by the Overhead  
14     Messages Protocol (in the order specified in the neighbor list) that is a member  
15     of the Remaining Set, the access terminal shall perform the following:
- 16         + If the addition of this neighbor list pilot to the Neighbor Set would not cause the  
17         size of the Neighbor Set size to increase beyond the maximum Neighbor Set  
18         size supported by the access terminal, then the access terminal shall add this  
19         neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge.
- 20         + If the addition of this neighbor list pilot would cause the size of the Neighbor  
21         Set to increase beyond the maximum Neighbor Set size supported by the  
22         access terminal and the Neighbor Set contains at least one pilot with AGE  
23         greater than NeighborMaxAge associated with the pilot's channel, then the  
24         access terminal shall delete the pilot in the Neighbor Set for which the  
25         difference between its AGE and the NeighborMaxAge associated with that  
26         pilot's channel (i.e., AGE - NeighborMaxAge) is the greatest and shall add this  
27         neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge  
28         associated with the pilot's channel.
- 29         + If the addition of this neighbor list pilot would cause the size of the Neighbor  
30         Set to increase beyond the maximum Neighbor Set size supported by the  
31         access terminal and the Neighbor Set does not contain a pilot with AGE  
32         greater than NeighborMaxAge associated with the pilot's channel, the access  
33         terminal shall not add this neighbor list pilot to the Neighbor Set.
- 34 • If the access terminal receives a NeighborList message, then:
- 35     – The access terminal shall increment the AGE for every pilot in the Neighbor  
36     Set.
- 37     – For each pilot in the neighbor list given in the NeighborList message that is a  
38     member of the Neighbor Set, the access terminal shall perform the following:

---

<sup>25</sup> The order in which pilots of the same AGE are deleted does not matter in this case.

- 1           + The access terminal shall set the AGE of this neighbor list pilot to the minimum  
2           of its current AGE and NeighborMaxAge.
- 3           – For each pilot in the neighbor list given in the NeighborList message (in the  
4           order specified in the message) that is a member of the Remaining Set, the  
5           access terminal shall perform the following:
- 6           + If the addition of this neighbor list pilot to the Neighbor Set would not cause the  
7           size of the Neighbor Set size to increase beyond the maximum Neighbor Set  
8           size supported by the access terminal, then the access terminal shall add this  
9           neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge.
- 10          + If the addition of this neighbor list pilot would cause the size of the Neighbor  
11          Set to increase beyond the maximum Neighbor Set size supported by the  
12          access terminal and the Neighbor Set contains at least one pilot with AGE  
13          greater than NeighborMaxAge associated with the pilot's channel, then the  
14          access terminal shall delete the pilot in the Neighbor Set for which the  
15          difference between its AGE and the NeighborMaxAge associated with that  
16          pilot's channel (i.e., AGE - NeighborMaxAge) is the greatest and shall add this  
17          neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge  
18          associated with the pilot's channel.
- 19          + If the addition of this neighbor list pilot would cause the size of the Neighbor  
20          Set to increase beyond the maximum Neighbor Set size supported by the  
21          access terminal and the Neighbor Set does not contain a pilot with AGE  
22          greater than NeighborMaxAge associated with the pilot's channel, the access  
23          terminal shall not add this neighbor list pilot to the Neighbor Set.

24          The access terminal shall perform the procedures specified in 3.7.6.1.2.1 if a pilot (specified  
25          by the pilot's PN offset and the pilot's CDMA Channel) is added to or deleted from the  
26          Neighbor Set.

#### 27          3.7.6.1.2.8 Remaining Set Management

28          The access terminal shall initialize the Remaining Set to contain all the pilots whose PN  
29          offset index is an integer multiple of PilotIncrement and are not already members of any  
30          other set.

31          The access terminal shall add a pilot to the Remaining Set if it deletes the pilot from the  
32          Neighbor Set and if the pilot was not added to the Active Set or Candidate Set.

33          The access terminal shall delete the pilot from the Remaining Set if it adds it to another set.

#### 34          3.7.6.1.2.9 Pilot PN Phase Measurement

35          The access terminal shall measure the arrival time, PILOT\_ARRIVAL, for each pilot reported  
36          to the access network. The pilot arrival time shall be the time of occurrence, as measured at  
37          the access terminal antenna connector, of the earliest arriving usable multipath component  
38          of the pilot. The arrival time shall be measured relative to the access terminal's time  
39          reference in units of PN chips. The access terminal shall compute the reported pilot PN  
40          phase, PILOT\_PN\_PHASE, as:

$$\text{PILOT\_PN\_PHASE} = (\text{PILOT\_ARRIVAL} + (64 \times \text{PILOT\_PN})) \bmod 2^{15},$$

where PILOT\_PN is the PN sequence offset index of the pilot.

### 3.7.6.1.3 Message Sequence Numbers

The access network shall validate all received RouteUpdate messages as specified in 3.7.6.1.3.1.

The access terminal shall validate all received TrafficChannelAssignment messages as specified in 3.7.6.1.3.2.

The RouteUpdate message and the TrafficChannelAssignment message carry a MessageSequence field that serves to flag duplicate or stale messages.

The MessageSequence field of the RouteUpdate message is independent of the MessageSequence field of the TrafficChannelAssignment message.

#### 3.7.6.1.3.1 RouteUpdate Message Validation

When the access terminal first sends a RouteUpdate message, it shall set the MessageSequence field of the message to zero. Subsequently, the access terminal shall increment this field each time it sends a RouteUpdate message.

The access network shall consider all RouteUpdate messages it receives in the Idle State as valid.

The access network shall initialize the receive pointer,  $V(R)$  to the MessageSequence field of the first RouteUpdate message it received in the Idle State, and the access network shall subsequently set it to the MessageSequence field of each received RouteUpdate message.

When the access network receives a RouteUpdate message in the Connected State, it shall validate the message using the procedure defined in [6]. The access network shall discard the message if it is invalid.

#### 3.7.6.1.3.2 TrafficChannelAssignment Message Validation

The access network shall set the MessageSequence field of the TrafficChannelAssignment message it sends in the Idle State to zero. Subsequently, each time the access network sends a new TrafficChannelAssignment message in the Connected State, it shall increment this field. If the access network is sending the same message multiple times, it shall not change the value of this field between transmissions.<sup>26</sup>

The access terminal shall initialize the receive pointer,  $V(R)$ , to the MessageSequence field of the TrafficChannelAssignment message that it receives in the Idle State.

When the access terminal receives a TrafficChannelAssignment message in the Connected State, it shall validate the message using the procedure defined in [6]. The access terminal shall discard the message if it is invalid.

---

<sup>26</sup> The access network may send a message multiple times to increase its delivery probability.

### 3.7.6.1.3.3 AttributeOverride Message Validation

The access network shall set the MessageSequence field of the first AttributeOverride message that it sends after the Route Update protocol enters the Connected State to zero. Subsequently, each time the access network sends a new AttributeOverride message in the Connected State, it shall increment this field. If the access network is sending the same message multiple times, it shall not change the value of this field between transmissions.<sup>27</sup>

The access terminal shall initialize the receive pointer,  $V(R)$ , to the MessageSequence field of the first AttributeOverride message that it receives in the Connected State.

When the access terminal receives a subsequent AttributeOverride message, it shall validate the message using the procedure defined in [6]. The access terminal shall discard the message if it is invalid.

### 3.7.6.1.4 Inactive State

Upon entering this state, the access terminal shall perform the following:

- The access terminal shall set the Active Set, the Candidate Set, and the Neighbor Set to NULL.
- The access terminal shall initialize the Remaining Set to contain all the pilots whose PN offset index is an integer multiple of PilotIncrement and are not already members of any other set.
- The access terminal shall perform the following in the order specified:
  - Remove all Neighbor structures from OverheadMessagesNeighborList.
  - Remove all Neighbor structures from NeighborListMessageNeighborList.
  - Perform the procedures specified in 3.7.6.1.2.1.
- The access terminal shall set  $(x_L, y_L)$ , the longitude and latitude of the sector in whose coverage area the access terminal last sent a RouteUpdate message, to (NULL, NULL).

### 3.7.6.1.5 Idle State

In this state, RouteUpdate messages from the access terminal are based on the distance between the sector where the access terminal last sent a RouteUpdate message and the sector currently in its active set.

The access network sends the TrafficChannelAssignment message to open a connection in this state.

Upon entering this state, the access terminal shall perform the following:

- Remove all Neighbor structures from NeighborListMessageNeighborList and perform the procedures specified in 3.7.6.1.2.1.

---

<sup>27</sup> The access network may send a message multiple times to increase its delivery probability.

- 1 • Stop using the parameters specified in the *AttributeOverride* message in the set  
2 management procedures and start using values specified by the  
3 *SetManagementSameChannelParameters* and the  
4 *SetManagementDifferentChannelParameters* attributes whichever applicable, in the set  
5 management procedures.

#### 6 3.7.6.1.5.1 Active Set Maintenance

7 The access network shall not initially maintain an Active Set for the access terminal in this  
8 state.

9 If the access network receives an *Open* command, prior to send a  
10 *TrafficChannelAssignment* message, the access network shall initialize the Active Set to the  
11 set of pilots in the *TrafficChannelAssignment* message that it sends in response to  
12 command (see 3.7.6.1.1.3).

13 The access terminal shall initially keep an Active Set of size one when it is in the Idle State.  
14 The Active Set pilot shall be the pilot associated with the Control Channel the access  
15 terminal is currently monitoring. The access terminal shall return an *IdleHO* indication  
16 when the Active Set changes in the Idle State.

17 The access terminal shall not change its Active Set pilot at a time that causes it to miss a  
18 synchronous Control Channel capsule. Other rules governing when to replace this Active  
19 Set pilot are beyond the scope of this specification.

20 If the access terminal receives a *TrafficChannelAssignment* message, it shall set its Active  
21 Set to the list of pilots specified in the message if the *TrafficChannelAssignment* message  
22 does not contain a Channel Record, or if the *TrafficChannelAssignment* message contains a  
23 Channel Record and the access terminal supports the CDMA Channel specified by the  
24 Channel Record.

#### 25 3.7.6.1.5.2 Pilot Channel Supervision in the Idle State

26 The access terminal shall perform pilot channel supervision in the Idle State as follows:

- 27 • Access terminal shall monitor the pilot strength of the pilot in its active set, all the  
28 pilots in the candidate set and all the pilots in the neighbor set that are on the same  
29 frequency.
- 30 • If the strength of all the pilots that the access terminal is monitoring goes below the  
31 value specified by *PilotDrop*, the access terminal shall start a pilot supervision timer.  
32 The access terminal shall consider the timer to be expired after the time specified by  
33 *PilotDropTimer*.
- 34 • If the strength of at least one of the pilots goes above the value specified by *PilotDrop*  
35 while the pilot supervision timer is counting down, the access terminal shall reset and  
36 disable the timer.
- 37 • If the pilot supervision timer expires, the access terminal shall return a *NetworkLost*  
38 indication.

### 3.7.6.1.5.3 Processing the TrafficChannelAssignment Message in the Idle State

If the access terminal receives a TrafficChannelAssignment message in this state, it shall perform the following if the TrafficChannelAssignment message does not contain a Channel Record, or if the TrafficChannelAssignment message contains a Channel Record and the access terminal supports the CDMA Channel specified by the Channel Record:

- Update its Active Set as described in 3.7.6.1.5.1.
- If MACIndexMSB fields are included in the TrafficChannelAssignment message, then the access terminal shall determine the 7-bit MACIndex for each pilot in the Active Set by prepending the corresponding MACIndexMSB field of the TrafficChannelAssignment message to the corresponding MACIndexLSBs field of the TrafficChannelAssignment message. Otherwise the access terminal shall set the MACIndex to the corresponding MACIndexLSBs field.
- Return a *ConnectionInitiated* Indication.
- If the Channel Record is included in the message, then the access terminal shall tune to the CDMA Channel specified by the Channel Record.
- Issue the following commands:
  - *ReverseTrafficChannelMAC.Activate*
  - *ForwardTrafficChannelMAC.Activate*
  - *AccessChannelMAC.Deactivate*
- Transition to the Connected State.

### 3.7.6.1.5.4 Route Update Report Rules

The access terminal shall send RouteUpdate messages to update its location with the access network.

The access terminal shall not send a RouteUpdate message if the state timer of the Connection Setup State in the Idle State Protocol is active.

The access terminal shall comply with the following rules regarding RouteUpdate messages:

- The xHRPD Subtype 0 Route Update Protocol shall send a RouteUpdate message upon receiving a *SendRouteUpdate* command.
- If the value of the SupportRouteUpdateEnhancements attribute is not 0x00, then the access terminal shall send a RouteUpdate message whenever it receives a RouteUpdateRequest message.
- The access terminal shall send a RouteUpdate message with every access channel capsule transmitted by the access terminal.
- The access terminal shall include in the RouteUpdate message the pilot PN phase, pilot strength, and drop timer status for every pilot in the Active Set and Candidate Set.
- The access terminal shall send a RouteUpdate message if all of the following conditions are true:

- 1           – the RouteUpdateRadiusOverhead field of the SectorParameters message is not  
2           set to zero, and
- 3           – the value of the RouteUpdateRadiusMultiply attribute is not 0x00, and
- 4           – the computed value  $r$  is greater than  $\max(0, r_m \times r_o + r_a)$ , where  $r_o$  is the  
5           value provided in the RouteUpdateRadiusOverhead field of the  
6           SectorParameters message transmitted by the sector in which the access  
7           terminal last sent a RouteUpdate message,  $r_m$  is the value of the  
8           RouteUpdateRadiusMultiply attribute, and  $r_a$  is the value of the  
9           RouteUpdateRadiusAdd attribute.

10 If  $(x_L, y_L)$  are the longitude and latitude of the sector to which the access terminal last sent a  
11 RouteUpdate, and  $(x_C, y_C)$  are the longitude and latitude of the sector currently providing  
12 coverage to the access terminal, then  $r$  is given by<sup>28</sup>

$$13 \quad r = \left[ \frac{\sqrt{\left[ (x_C - x_L) \times \cos\left(\frac{\pi}{180} \times \frac{y_L}{14400}\right) \right]^2 + [y_C - y_L]^2}}{16} \right]^{29}$$

14 The access terminal shall compute  $r$  with an error of no more than  $\pm 5\%$  of its true value  
15 when  $|y_L/14400|$  is less than 60 and with an error of no more than  $\pm 7\%$  of its true value  
16 when  $|y_L/14400|$  is between 60 and 70.<sup>30</sup>

17 If the value of the SupportRouteUpdateEnhancements attribute is 0x00, then the access  
18 network shall not send a RouteUpdateRequest message. If the value of the  
19 SupportRouteUpdateEnhancements attribute is not 0x00, then the access network may  
20 send a RouteUpdateRequest message.

---

<sup>28</sup> The  $x$ 's denote longitude and the  $y$ 's denote latitude.

<sup>29</sup> This equation applies if the access terminal does not cross longitude = 180. Modified equation that is applicable in all cases is:

$$r = \left[ \frac{\sqrt{\left[ D_{\text{longitude}} \times \cos\left(\frac{\pi}{180} \times \frac{y_L}{14400}\right) \right]^2 + [y_C - y_L]^2}}{16} \right]$$

$$D_{\text{longitude}} = x_C - x_L \text{ if } \left| \frac{x_C - x_L}{14400} \right| < 180$$

$$D_{\text{longitude}} = 360 \times 14400 - |x_C - x_L| \text{ if } \left| \frac{x_C - x_L}{14400} \right| \geq 180$$

<sup>30</sup>  $x_L$  and  $y_L$  are given in units of 1/4 seconds.  $x_L/14400$  and  $y_L/14400$  are in units of degrees.

### 1 3.7.6.1.6 Connected State

2 In this state, RouteUpdate messages from the access terminal are based on changes in the  
3 radio link between the access terminal and the access network, obtained through pilot  
4 strength measurements at the access terminal.

5 The access network determines the contents of the Active Set through  
6 TrafficChannelAssignment messages.

#### 7 3.7.6.1.6.1 Access Terminal Requirements

8 In the Connected State, the access terminal shall perform the following:

- 9 • If the protocol receives a *ReverseTrafficChannelMAC.LinkAcquired* indication the access  
10 terminal shall:
  - 11 – Send a TrafficChannelComplete message with the MessageSequence field of the  
12 message set to the MessageSequence field of the TrafficChannelAssignment  
13 message,
  - 14 – Return a *ConnectionOpened* indication.

#### 15 3.7.6.1.6.2 Access Network Requirements

16 In the Connected State, the access network shall perform the following:

- 17 • If the protocol receives a *ReverseTrafficChannelMAC.LinkAcquired* indication the access  
18 network shall return a *ConnectionOpened* indication.

#### 19 3.7.6.1.6.3 Active Set Maintenance

##### 20 3.7.6.1.6.3.1 Access Network

21 Whenever the access network sends a TrafficChannelAssignment message to the access  
22 terminal, it shall add to the Active Set any pilots listed in the message that are not  
23 currently in the Active Set.

24 The access network shall delete a pilot from the Active Set if the pilot was not listed in a  
25 TrafficChannelAssignment message and if the access network received the  
26 TrafficChannelComplete message, acknowledging that TrafficChannelAssignment message.

27 The access network should send a TrafficChannelAssignment message to the access  
28 terminal in response to changing radio link conditions, as reported in the access terminal's  
29 RouteUpdate messages.

30 The access network should only specify a pilot in the TrafficChannelAssignment message if  
31 it has allocated the required resources in the associated sector. This means that the sector  
32 specified by the pilot is ready to receive data from the access terminal and is ready to  
33 transmit queued data to the access terminal.

34 If the SupportedCDMAChannels attribute contains one or more band classes, then the  
35 access network shall assign a Traffic Channel on a CDMA Channel supported by the access  
36 terminal as indicated by the value of the SupportedCDMAChannels attribute.

1 If the access network adds or deletes a pilot in the Active Set, it shall send an  
2 *ActiveSetUpdated* indication.

3 If the access network adds a pilot specified in a RouteUpdate message to the Active Set, the  
4 access network may use the PilotPNPhase field provided in the message to obtain a round  
5 trip delay estimate from the access terminal to the sector associated with this pilot. The  
6 access network may use this estimate to accelerate the acquisition of the access terminal's  
7 Reverse Traffic Channel in that sector.

#### 8 3.7.6.1.6.3.2 Access Terminal

9 If the access terminal receives a valid TrafficChannelAssignment message (see 3.7.6.1.3.2),  
10 it shall replace the contents of its current Active Set with the pilots specified in the  
11 message. The access terminal shall process the message as defined in 3.7.6.1.6.6.

#### 12 3.7.6.1.6.4 ResetReport Message

13 The access network may send a ResetReport message to reset the conditions under which  
14 RouteUpdate messages are sent from the access terminal. Access terminal usage of the  
15 ResetReport message is specified in the following section.

#### 16 3.7.6.1.6.5 Route Update Report Rules

17 The access terminal sends a RouteUpdate message to the access network in this state to  
18 request addition or deletion of pilots from its Active Set. If the access terminal is sending  
19 the RouteUpdate message in response to a RouteUpdateRequest message that contains a  
20 Channel record, the access terminal shall include in a RouteUpdate message the pilot PN  
21 phase, pilot strength, and drop status for pilots whose strength is above the value specified  
22 by PilotAdd and subject to the following conditions:

- 23 • If the RouteUpdateRequest message contains one or more SectorPilotPN fields, the  
24 access terminal shall include pilots in the CDMA channel indicated by the Channel  
25 record and that are indicated by the SectorPilotPN fields. Otherwise, the access terminal  
26 shall include pilots which are in the CDMA channel indicated by the Channel record.

27 If the access terminal is not sending the RouteUpdate message in response to a  
28 RouteUpdateRequest message that contains a Channel record, the access terminal shall  
29 determine which pilots to include in the RouteUpdate message as follows:

- 30 • If DynamicThresholds is equal to '0', the access terminal shall include in the  
31 RouteUpdate message the pilot PN phase, pilot strength, and drop timer status for every  
32 pilot in the Active Set and Candidate Set. If DynamicThresholds is equal to '1', then the  
33 access terminal shall include in the RouteUpdate message the pilot PN phase, pilot  
34 strength, and drop timer status for every pilot in the Active Set, for each pilot in the  
35 Candidate Set whose strength is above the values specified by PilotAdd, and for each  
36 pilot in the Candidate Set whose strength, PS, satisfies the following inequality:

$$37 \quad 10 \times \log_{10} PS > \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{i \in A} PS_i + \frac{\text{AddIntercept}}{2},$$

38 where the summation is performed over all pilots currently in the Active Set.

1 It is optional for the access terminal to send RouteUpdate message. In case the access  
 2 terminal chooses to do so, it shall send a RouteUpdate message if any one of the following  
 3 occurs:

- 4 • The value of the SupportRouteUpdateEnhancements attribute is not 0x00 and the  
 5 access terminal receives a RouteUpdateRequest message.
- 6 • The xHRPD Subtype 0 Route Update Protocol receives a *SendRouteUpdate* command.
- 7 • If DynamicThresholds is equal to '0' and the strength of a Neighbor Set or Remaining  
 8 Set pilot is greater than the value specified by PilotAdd.
- 9 • If DynamicThresholds is equal to '1' and the strength of a Neighbor Set or Remaining  
 10 Set pilot, PS, satisfies the following inequality:

$$11 \quad 10 \times \log_{10} PS > \max \left( \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{i \in A} PS_i + \frac{\text{AddIntercept}}{2}, \frac{\text{PilotAdd}}{2} \right)$$

12 where the summation is performed over all pilots currently in the Active Set.

- 13 • If DynamicThresholds is equal to '0' and the strength of a Candidate Set pilot is greater  
 14 than the value specified by PilotCompare above an Active Set pilot, and a RouteUpdate  
 15 message carrying this information has not been sent since the last ResetReport  
 16 message was received.
- 17 • If DynamicThresholds is equal to '0' and the strength of a Candidate Set pilot is above  
 18 PilotAdd, and a RouteUpdate message carrying this information has not been sent since  
 19 the last ResetReport message was received.
- 20 • If DynamicThresholds is equal to '1' and

- 21 – the strength of a Candidate Set pilot, PS, satisfies the following inequality:

$$22 \quad 10 \times \log_{10} PS > \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{i \in A} PS_i + \frac{\text{AddIntercept}}{2}$$

23 where the summation is performed over all pilots currently in the Active Set, and

- 24 – a RouteUpdate message carrying this information has not been sent since the  
 25 last ResetReport message was received.

- 26 • If DynamicThresholds is equal to '1' and

- 27 – the strength of a Candidate Set pilot is greater than the value specified by  
 28 PilotCompare above an Active Set pilot, and
- 29 – the strength of a Candidate Set pilot, PS, satisfies the following inequality:

$$30 \quad 10 \times \log_{10} PS > \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{i \in A} PS_i + \frac{\text{AddIntercept}}{2}$$

31 where the summation is performed over all pilots currently in the Active Set, and

- 32 – a RouteUpdate message carrying this information has not been sent since the  
 33 last ResetReport message was received.

- 1 • The pilot drop timer of an Active Set pilot has expired, and a RouteUpdate message  
2 carrying this information has not been sent since the last ResetReport message was  
3 received.

4 If the value of the SupportRouteUpdateEnhancements attribute is 0x00, then the access  
5 network shall not send a RouteUpdateRequest message. If the value of the  
6 SupportRouteUpdateEnhancements attribute is not 0x00, then the access network may  
7 send a RouteUpdateRequest message.

#### 8 3.7.6.1.6.6 Processing the TrafficChannelAssignment Message in the Connected State

9 If valid TrafficChannelAssignment (see 3.7.6.1.3.2) message does not contain a Channel  
10 Record, or if a valid TrafficChannelAssignment message contains a Channel Record and the  
11 access terminal supports the CDMA Channel specified by the Channel Record, then the  
12 access terminal shall process the message as follows:

- 13 • If the TrafficChannelAssignment message contains a value for the FrameOffset that is  
14 different from the value of the FrameOffset received in the last  
15 TrafficChannelAssignment message that was received in the Idle state, then the access  
16 terminal shall return a *RouteUpdate.AssignmentRejected* indication and shall discard  
17 the message.
- 18 • The access terminal shall update its Active Set as defined in 3.7.6.1.6.3.2.
- 19 • The access terminal shall tune to the CDMA Channel defined by the Channel Record, if  
20 this record is included in the message.
- 21 • If MACIndexMSB fields are included in the TrafficChannelAssignment message, then  
22 the access terminal shall determine the 7-bit MACIndex for each pilot in the Active Set  
23 by prepending the corresponding MACIndexMSB field of the TrafficChannelAssignment  
24 message to the corresponding MACIndexLSBs field of the TrafficChannelAssignment  
25 message. Otherwise the access terminal shall set the MACIndex to the corresponding  
26 MACIndexLSBs field.
- 27 • The access terminal shall start monitoring and responding to the Power Control  
28 Channels defined by the MACIndex fields provided in the message.
- 29 • The access terminal shall send the access network a TrafficChannelComplete message  
30 specifying the MessageSequence value received in the TrafficChannelAssignment  
31 message.

#### 32 3.7.6.1.6.7 Processing the TrafficChannelComplete Message

33 The access network should set a transaction timer when it sends a  
34 TrafficChannelAssignment message. If the access network sets a transaction timer, it shall  
35 reset the timer when it receives a TrafficChannelComplete message containing a  
36 MessageSequence field equal to the one sent in the TrafficChannelAssignment message.

37 If the timer expires, the access network should return a *ConnectionLost* indication.

#### 3.7.6.1.6.8 Transmission and Processing of the NeighborList Message

The access network may send the NeighborList message to the access terminal when the protocol is in the Connected State to override the search window size and/or search window offset corresponding to a pilot in the Neighbor Set.

Upon receiving a NeighborList message, the access terminal shall perform the following in the order specified:

- The access terminal shall remove all Neighbor structures from NeighborListMessageNeighborList.
- For each pilot (specified by its pilot PN and its channel) listed in the received NeighborList message, the access terminal shall add a Neighbor structure to NeighborListMessageNeighborList and populate it as follows:
  - Set the structure's PilotPN field to the message's corresponding PilotPN field.
  - If the message's ChannelIncluded field is set to '1', set the structure's Channel field to the message's corresponding Channel field. Otherwise, set the structure's Channel field to the current channel.
  - If the message's SearchWindowSizeIncluded field is set to '1', then set the structure's SearchWindowSize field to the message's corresponding SearchWindowSize field. Otherwise, set the structure's SearchWindowSize field to NULL.
  - If the SearchWindowOffsetIncluded field is set to '1', then set the structure's SearchWindowOffset field to the message's corresponding SearchWindowOffset field. Otherwise, set the structure's SearchWindowOffset field to NULL.
- Perform the procedures specified in 3.7.6.1.2.1.

#### 3.7.6.1.6.9 Transmission and Processing of the AttributeOverride Message

The access network may send the AttributeOverride message to the access terminal to override the parameters specified in the SetManagementSameChannelParameters and SetManagementDifferentChannelParameters configuration attributes.

If the value of the SetManagementOverrideAllowed attribute is 0x01, then upon receiving a valid (see 3.7.6.1.3.3) AttributeOverride message, the access terminal shall start using the values specified in the message.

The access terminal shall discard the values of the SetManagementSameChannelParameters and SetManagementDifferentChannelParameters in the AttributeOverride message if the SetManagementOverrideAllowed attribute is set to 0x00.

When the access terminal receives a valid (see 3.7.6.1.3.3) AttributeOverride message, it shall send the access network an AttributeOverrideResponse message specifying the MessageSequence value received in the AttributeOverride message.

#### 1 3.7.6.1.6.10 Processing of OverheadMessages.Updated Indication

2 Upon receiving *OverheadMessages.Updated* indication, the access terminal shall perform  
3 the *OverheadMessagesNeighborList* Initialization procedures as specified in 3.7.6.1.6.11  
4 and then perform the procedures specified in 3.7.6.1.2.1.

#### 5 3.7.6.1.6.11 OverheadMessagesNeighborList Initialization

6 When the *OverheadMessagesNeighborList* initialization procedures are invoked by the  
7 access terminal, it shall perform the following:

- 8 • The access terminal shall remove all *Neighbor* structures from the  
9 *OverheadMessagesNeighborList* list.
- 10 • For each pilot (specified by its pilot PN and its channel) in the neighbor list given as  
11 public data of Overhead Messages Protocol, the access terminal shall add a *Neighbor*  
12 structure to the *OverheadMessagesNeighborList* list and populate it as follows:
  - 13 – Set the structure's *PilotPN* field to the corresponding *NeighborPilotPN* field  
14 given as public data of the Overhead Messages Protocol.
  - 15 – If the Overhead Messages Protocol's *NeighborChannelIncluded* field is set to '1',  
16 set the structure's *Channel* field to the Overhead Messages Protocol's  
17 corresponding *NeighborChannel*. Otherwise, set the structure's *Channel* field  
18 to the current channel.
  - 19 – If the Overhead Messages Protocol's *SearchWindowSizeIncluded* field is set to  
20 '1', then set the structure's *SearchWindowSize* field to the Overhead Messages  
21 Protocol's corresponding *SearchWindowSize* field. Otherwise, set the  
22 structure's *SearchWindowSize* field to NULL.
  - 23 – If the Overhead Messages Protocol's *SearchWindowOffsetIncluded* field is set to  
24 '1', then set the structure's *SearchWindowOffset* field to the Overhead  
25 Messages Protocol's corresponding *SearchWindowOffset* field. Otherwise, set  
26 the structure's *SearchWindowOffset* field to NULL.

### 27 3.7.6.2 Message Formats

#### 28 3.7.6.2.1 RouteUpdate

29 The access terminal sends the *RouteUpdate* message to notify the access network of its  
30 current location and provide it with an estimate of its surrounding radio link conditions.  
31

Field	Length (bits)
MessageID	8
MessageSequence	8
ReferencePilotPN	9
ReferencePilotStrength	6
ReferenceKeep	1
NumPilots	4

NumPilots occurrences of the following fields:

{

PilotPNPhase	15
ChannelIncluded	1
FwdChannel	0 or 24
PilotStrength	6
Keep	1

}

InitialCQI	4
CQIFormat	2
xHRPDLocationPresent	1
xHRPDLocation	0 or 7
Reserved	Variable

- 1 MessageID The access terminal shall set this field to 0x00.
- 2 MessageSequence The access terminal shall set this field to the sequence number of  
 3 this message. The sequence number of this message is 1 more than  
 4 the sequence number of the last RouteUpdate message (modulo  $2^8$ )  
 5 sent by this access terminal. If this is the first RouteUpdate message  
 6 sent by the access terminal, it shall set this field to 0x00.
- 7 ReferencePilotPN The access terminal shall set this field to the access terminal's time  
 8 reference (the reference pilot), relative to the zero offset pilot PN  
 9 sequence in units of 64 PN chips.
- 10 ReferencePilotStrength  
 11 The access terminal shall set this field to  $\lfloor -2 \times 10 \times \log_{10} PS \rfloor$ , where  
 12 PS is the strength of the reference pilot, measured as specified in  
 13 3.7.6.1.2.3. If this value is less than 0, the access terminal shall set  
 14 this field to '000000'. If this value is greater than '111111', the access  
 15 terminal shall set this field to '111111'.

1	ReferenceKeep	If the pilot drop timer corresponding to the reference pilot has
2		expired, the access terminal shall set this field to '0'; otherwise, the
3		access terminal shall set this field to '1'.
4	NumPilots	The access terminal shall set this field to the number of pilots that
5		follow this field in the message.
6	PilotPNPhase	The PN offset in resolution of 1 chip of a pilot in the Active Set or
7		Candidate Set of the access terminal that is not the reference pilot.
8	ChannelIncluded	The access terminal shall set this field to '1' if the channel for this
9		pilot offset is not the same as the current channel. Otherwise, the
10		access terminal shall set this field to '0'.
11	FwdChannel	The access terminal shall include this field if the ChannelIncluded
12		field is set to '1'. The access terminal shall set this to the channel
13		record corresponding to this pilot (see [1]). Otherwise, the access
14		terminal shall omit this field for this pilot offset.
15	PilotStrength	The access terminal shall set this field to $\lfloor -2 \times 10 \times \log_{10} PS \rfloor$ , where
16		PS is the strength of the pilot in the above field, measured as
17		specified in 3.7.6.1.2.3. If this value is less than 0, the access
18		terminal shall set this field to '000000'. If this value is greater than
19		'111111', the access terminal shall set this field to '111111'.
20	Keep	If the pilot drop timer corresponding to the pilot in the above field has
21		expired, the access terminal shall set this field to '0'; otherwise, the
22		access terminal shall set this field to '1'.
23	InitialCQI	The access terminal shall set this field to the initial CQI value
24		corresponding to the initial forward link data rate being requested by
25		the access terminal.
26	CQIFormat	The access terminal shall set this field to '00' if it supports 4-bit CQI
27		format and to '01' if it supports 2-bit CQI format. Other values are
28		reserved.
29	xHRPDLocationPresent	
30		The access terminal shall set this field to '1' if it has GPS location.
31		Otherwise, the access terminal shall set this field to '0'.
32	xHRPDLocation	If the xHRPDLocationPresent field is set to '0', then the access
33		terminal shall omit this field. Otherwise, the access terminal shall set
34		this field to '0000000' for USA and '0000001' for Canada. Rest of the
35		values are reserved.

1 Reserved                    The number of bits in this field is equal to the number needed to  
 2                                    make the message length an integer number of octets. This field shall  
 3                                    be set to all zeros.  
 4

<b>Channels</b>	AC	RTC	<b>SLP</b>	Reliable <sup>31</sup>	Best Effort
<b>Addressing</b>	unicast		<b>Priority</b>	20	

5 3.7.6.2.2 TrafficChannelAssignment

6 The access network sends the TrafficChannelAssignment message for assigning traffic  
 7 channel.  
 8

---

<sup>31</sup> This message is sent reliably when it is sent over the Reverse Traffic Channel.

<b>Field</b>	<b>Length (bits)</b>
MessageID	8
MessageSequence	8
ChannelIncluded	1
xHRPDFwdChannel	0 or 24
FrameOffset	4
CQIFormat	2
CQIPeriod	8
xHRPDReserved1	4
NumPilots	4

NumPilots occurrences of the following record:

{

PilotPN	9
xHRPDReserved2	1
MACIndexLSBs	6
xHRPDReserved3	3
xHRPDReserved4	2
xHRPDReserved5	3

}

xHRPDReserved6	1
----------------	---

NumPilots occurrences of the following field:

{

xHRPDReserved7	2
----------------	---

}

MACIndexMSBsIncluded	1
----------------------	---

NumPilots occurrences of the following field:

{

MACIndexMSB	0 or 1
-------------	--------

}

xHRPDReserved8	5
----------------	---

NumPilots occurrences of the following field:

{

xHRPDReserved9	3
----------------	---

}

xHRPDReserved10	1
-----------------	---

xHRPDRcvChannel	24
FrequencyPreCorrection	10
AccessSNR	6
Reserved	Variable

- 1    MessageID                    The access network shall set this field to 0x01.
  
- 2    MessageSequence            The access network shall set this to 1 higher than the  
3                                    MessageSequence field of the last TrafficChannelAssignment message  
4                                    (modulo  $2^S$ ,  $S=8$ ) sent to this access terminal.
  
- 5    ChannelIncluded            The access network shall set this field to '1' if the Channel record is  
6                                    included for these pilots. Otherwise, the access network shall set this  
7                                    field to '0'.
  
- 8    xHRPDFwdChannel            The access network shall include this field if the ChannelIncluded  
9                                    field is set to '1'. The access network shall set this to the forward  
10                                    channel record corresponding to this pilot (see [1]). Otherwise, the  
11                                    access network shall omit this field for this pilot offset. If Channel is  
12                                    included, the access network shall set the SystemType field of the  
13                                    Channel record to '0x03'.
  
- 14   FrameOffset                The access network shall set this field to the frame offset the access  
15                                    terminal shall use when transmitting the Reverse Traffic Channel, in  
16                                    units of slots.
  
- 17   CQIFormat                  The access terminal shall set this field to '00' if it supports 4-bit CQI  
18                                    format and to '01' if it supports 2-bit CQI format. Other values are  
19                                    reserved.
  
- 20   CQIPeriod                    The access terminal shall set this field to a value that specifies the  
21                                    duration in 20 msec frames during which access terminal transmits a  
22                                    single CQI value.
  
- 23   xHRPDRreserved1            This field shall be set to all zeros.
  
- 24   NumPilots                    The access network shall set this field to the number of pilots  
25                                    included in this message.
  
- 26   PilotPN                        The access network shall set this field to the PN Offset associated  
27                                    with the sector that will transmit a Power Control Channel to the  
28                                    access terminal, to whom the access terminal is allowed to connect,  
29                                    and whose Control Channel and Forward Traffic Channel the access  
30                                    terminal may monitor.
  
- 31   xHRPDRreserved2            This field shall be set to zero.

1	MACIndexLSBs	Least Significant Bits of the Medium Access Control Index. The
2		access network shall set this field to the six least significant bits of
3		the MACIndex assigned to the access terminal by this sector.
4	xHRPDReserved3	This field shall be set to all zeros.
5	xHRPDReserved4	This field shall be set to all zeros.
6	xHRPDReserved5	This field shall be set to all zeros.
7	xHRPDReserved6	This field shall be set to '1'.
8	xHRPDReserved7	This field shall be set to all zeros.
9	MACIndexMSBsIncluded	
10		If MACIndexMSB fields are included in this message, then the access
11		network shall set this field to '1'. Otherwise, the access network shall
12		set this field to '0'.
13	MACIndexMSB	Most significant bit of the Medium Access Control Index. If
14		MACIndexMSBsIncluded field is not included in this message or if
15		MACIndexMSBsIncluded field is equal to '0', then the access network
16		shall omit this field. Otherwise, the access network shall set this field
17		as follows:
18		The <i>i</i> th occurrence of this field corresponds to the <i>i</i> th occurrence of
19		the PilotPN field in this message. The access network shall set the <i>i</i> th
20		occurrence of this field to the most significant bit of the 7-bit
21		MACIndex assigned to the access terminal by the <i>i</i> th PilotPN.
22	xHRPDReserved8	This field shall be set to all zeros.
23	xHRPDReserved9	This field shall be set to all zeros.
24	xHRPDReserved10	This field shall be set to zero.
25	xHRPDRRevChannel	The access network shall set this field to reverse channel record (see
26		[6]).
27	FrequencyPreCorrection	
28		The access network shall set field to the frequency offset of the
29		received access probe as measured by the access network. This field
30		is a 10-bit signed number and the value range of -512 to 511
31		corresponds to -1024 to 1022 Hz frequency offset.
32	AccessSNR	The access network shall set field to the signal-to-noise ratio of the
33		received access probe as measured by the access network. The value

1 range of -32 to 31 corresponds to SNR of -15 dB to 16 dB with 0.5 dB  
 2 resolution.

3 **Reserved** The number of bits in this field is equal to the number needed to  
 4 make the message length an integer number of octets. This field shall  
 5 be set to all zeros.  
 6

<b>Channels</b>	CC	FTC	<b>SLP</b>	Reliable	Best Effort <sup>32</sup>
<b>Addressing</b>	unicast		<b>Priority</b>	20	

7 3.7.6.2.3 TrafficChannelComplete

8 The access terminal sends the TrafficChannelComplete message to provide an  
 9 acknowledgment for the TrafficChannelAssignment message.  
 10

Field	Length (bits)
MessageID	8
MessageSequence	8

11 **MessageID** The access terminal shall set this field to 0x02.

12 **MessageSequence** The access terminal shall set this field to the MessageSequence field  
 13 of the TrafficChannelAssignment message whose receipt this message  
 14 is acknowledging.  
 15

<b>Channels</b>	RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

16 3.7.6.2.4 ResetReport

17 The access network sends the ResetReport message to reset the RouteUpdate transmission  
 18 rules at the access terminal.  
 19

Field	Length (bits)
MessageID	8

20 **MessageID** The access network shall set this field to 0x03.  
 21

---

<sup>32</sup> The TrafficChannelAssignment message sent in response to the Open command is sent using best effort SLP. All subsequent TrafficChannelAssignment messages are sent using reliable delivery SLP.

<b>Channels</b>	FTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

1 3.7.6.2.5 NeighborList

2 The NeighborList message is used to convey information corresponding to the neighboring  
3 sectors to the access terminals when the access terminal is in the Connected State.

4

Field	Length (bits)
MessageID	8
Count	5

Count occurrences of the following field:

{

PilotPN	9
---------	---

}

Count occurrences of the following two fields:

{

ChannelIncluded	1
Channel	0 or 24

}

SearchWindowSizeIncluded	1
--------------------------	---

Count occurrences of the following field:

{

SearchWindowSize	0 or 4
------------------	--------

}

SearchWindowOffsetIncluded	1
----------------------------	---

Count occurrences of the following field:

{

SearchWindowOffset	0 or 3
--------------------	--------

}

FPDCHSupportedIncluded	0 or 1
------------------------	--------

$m$ ,  $0 \leq m \leq \text{Count}$ . occurrences of the following field:

{

FPDCHSupported	0 or 1
----------------	--------

}

Reserved	Variable
----------	----------

5 MessageID

The access network shall set this field to 0x04.

1	Count	The access network shall set this field to the number of records
2		specifying neighboring sectors information included in this message.
3	PilotPN	The access network shall set this field to the PN Offset of a
4		neighboring sector for which the access network is providing search
5		window information in this message.
6	ChannelIncluded	The access network shall set this field to '1' if a Channel record is
7		included for this neighbor, and to '0' otherwise. The access network
8		may set this field to '0' if the channel associated with this pilot is the
9		same as the channel that is used to carry this message. If this field is
10		set to '0', the access terminal shall assume that the channel
11		associated with this pilot is the same as the channel on which this
12		message is received. The $n^{\text{th}}$ occurrence of this field corresponds to
13		the $n^{\text{th}}$ occurrence of PilotPN in the record that contains the PilotPN
14		field above.
15	Channel	Channel record specification for the neighbor channel. See [1] for the
16		Channel record format. The $n^{\text{th}}$ occurrence of this field corresponds to
17		the $n^{\text{th}}$ occurrence of PilotPN in the record that contains the PilotPN
18		field above.
19	SearchWindowSizeIncluded	
20		The access network shall set this field to '1' if SearchWindowSize field
21		for neighboring sectors is included in this message. Otherwise, the
22		access network shall set this field to '0'.
23	SearchWindowSize	The access network shall omit this field if SearchWindowSizeIncluded
24		is set to '0'. If SearchWindowSizeIncluded is set to '1', the access
25		network shall set this field to the value shown in Table
26		corresponding to the search window size to be used by the access
27		terminal for the neighbor pilot. The $n^{\text{th}}$ occurrence of this field
28		corresponds to the $n^{\text{th}}$ occurrence of PilotPN in the record that
29		contains the PilotPN field above.

1

**Table 3.7.6.2.5-1. Search Window Sizes**

<b>SearchWindowSize Value</b>	<b>Search Window Size (PN chips)</b>
0	4
1	6
2	8
3	10
4	14
5	20
6	28
7	40
8	60
9	80
10	100
11	130
12	160
13	226
14	320
15	452

2 SearchWindowOffsetIncluded

3 The access network shall set this field to '1' if SearchWindowOffset  
4 field for neighboring sectors is included in this message. Otherwise,  
5 the access network shall set this field to '0'.

6 SearchWindowOffset

7 The access network shall omit this field if  
8 SearchWindowOffsetIncluded is set to '0'. If  
9 SearchWindowOffsetIncluded is set to '1', the access network shall  
10 set this field to the value shown in Table 3.7.6.2.5-2Table  
11 corresponding to the search window offset to be used by the access  
12 terminal for the neighbor pilot. The  $n^{\text{th}}$  occurrence of this field  
13 corresponds to the  $n^{\text{th}}$  occurrence of PilotPN in the record that  
14 contains the PilotPN field above.

1

**Table 3.7.6.2.5-2. Search Window Offset**

<b>SearchWindowOffset</b>	<b>Offset ( PN chips)</b>
0	0
1	WindowSize <sup>33</sup> /2
2	WindowSize
3	3 × WindowSize /2
4	- WindowSize /2
5	- WindowSize
6	-3 × WindowSize /2
7	Reserved

2 FPDCHSupportedIncluded

3 If this field is included, the access network shall set this field as  
4 follows:

5 The access network shall set this field to '0' if the FPDCHSupported  
6 fields are omitted. Otherwise, the access network shall set this field  
7 to '1'.

8 FPDCHSupported If FPDCHSupportedIncluded is not included or is included and is set  
9 to '0', the access network shall omit all occurrences of this field.  
10 Otherwise, the access network shall include *m* occurrences of this  
11 field, where *m* is the number of Channel records in this message that  
12 have SystemType equal to 0x01, and the access network shall set the  
13 occurrences of this field as follows:

14 The access network shall set the *i*th occurrence of this field as  
15 follows:

16 If the system on the CDMA Channel corresponding to the *i*th Channel  
17 record (see [6]) that has SystemType equal to 0x01 supports the  
18 Forward Packet Data Channel (see [11]), the access terminal shall set  
19 the *i*th occurrence of this field to '1'. Otherwise, the access network  
20 shall set the *i*th occurrence of this field to '0'.

21 Reserved The number of bits in this field is equal to the number needed to  
22 make the message length an integer number of octets. The access  
23 network shall set this field to zero. The access terminal shall ignore  
24 this field.

---

<sup>33</sup> WindowSize is pilot's search window size in PN chips.

<b>Channels</b>	FTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 3.7.6.2.6 AttributeOverride

The access network may send this message in order to override the configured values for the attributes includes in this message.

Field	Length (bits)
MessageID	8
MessageSequence	8

One or more instances of the following record:

AttributeRecord	variable
-----------------	----------

**MessageID** The access network shall set this field to 0x05.

**MessageSequence** The access network shall set this to 1 higher than the MessageSequence field of the last AttributeOverride message (modulo  $2^S$ , S=8) sent to this access terminal.

The access network shall include one or more instances of the following record:

**AttributeRecord** The access network shall set this record to the attribute record that the access terminal is to use to override the values of the configured attribute specified by the AttributeID of this record. See [6] for the format of the attributes. The access network shall not include more than one AttributeRecord with the same AttributeID in this message. The access network shall include exactly one instance of attribute values per AttributeID. The access network shall set the ValueID associated with the complex attributes to zero. The valid attribute records that can be included in this message are SetManagementSameChannelParameters and SetManagementDifferentChannelParameters.

<b>Channels</b>	FTC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	40

### 3.7.6.2.7 AttributeOverrideResponse

The access terminal sends the AttributeOverrideResponse message to provide an acknowledgment for the AttributeOverride message.

<b>Field</b>	<b>Length (bits)</b>
MessageID	8
MessageSequence	8

- 1 MessageID            The access network shall set this field to 0x06.
- 2 MessageSequence    The access terminal shall set this field to the MessageSequence field
- 3                        of the AttributeOverride message whose receipt this message is
- 4                        acknowledging.

<b>Channels</b>	RTC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	40

6 3.7.6.2.8 RouteUpdateRequest

- 7 The access network sends a RouteUpdateRequest message to request the access terminal to
- 8 send a RouteUpdate message.
- 9

Field	Length (bits)
MessageID	8
ChannelIncluded	1
Channel	0 or 24
SectorCount	0 or 4

SectorCount occurrences of the following field:

{

SectorPilotPN	9
---------------	---

}

SectorSearchWindowSizeIncluded	0 or 1
--------------------------------	--------

SectorCount occurrences of the following field:

{

SectorSearchWindowSize	0 or 4
------------------------	--------

}

SectorSearchWindowOffsetIncluded	0 or 1
----------------------------------	--------

SectorCount occurrences of the following field:

{

SectorSearchWindowOffset	0 or 3
--------------------------	--------

}

Reserved	0 – 7 (as needed)
----------	-------------------

- 1 MessageID The access network shall set this field to 0x07.
- 2 ChannelIncluded If SupportRouteUpdateEnhancements is less than 0x02 or if this  
3 message is being sent on the Control Channel, the access network  
4 shall set this field to '0'. Otherwise, the access network may set this  
5 field to '1' to indicate that the Channel field is included or to '0' to  
6 indicate that the Channel field is not included.
- 7 Channel If ChannelIncluded is set to '0', the access network shall omit this  
8 field. Otherwise, the access network shall set this field to a Channel  
9 record specification. See [1] for the Channel record format. The  
10 access network shall set the SystemType field of this record to 0x03 if  
11 SupportRouteUpdateEnhancements is equal to 0x02.
- 12 SectorCount If ChannelIncluded is set to '0', the access network shall omit this  
13 field. Otherwise, the access network shall set this field to the number  
14 of records specifying neighboring sectors information included in this  
15 message.

- 1 SectorPilotPN           The access network shall set this field to the PN Offset of a  
2                            neighboring sector for which the access terminal is to report pilot  
3                            strength information.
- 4 SectorSearchWindowSizeIncluded  
5                            If ChannelIncluded is set to '0', the access network shall omit this  
6                            field. Otherwise, the access network shall set this field to '1' if  
7                            SectorSearchWindowSize field for neighboring sectors is included in  
8                            this message. Otherwise, the access network shall set this field to '0'.
- 9 SectorSearchWindowSize  
10                           The access network shall omit this field if  
11                           SectorSearchWindowSizeIncluded is set to '0'. If  
12                           SectorSearchWindowSizeIncluded is set to '1', the access network  
13                           shall set this field to the value shown in Table 3.7.6.2.8-1  
14                           corresponding to the search window size to be used by the access  
15                           terminal for the neighbor pilot. The  $n^{\text{th}}$  occurrence of this field  
16                           corresponds to the  $n^{\text{th}}$  occurrence of SectorPilotPN in the record that  
17                           contains the SectorPilotPN field above.

**Table 3.7.6.2.8-1. Search Window Sizes**

<b>SearchWindowSize Value</b>	<b>Search Window Size (PN chips)</b>
0	4
1	6
2	8
3	10
4	14
5	20
6	28
7	40
8	60
9	80
10	100
11	130
12	160
13	226
14	320
15	452

**SectorSearchWindowOffsetIncluded**

If ChannelIncluded is set to '0', the access network shall omit this field. Otherwise, the access network shall set this field to '1' if SectorSearchWindowOffset field for neighboring sectors is included in this message. Otherwise, the access network shall set this field to '0'.

**SectorSearchWindowOffset**

The access network shall omit this field if SectorSearchWindowOffsetIncluded is set to '0'. If SectorSearchWindowOffsetIncluded is set to '1', the access network shall set this field to the value shown in Table 3.7.6.2.8-2 corresponding to the search window offset to be used by the access terminal for the neighbor pilot. The  $n^{\text{th}}$  occurrence of this field corresponds to the  $n^{\text{th}}$  occurrence of SectorPilotPN in the record that contains the SectorPilotPN field above.

1

**Table 3.7.6.2.8-2. Search Window Offset**

SearchWindowOffset	Offset ( PN chips)
0	0
1	WindowSize <sup>34</sup> /2
2	WindowSize
3	3 × WindowSize /2
4	- WindowSize /2
5	- WindowSize
6	-3 × WindowSize /2
7	Reserved

2 Reserved

The access network shall add reserved bits to make the length of the entire message equal to an integer number of octets. The access network shall set this field to 0. The access terminal shall ignore this field.

3  
4  
5  
6

<b>Channels</b>	FTC CC	<b>SLP</b>	Best Effort
<b>Addressing</b>	unicast	<b>Priority</b>	40

7 3.7.6.2.9 AttributeUpdateRequest

8 The sender sends an AttributeUpdateRequest message to offer an attribute value for a given  
9 attribute.

10

Field	Length (bits)
MessageID	8
TransactionID	8

One or more instances of the following record

AttributeRecord	Attribute dependent
-----------------	---------------------

11 MessageID

The sender shall set this field to 0x52.

12 TransactionID

The sender shall increment this value for each new AttributeUpdateRequest message sent.

13

14 AttributeRecord

The format of this record is specified in [6].

15

---

<sup>34</sup> WindowSize is pilot's search window size in PN chips.

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

1    3.7.6.2.10 AttributeUpdateAccept

2    The sender sends an AttributeUpdateAccept message in response to an  
3    AttributeUpdateRequest message to accept the offered attribute values.

4

Field	Length (bits)
MessageID	8
TransactionID	8

5    MessageID            The sender shall set this field to 0x53.

6    TransactionID        The sender shall set this value to the TransactionID field of the  
7    corresponding AttributeUpdateRequest message.

8

<b>Channels</b>	FTC    RTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

9    3.7.6.2.11 AttributeUpdateReject

10   The access network sends an AttributeUpdateReject message in response to an  
11   AttributeUpdateRequest message to reject the offered attribute values.

12

Field	Length (bits)
MessageID	8
TransactionID	8

13   MessageID            The access network shall set this field to 0x54.

14   TransactionID        The access network shall set this value to the TransactionID field of  
15   the corresponding AttributeUpdateRequest message.

16

<b>Channels</b>	FTC	<b>SLP</b>	Reliable
<b>Addressing</b>	unicast	<b>Priority</b>	40

17   3.7.6.3 Interface to Other Protocols

18   3.7.6.3.1 Commands Sent

19   This protocol sends the following commands:

- 20   •    *ReverseTrafficChannelMAC.Activate*

- 1 • *ReverseTrafficChannelMAC.Deactivate*
- 2 • *ForwardTrafficChannelMAC.Activate*
- 3 • *ForwardTrafficChannelMAC.Deactivate*
- 4 • *AccessChannelMAC.Activate*
- 5 • *AccessChannelMAC.Deactivate*

#### 6 3.7.6.3.2 Indications

7 This protocol registers to receive the following indications:

- 8 • *ReverseTrafficChannelMAC.LinkAcquired*
- 9 • *OverheadMessages.Updated*

#### 10 3.7.7 Configuration Attributes

11 Unless specified otherwise, the access terminal and the access network shall not use the  
12 Generic Attribute Update Protocol to update configurable attributes belonging to the xHRPD  
13 Subtype 0 Route Update Protocol. If the value of the SupportRouteUpdateEnhancements  
14 attribute is not 0x00, then the access terminal and the access network shall support the  
15 use of the Generic Attribute Update Protocol to update values of the following attributes  
16 belonging to the xHRPD Subtype 0 Route Update Protocol:

- 17 • RouteUpdateRadiusMultiply
- 18 • RouteUpdateRadiusAdd

19 If the value of the SupportRouteUpdateEnhancements attribute is 0x00, then the access  
20 network shall not include the RouteUpdateRadiusMultiply and RouteUpdateRadiusAdd  
21 attributes in an AttributeUpdateRequest message.

#### 22 3.7.7.1 Simple Attributes

23 The configurable simple attributes for this protocol are listed in Table 3.7.7.1-1. The access  
24 terminal shall not include these simple attributes in a ConfigurationRequest message or an  
25 AttributeUpdateRequest message.

26 The access terminal and access network shall use as defaults the values in Table 3.7.7.1-1  
27 that are typed in ***bold italics***.

1

**Table 3.7.7.1-1. Configurable Values**

<b>Attribute ID</b>	<b>Attribute</b>	<b>Value s</b>	<b>Meaning</b>
0x03	SetManagementOverrideAllowed	<b>0x00</b>	The SetManagementSameChannelParameters and SetManagementDifferentChannelParameters attributes in the AttributeOverride message are discarded.
		0x01	The SetManagementSameChannelParameters and SetManagementDifferentChannelParameters attributes in the AttributeOverride message are acted upon.
		0x02-0xff	Reserved
0xff	RouteUpdateRadiusMultiply	0x00	Distance-based registration is disabled.
		<b>0x0a</b>	Multiplier for the Route update radius is 1.
		0x01 to 0x64	Multiplier for the Route update radius in units of 0.1.
		All other values	Reserved
0xfe	RouteUpdateRadiusAdd	<b>0x0000</b>	Addition to the Route update radius is zero.
		0x0001 to 0x0fff	Addition to the Route update radius expressed as 2's complement value.
		All other values	Reserved
0xfd	SupportRouteUpdateEnhancements	<b>0x00</b>	Use of Generic Attribute Update Protocol to update RouteUpdateRadiusMultiply and RouteUpdateRadiusAdd and processing of RouteUpdateRequest message is not supported.

Attribute ID	Attribute	Values	Meaning
		0x01	Use of Generic Attribute Update Protocol to update RouteUpdateRadiusMultiply and RouteUpdateRadiusAdd and processing of RouteUpdateRequest message without Channel Record is supported.
		0x02	Use of Generic Attribute Update Protocol to update RouteUpdateRadiusMultiply and RouteUpdateRadiusAdd and processing of RouteUpdateRequest message with Channel Record whose SystemType is equal to 0x03 is supported.
		All other values	Reserved

1 3.7.7.2 Complex Attributes

2 The following complex attributes and default values are defined (see [6] for attribute record  
 3 definition). The following complex attributes are to be used only by the access network in a  
 4 ConfigurationRequest message:

- 5 • SearchParameters
- 6 • SetManagementSameChannelParameters
- 7 • SetManagementDifferentChannelParameters

8 The following complex attributes are to be used only by the access terminal in a  
 9 ConfigurationRequest message:

- 10 • SupportedCDMAChannels

11 3.7.7.2.1 SearchParameters Attribute

12

<b>Field</b>	<b>Length (bits)</b>	<b>Default Value</b>
Length	8	N/A
AttributeID	8	N/A

One or more of the following record:

ValueID	8	N/A
PilotIncrement	4	4
SearchWindowActive	4	8
SearchWindowNeighbor	4	10
SearchWindowRemaining	4	10

- 1 Length Length of the complex attribute in octets. The access network shall  
2 set this field to the length of the complex attribute excluding the  
3 Length field.
- 4 AttributeID The access network shall set this field to 0x00.
- 5 ValueID This field identifies this particular set of values for the attribute. The  
6 access network shall increment this field for each complex attribute-  
7 value record for a particular attribute.
- 8 PilotIncrement The access network shall set this field to the pilot PN sequence  
9 increment, in units of 64 PN chips, that access terminals are to use  
10 for searching the Remaining Set. The access network should set this  
11 field to the largest increment such that the pilot PN sequence offsets  
12 of all its neighbor access networks are integer multiples of that  
13 increment. The access terminal shall support all the valid values for  
14 this field.
- 15 SearchWindowActive Search window size for the Active Set and Candidate Set. The access  
16 network shall set this field to the value shown in Table  
17 3.7.6.2.8-1Table corresponding to the search window size to be used  
18 by the access terminal for the Active Set and Candidate Set. The  
19 access terminal shall support all the valid values specified by this  
20 field.
- 22 SearchWindowNeighbor Search window size for the Neighbor Set. The access network shall  
23 set this field to the value shown in Table corresponding to the search  
24 window size to be used by the access terminal for the Neighbor Set.  
25 The access terminal shall support all the valid values specified by  
26 this field.  
27

1 SearchWindowRemaining

2 Search window size for the Remaining Set. The access network shall  
 3 set this field to the value shown in Table corresponding to the search  
 4 window size to be used by the access terminal for the Remaining Set.  
 5 The access terminal shall support all the valid values specified by  
 6 this field.

7 3.7.7.2.2 SetManagementSameChannelParameters Attribute

8 The access terminal shall use these attributes if the pilot being compared is on the same  
 9 channel as the active set pilots' channel.

10

Field	Length (bits)	Default Value
Length	8	N/A
AttributeID	8	N/A

One or more of the following attribute value record:

{

ValueID	8	N/A
PilotAdd	6	0x0e
PilotCompare	6	0x05
PilotDrop	6	0x12
PilotDropTimer	4	3
DynamicThresholds	1	0
SoftSlope	0 or 6	N/A
AddIntercept	0 or 6	N/A
DropIntercept	0 or 6	N/A
NeighborMaxAge	4	0
Reserved	variable	N/A

}

11 Length Length of the complex attribute in octets. The access network shall  
 12 set this field to the length of the complex attribute excluding the  
 13 Length field.

14 AttributeID The access network shall set this field to 0x01.

15 ValueID This field identifies this particular set of values for the attribute. The  
 16 access network shall increment this field for each complex attribute-  
 17 value record for a particular attribute.

18 PilotAdd This value is used by the access terminal to trigger a RouteUpdate in  
 19 the Connected State. The access network shall set this field to the

1		pilot detection threshold, expressed as an unsigned binary number
2		equal to $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$ . The value used by the access
3		terminal is $-0.5$ dB times the value of this field. The access terminal
4		shall support all the valid values specified by this field.
5	PilotDrop	This value is used by the access terminal to start a pilot drop timer
6		for a pilot in the Active Set or the Candidate Set. The access network
7		shall set this field to the pilot drop threshold, expressed as an
8		unsigned binary number equal to $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$ . The value
9		used by the access terminal is $-0.5$ dB times the value of this field.
10		The access terminal shall support all the valid values specified by
11		this field.
12	PilotCompare	Active Set versus Candidate Set comparison threshold, expressed as
13		a 2's complement number. The access terminal transmits a
14		RouteUpdate message when the strength of a pilot in the Candidate
15		Set exceeds that of a pilot in the Active Set by this margin. The
16		access network shall set this field to the threshold Candidate Set
17		pilot to Active Set pilot ratio, in units of 0.5 dB. The access terminal
18		shall support all the valid values specified by this field.
19	PilotDropTimer	Timer value after which an action is taken by the access terminal for
20		a pilot that is a member of the Active Set or Candidate Set, and
21		whose strength has not become greater than the value specified by
22		PilotDrop. If the pilot is a member of the Active Set, a RouteUpdate
23		message is sent in the Connected State. If the pilot is a member of
24		the Candidate Set, it will be moved to the Neighbor Set. The access
25		network shall set this field to the drop timer value shown in Table
26		3.7.7.2.2-1 corresponding to the pilot drop timer value to be used by
27		access terminals. The access terminal shall support all the valid
28		values specified by this field.

1

**Table 3.7.7.2.2-1. Pilot Drop Timer Values**

<b>PilotDropTimer</b>	<b>Timer Expiration (seconds)</b>	<b>PilotDropTimer</b>	<b>Timer Expiration (seconds)</b>
0	< 0.1	8	27
1	1	9	39
2	2	10	55
3	4	11	79
4	6	12	112
5	9	13	159
6	13	14	225
7	19	15	319

2

**DynamicThresholds** This field shall be set to '1' if the following three fields are included in this record. Otherwise, this field shall be set to '0'.

3

4

**SoftSlope** This field shall be included only if **DynamicThresholds** is set to '1'. This field shall be set to an unsigned binary number, which is used by the access terminal in the inequality criterion for adding a pilot to the Active Set or dropping a pilot from the Active Set. The access terminal shall support all the valid values specified by this field.

5

6

7

8

9

**AddIntercept** This field shall be included only if **DynamicThresholds** is set to '1'. This field shall be set to a 2's complement signed binary number in units of dB. The access terminal shall support all the valid values specified by this field.

10

11

12

13

**DropIntercept** This field shall be included only if **DynamicThresholds** is set to '1'. This field shall be set to a 2's complement signed binary number in units of dB. The access terminal shall support all the valid values specified by this field.

14

15

16

17

**NeighborMaxAge** The access network shall set this field to the maximum AGE value beyond which the access terminal is to drop members from the Neighbor Set. The access terminal shall support all the valid values specified by this field.

18

19

20

21

**Reserved** The access network shall set this field to zero. The access terminal shall ignore this field. The length of this field shall be such that the attribute value record is octet-aligned.

22

23

## 3.7.7.2.3 SetManagementDifferentChannelParameters Attribute

The access terminal shall use these attributes if the pilot being compared is on a channel that is different from the active set pilots' channel.

Field	Length (bits)	Default Value
Length	8	N/A
AttributeID	8	N/A

One or more of the following attribute value record:

{

ValueID	8	N/A
PilotAdd	6	0x0e
PilotCompare	6	0x05
PilotDrop	6	0x12
PilotDropTimer	4	3
DynamicThresholds	1	0
SoftSlope	0 or 6	N/A
AddIntercept	0 or 6	N/A
DropIntercept	0 or 6	N/A
NeighborMaxAge	4	0
Reserved	variable	N/A

}

**Length** Length of the complex attribute in octets. The access network shall set this field to the length of the complex attribute excluding the Length field.

**AttributeID** The access network shall set this field to 0x02.

**ValueID** This field identifies this particular set of values for the attribute. The access network shall increment this field for each complex attribute-value record for a particular attribute.

**PilotAdd** This value is used by the access terminal to trigger a RouteUpdate in the Connected State. The access network shall set this field to the pilot detection threshold, expressed as an unsigned binary number equal to  $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$ . The value used by the access terminal is -0.5 dB times the value of this field. The access terminal shall support all the valid values specified by this field.

**PilotDrop** This value is used by the access terminal to start a pilot drop timer for a pilot in the Active Set or the Candidate Set. The access network

1		shall set this field to the pilot drop threshold, expressed as an
2		unsigned binary number equal to $\lfloor -2 \times 10 \times \log_{10} E_c/I_0 \rfloor$ . The value
3		used by the access terminal is $-0.5$ dB times the value of this field.
4		The access terminal shall support all the valid values specified by
5		this field.
6	PilotCompare	Active Set versus Candidate Set comparison threshold, expressed as
7		a 2's complement number. The access terminal transmits a
8		RouteUpdate message when the strength of a pilot in the Candidate
9		Set exceeds that of a pilot in the Active Set by this margin. The
10		access network shall set this field to the threshold Candidate Set
11		pilot to Active Set pilot ratio, in units of 0.5 dB. The access terminal
12		shall support all the valid values specified by this field.
13	PilotDropTimer	Timer value after which an action is taken by the access terminal for
14		a pilot that is a member of the Active Set or Candidate Set, and
15		whose strength has not become greater than the value specified by
16		PilotDrop. If the pilot is a member of the Active Set, a RouteUpdate
17		message is sent in the Connected State. If the pilot is a member of
18		the Candidate Set, it will be moved to the Neighbor Set. The access
19		network shall set this field to the drop timer value shown in Table
20		3.7.7.2.2-1 corresponding to the pilot drop timer value to be used by
21		access terminals. The access terminal shall support all the valid
22		values specified by this field.
23	DynamicThresholds	This field shall be set to '1' if the following three fields are included in
24		this record. Otherwise, this field shall be set to '0'.
25	SoftSlope	This field shall be included only if DynamicThresholds is set to '1'.
26		This field shall be set to an unsigned binary number, which is used
27		by the access terminal in the inequality criterion for adding a pilot to
28		the Active Set or dropping a pilot from the Active Set. The access
29		terminal shall support all the valid values specified by this field.
30	AddIntercept	This field shall be included only if DynamicThresholds is set to '1'.
31		This field shall be set to a 2's complement signed binary number in
32		units of dB. The access terminal shall support all the valid values
33		specified by this field.
34	DropIntercept	This field shall be included only if DynamicThresholds is set to '1'.
35		This field shall be set to a 2's complement signed binary number in
36		units of dB. The access terminal shall support all the valid values
37		specified by this field.
38	NeighborMaxAge	The access network shall set this field to the maximum AGE value
39		beyond which the access terminal is to drop members from the

1 Neighbor Set. The access terminal shall support all the valid values  
2 specified by this field.

3 Reserved The access network shall set this field to zero. The access terminal  
4 shall ignore this field. The length of this field shall be such that the  
5 attribute value record is octet-aligned.

#### 6 3.7.7.2.4 SupportedCDMAChannels Attribute

7 The access terminal uses this attribute to convey to the access network the CDMA  
8 Channels supported by the access terminal.

9

Field	Length (bits)	Default Value
Length	8	N/A
AttributeID	8	N/A

One or more of the following attribute value record:

{

ValueID	8	N/A
BandClassCount	8	0

BandClassCount occurrences of the following record:

{

BandClass	5	N/A
BandSubClassCount	8	N/A

BandSubClassCount occurrences of the following field:

BandSubClass	8	N/A
--------------	---	-----

}

Reserved	0 – 7 (as needed)	N/A
----------	----------------------	-----

}

10 Length Length of the complex attribute in octets. The access terminal shall  
11 set this field to the length of the complex attribute excluding the  
12 Length field.

13 AttributeID The access terminal shall set this field to 0x04.

14 ValueID This field identifies this particular set of values for the attribute. The  
15 access terminal shall set this field to an identifier assigned to this  
16 complex value.

17 BandClassCount The access terminal shall set this field to the number of occurrences  
18 of the BandClass field in this complex value.

- 1 BandClass The access terminal shall set this field to the band class supported by
- 2 the access terminal.
  
- 3 BandSubClassCount The access terminal shall set this field to the number of band sub-
- 4 classes supported by the access terminal in this band class.
  
- 5 BandSubClass The access terminal shall set this field to the band sub-class
- 6 supported by the access terminal.
  
- 7 Reserved The access terminal shall add reserved bits to make the length of
- 8 each attribute value record equal to an integer number of octets. The
- 9 access terminal shall set this field to zero. The access network shall
- 10 ignore this field.

11 3.7.8 Protocol Numeric Constants

12

Constant	Meaning	Value
N <sub>RUP</sub> Type	Type field for this protocol	See [5]
N <sub>RUPxHRPDS0</sub>	Subtype field for this protocol	0x0000
N <sub>RUP</sub> Active	Maximum size of the Active Set	6
N <sub>RUP</sub> Candidate	Maximum size of the Candidate Set	6
N <sub>RUP</sub> Neighbor	Minimum size of the Neighbor Set	20

13 3.7.9 Session State Information

14 The Session State Information record (see) consists of parameter records.

15 This protocol defines the following parameter record in addition to the configuration

16 attributes for this protocol.

17 3.7.9.1 RouteUpdate Parameter

18 The following parameter shall be included in the Session State Information record only if

19 the Session State Information is being transferred while the connection is open.

1 Table 3.7.9.1-1. The Format of the Parameter Record for the RouteUpdate Parameter

Field	Length (bits)
ParameterType	8
Length	8
TCAMessageSequence	8
RUPMessageSequence	8
ChannelIncluded	1
xHRPDFwdChannel	0 or 24
FrameOffset	4
CQIFormat	2
CQIPeriod	8
xHRPDReserved1	4
NumPilots	4
NumPilots occurrences of the following fields{	
PilotPN	9
SectorID	128
xHRPDReserved2	1
MACIndexLSBs	6
xHRPDReserved3	3
xHRPDReserved4	2
xHRPDReserved5	3
}	
xHRPDReserved6	1
NumPilots occurrences of the following field:	
{	
xHRPDReserved7	2
}	
MACIndexMSBsIncluded	1
NumPilots occurrences of the following field:	
{	
MACIndexMSB	0 or 1
}	
xHRPDReserved8	5
NumPilots occurrences of the following field:	
{	

xHRPDReserved9	3
}	
xHRPDReserved10	1
xHRPDRRevChannel	24
FrequencyPreCorrection	10
AccessSNR	6
Reserved	Variable

1

2 ParameterType This field shall be set to 0x01 for this parameter record.

3 Length This field shall be set to the length of this parameter record in units  
4 of octets excluding the Length field.

5 TCAMessageSequence  
6 This field shall be set to the MessageSequence field of the last  
7 TrafficChannelAssignment message that was sent by the source  
8 access network.

9 RUPMessageSequence  
10 This field shall be set to the MessageSequence field of the last  
11 RouteUpdate message that was received by the source access  
12 network.

13 ChannelIncluded This field shall be set to '1' if the Channel field is included. Otherwise,  
14 this field shall be set to '0'.

15 xHRPDFwdChannel This field shall be included only if the ChannelIncluded field is set to  
16 '1'. If included, this field shall be set to the last xHRPDFwdChannel  
17 field of the last TrafficChannelAssignment message that included the  
18 Channel field and was sent by the source access network, or the  
19 xHRPDFwdChannel field shall be set by another access network if the  
20 RouteUpdate parameter is from the other access network.

21 FrameOffset This field shall be set to the FrameOffset field in the last  
22 TrafficChannelAssignment message that was sent by the source  
23 access network, or the FrameOffset field in the next  
24 TrafficChannelAssignment message to be sent by the source access  
25 network if the RouteUpdate parameter is from another access  
26 network.

27 CQIFormat This field shall be set to the CQIFormat field in the last  
28 TrafficChannelAssignment message that was sent by the source  
29 access network, or the CQIFormat field in the next

1		TrafficChannelAssignment message to be sent by the source access
2		network if the RouteUpdate parameter is from another access
3		network.
4	CQIPeriod	This field shall be set to the CQIPeriod field in the last
5		TrafficChannelAssignment message that was sent by the source
6		access network, or the CQIPeriod field in the next
7		TrafficChannelAssignment message to be sent by the source access
8		network if the RouteUpdate parameter is from another access
9		network.
10	xHRPDReserved1	This field shall be set to all zeros.
11	NumPilots	This field shall be set to the NumPilots field in the last
12		TrafficChannelAssignment message that was sent by the source
13		access network, or the NumPilots field in the next
14		TrafficChannelAssignment message to be sent by the source access
15		network if the RouteUpdate parameter is from another access
16		network.
17	PilotPN	This field shall be set to the corresponding PilotPN field in the last
18		TrafficChannelAssignment message that was sent by the source
19		access network, or the corresponding PilotPN field in the next
20		TrafficChannelAssignment message to be sent by the source access
21		network if the RouteUpdate parameter is from another access
22		network.
23	SectorID	This field shall be set to the SectorID corresponding to the sector
24		associated with the PilotPN specified above.
25	xHRPDReserved2	This field shall be set to zero.
26	MACIndexLSBs	This field shall be set to the corresponding MACIndexLSBs field in the
27		last TrafficChannelAssignment message that was sent by the source
28		access network, or the corresponding MACIndexLSBs field in the next
29		TrafficChannelAssignment message to be sent by the source access
30		network if the RouteUpdate parameter is from another access
31		network.
32	xHRPDReserved3	This field shall be set to all zeros.
33	xHRPDReserved4	This field shall be set to all zeros.
34	xHRPDReserved5	This field shall be set to all zeros.
35	xHRPDReserved6	This field shall be set to '1'.

1	xHRPDReserved7	This field shall be set to all zeros.
2	MACIndexMSBsIncluded	If MACIndexMSB fields are included in this message, then the access network shall set this field to '1'. Otherwise, the access network shall set this field to '0'.
3		
4		
5		
6	MACIndexMSB	If MACIndexMSBsIncluded field is set to '1' then this field shall be set to the corresponding MACIndexMSB field in the last TrafficChannelAssignment message that was sent by the source access network, or the corresponding MACIndexMSB field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.
7		
8		
9		
10		
11		
12		
13	xHRPDReserved8	This field shall be set to all zeros.
14	xHRPDReserved9	This field shall be set to all zeros.
15	xHRPDReserved10	This field shall be set to zero.
16	xHRPDRevChannel	This field shall be set to the last xHRPDRevChannel field of the last TrafficChannelAssignment message that was sent by the source access network, or the corresponding xHRPDRevChannel field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.
17		
18		
19		
20		
21		
22	FrequencyPreCorrection	This field shall be set to the last FrequencyPreCorrection field of the last TrafficChannelAssignment message that was sent by the source access network, or the corresponding FrequencyPreCorrection field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.
23		
24		
25		
26		
27		
28		
29	AccessSNR	This field shall be set to the last AccessSNR field of the last TrafficChannelAssignment message that was sent by the source access network, or the corresponding AccessSNR field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.
30		
31		
32		
33		
34		
35	Reserved	The number of bits in this field is equal to the number needed to make the length of this parameter record length an integer number of octets. This field shall be set to all zeros.
36		
37		

### 3.7.9.2 AttributeOverrideMessageSequence Parameter

The following parameter shall be included in the Session State Information Record only if the Session State Information is being transferred while the Connection is open and SetManagementOverrideAllowed is set to 0x01.

**Table 3.7.9.2-1. The Format of the Parameter Record for the AttributeOverrideMessageSequence Parameter**

Field	Length (bits)
ParameterType	8
Length	8
AttributeOverrideMessageSequence	8

**ParameterType** This field shall be set to 0x03 for this parameter record.

**Length** This field shall be set to the length of this parameter record in units of octets excluding the Length field.

**AttributeOverrideMessageSequence**

This field shall be set to the MessageSequence field of the last AttributeOverride message that was sent by the source access network. If the access network has not sent the AttributeOverride message during this connection, then this field shall be set to 255.

### 3.8 Default Packet Consolidation Protocol

The Default Packet Consolidation Protocol is same as defined in [4].

### 3.9 Overhead Messages Protocol

The Overhead Messages Protocol is same as defined in [29].

## 1 **4 SESSION LAYER**

### 2 **4.1 Introduction**

#### 3 4.1.1 General Overview

4 The Session Layer contains protocols used to negotiate a session between the access  
5 terminal and the access network.

6 A session is a shared state maintained between the access terminal and the access  
7 network, including information such as:

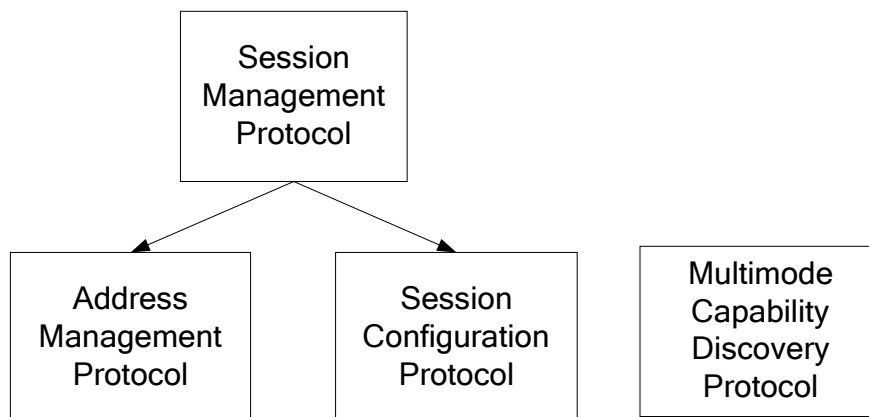
- 8 • A unicast address (UATI) assigned to the access terminal,
- 9 • the set of protocols used by the access terminal and the access network to  
10 communicate over the air-link,
- 11 • configuration settings for these protocols (e.g., authentication keys, parameters for  
12 Connection Layer and MAC Layer protocols, etc.), and
- 13 • an estimate of the current access terminal location.

14 During a single session the access terminal and the access network can open and close a  
15 connection multiple times; therefore, sessions will be closed rarely, and only on occasions  
16 such as the access terminal leaving the coverage area or such as prolonged periods in  
17 which the access terminal is unavailable.

18 The Session Layer contains the following protocols:

- 19 • Session Management Protocol: This protocol provides the means to control the  
20 activation of other Session Layer protocols. In addition, this protocol ensures the  
21 session is still valid and manages closing of the session.
- 22 • Address Management Protocol: This protocol specifies procedures for the initial UATI  
23 assignment and maintains the access terminal addresses.
- 24 • Session Configuration Protocol: This protocol provides the means to negotiate and  
25 provision the protocols used during the session, and negotiates the configuration  
26 parameters for these protocols. This protocol uses the procedures and attribute value  
27 formats defined by the Generic Configuration Protocol (see [6]) for protocol negotiation.
- 28 • Multimode Capability Discovery Protocol: This protocol allows the access network to  
29 discover the multimode capabilities of the access terminal.

30 The relationship between the Session Layer protocols is illustrated in Figure 4.1.1-1.

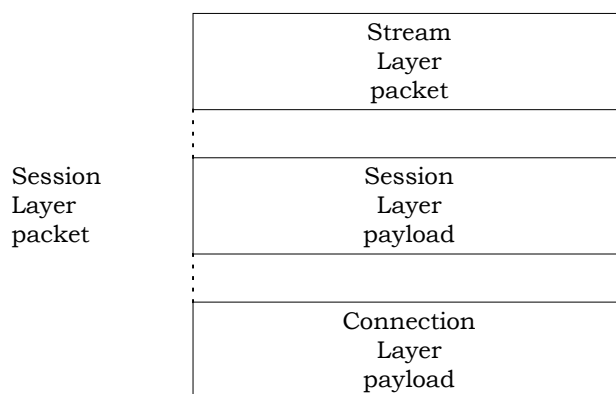


**Figure 4.1.1-1. Session Layer Protocols**

4.1.2 Data Encapsulation for the InUse Protocol Instance

The Session Layer does not modify transmitted or received packets.

Figure 4.1.2-1 illustrates the relationship between Stream Layer packets, Session Layer packets, and Connection Layer payload.



**Figure 4.1.2-1. Session Layer Encapsulation**

**4.2 Default Session Management Protocol**

The Default Session Management Protocol is same as defined in[5].

**4.3 Default Address Management Protocol**

The Default Address Management Protocol is same as defined in[5].

**4.4 Default Session Configuration Protocol**

The Default Session Configuration Protocol is same as defined in[5] except for the change in the simple configurable attribute 0x00NN as shown in Table 4.4-1.

1

**Table 4.4-1. Simple Configurable Attributes**

<b>Attribute ID</b>	<b>Attribute</b>	<b>Values</b>	<b>Meaning</b>
0x00NN	Protocol Type, where NN is the hexadecimal Protocol Type value excluding values 0x03, 0x0c, 0x14, 0x15, 0x16, and 0x17. <sup>35</sup>	<b>0x0000</b>	Default Protocol Subtype
		0xfffe	HardLink Protocol Subtype
		0x0001 – 0xfffd, 0xffff	Protocol Subtype
	NN is 0x03 or 0x0c	<b>0x0001</b>	xHRPD Protocol Subtype 1
		0xfffe	HardLink Protocol Subtype
		0x0000, 0x0002 – 0xfffd, 0xffff	Protocol Subtype

2

**4.5 Generic Multimode Capability Discovery Protocol**

3

The Generic Multimode Capability Discovery Protocol is same as defined in[5].

4

**4.6 Session State Information**

5

The Session State Information record (see [6]) consists of parameter records.

6

The parameter records for this protocol consist of only the configuration attributes for this protocol.

7

8

9

---

<sup>35</sup> Protocol subtypes for protocol types 0x14 – 0x17 are configured by the Stream Layer Protocol.

1  
2

## 5 STREAM LAYER

### 5.1 Introduction

#### 5.1.1 General Overview

The Stream Layer provides the following functions:

- Multiplexing of application streams for one access terminal. Stream 0 is always assigned to the Signaling Application. The other streams can be assigned to applications with different QoS (Quality of Service) requirements, or other applications.
- Provision of configuration messages that map applications to streams.

The Stream Layer uses the Stream Layer Protocol to provide these functions.

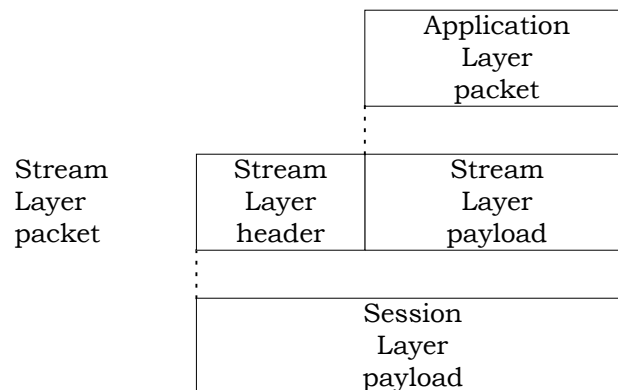
Application Subtypes are specified in [18]. Table 5.1-1 specifies the values of Application Subtype for Applications defined in this specification.

**Table 5.1-1. Application Subtypes for Applications Defined in this Specification**

Value	Meaning
0x0001	Default Packet Application bound to the radio network.
0x0002	Default Packet Application bound to the service network.
0x0008	Enhanced Multi-Flow Packet Application bound to the radio network.
0x0009	Enhanced Multi-Flow Packet Application bound to the service network.

#### 5.1.2 Data Encapsulation for the InUse Protocol Instance

Figure 5.1.2-1 illustrates the relationship between an Application Layer packet, a Stream Layer packet and a Session Layer payload.



**Figure 5.1.2-1. Stream Layer Encapsulation**

1 **5.2 Default Stream Protocol**

2 The Default Stream Protocol is same as defined in[5].

3 **5.3 Generic Virtual Stream Protocol**

4 The Generic Virtual Stream Protocol is same as defined in[5].

5

1 **6 DEFAULT SIGNALING APPLICATION**

2 The Default Signaling Application Protocol is same as defined in [5] with the exception of  
3  $T_{SLPWaitAck} = 1000$  ms.

4

5

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1 **7 DEFAULT PACKET APPLICATION**

2 The Default Packet Application Protocol is same as defined in[5].

3

4

- 1 This page intentionally left blank.

1 **8 ENHANCED MULTI-FLOW PACKET APPLICATION**

2 The Enhanced Multi-flow Packet Application Protocol is same as defined in [28].

3

4

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2