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

Revision A

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The following new protocol subtypes are defined:

- Subtype 2 Idle State protocol supporting MultiUserPage (AC20-20140318-015 QC MultiATPage support for xHRPD)

- Subtype 3 Idle State protocol supporting UserPriority (AC22-20141202-006r1 VIA AT priority based access control stage 3 and AC22-20141202-013 VIA PBAC OMP update)

- Subtype 2 Forward Traffic Channel MAC Protocol supporting MultiUserPacket 16 (AC21-20140724-003 QC MUP16 support for xHRPD)

- Subtype 1 Access Channel MAC protocol supporting Service Based Access Control (AC22-20141202-008r1 QC xHRPD Service Based Access Control Stage 3)

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(This foreword is not part of this Standard)

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

- Introduction to cdma2000 Extended Cell High Rate Packet Data Air Interface Specification
- Physical Layer for cdma2000 Extended Cell High Rate Packet Data Air Interface Specification

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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:


[8] Reserved.


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REFERENCES


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

**Figure 1.1.2-2. Access Channel MAC Layer Packet Encapsulation**
Figure 1.1.2-3. Forward Traffic Channel MAC Layer Packet Encapsulation

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

1.2 Default Control Channel MAC Protocol

The Default Control Channel MAC Protocol is same as defined in Error! Reference source not found. which also works with xHRPD Subtype 0 Physical Layer Protocol.

1.3 Enhanced Control Channel MAC Protocol

The Enhanced Control Channel MAC Protocol is same as defined in Error! Reference source not found. which also works with xHRPD Subtype 0 Physical Layer Protocol.

1.4 xHRPD Subtype 0 Access Channel MAC Protocol

1.4.1 Overview

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

This protocol can be in one of two states:

- **Inactive State**: In this state the protocol waits for an *Activate* command. This state applies only to the access terminal and occurs when the access terminal has not acquired an access network or the access terminal has a connection open.

- **Active State**: In this state the access terminal transmits and the access network receives the Access Channel.

![State Diagram]

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

### 1.4.2 Primitives and Public Data

#### 1.4.2.1 Commands

This protocol defines the following commands:

- *Activate*
- *Deactivate*

#### 1.4.2.2 Return Indications

This protocol returns the following indications:

- *TransmissionSuccessful*
- *TransmissionAborted*
- *TransmissionFailed*
- *TxStarted*
- *TxEnded*
- *SupervisionFailed*
- *MACLayerCapsuleReceived*
1.4.2.3 Public Data

This protocol shall make the following data public:

- Subtype for this protocol
- PowerStep
- OpenLoopAdjust
- ProbeInitialAdjust
- PreambleLength
- AccessSignature field of the next AccessParameters message to be sent by the access network
- $MI_{ACMAC}$
- $MQ_{ACMAC}$

1.4.3 Protocol Data Unit

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

1.4.4 Protocol Initialization

1.4.4.1 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.

1.4.4.2 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 shall enter the Inactive State.
- 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:
### MAC Layer

#### 3GPP2 C.S0098-300-0 v1.0

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 ConfigurationRequest message sent.

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td>Priority</td>
</tr>
<tr>
<td>Priority</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.4.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 corresponding ConfigurationRequest message.

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

![Diagram of Access Channel MAC Packet Structure](image-url)

**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.

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

1.4.6.1.1.2 Deactivate

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

If this protocol receives the command in the Active State,

• The access terminal shall transition to the Inactive State.

• The access network shall ignore it.

1.4.6.1.2 Access Channel Structure

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

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

\[
(T - 12 \times \text{AccessChannelOffset}) \mod \text{AccessCycleDuration} = 0,
\]

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

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

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.

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.
1.4.6.1.4 Active State

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

If the protocol receives a Deactivate command,

- Access terminal shall:
  - Immediately cease transmitting on the Access Channel if it is in the process of sending a probe.
  - Return a TransmissionAborted indication if it was in the process of sending an Access Channel MAC Layer capsule.
  - Transition to the Inactive State.
- Access network shall ignore this command.

All other commands shall be ignored in this state.

1.4.6.1.4.1 Access Terminal Requirements

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

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

The access terminal shall return a TxStarted indication before transmitting the first probe for an Access Channel MAC Layer capsule.\(^3\)

The access terminal shall return a TxEnded indication either:

- Simultaneous with a TransmissionAborted or a TransmissionFailed indication, or
- T_{ACMPTransaction} seconds after a TransmissionSuccessful indication.

1.4.6.1.4.1.1 Probe Transmission

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

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

\(^3\) 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.
2. Current AccessParameters. Prior to sending the first probe of the first probe sequence, the access terminal shall verify that the last AccessParameters message it received is current, according to the last AccessSignature value given as public data by the Overhead Messages Protocol. If the AccessParameters message is not current, the access terminal shall start the AccessParameters supervision timer for \( T_{ACMPAPSupervision} \). If the timer expires before it receives the current AccessParameters message, the access terminal shall return a \( SupervisionFailed \) indication and transition to the Inactive State.

3. ATI Record. The access terminal shall set the ATI and ATIType fields of the ATI Record in the MAC Layer header to TransmitATI.ATI and TransmitATI.ATIType, respectively (TransmitATI is provided as public data by the Address Management Protocol).

4. Probe Power Control. The access terminal shall send the \( i \)th probe in the probe sequence at a power level given by \( X_0 + (i-1) \times PowerStep \), where \( X_0 \) represents the access terminal’s open-loop mean output power of the Pilot Channel and is given by

\[
X_0 = - \text{Mean } R_X \text{ Power (dBm)} + \text{OpenLoopAdjust} + \text{ProbeInitialAdjust}
\]

and the Mean \( R_X \) Power is estimated throughout the transmission of each probe.

5. Probe Structure. When sending a probe, the access terminal shall transmit PreambleLength frames of pilot only, followed by up to CapsuleLengthMax frames of probe data and pilot. The access terminal shall transmit a single Access Channel Capsule per probe. The access terminal shall not change the probe data contents in between probes.

6. PN Code Cover. The access terminal shall use the Access Channel long codes masks for generating the PN sequence to cover the entire probe. The Access Channel PN sequence is specified in[7].

7. Inter-Probe Backoff. If the access terminal receives an ACAck message or it has already transmitted ProbeNumStep \( (N_P \) in Figure 1.4.6.1.2-3) probes in this probe sequence, then it shall not send the next probe in this probe sequence. Otherwise, after sending an access probe within an access probe sequence, the access terminal shall perform the following procedures:

   a. Set \( yTotal \) to 0,

   b. Generate a pseudo random number \( y \) which is a uniformly distributed integer random number between 0 and \( \text{ProbeBackoff} \),

   c. Add \( y \) to \( yTotal \) (i.e., \( yTotal = yTotal + y \)),

   d. Compute \( P = T_{ACMPATProbeTimeout} + (yTotal \times \text{AccessCycleDuration}) \)
e. Consider the access probe that would start at the first Access Channel Cycle instance that occurs at least \( P \) slots after the end of the previous access probe. If any portion of the access probe plus the time interval that is required to receive the corresponding ACAck message (as estimated by the access terminal)\(^4\) overlaps with slots when the access terminal does not receive the Forward Channel, then the access terminal shall transmit the next access probe at the first Access Channel Cycle instance that occurs at least \( P + T \times \text{AccessCycleDuration} \) slots after the end of the previous access probe where \( T \) is the minimum number of intervals of length \( \text{AccessCycleDuration} \) that are needed to be added to \( P \) in order to ensure that the access probe does not overlap with the slots when the access terminal does not receive the Forward Channel.

f. Otherwise, if condition 'e' is not satisfied, the access terminal shall transmit the next access probe at the first Access Channel Cycle instance that occurs at least \( P \) slots after the end of the previous access probe.

1.4.6.1.4.1.2 Access Channel Long Code Mask

The access terminal shall set the Access Channel long masks, \( \text{MI}_{\text{ACMAC}} \) and \( \text{MQ}_{\text{ACMAC}} \) as follows.

The 42-bit mask \( \text{MI}_{\text{ACMAC}} \) shall be as specified in Table 1.4.6.1.4.1.2-1.

| BIT | MI\(_{\text{ACMAC}}\) Permuted (ColorCode | SectorID[23:0]) |
|-----|---------------------------------|
| 41  | 1 AccessCycleNumber              |

The 42-bit mask \( \text{MQ}_{\text{ACMAC}} \) shall be derived from the mask \( \text{MI}_{\text{ACMAC}} \) as follows:

\[
\text{MQ}_{\text{ACMAC}}[k] = \text{MI}_{\text{ACMAC}}[k-1], \quad \text{for } k = 1,\ldots, 41
\]

\[
\text{MQ}_{\text{ACMAC}}[0] = \text{MI}_{\text{ACMAC}}[0] \oplus \text{MI}_{\text{ACMAC}}[1] \oplus \text{MI}_{\text{ACMAC}}[2] \oplus \text{MI}_{\text{ACMAC}}[4] \oplus \text{MI}_{\text{ACMAC}}[5] \oplus \text{MI}_{\text{ACMAC}}[6] \oplus \text{MI}_{\text{ACMAC}}[9] \oplus \text{MI}_{\text{ACMAC}}[15] \oplus \text{MI}_{\text{ACMAC}}[16] \oplus \text{MI}_{\text{ACMAC}}[17] \oplus \text{MI}_{\text{ACMAC}}[18] \oplus \text{MI}_{\text{ACMAC}}[20] \oplus \text{MI}_{\text{ACMAC}}[21] \oplus \text{MI}_{\text{ACMAC}}[24] \oplus \text{MI}_{\text{ACMAC}}[25] \oplus \text{MI}_{\text{ACMAC}}[26] \oplus \text{MI}_{\text{ACMAC}}[30] \oplus \text{MI}_{\text{ACMAC}}[32] \oplus \text{MI}_{\text{ACMAC}}[34] \oplus \text{MI}_{\text{ACMAC}}[41]
\]

where the \( \oplus \) denotes the Exclusive OR operation, and \( \text{MQ}_{\text{ACMAC}}[i] \) and \( \text{MI}_{\text{ACMAC}}[i] \) denote the \( i^{\text{th}} \) least significant bit of \( \text{MQ}_{\text{ACMAC}} \) and \( \text{MI}_{\text{ACMAC}} \), respectively.

In Table 1.4.6.1.4.1.2-1:

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

---

\(^4\) 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.
• ColorCode is given as public data of Overhead Messages Protocol and corresponds to
  the sector to which the access terminal is sending the access probe.

• AccessCycleNumber is defined as follows:

  AccessCycleNumber = SystemTime mod 256

Where:

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

  ColorCode | SectorID[23:0] = (S_{31}, S_{30}, S_{29}, ..., S_0)

  Permuted(ColorCode | SectorID[23:0]) =
  (S_0, S_{31}, S_{22}, S_{13}, 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},
  S_{15}, S_6, S_{28}, S_{19}, S_{10}, S_1, S_{23}, S_{14}, S_5, S_{27}, S_{18}, S_9).

1.4.6.1.4.1.3 Probe Sequence Transmission

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

1. The access terminal shall randomly select one of the narrowband channels designated as Access Channel.

2. Transmission of the First Probe.

  – Prior to sending the first probe of the sequence, the access terminal shall perform the following:

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

    When $p$ is not zero, the persistence test consists of comparing a uniformly distributed random number $x$, $0 < x < 1$, (using the procedure specified in [1]) with $p$. If $x < p$ the test is said to succeed. If the persistence test succeeds or if the number of consecutive unsuccessful persistence tests exceeds $4/p$, the access terminal may transmit in the first upcoming Access Channel Cycle such that no portion of the access probe plus the time interval that is required to

5 The access terminal’s class is configured through means that are outside the scope of this specification.
receive the corresponding ACAck message (as estimated by the access terminal) will overlap with slots when the access terminal does not receive the Forward Channel. If $p$ is equal to zero, the access terminal shall return a TransmissionFailed indication and end the access.

3. **Probe Contents.** The access terminal shall not change the data portion of the probe contents between probe sequences.

4. **Success Condition.** If the access terminal receives an ACAck message it shall stop the probe sequence, including any transmission in progress, and shall return a TransmissionSuccessful indication.

5. **Failure Condition.** If the access terminal has already sent ProbeSequenceMax probe sequences for this access ($N_S$ in Figure 1.4.6.1.2-3), and if it does not receive an ACAck message acknowledging its receipt within $(T_{ACMPATProbeTimeout} + T_{ACMPCycleLen})$ slots after the end of the last access probe, or if the interval between two adjacent probes in the access attempt is greater than $T_{ACMPATProbeTimeout} + \max(ProbeBackoff, ProbeSequenceBackoff) \times \text{AccessCycleDuration} + T_{ACMPMaxDelayPrevProbe}$ slots, then the access terminal shall return a TransmissionFailed indication and abort the access.

6. **Inter-Sequence Backoff.** The access terminal shall generate a uniformly distributed integer random number $k$ between 0 and ProbeSequenceBackoff. The access terminal shall wait for $T_S = (k \times \text{AccessCycleDuration}) + T_{ACMPATProbeTimeout}$ slots from the end of the last probe of the previous sequence before repeating this sequence.

1.4.6.1.4.2 Access Network Requirements

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

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

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

1.4.6.2 Header and Message Formats

1.4.6.2.1 MAC Layer Header

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

---

6 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.

7 E.g., because the access terminal has tuned to the frequency associated with another air-interface.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
</tr>
<tr>
<td>SessionConfigurationToken</td>
<td>16</td>
</tr>
<tr>
<td>SecurityLayerFormat</td>
<td>1</td>
</tr>
<tr>
<td>ConnectionLayerFormat</td>
<td>1</td>
</tr>
<tr>
<td>Reserved</td>
<td>4</td>
</tr>
<tr>
<td>ATI Record</td>
<td>34</td>
</tr>
</tbody>
</table>

Length

The access terminal shall set this field to the combined length, in octets, of the Security Layer packet and this MAC Layer header, excluding the Length field.

SessionConfigurationToken

The access terminal shall set this field to the value of the SessionConfigurationToken which is public data of the Session Configuration Protocol.

SecurityLayerFormat

The access terminal shall set this field to ‘1’ if security layer packet is either authenticated or encrypted; otherwise, the access terminal shall set this field to ‘0’.

ConnectionLayerFormat

The access terminal shall set this field to ‘1’ if the connection layer packet is Format B; otherwise, the access terminal shall set this field to ‘0’.

Reserved

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

ATI Record

Access Terminal Identifier Record. The access terminal shall set this field to the record specifying the access terminal’s ID specified by TransmitATI.ATI and TransmitATI.ATIType. This record is defined in [1].

1.4.6.2.2 FCS

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

\[ g(x) = x^{32} + x^{26} + x^{23} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^3 + x + 1 \]

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

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

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'.

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](image)

Denotes one-bit storage element
Denotes modulo-2 addition

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.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>AccessCycleDuration</td>
<td>8</td>
</tr>
<tr>
<td>AccessSignature</td>
<td>16</td>
</tr>
<tr>
<td>OpenLoopAdjust</td>
<td>8</td>
</tr>
<tr>
<td>ProbeInitialAdjust</td>
<td>5</td>
</tr>
<tr>
<td>ProbeNumStep</td>
<td>4</td>
</tr>
<tr>
<td>PowerStep</td>
<td>4</td>
</tr>
<tr>
<td>PreambleLength</td>
<td>3</td>
</tr>
<tr>
<td>CapsuleLengthMax</td>
<td>4</td>
</tr>
</tbody>
</table>

`NACMPAPersist` occurrences of the following field:

```
{
    APersistence 6
}
```

`AccessChannelRecordCount` 4

`AccessChannelRecordCount` occurrences of the following field:

```
{
    AccessChannelRecord 24
}
```

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

```
{
    AccessChannelOffset 8
}
```

`MaxPathDelay` 0 or 8

`Reserved` variable

MessageID

The access network shall set this field to 0x01.
AccessCycleDuration

The access network shall set this field to the duration of an Access Channel Cycle in units of 20 msec frames.

AccessSignature

AccessParameters message signature. The access network shall change this field if the contents of the AccessParameters message change.

OpenLoopAdjust

The access network shall set this field to the negative of the nominal power to be used by access terminals in the open loop power estimate, expressed as an unsigned value in units of 1 dB. The value used by the access terminal is -1 times the value of this field.

ProbeInitialAdjust

The access network shall set this field to the correction factor to be used by access terminals in the open loop power estimate for the initial transmission on the Access Channel, expressed as a two's complement value in units of 1 dB.

ProbeNumStep

The access network shall set this field to the maximum number of access probes access terminals are to transmit in a single access probe sequence. The access network shall set this field to a value in the range [1 ... 15].

PowerStep

Probe power increase step. The access network shall set this field to the increase in power between probes, in resolution of 0.5 dB. The access terminal shall support all the valid values specified by this field.

PreambleLength

The access network shall set this field to the length in 20 msec frames of the access probe preamble in the range [4 ... 7]. The access terminal shall support all the valid values specified by this field.

CapsuleLengthMax

Access Channel Max Capsule length. The access network shall set this field to the maximum number of frames in an Access Channel Capsule. The access network shall set this field to a value in the range [2 ... 15]. The access terminal shall support all the valid values specified by this field.

APersistence

Access persistence vector. If a value in this vector is 0x3F, the access terminal shall use zero as the corresponding persistence probability; otherwise, if the value of this field, n, not equal to 0x3F, the access terminal shall use $2^{-n/4}$ as the corresponding persistence probability.

AccessChannelRecordCount

Number of access channel records. Access network shall set this field to the number of access channel records supported by a sector. Each
channel record may contain more than one (up to 15 channels for a single 1.25MHz carrier) consecutive narrowband access channels.

AccessChannelRecord

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

AccessChannelOffset

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

MaxPathDelay

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

Reserved

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>CC</th>
<th>SLP</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>Broadcast</td>
<td>Best Effort</td>
<td>30</td>
</tr>
</tbody>
</table>

1.4.6.3 Interface to Other Protocols

1.4.6.3.1 Commands

This protocol does not issue any commands.

1.4.6.3.2 Indications

This protocol does not register to receive any indications.

1.4.7 Configuration Attributes

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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
}
```

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

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

ValueID

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

ProbeSequenceMax

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

ProbeBackoff

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

ProbeSequenceBackoff

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

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

1.4.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N_{ACMP\text{Type}}</td>
<td>Type field for this protocol</td>
<td>[5]</td>
</tr>
<tr>
<td>N_{ACMP\text{dHRPDS0}}</td>
<td>Subtype field for this protocol</td>
<td>0x0000</td>
</tr>
<tr>
<td>N_{ACMP\text{AccessParameters}}</td>
<td>The recommended maximum number of slots between transmission of two consecutive AccessParameters message.</td>
<td>3 * T_{ACMPCycleLen}</td>
</tr>
<tr>
<td>T_{ACMP\text{APSupervision}}</td>
<td>AccessParameters supervision timer</td>
<td>12 * T_{ACMPCycleLen}</td>
</tr>
<tr>
<td>T_{ACMPAT\text{ProbeTimeout}}</td>
<td>Time to receive an acknowledgment at the access terminal for a probe before sending another probe</td>
<td>128 + 4 * MaxPathDelay slots</td>
</tr>
<tr>
<td>T_{ACMPAN\text{ProbeTimeout}}</td>
<td>Maximum time to send an acknowledgment for a probe at the access network</td>
<td>96 slots</td>
</tr>
<tr>
<td>T_{ACMP\text{Transaction}}</td>
<td>Time for access terminal to wait after a successful transmission before returning a Tx\text{Ended} indication</td>
<td>1 second</td>
</tr>
<tr>
<td>T_{ACMPCycleLen}</td>
<td>Length of Control Channel Cycle used by the Access Channel MAC Protocol</td>
<td>256 slots</td>
</tr>
<tr>
<td>T_{ACMP\text{MaxDelayPrevProbe}}</td>
<td>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 TransmissionFailed indication</td>
<td>300 slots</td>
</tr>
</tbody>
</table>

1.4.9 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.
1.5 xHRPD Subtype 1 Access Channel MAC Protocol

1.5.1 Overview

The xHRPD Subtype 1 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 or Subtype 1 Physical Layer Protocol.

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

This protocol can be in one of two states:

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

Figure 1.5.1-1. xHRPD Subtype 1 Access 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 indications:

- TransmissionSuccessful
- TransmissionAborted
• TransmissionFailed
• SBACTransmissionFailed
• TxStarted
• TxEnded
• SupervisionFailed
• MACLayerCapsuleReceived

1.5.2.3 Public Data
This protocol shall make the following data public:
• Subtype for this protocol
• PowerStep
• OpenLoopAdjust
• ProbeInitialAdjust
• PreambleLength
• AccessSignature field of the next AccessParameters message to be sent by the access network
• MIAcmac
• MQACMAC

1.5.3 Protocol Data Unit
The transmission unit of this protocol is the Access Channel MAC Layer packet. Each Access Channel MAC Layer packet contains part or all of a 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 shall enter the Inactive State.
- The protocol at the access network shall enter the Active 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:

- 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.
1.5.5.3 Message Formats

1.5.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AttributeRecord</td>
<td>Attribute dependent</td>
</tr>
</tbody>
</table>

MessageID  The sender shall set this field to 0x50.

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td>Priority</td>
</tr>
</tbody>
</table>

1.5.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AttributeRecord</td>
<td>Attribute dependent</td>
</tr>
</tbody>
</table>

MessageID  The sender shall set this field to 0x51.

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

AttributeRecord An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [1]. The sender shall not include more than one attribute record with the same attribute identifier.
1.5.6 Procedures and Messages for the InUse Instance of the Protocol

1.5.6.1 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 1.5.6.2.1 in front of the Security Layer packet,
- The protocol adds the FCS as defined in 1.5.6.2.2,
- The protocol pads the result as defined in 1.5.6.2.3,
- The protocol splits the result into one or more Access Channel MAC Layer capsule fragments,
- The protocol adds the reserved bits, as defined in 1.5.6.2.4, 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 1.5.6.1-1.

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.

---

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addressing</strong></td>
<td>unicast</td>
<td></td>
</tr>
<tr>
<td><strong>SLP</strong></td>
<td>Reliable</td>
<td></td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 1.5.6.1-1. Access Channel MAC Packet Structure**

---

1.5.6.1.1 Command Processing

The access network shall ignore all commands.

1.5.6.1.1.1 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.

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

1.5.6.1.1.2 Deactivate

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

If this protocol receives the command in the Active State,

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

1.5.6.1.2 Access Channel Structure

The Access Channel consists of one or more reverse link narrowband channels. The number of narrowband channels and the corresponding frequencies designated for Access Channel are specified by the AccessParameter message. The access terminal randomly selects one of the narrowband channels from the designated set of channels to send its access probe. Figure 1.5.6.1.2-1 and Figure 1.5.6.1.2-3 illustrate the access probe structure and the access probe sequence.

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

\[(T - 12 \times \text{AccessChannelOffset}) \mod \text{AccessCycleDuration} = 0\],

where T is CDMA System Time in slots and AccessChannelOffset is time offset of individual narrowband Access Channel in 20 msec frame. The Access Channel Cycle for each narrowband Access Channel is staggered in time by its AccessChannelOffset as shown in Figure 1.5.6.1.2-2.

The structure of an individual access probe is shown in Figure 1.5.6.1.2-1. In each access probe, the preamble which consists of only the pilot symbols is first transmitted. After PreambleLength frames (of duration PreambleLength × 20 msec), the probe data is enabled for up to CapsuleLengthMax × 20 msec.
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.
1.5.6.1.4 Active State

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

If the protocol receives a *Deactivate* command,

- Access terminal shall:
  - Immediately cease transmitting on the Access Channel if it is in the process of sending a probe.
  - Return a *TransmissionAborted* indication if it was in the process of sending an Access Channel MAC Layer capsule.
  - Transition to the Inactive State.

- Access network shall ignore this command.

All other commands shall be ignored in this state.

1.5.6.1.4.1 Access Terminal Requirements

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

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

The access terminal shall return a *TxStarted* indication before transmitting the first probe for an Access Channel MAC Layer capsule.\(^8\)

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

- Simultaneous with a *TransmissionAborted* or a *TransmissionFailed* indication, or
- \(T_{ACMPTransaction}\) seconds after a *TransmissionSuccessful* indication.

1.5.6.1.4.1.1 Probe Transmission

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

8. Current SectorParameters. The access terminal shall verify that the value of SectorSignature field of the latest QuickConfig message is the same as SectorSignature field of the latest SectorParameters message prior to sending the first probe of the first probe sequence. Both SectorSignature values (one belonging to the QuickConfig message and one belonging to the SectorParameters message) are public data of the Overhead Messages Protocol.

---

\(^8\) 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.
9. Current AccessParameters. Prior to sending the first probe of the first probe sequence, the access terminal shall verify that the last AccessParameters message it received is current, according to the last AccessSignature value given as public data by the Overhead Messages Protocol. If the AccessParameters message is not current, the access terminal shall start the AccessParameters supervision timer for TACMPAPSupervision. If the timer expires before it receives the current AccessParameters message, the access terminal shall return a \textit{SupervisionFailed} indication and transition to the Inactive State.

10. ATI Record. The access terminal shall set the ATI and ATIType fields of the ATI Record in the MAC Layer header to TransmitATI.ATI and TransmitATI.ATIType, respectively (TransmitATI is provided as public data by the Address Management Protocol).

11. Probe Power Control. The access terminal shall send the $i$th probe in the probe sequence at a power level given by $X_0 + (i-1) \times \text{PowerStep}$, where $X_0$ represents the access terminal’s open-loop mean output power of the Pilot Channel and is given by
\begin{equation}
X_0 = -\text{Mean R}_X \text{ Power (dBm)} + \text{OpenLoopAdjust} + \text{ProbeInitialAdjust}
\end{equation}
and the Mean R$_X$ Power is estimated throughout the transmission of each probe.

12. Probe Structure. When sending a probe, the access terminal shall transmit PreambleLength frames of pilot only, followed by up to CapsuleLengthMax frames of probe data and pilot. The access terminal shall transmit a single Access Channel Capsule per probe. The access terminal shall not change the probe data contents in between probes.

13. PN Code Cover. The access terminal shall use the Access Channel long codes masks for generating the PN sequence to cover the entire probe. The Access Channel PN sequence is specified in [7].

14. Inter-Probe Backoff. If the access terminal receives an ACAck message or it has already transmitted ProbeNumStep ($N_p$ in Figure 1.5.6.1.2-3) probes in this probe sequence, then it shall not send the next probe in this probe sequence. Otherwise, after sending an access probe within an access probe sequence, the access terminal shall perform the following procedures:
\begin{enumerate}
    \item Set $y$Total to 0,
    \item Generate a pseudo random number $y$ which is a uniformly distributed integer random number between 0 and ProbeBackoff,
    \item Add $y$ to $y$Total (i.e., $y$Total = $y$Total + $y$),
    \item Compute $P = \text{TACPAPATProbeTimeout} + (y$Total $\times$ AccessCycleDuration)
\end{enumerate}
k. Consider the access probe that would start at the first Access Channel Cycle instance that occurs at least P slots after the end of the previous access probe. If any portion of the access probe plus the time interval that is required to receive the corresponding ACAck message (as estimated by the access terminal)\(^9\) overlaps with slots when the access terminal does not receive the Forward Channel, then the access terminal shall transmit the next access probe at the first Access Channel Cycle instance that occurs at least \(P + T \times \text{AccessCycleDuration}\) slots after the end of the previous access probe where \(T\) is the minimum number of intervals of length AccessCycleDuration that are needed to be added to \(P\) in order to ensure that the access probe does not overlap with the slots when the access terminal does not receive the Forward Channel.

l. Otherwise, if condition ‘e’ is not satisfied, the access terminal shall transmit the next access probe at the first Access Channel Cycle instance that occurs at least \(P\) slots after the end of the previous access probe.

1.5.6.1.4.1.2 Access Channel Long Code Mask

The access terminal shall set the Access Channel long masks, \(\text{MI}_{\text{ACMAC}}\) and \(\text{MQ}_{\text{ACMAC}}\) as follows.

The 42-bit mask \(\text{MI}_{\text{ACMAC}}\) shall be as specified in Table 1.5.6.1.4.1.2-1.

| BIT | MI\(_{\text{ACMAC}}\) Permuted (ColorCode | SectorID[23:0]) | AccessCycleNumber |
|-----|---------------------------------|-----------------|
| 1   | 1                               | 1               |

The 42-bit mask \(\text{MQ}_{\text{ACMAC}}\) shall be derived from the mask \(\text{MI}_{\text{ACMAC}}\) as follows:

\[
\text{MQ}_{\text{ACMAC}}[k] = \text{MI}_{\text{ACMAC}}[k-1], \text{ for } k = 1, \ldots, 41
\]

\[
\text{MQ}_{\text{ACMAC}}[0] = \text{MI}_{\text{ACMAC}}[0] \oplus \text{MI}_{\text{ACMAC}}[1] \oplus \text{MI}_{\text{ACMAC}}[2] \oplus \text{MI}_{\text{ACMAC}}[4] \oplus \text{MI}_{\text{ACMAC}}[5] \oplus \\
\text{MI}_{\text{ACMAC}}[6] \oplus \text{MI}_{\text{ACMAC}}[9] \oplus \text{MI}_{\text{ACMAC}}[15] \oplus \text{MI}_{\text{ACMAC}}[16] \oplus \text{MI}_{\text{ACMAC}}[17] \oplus \\
\text{MI}_{\text{ACMAC}}[18] \oplus \text{MI}_{\text{ACMAC}}[20] \oplus \text{MI}_{\text{ACMAC}}[21] \oplus \text{MI}_{\text{ACMAC}}[24] \oplus \text{MI}_{\text{ACMAC}}[25] \oplus \\
\text{MI}_{\text{ACMAC}}[26] \oplus \text{MI}_{\text{ACMAC}}[30] \oplus \text{MI}_{\text{ACMAC}}[32] \oplus \text{MI}_{\text{ACMAC}}[34] \oplus \text{MI}_{\text{ACMAC}}[41]
\]

where the \(\oplus\) denotes the Exclusive OR operation, and \(\text{MQ}_{\text{ACMAC}}[i]\) and \(\text{MI}_{\text{ACMAC}}[i]\) denote the \(i\)th least significant bit of \(\text{MQ}_{\text{ACMAC}}\) and \(\text{MI}_{\text{ACMAC}}\), respectively.

In Table 1.5.6.1.4.1.2-1:

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

---

\(^9\) 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.
• ColorCode is given as public data of Overhead Messages Protocol and corresponds to
the sector to which the access terminal is sending the access probe.

• AccessCycleNumber is defined as follows:

\[ AccessCycleNumber = \text{SystemTime mod 256} \]

Where:

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

\[
\text{ColorCode} | \text{SectorID}[23:0] = (S_{31}, S_{30}, S_{29}, \ldots, S_0)
\]

\[
\text{Permuted} (\text{ColorCode} | \text{SectorID}[23:0]) = \\
(S_0, S_{31}, S_{22}, S_{13}, S_4, S_{26}, S_{17}, S_8, S_{30}, S_{21}, S_{12}, S_3, S_{25}, S_{16}, S_7, S_{29}, S_{20}, S_{11}, S_2, S_{24}, \\
S_{15}, S_6, S_{28}, S_{19}, S_{10}, S_1, S_{23}, S_{14}, S_5, S_{27}, S_{18}, S_9).
\]

1.5.6.1.4.1.3 Probe Sequence Transmission

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

7. The access terminal shall randomly select one of the narrowband channels
designated as Access Channel.

8. Transmission of the First Probe.

   - Prior to sending the first probe of the sequence, the access terminal shall
     perform the following:

     + If the value of PageResponseAPersistenceSupported equals to 0x01 and the
       access terminal is initiating a connection in response to a page and the page
       message or MultiAT page message includes a PageResponseAPersistence
       value then the access terminal should use that access persistence for that
       connection.

     + Persistence Test with Service Based Access Control enabled: If the
       SBACFieldCount is not set to zero in the AccessParameters message, the
       access terminal shall perform the persistence test using the value \( p \)
       corresponds to the service identified by the Access Control Class\(^{10}\). The
       Service Based Access Control shall apply the class of the access terminal \( i=0 \)
       and 2 only.

     + Persistence Test with Service Based Access Control disabled: If the
       SBACFieldCount is set to zero in the AccessParameters message, the access
       terminal shall use the value \( p \) as specified by APersistence[\( i=0 \) or 2] where \( i \) is

\(^{10}\) The means for differenciating services, such as using Packet Filter, API or Dialed Digits within the
access terminal is outside the scope of this specification.
the class of the access terminal and APersistence[i] is the (i+1)st occurrence of
the APersistence field in the AccessParameters message.\textsuperscript{11}

Persistence Test for access terminals other than access class \(i=0\) and 2: The
access terminal shall use the value \(p\) as specified by APersistence[i] where \(i\) is
the class of the access terminal and APersistence[i] is the (i+1)st occurrence of
the APersistence field in the AccessParameters message. The value \(i=1\) is
reserved for emergency terminals. The value \(i=2\) is reserved for test access
terminals. If the access terminal does not have a class defined, it shall use \(i=0,\)
corresponding to non-emergency access terminals. All other values of \(i\) are
reserved for future use.

When \(p\) is not zero, the persistence test consists of comparing a uniformly
distributed random number \(x, 0 < x < 1\), (using the procedure specified in [1])
with \(p\). If \(x < p\) the test is said to succeed. If the persistence test succeeds or if
the number of consecutive unsuccessful persistence tests exceeds \(4/p\), and \(4/p\)
is smaller than or equal to \(2(\text{SBACMaxRetryNumber} + 1)\) in case SBAC is enabled, the
access terminal may transmit in the first upcoming Access Channel Cycle such
that no portion of the access probe plus the time interval that is required to
receive the corresponding ACAck message (as estimated by the access
terminal)\textsuperscript{12} will overlap with slots when the access terminal does not receive the
Forward Channel. If SBAC is enabled and \(4/p\) is greater than \(2(\text{SBACMaxRetryNumber} +
1)\), the access terminal may perform the Persistence test by \(2(\text{SBACMaxRetryNumber} +
1)\) times. If the persistence test succeeds, the access terminal may transmit the
access probe as previously described in this section. If unsuccessful persistence
tests reaches \(2(\text{SBACMaxRetryNumber} + 1)\) times the access terminal shall return a
\textit{SBACTransmissionFailed} indication and end the access. If \(p\) is equal to zero, the
access terminal shall return a \textit{TransmissionFailed} indication and end the access.

9. Probe Contents. The access terminal shall not change the data portion of the probe
contents between probe sequences.

10. Success Condition. If the access terminal receives an ACAck message it shall stop
the probe sequence, including any transmission in progress, and shall return a
\textit{TransmissionSuccessful} indication.

\textsuperscript{11} The access terminal’s class is configured through means that are outside the scope of this
specification.

\textsuperscript{12} 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.
11. Failure Condition. If the access terminal has already sent ProbeSequenceMax probe sequences for this access (N_S in Figure 1.5.6.1.2-3), and if it does not receive an ACAck message acknowledging its receipt within \((T_{ACMPATProbeTimeout} + T_{ACMPCycleLen})\) slots after the end of the last access probe, or if the interval between two adjacent probes in the access attempt is greater than \(T_{ACMPATProbeTimeout} + \max\{ProbeBackoff, \, \text{ProbeSequenceBackoff}\} \times \text{AccessCycleDuration} + T_{ACMPMaxDelayPrevProbe} \) slots\(^{13}\), then the access terminal shall return a *TransmissionFailed* indication and abort the access.

12. Inter-Sequence Backoff. The access terminal shall generate a uniformly distributed integer random number \(k\) between 0 and \(\text{ProbeSequenceBackoff}\). The access terminal shall wait for \(T_S = (k \times \text{AccessCycleDuration}) + T_{ACMPATProbeTimeout}\) slots from the end of the last probe of the previous sequence before repeating this sequence.

1.5.6.1.4.2 Access Network Requirements

The access network should send an *AccessParameters* message at least once every \(N_{ACMPAccessParameters}\) slots.

The access network should send an ACAck message in response to every Access Channel MAC Layer capsule it receives. The message should be sent within \(T_{ACMPANProbeTimeout}\) slots of receipt of the packet. The access network shall return a *MACLayerCapsuleReceived* indication upon sending an ACAck message.

The access network should monitor and control the load on the Access Channel. The access network may control the load by adjusting the access persistence vector, \(\text{APersistence}\), sent as part of the *AccessParameters* message.

1.5.6.2 Header and Message Formats

1.5.6.2.1 MAC Layer Header

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
</tr>
<tr>
<td>SessionConfigurationToken</td>
<td>16</td>
</tr>
<tr>
<td>SecurityLayerFormat</td>
<td>1</td>
</tr>
<tr>
<td>ConnectionLayerFormat</td>
<td>1</td>
</tr>
<tr>
<td>Reserved</td>
<td>4</td>
</tr>
<tr>
<td>ATI Record</td>
<td>34</td>
</tr>
</tbody>
</table>

Length

The access terminal shall set this field to the combined length, in octets, of the Security Layer packet and this MAC Layer header, excluding the Length field.

\(^{13}\) E.g., because the access terminal has tuned to the frequency associated with another air-interface.
SessionConfigurationToken

The access terminal shall set this field to the value of the SessionConfigurationToken which is public data of the Session Configuration Protocol.

SecurityLayerFormat

The access terminal shall set this field to ‘1’ if security layer packet is either authenticated or encrypted; otherwise, the access terminal shall set this field to ‘0’.

ConnectionLayerFormat

The access terminal shall set this field to ‘1’ if the connection layer packet is Format B; otherwise, the access terminal shall set this field to ‘0’.

Reserved

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

ATI Record

Access Terminal Identifier Record. The access terminal shall set this field to the record specifying the access terminal’s ID specified by TransmitATI.ATI and TransmitATI.ATIType. This record is defined in [1].

1.5.6.2.2 FCS

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

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

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

- All shift register elements shall be initialized to logical zeros.
- Switches shall be set in the up position.
- 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.
- 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’.
- Register shall be clocked an additional 32 times for the 32 FCS bits.
### 1.5.6.2.3 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.

### 1.5.6.2.4 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.

### 1.5.6.2.5 ACAck

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>Addressing</th>
<th>Priority</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>unicast</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1.5.6.2.6 AccessParameters

The AccessParameters message is used to convey Access Channel information to the access terminals.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>AccessCycleDuration</td>
<td>8</td>
</tr>
<tr>
<td>AccessSignature</td>
<td>16</td>
</tr>
<tr>
<td>OpenLoopAdjust</td>
<td>8</td>
</tr>
<tr>
<td>ProbeInitialAdjust</td>
<td>5</td>
</tr>
<tr>
<td>ProbeNumStep</td>
<td>4</td>
</tr>
<tr>
<td>PowerStep</td>
<td>4</td>
</tr>
<tr>
<td>PreambleLength</td>
<td>3</td>
</tr>
<tr>
<td>CapsuleLengthMax</td>
<td>4</td>
</tr>
<tr>
<td>( N_{ACMPAPersist} )</td>
<td>occurrences of the following field:</td>
</tr>
<tr>
<td>{</td>
<td></td>
</tr>
<tr>
<td>APersistence</td>
<td>6</td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
<tr>
<td>AccessChannelRecordCount</td>
<td>4</td>
</tr>
<tr>
<td>AccessChannelRecordCount</td>
<td>occurrences of the following field:</td>
</tr>
<tr>
<td>{0</td>
<td></td>
</tr>
<tr>
<td>AccessChannelRecord</td>
<td>24</td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
<tr>
<td>NumOfNarrowBandChannels</td>
<td>(see [6]) occurrences of the following field:</td>
</tr>
<tr>
<td>{1</td>
<td></td>
</tr>
<tr>
<td>AccessChannelOffset</td>
<td>8</td>
</tr>
<tr>
<td>}1</td>
<td></td>
</tr>
<tr>
<td>}0</td>
<td></td>
</tr>
<tr>
<td>MaxPathDelay</td>
<td>0 or 8</td>
</tr>
<tr>
<td>SBACFieldsCount</td>
<td>6</td>
</tr>
<tr>
<td>SBACMaxRetryNumber</td>
<td>0 or 3</td>
</tr>
<tr>
<td>ProbabilityFactor</td>
<td>0 or 4</td>
</tr>
<tr>
<td>SBACFieldsCount occurrence of the following field:</td>
<td></td>
</tr>
<tr>
<td>{</td>
<td></td>
</tr>
<tr>
<td>AccessControlClass</td>
<td>6</td>
</tr>
<tr>
<td>SBACApersistence</td>
<td>8</td>
</tr>
</tbody>
</table>
MessageID | The access network shall set this field to 0x01.
---|---
AccessCycleDuration | The access network shall set this field to the duration of an Access Channel Cycle in units of 20 msec frames.
AccessSignature | AccessParameters message signature. The access network shall change this field if the contents of the AccessParameters message change.
OpenLoopAdjust | The access network shall set this field to the negative of the nominal power to be used by access terminals in the open loop power estimate, expressed as an unsigned value in units of 1 dB. The value used by the access terminal is -1 times the value of this field.
ProbeInitialAdjust | The access network shall set this field to the correction factor to be used by access terminals in the open loop power estimate for the initial transmission on the Access Channel, expressed as a two’s complement value in units of 1 dB.
ProbeNumStep | The access network shall set this field to the maximum number of access probes access terminals are to transmit in a single access probe sequence. The access network shall set this field to a value in the range [1 ... 15].
PowerStep | Probe power increase step. The access network shall set this field to the increase in power between probes, in resolution of 0.5 dB. The access terminal shall support all the valid values specified by this field.
PreambleLength | The access network shall set this field to the length in 20 msec frames of the access probe preamble in the range [4 ... 7]. The access terminal shall support all the valid values specified by this field.
CapsuleLengthMax | Access Channel Max Capsule length. The access network shall set this field to the maximum number of frames in an Access Channel Capsule. The access network shall set this field to a value in the range [2 ... 15]. The access terminal shall support all the valid values specified by this field.
APersistence | Access persistence vector. If a value in this vector is 0x3F, the access terminal shall use zero as the corresponding persistence probability;
otherwise, if the value of this field, n, not equal to 0x3F, the access
terminal shall use $2^{n/4}$ as the corresponding persistence probability.

**AccessChannelRecordCount**

Number of access channel records. Access network shall set this field
to the number of access channel records supported by a sector. Each
channel record may contain more than one (up to 15 channels for a
single 1.25MHz carrier) consecutive narrowband access channels.

**AccessChannelRecord**

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

**AccessChannelOffset**

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

**MaxPathDelay**

Maximum round-trip path delay in unit of 4 slots period. The access
network shall include non-zero value.

**SBACFieldCount**

The access network shall set this field to the number of Service Based
Access Control fields. If the Service Based Access Control is not
enabled, the access network shall set this field to zero.

**SBACMaxRetryNumber**

If SBACFieldCount is set to zero, the access network shall omit this
field. Otherwise, the access network shall set this field to the
maximum number of SBAC persistence tests that the access terminal
may perform. The actual number of maximum valu is calculated by $2^{(SBACMaxRetryNumber+1)}$.

**ProbabilityFactor**

If SBACFieldCount is set to zero, the access network shall omit this
field. If SBACFieldCount is set to non-zero, the access network shall
set ProbabilityFactor with non-zero value which is used for
SBAC persistence probability calculation.

**AccessControlClass**

If the Service Based Access Control is enabled, the access network
shall use the following value to identify the service. The access
network may include the access control classes 0x3C and/or 0x3D, which is/are applicable to test terminals (the class of the access terminal \( i = 2 \)). If the Service Based Access Control is enabled, but the access network does not include access control class(es) for test service in the AccessParameters message, the test terminal shall use APersistence for the class of the access terminal = 2. The access terminal with the class of the access terminal \( i = 0 \) shall not use the access control classes 0x3C or 0x3D. The access network shall always include the access control class 0x3E (any other services) if the Service Based Access Control is enabled.
<table>
<thead>
<tr>
<th>Access Control Class</th>
<th>Value</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control traffic</td>
<td>000000</td>
<td>This type applies when the access terminal sends xHRPD control messages other than triggered by user services initiation from the idle state. Examples for such messages are messages for establishing xHRPD session, RouteUpdate message to update its location, and changing protocol configuration.</td>
</tr>
<tr>
<td>Emergency Voice</td>
<td>000001</td>
<td>This type applies when the access terminal originates emergency voice call (e.g., 911).</td>
</tr>
<tr>
<td>Emergency data service</td>
<td>000010</td>
<td>This type applies when the access terminal originates Emergency Data Services.</td>
</tr>
<tr>
<td>Non-emergency Voice</td>
<td>000011</td>
<td>This type applies when the access terminal originates non-emergency voice call.</td>
</tr>
<tr>
<td>SMS</td>
<td>000100</td>
<td>This type applies when the access terminal originates SMS.</td>
</tr>
<tr>
<td>Machine Type Communication</td>
<td>000101</td>
<td>This type applies when the machine type communication device or application generates traffic.</td>
</tr>
<tr>
<td>Reserved</td>
<td>000110 - 111011</td>
<td>Reserved for future enhancements</td>
</tr>
<tr>
<td>Test Service 1</td>
<td>111100</td>
<td>This type applies when the test terminal (terminal type = 2) performs test.</td>
</tr>
<tr>
<td>Test Service 2</td>
<td>111101</td>
<td>This type applies when the test terminal (terminal type = 2) performs test.</td>
</tr>
<tr>
<td>Any other services</td>
<td>111110</td>
<td>This type applies when the access terminal accesses the network to initiate services other than defined in the Access Control Class range from 0x00 to 0x04.</td>
</tr>
<tr>
<td>Not used</td>
<td>111111</td>
<td>This value shall not be used.</td>
</tr>
</tbody>
</table>

SBACApersistence: Access persistence vector for the service identified by the AccessControlClass. If a value in this vector is 0xFF, the access terminal shall use zero as the corresponding persistence probability; otherwise, if the value of this field, n, not equal to 0xFF, the access terminal shall use \(2^{-n/(4 \times ProbabilityFactor)}\) as the corresponding persistence probability for the service.

Reserved: Number of bits in this field is equal to the number needed to make the message length an integer number of octets. The access network shall set this field to zero. The access terminal shall ignore this field.
1.5.6.3 Interface to Other Protocols

1.5.6.3.1 Commands
This protocol does not issue any commands.

1.5.6.3.2 Indications
This protocol does not register to receive any indications.

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

1.5.7.1 InitialConfiguration Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
<td>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.</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
<td>Parameter set identifier. The access network shall set this field to 0x00.</td>
</tr>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
<td>The access network shall set this field to an identifier assigned to this complex attribute. The access network should change this field for each set of values for this complex attribute.</td>
</tr>
<tr>
<td>ProbeSequenceMax</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ProbeBackoff</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ProbeSequenceBackoff</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Reserved</td>
<td>4</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
ProbeSequenceMax  Maximum number of probe sequences. The access network shall set this field to the maximum number of probe sequences for a single access attempt. The access network shall set this field to a value in the range [1 ... 15]. The access terminal shall support all the valid values specified by this field.

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

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

Reserved  The access network shall set this field to zero. The access terminal shall ignore this field.
### 1.5.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NACMPType</td>
<td>Type field for this protocol</td>
<td>[5]</td>
</tr>
<tr>
<td>NACMPxHRPDS0</td>
<td>Subtype field for this protocol</td>
<td>0x0000</td>
</tr>
<tr>
<td>NACMPAPersist</td>
<td>Number of different persistence values</td>
<td>4</td>
</tr>
<tr>
<td>NACMPAccessParameters</td>
<td>The recommended maximum number of slots between transmission of two consecutive AccessParameters message.</td>
<td>$3 \times T_{ACMPCycleLen}$</td>
</tr>
<tr>
<td>TACMPAPSupervision</td>
<td>AccessParameters supervision timer</td>
<td>$12 \times T_{ACMPCycleLen}$</td>
</tr>
<tr>
<td>TACMPATProbeTimeout</td>
<td>Time to receive an acknowledgment at the access terminal for a probe before sending another probe</td>
<td>$128 + 4 \times \text{MaxPathDelay slots}$</td>
</tr>
<tr>
<td>TACMPANProbeTimeout</td>
<td>Maximum time to send an acknowledgment for a probe at the access network</td>
<td>96 slots</td>
</tr>
<tr>
<td>TACMPTransaction</td>
<td>Time for access terminal to wait after a successful transmission before returning a $Tx\text{Ended}$ indication</td>
<td>1 second</td>
</tr>
<tr>
<td>TACMPCycleLen</td>
<td>Length of Control Channel Cycle used by the Access Channel MAC Protocol</td>
<td>256 slots</td>
</tr>
<tr>
<td>TACMPMaxDelayPrevProbe</td>
<td>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 $TransmissionFailed$ indication</td>
<td>300 slots</td>
</tr>
</tbody>
</table>

### 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 0 Forward Traffic Channel MAC Protocol

#### 1.6.1 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 1.6.1-1. The rules governing these transitions are provided in sections 1.6.6.1.3, and 1.6.6.1.4 for transitions out of the Inactive State, and Variable Rate State.

```
Initial State

Inactive State

Deactivate

Activate

Variable Rate State
```

**Figure 1.6.1-1. xHRPD Subtype 0 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
1.6.3 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.

1.6.4 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:

- 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.

1.6.4.2 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.

1.6.5 Procedures and Messages for the InConfiguration Instance of the Protocol

1.6.5.1 Procedures

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

1.6.5.2 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,
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 network and the access terminal shall perform the following in the order specified:
  - The access terminal and the access network shall set the initial state for the InConfiguration instance of this protocol to the Inactive State.
  - The InConfiguration protocol instance shall become the InUse protocol instance for the Forward Traffic Channel MAC Protocol.

- All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

1.6.5.3 Message Formats

1.6.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord | Attribute dependent |

MessageID
The sender shall set this field to 0x50.

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td></td>
<td></td>
<td>SLP</td>
<td></td>
</tr>
</tbody>
</table>

1.6.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 corresponding ConfigurationRequest message.

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Priority</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

1.6.6 Procedures and Messages for the InUse Instance of the Protocol

1.6.6.1 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 1.6.6.2.1.

The protocol then sends the packet for transmission to the Physical Layer. The packet structure is shown in Figure 1.6.6-1.

![Figure 1.6.6-1. Forward Traffic Channel MAC Layer Packet Structure](image-url)

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. The access terminal shall discard the MAC packet if the MACLayerFormat field of the MAC Layer trailer is equal to ‘0’. The ConnectionLayerFormat field within the MAC Layer trailer shall be passed to the Security Layer with the Security Layer packet.
1.6.6.1.1 Command Processing

1.6.6.1.1.1 Activate

If this protocol receives an Activate command in the Inactive State, the access terminal and the access network shall transition to the Variable Rate State. If this protocol receives the command in any other state it shall be ignored.

1.6.6.1.1.2 Deactivate

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

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

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

1.6.6.1.2 Forward Traffic Channel Addressing

Transmission on the Forward Traffic Channel is time division multiplexed. At any given time, the channel is either being transmitted or not; and, if it is being transmitted, it is addressed to a single user. When transmitting the Forward Traffic Channel, the access network uses the MACIndex to identify the target access terminal. Requirements for Forward Traffic Channel addressing are part of the Physical Layer.

1.6.6.1.3 Inactive State

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

1.6.6.1.4 Variable Rate State

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

The access terminal shall perform the supervision procedures described in 1.6.6.1.5.1 in the Variable Rate State.

1.6.6.1.4.1 CQI and Packet Transmission Requirements

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

The access terminal shall set the CQI value to a 4-bit CQI index, ranging from 0x0 to 0xe. The CQI index 0 is also known as the null-rate CQI. Each CQI index is associated with a Rate Metric, a Span and a list of Single User transmission formats, as shown in Table 1.6.6.1.4.1-1.

2-bit CQI Format

The access terminal shall set the CQI value to a 2-bit CQI index, ranging from 0x0 to 0x3. Each CQI index is associated with a Rate Metric, a Span and a list of Single User transmission formats, as shown in Table 1.6.6.1.4.1-1 where the CQI values 0x0 to 0x3 in 2-bit format map to CQI values 0x1 to 0x4 in 4-bit format.

1.6.6.1.4.1.1 Access Terminal Requirements

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

- Access terminal shall use CQIPeriod number of 20-ms reverse link frames to send a single CQI value. The CQI value is defined to take effect after CQIDelay number of frames from the frame boundary that the access terminal sends this new CQI value at, and stay in effect for CQIPeriod frames (see [7]).

- For an access terminal, the CQI value it transmits shall not change in slots other than T such that:

\[
(T_{AT} - \text{FrameOffset} - \text{CQIDelay in slots}) \mod (\text{CQIPeriod} \times 12 \text{ slots/frame}) = 0,
\]

where \( T_{AT} \) is the CDMA system time in slots observed at the access terminal.

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

\[
(T - \text{FrameOffset}) \mod (\text{CQIPeriod} \times 12 \text{ slots/frame}) = 0
\]

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

- Access terminal shall set the CQI to one of the valid values in Table 1.6.6.1.4.1-1, corresponding to the rate it requests.

- Access terminal shall set the CQI to the maximum value that channel conditions permit. The access terminal uses the null rate if the channel conditions do not permit even the lowest non-null rate.
Table 1.6.6.1.4.1-1. CQI Value Specification

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

1.6.6.1.4.1.2 Access Network Requirements

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

- 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.

1.6.6.1.5 Supervision Procedures

1.6.6.1.5.1 CQI Supervision

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

- The access terminal shall set the CQI supervision timer for $T_{FTCMCQISupervision}$ when it transmits 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 requests a non-null rate
the access terminal successfully receives a Forward Traffic Channel packet
to its unicast address and the value of the
NullRateCQI38.4Enable attribute is equal to 0x0001.

- The access terminal may disable the timer if the CQI supervision timer is active and the
  access terminal successfully receives 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 non-null rate CQI values for more than
  $N_{FTCMPRestartTx}$ slots or successfully receives a 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
  \textit{SupervisionFailed} indication and transition to the Inactive State.

1.6.6.1.5.2 \texttt{ForwardTrafficValid} Monitoring

The access terminal shall monitor the bit associated with its MACIndex in the
\texttt{ForwardTrafficValid63To0} field made available by the Overhead Messages Protocol. If the
Overhead Messages Protocol does not provide a \texttt{ForwardTrafficValid63To0} 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 \textit{SupervisionFailed} indication and
transition to the Inactive State.

1.6.6.2 Trailer and Message Formats

1.6.6.2.1 MAC Layer Trailer

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConnectionLayerFormat</td>
<td>1</td>
</tr>
<tr>
<td>MACLayerFormat</td>
<td>1</td>
</tr>
</tbody>
</table>

ConnectionLayerFormat

The access network shall set this field to ‘1’ if the connection layer
packet is Format B; otherwise, the access network shall set this field
to ‘0’.

MACLayerFormat

The access network shall set this field to ‘1’ if the MAC layer packet
contains a valid payload; otherwise, the access network shall set this
field to ‘0’.
1.6.6.3 Interface to Other Protocols

1.6.6.3.1 Commands Sent
This protocol does not issue any commands.

1.6.6.3.2 Indications
This protocol registers to receive the following indication:
- `PhysicalLayer.ForwardTrafficCompleted`

1.6.7 Configuration Attributes
The following attributes and default values are defined (see [1] for attribute record definition).

1.6.7.1 Simple Attributes
The negotiable simple attribute for this protocol is listed in Table 1.6.7.1-1. The access terminal shall use as defaults the values in Table 1.6.7.1-1 that are typed in **bold italics**.

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

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

1.6.8 Protocol Numeric Constants
### 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 1 Forward Traffic Channel MAC Protocol

#### 1.7.1 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 1.7.1-1.

The rules governing these transitions are provided in sections 1.7.6.1.7, and 1.7.6.1.8 for transitions out of the Inactive State, and Variable Rate State.

---

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFTCMType</td>
<td>Type field for this protocol</td>
<td>[5]</td>
</tr>
<tr>
<td>NFTCMpHRPDS0</td>
<td>Subtype field for this protocol</td>
<td>0x0000</td>
</tr>
<tr>
<td>NFTCMRestartTx</td>
<td>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.</td>
<td>16</td>
</tr>
<tr>
<td>TFTCMCQISupervision</td>
<td>CQI supervision timer</td>
<td>240 ms</td>
</tr>
<tr>
<td>TFTCMRestartTx</td>
<td>Reverse Channel Restart Timer</td>
<td>12 Control Channel cycles</td>
</tr>
</tbody>
</table>
1.7.2 Primitives and Public Data

1.7.2.1 Commands

This protocol defines the following commands:
- Activate
- Deactivate

1.7.2.2 Return Indications

This protocol returns the following indication:
- SupervisionFailed

1.7.2.3 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)

1.7.3 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.

1.7.4 Protocol Initialization

1.7.4.1 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.

1.7.5 Procedures and Messages for the InConfiguration Instance of the Protocol

1.7.5.1 Procedures

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

1.7.5.2 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 protocol shall be set to the corresponding attribute value of the InConfiguration protocol instance:
  - MultiUserPacketsEnabled

• 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 network and the access terminal shall perform the following in the order specified:
  - The access terminal and the access network shall set the initial state for the InConfiguration instance of this protocol to the Inactive State.
  - The InConfiguration protocol instance shall become the InUse protocol instance for the Forward Traffic Channel MAC Protocol.

• All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.
1.7.5.3 Message Formats

1.7.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record:

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

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

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
</tr>
<tr>
<td>SLP</td>
<td>Reliable</td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

1.7.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record:

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

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

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

AttributeRecord: An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [1]. The sender shall not include more than one attribute record with the same attribute identifier.
1.7.6 Procedures and Messages for the InUse Instance of the Protocol

1.7.6.1 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.

1.7.6.1.1 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 1.7.6.1.1-1. 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 1.7.6.1.1-1.

![Figure 1.7.6.1.1-1. xHRPD Subtype 1 Forward Traffic Channel MAC Layer Packet Structure](image-url)
The MAC Layer payload consists of zero or more Security Layer packets addressed to zero or more access terminals. The MAC Layer Header (if included), MACHeaderDelimiter (if included), and MAC Layer Trailer are used to provide information needed to parse the contents of the MAC Layer Payload and to specify the type of the MAC Layer packet (Single User Simplex, or Multi-User).

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

1.7.6.1.1.1 Description of MAC Layer packet types

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

- An empty MAC Layer Header
- A MAC Layer Payload consisting of one Security Layer packet
- No PAD

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

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

- Non-empty MAC Layer Header
- MACHeaderDelimiter (if required)
- MAC Layer Payload consisting of zero or more (max of eight) Security Layer packets
- PAD (if required)
- MAC Layer Trailer

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

1.7.6.1.1.2 Construction of MAC Layer packets

The structure of Single User Simplex MAC packets and Multi-User MAC packets are shown in Figure 1.7.6.1.1.2-1, and Figure 1.7.6.1.1.2-2 respectively. The type of MAC Layer packet may be inferred from the Preamble MAC Index and the MAC Layer Trailer. When the Preamble MAC Index is set to the MAC Index assigned to the access terminal, the MAC Layer Trailer field indicates a Single User Simplex packet if equal to ‘01’ or ‘11’. For Single-User MAC packets, the values of ‘00’ and ‘10’ for the MAC Trailer are reserved. The access terminal shall not pass the payload of the Single-User Simplex MAC packet to the higher layer if the MAC Layer Trailer is set to ‘00’ or ‘10’.
When the Preamble MAC Index is set to a Multi-User Preamble MAC Index as specified in 1.7.6.1.2, the access network shall set the MAC Trailer to ‘00’. For Multi-User MAC packets, the values for the MAC Trailer other than ‘00’ are reserved. The access terminal shall not pass the payload of the Multi-User MAC packet to the higher layer if the MAC Layer Trailer associated with the Multi-User packet is set to any value other than ‘00’.

<table>
<thead>
<tr>
<th>MAC Layer Payload</th>
<th>MAC trailer</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Security Layer Packet )</td>
<td>01 or 11</td>
</tr>
</tbody>
</table>

**Figure 1.7.6.1.1.2-1 Format of Forward Traffic Channel Single User Simplex MAC Layer Packet**

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

- **Field**: Security Layer Packet
  - **Length (bits)**: 96, 224, 480, 992, 2016, 3040, 4064, or 5088 bits

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Layer Packet</td>
<td>96, 224, 480, 992, 2016, 3040, 4064, or 5088</td>
</tr>
<tr>
<td>MAC Layer Trailer</td>
<td>2</td>
</tr>
</tbody>
</table>

Security Layer Packet

The access network shall set this field to a Security Layer packet from the Security Protocol, containing a Format A or a Format B Connection Layer packet.
MAC Layer Trailer  If the Security Layer packet contains a Format B Connection Layer Packet, the access network shall set this field to ‘11’. Otherwise, the access network shall set this field to ‘01’.

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n occurrences (0 ≤ n ≤ 8) of the following two fields:</td>
<td></td>
</tr>
<tr>
<td>PktInfo</td>
<td>8</td>
</tr>
<tr>
<td>Length</td>
<td>8</td>
</tr>
<tr>
<td>MACHeaderDelimiter</td>
<td>0 or 8</td>
</tr>
<tr>
<td>n occurrences (0 ≤ n ≤ 8) of the following field:</td>
<td></td>
</tr>
<tr>
<td>Security Layer Packet</td>
<td>8 × i, where i is the value of the corresponding Length field</td>
</tr>
<tr>
<td>Pad</td>
<td>As needed</td>
</tr>
<tr>
<td>MAC trailer</td>
<td>2</td>
</tr>
</tbody>
</table>

PktInfo  For 1 ≤ i ≤ n, the \(i^{th}\) occurrence of this field as shown below.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format</td>
<td>1</td>
</tr>
<tr>
<td>MACIndex</td>
<td>7</td>
</tr>
</tbody>
</table>

Format  If the \(i^{th}\) Security Layer packet contains a Format B Connection Layer packet, the access network shall set the \(i^{th}\) occurrence of this field to ‘1’. Otherwise, the access network shall set the \(i^{th}\) occurrence of this field to ‘0’.

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

Length  The \(i^{th}\) occurrence of this field shall be set to the length, in octets, of the \(i^{th}\) Security Layer packet in this MAC Layer payload.
MAC Header Delimiter
This field shall not be included if the sum of the lengths of the Security Layer Packets, MAC header, and MAC trailer equals the size of the corresponding MAC Layer packet. This field shall be included if the MAC Layer Packet size exceeds the sum of the length of the Security Layer Packets, MAC header, and MAC trailer by one or more octets. If included this field shall be set to ‘00000000’.

Security Layer Packet

Pad
The access network shall set the size of this field to the size of the MAC Layer packet minus the size of MAC Layer header (2n octets), MACHeaderDelimiter (if included), payload and trailer (2 bits). The access network shall set the value of this field to all ‘0’s. The receiver shall ignore this field.

MAC trailer
Forward Traffic Channel Medium Access Control trailer. The access network shall set this field to ‘00’.

The MAC Layer payload consists of n Security Layer packets, where n is an integer from zero to eight. The MAC Layer header consists of n PktInfo fields and n Length fields The MACHeaderDelimiter is included if the MAC Layer Packet size exceeds the sum of the length of the Security Layer Packets, MAC header, and MAC trailer by one or more octets. If 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.

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

When transmitting a Single User MAC Layer packet to an access terminal on the Forward Traffic Channel, the access network shall set the Preamble MAC Index to the MACIndex assigned to the access terminal by the transmitting sector. When transmitting a Multi-User MAC Layer packet on the Forward Traffic Channel, the access network shall set the Preamble MAC Index based on the size of the packet, in accordance with Table 1.7.6.1.2-1.
Table 1.7.6.1.2-1 Preamble MAC Index of Multi-User MAC packets

<table>
<thead>
<tr>
<th>MAC Layer Packet Size (bits)</th>
<th>Preamble MAC Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>98, 226, 482, or 994</td>
<td>66</td>
</tr>
<tr>
<td>2018</td>
<td>67</td>
</tr>
<tr>
<td>3042</td>
<td>68</td>
</tr>
<tr>
<td>4066</td>
<td>69</td>
</tr>
<tr>
<td>5090</td>
<td>70</td>
</tr>
</tbody>
</table>

1.7.6.1.3 Forward Traffic Channel Addressing

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

1.7.6.1.4 Transmission Format of the Forward Traffic Channel

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

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

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

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

A transmission format is defined to be consistent with a MAC Layer packet if the size of the MAC Layer packet is equal to the Physical Layer Packet Size of the transmission format, less 30 bits (FCS + Tail). Table 1.7.6.1.4-1 provides the set of all transmission formats.
defined by the Forward Traffic Channel MAC protocol, as well as the list of all transmission
formats consistent with MAC Layer packets of each size.

Table 1.7.6.1.4-1 List of all Transmission Formats Consistent with each MAC Layer
Packet Size

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

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

1.7.6.1.5 CQI Channel

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

4-bit CQI Format

The access terminal shall set the CQI value to a 4-bit CQI index, ranging from 0x0 to 0xe.
The CQI index 0 is also known as the null-rate CQI. Each CQI index is associated with a
Rate Metric, a Span, a list of Single User transmission formats and a list of Multi-User
transmission formats, as shown in Table 1.7.6.1-2. Among the Single User transmission
formats associated with a CQI index, the transmission format with the largest Physical
Layer Packet Size is defined to be the canonical transmission format of the CQI index. In
Table 1.7.6.1-2, the canonical transmission format of each CQI index is typed in bold
italics. The Rate Metric and Span of a non-zero CQI index are equal to the Data Rate (in
kbps) and Transmit Duration (in slots) respectively, of the canonical transmission format of
the CQI index.
## Table 1.7.6.1-2 Rate Metric, Span and Lists of Associated Transmission Formats

<table>
<thead>
<tr>
<th>CQI Index</th>
<th>Rate Metric (kbps)</th>
<th>Span (slots)</th>
<th>List of Associated Single User Transmission Formats</th>
<th>List of Associated Multi-User Transmission Formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>0</td>
<td>16</td>
<td>(128, 16, 1024), (256, 16, 1024), (512, 16, 1024), <strong>(1024, 16, 1024)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x1</td>
<td>38.4</td>
<td>16</td>
<td>(128, 16, 1024), (256, 16, 1024), (512, 16, 1024), <strong>(1024, 16, 1024)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x2</td>
<td>76.8</td>
<td>8</td>
<td>(128, 8, 512), (256, 8, 512), (512, 8, 512), <strong>(1024, 8, 512)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x3</td>
<td>153.6</td>
<td>4</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), <strong>(1024, 4, 256)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x4</td>
<td>307.2</td>
<td>2</td>
<td>(128, 2, 128), (256, 2, 128), (512, 2, 128), <strong>(1024, 2, 128)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x5</td>
<td>307.2</td>
<td>4</td>
<td>(512, 4, 128), (1024, 4, 128), <strong>(2048, 4, 128)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128)</td>
</tr>
<tr>
<td>0x6</td>
<td>614.4</td>
<td>1</td>
<td>(128, 1, 64), (256, 1, 64), (512, 1, 64), <strong>(1024, 1, 64)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x7</td>
<td>614.4</td>
<td>2</td>
<td>(512, 2, 64), (1024, 2, 64), <strong>(2048, 2, 64)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128)</td>
</tr>
<tr>
<td>0x8</td>
<td>921.6</td>
<td>2</td>
<td>(1024, 2, 64), <strong>(3072, 2, 64)</strong></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64)</td>
</tr>
<tr>
<td>0x9</td>
<td>1228.8</td>
<td>1</td>
<td>(512, 1, 64),</td>
<td>(128, 4, 256), (256, 4, 256),</td>
</tr>
<tr>
<td>CQI Index</td>
<td>Rate Metric (kbps)</td>
<td>Span (slots)</td>
<td>List of Associated Single User Transmission Formats</td>
<td>List of Associated Multi-User Transmission Formats</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
<td>-------------</td>
<td>---------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1024, 1, 64), (2048, 1, 64)</td>
<td>(512, 4, 256), (1024, 4, 256), (2048, 4, 128)</td>
</tr>
<tr>
<td>0xa</td>
<td>1228.8</td>
<td>2</td>
<td>(4096, 2, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64)</td>
</tr>
<tr>
<td>0xb</td>
<td>1843.2</td>
<td>1</td>
<td>(1024, 1, 64), (3072, 1, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64)</td>
</tr>
<tr>
<td>0xc</td>
<td>2457.6</td>
<td>1</td>
<td>(4096, 1, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64)</td>
</tr>
<tr>
<td>0xd</td>
<td>1536</td>
<td>2</td>
<td>(5120, 2, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64), (5120, 2, 64)</td>
</tr>
<tr>
<td>0xe</td>
<td>3072</td>
<td>1</td>
<td>(5120, 1, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64), (5120, 2, 64)</td>
</tr>
</tbody>
</table>

2-bit CQI Format

The access terminal shall set the CQI value to a 2-bit CQI index, ranging from 0x0 to 0x3. Each CQI index is associated with a Rate Metric, a Span, a list of Single User transmission formats and a list of Multi-User transmission formats, as shown in Table 1.7.6.1-2 where the CQI values 0x0 to 0x3 in 2-bit format map to CQI values 0x1 to 0x4 in 4-bit format.

The canonical packet size of a CQI index is defined to be the Physical Layer Packet Size of the canonical transmission format of that CQI index. A Single User Transmission Format associated with a CQI index shown in Table 1.7.6.1-2 is defined to be compatible with the CQI index, if at least one of the following conditions is met:

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

A Multi-User transmission format associated with a CQI index is defined to be compatible with the CQI index, if the value of the MultiUserPacketsEnabled attribute is 0x01.
The access terminal shall obey the following rules when transmitting the CQI Channel:

- Access terminal shall use CQIPeriod number of 20-ms reverse link frames to send a single CQI value. The CQI value is defined to take effect after CQIDelay number of frames from the frame boundary that the access terminal sends this new CQI value at, and stay in effect for CQIPeriod frames (see [7]).

- For an access terminal, the CQI value it transmits shall not change in slots other than T such that:
  \[(T_{AT} - \text{FrameOffset} - \text{CQIDelay in slots}) \mod (\text{CQIPeriod} \times 12 \text{ slots/frame}) = 0,\]
  where \(T_{AT}\) is the CDMA system time in slots observed at the access terminal.

- The forward link serving data rate to this access terminal shall not change in slots other than T such that:
  \[(T - \text{FrameOffset}) \mod (\text{CQIPeriod} \times 12 \text{ slots/frame}) = 0\]
  where T the local CDMA system time observed either at access network or access terminal.

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

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

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

- The access terminal is a potential target of a packet for which the reception began in slot s.
- The slot t is in the same forward link interlace as the slot s; i.e., \((t - s) \mod 4 = 0\).
- \(s < t < s + 4 \times \min(N_1, N_2, \text{MinimumContinuationSpan})\), where \(N_1\) denotes the Transmit Duration of the packet whose reception began in slot s and \(N_2\) denotes the Span of the CQI index corresponding to the CQI value that is in effect during slot s (according to Table 1.7.6.1-2).

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

1.7.6.1.6.1 Activate

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

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

1.7.6.1.6.2 Deactivate

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

- The access terminal shall cease monitoring the Forward Traffic Channel, shall cease transmitting the CQI Channel, and shall transition to the Inactive State.

- The access network should cease transmitting the Forward Traffic Channel to this access terminal, should cease receiving the CQI channel- from this access terminal, and should transition to the Inactive State.

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

1.7.6.1.7 Inactive State

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

1.7.6.1.8 Variable Rate State

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

The access terminal shall perform the supervision procedures described in 1.7.6.1.9.1 in the Variable Rate State.

1.7.6.1.8.1 Packet Transmission and CQI Requirements

1.7.6.1.8.1.1 Access Terminal Requirements

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

1.7.6.1.8.1.2 Access Network Requirements

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

1.7.6.1.9 Supervision Procedures

1.7.6.1.9.1 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 \(T_{FTCMStartTx}\).

- If the access terminal generates consecutive CQI values that correspond to non-null rates for more than \(N_{FTCMStartTx}\) 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.

1.7.6.1.9.2 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.

1.7.6.2 Message Formats

1.7.6.2.1 AttributeUpdateRequest

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

One or more instances of the following record

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

MessageID
The sender shall set this field to 0x52.

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

MessageID
The sender shall set this field to 0x53.

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

1.7.6.2.3 AttributeUpdateReject
The access network sends an AttributeUpdateReject message in response to an AttributeUpdateRequest message to reject the offered attribute values.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 corresponding AttributeUpdateRequest message.

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>Addressing</th>
<th>SLP</th>
<th>Reliable</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>unicast</td>
<td></td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

1.7.6.3 Interface to Other Protocols

1.7.6.3.1 Commands Sent

This protocol does not issue any commands.

1.7.6.3.2 Indications

This protocol does not register to receive any indications.

1.7.7 Configuration Attributes

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

- MultiUserPacketsEnabled
- ShortPacketsEnabledThresh
- CQISupervisionTimer

1.7.7.1 Simple Attributes

The negotiable simple attributes for this protocol are listed in Table 1.7.7.1-1. The access terminal shall use as defaults the values in Table 1.7.7.1-1 that are typed in **bold italics**.
### Table 1.7.7.1-1. Configurable Values

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

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( N_{\text{FTCMPType}} )</td>
<td>Type field for this protocol</td>
<td>[5]</td>
</tr>
<tr>
<td>( N_{\text{FTCMPxHRPDS1}} )</td>
<td>Subtype field for this protocol</td>
<td>0x0001</td>
</tr>
<tr>
<td>( N_{\text{FTCMPRestartTx}} )</td>
<td>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.</td>
<td>16</td>
</tr>
<tr>
<td>( T_{\text{FTCMPRestartTx}} )</td>
<td>Reverse Channel Restart Timer</td>
<td>12 Control Channel cycles</td>
</tr>
</tbody>
</table>

### 1.7.9 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.

### 1.8 xHRPD Subtype 2 Forward Traffic Channel MAC Protocol

#### 1.8.1 Overview

The xHRPD Subtype 2 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 1 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 1.8.1-1.

The rules governing these transitions are provided in sections 1.8.6.1.7, and 1.8.6.1.8 for transitions out of the Inactive State, and Variable Rate State.
1.8.2 Primitives and Public Data

1.8.2.1 Commands
This protocol defines the following commands:
- *Activate*
- *Deactivate*

1.8.2.2 Return Indications
This protocol returns the following indication:
- *SupervisionFailed*

1.8.2.3 Public Data
This protocol shall make the following data public:
- Subtype for this protocol
- CQIPeriod
- CQIDelay
- MultiUserPacketsEnabled
- State of the xHRPD Subtype 2 Forward Traffic Channel MAC Protocol (Inactive State or Variable Rate State)

1.8.3 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.

1.8.4 Protocol Initialization

1.8.4.1 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.

1.8.5 Procedures and Messages for the InConfiguration Instance of the Protocol

1.8.5.1 Procedures

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

1.8.5.2 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 protocol shall be set to the
  corresponding attribute value of the InConfiguration protocol instance:

  – MultiUserPacketsEnabled

• 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 network and the access terminal shall perform the following
  in the order specified:

  – The access terminal and the access network shall set the initial state for the
    InConfiguration instance of this protocol to the Inactive State.

  – The InConfiguration protocol instance shall become the InUse protocol
    instance for the Forward Traffic Channel MAC Protocol.

• All the public data not defined by this protocol shall be removed from the public data of
  the InUse protocol.
1.8.5.3 Message Formats

1.8.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord | Attribute dependent |

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td>Priority</td>
</tr>
</tbody>
</table>

1.8.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord | Attribute dependent |

- **MessageID**: The sender shall set this field to 0x51.
- **TransactionID**: The sender shall set this value to the TransactionID field of the corresponding ConfigurationRequest message.
- **AttributeRecord**: An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [1]. The sender shall not include more than one attribute record with the same attribute identifier.
1.8.6 Procedures and Messages for the InUse Instance of the Protocol

1.8.6.1 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.

1.8.6.1.1 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 1.8.6.1.1-1. 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 1.8.6.1.1-1.
The MAC Layer payload consists of zero or more Security Layer packets addressed to zero or more access terminals. The MAC Layer Header (if included), MACHeaderDelimiter (if included), and MAC Layer Trailer are used to provide information needed to parse the contents of the MAC Layer Payload and to specify the type of the MAC Layer packet (Single User Simplex, or Multi-User).

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

1.8.6.1.1 Description of MAC Layer packet types

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

- An empty MAC Layer Header
- A MAC Layer Payload consisting of one Security Layer packet
- No PAD

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

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

- Non-empty MAC Layer Header
- MACHeaderDelimiterH (if required)
- MAC Layer Payload consisting of zero or more (max of eight) Security Layer packets
- PAD (if required)
- MACHeaderDelimiterT (if required)
- MAC Layer Trailer

Each Security Layer packet addressed to an access terminal with ForwardTrafficMACIndex \( \leq 127 \) in a Multi-User packet contains a Format A or Format B Connection Layer packet. Each Security Layer packet addressed to an access terminal with ForwardTrafficMACIndex \( > 127 \) in a Multi-User packet contains a Format A Connection Layer packet.

1.8.6.1.2 Construction of MAC Layer packets

The structure of Single User Simplex MAC packets and Multi-User MAC packets are shown in Figure 1.8.6.1.2-1, and Figure 1.8.6.1.2-2 respectively. The type of MAC Layer packet may be inferred from the Preamble MAC Index and the MAC Layer Trailer. When the Preamble MAC Index is set to the MAC Index assigned to the access terminal, the MAC Layer Trailer field indicates a Single User Simplex packet if equal to '01' or '11'. For Single-User MAC packets, the values of '00' and '10' for the MAC Trailer are reserved. The access
terminal shall not pass the payload of the Single-User Simplex MAC packet to the higher
layer if the MAC Layer Trailer is set to ‘00’ or ‘10’. The access terminal shall not ACK a
Single User MAC packet if the MACPacketType is set to ‘00’ or ‘10’. The access terminal
shall not pass the payload of a Multi-User MAC packet to the higher layer if the
MACPacketType is set to a value other than ‘00’. The access terminal shall not ACK a Multi-
User MAC packet if the MACPacketType is set to a value other than ‘00’.

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

Figure 1.8.6.1.1.2-1 Format of Forward Traffic Channel Single User Simplex MAC
Layer Packet

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Layer Packet</td>
<td>96, 224, 480, 992, 2016, 3040, 4064, or 5088 bits</td>
</tr>
<tr>
<td>MAC Layer Trailer</td>
<td>2 bits</td>
</tr>
</tbody>
</table>

Security Layer Packet

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

MAC Layer Trailer

If the Security Layer packet contains a Format B Connection Layer Packet, the access network shall set this field to ‘11’. Otherwise, the access network shall set this field to ‘01’.
Figure 1.8.6.1.2-2 Format of Forward Traffic Channel Multiuser MAC Layer Packet
The access network shall construct a Multi-User MAC Layer packet as shown below. A Multi-User packet carries 0 to 16 Security Layer packets. A Multi-User packet carries up to 8 Security Layer packets for access terminals with ForwardTrafficMACIndex ≤ 127, and up to 8 Security Layer packets for access terminals with ForwardTrafficMACIndex > 127. The first n (0 ≤ n ≤ 8) Security Layer packets are addressed to access terminals with ForwardTrafficMACIndex ≤ 127. The last r (0 ≤ r ≤ 8) Security Layer packets are addressed to access terminals with ForwardTrafficMACIndex > 127.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n occurrences (0 ≤ n ≤ 8) of the following two fields:</td>
<td></td>
</tr>
<tr>
<td>PacketInfoH</td>
<td>8</td>
</tr>
<tr>
<td>LengthH</td>
<td>8</td>
</tr>
<tr>
<td>DelimiterH</td>
<td>0 or 8</td>
</tr>
<tr>
<td>n occurrences (0 ≤ n ≤ 8) of the following field:</td>
<td></td>
</tr>
<tr>
<td>Security Layer Packet</td>
<td>8 × i, where i is the value of the corresponding LengthH field</td>
</tr>
<tr>
<td>r occurrences (0 ≤ r ≤ 8) of the following field:</td>
<td></td>
</tr>
<tr>
<td>Security Layer Packet</td>
<td>8 × j, where j is the value of the corresponding LengthT field</td>
</tr>
<tr>
<td>Pad</td>
<td>As needed</td>
</tr>
<tr>
<td>DelimiterT</td>
<td>0 or 8</td>
</tr>
<tr>
<td>r occurrences (0 ≤ r ≤ 8) of the following two fields:</td>
<td></td>
</tr>
<tr>
<td>PacketInfoT</td>
<td>8</td>
</tr>
<tr>
<td>LengthT</td>
<td>8</td>
</tr>
<tr>
<td>MACLayerTrailer</td>
<td>2</td>
</tr>
</tbody>
</table>

For 0 ≤ i ≤ n, the i\textsuperscript{th} occurrence of this field as shown below.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format</td>
<td>1</td>
</tr>
<tr>
<td>ForwardTrafficMACInd</td>
<td>7</td>
</tr>
</tbody>
</table>

- **Format**: If the $i^{th}$ Security Layer packet contains a Format B Connection Layer packet, the access network shall set the $i^{th}$ occurrence of this field to ‘1’. Otherwise, the access network shall set the $i^{th}$ occurrence of this field to ‘0’.

- **ForwardTrafficMACIndex**: The $i^{th}$ occurrence of this field shall be set to ForwardTrafficMACIndex of the access terminal to which the $i^{th}$ Security Layer packet is addressed. The access network shall use the ForwardTrafficMACIndex assigned to the access terminal by the sector transmitting this MAC Layer packet for the CDMA Channel and interlace on which the MAC Layer packet is to be transmitted.

- **LengthH**: The $i^{th}$ occurrence of this field shall be set to the length, in octets, of the $i^{th}$ Security Layer packet in this MAC Layer payload.

- **DelimiterH**: This field shall not be included if the sum of the lengths of the first $n$ Security Layer Packets, PacketInfoH fields, LengthH fields, and the MACPacketType field equals the size of the corresponding MAC Layer packet. Otherwise, this field shall be included and shall be set to 0x00.

- **Security Layer Packet**: The first $n$ occurrences of this field shall contain a Security Layer packet for access terminal with ForwardTrafficMACIndex ≤ 127 from the Security Protocol, containing a Format A or Format B Connection Layer packet. The next $r$ occurrences of this field shall contain a Security Layer packet for access terminal with ForwardTrafficMACIndex > 127 from the Security Protocol, containing a Format A Connection Layer packet.

- **Pad**: The access network shall set the length of this field to the size of the MAC Layer packet minus the sum of the lengths of the rest of the fields included in the MAC Layer packet. The access network shall set the value of this field to all ‘0’s. The receiver shall ignore this field.

- **DelimiterT**: This field shall not be included if the sum of the lengths of the first $(n+r)$ Security Layer Packets, $n$ PacketInfoH fields, $n$ LengthH fields, $r$ PacketInfoT fields, $r$ LengthT fields, and MACPacketType field equals
the length of the MAC Layer packet. Otherwise, this field shall be included and shall be set to 0x00.

PacketInfoT

For $0 \leq j \leq r$, the $j$th occurrence of this field as shown below.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ForwardTrafficMACIndex</td>
<td>8</td>
</tr>
</tbody>
</table>

ForwardTrafficMACIndex

The $j$th occurrence of this field shall be set to 128 less than the ForwardTrafficMACIndex of the access terminal to which the $(n+j)^{th}$ Security Layer packet is addressed. The access network shall use the ForwardTrafficMACIndex assigned to the access terminal by the sector transmitting this MAC Layer packet for the CDMA Channel and interlace on which the MAC Layer packet is to be transmitted.

LengthT

The $j$th occurrence of this field shall be set to the length, in octets, of the $(n+j)th$ Security Layer packet in this MAC Layer packet.

MACLayerTrailer

The access network shall set this field to ‘00’.

The MAC Layer payload consists of $n$ Security Layer packets, where $n$ is an integer from zero to eight. The MAC Layer header consists of $n$ PktInfo fields and $n$ Length fields. The MACHeaderDelimiter is included if the MAC Layer Packet size exceeds the sum of the length of the Security Layer Packets, MAC header, and MAC trailer by one or more octets. If included this field shall be set to ‘0000000’. 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.

1.8.6.1.2 Preamble MAC Index

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

When transmitting a Single User MAC Layer packet to an access terminal on the Forward Traffic Channel, the access network shall set the Preamble MAC Index to the MACIndex assigned to the access terminal by the transmitting sector. When transmitting a Multi-User MAC Layer packet on the Forward Traffic Channel, the access network shall set the Preamble MAC Index based on the size of the packet, in accordance with Table 1.8.6.1.2-1.
1.8.6.1.2-1 Preamble MAC Index of Multi-User MAC packets

<table>
<thead>
<tr>
<th>MAC Layer Packet Size (bits)</th>
<th>Preamble MAC Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>98, 226, 482, or 994</td>
<td>66</td>
</tr>
<tr>
<td>2018</td>
<td>67</td>
</tr>
<tr>
<td>3042</td>
<td>68</td>
</tr>
<tr>
<td>4066</td>
<td>69</td>
</tr>
<tr>
<td>5090</td>
<td>70</td>
</tr>
</tbody>
</table>

1.8.6.1.3 Forward Traffic Channel Addressing

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

1.8.6.1.4 Transmission Format of the Forward Traffic Channel

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

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

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

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

A transmission format is defined to be consistent with a MAC Layer packet if the size of the MAC Layer packet is equal to the Physical Layer Packet Size of the transmission format, less 30 bits (FCS + Tail). Table 1.8.6.1.4-1 provides the set of all transmission formats...
defined by the Forward Traffic Channel MAC protocol, as well as the list of all transmission
formats consistent with MAC Layer packets of each size.

Table 1.8.6.1.4-1 List of all Transmission Formats Consistent with each MAC Layer Packet Size

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

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

1.8.6.1.5 CQI Channel

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

4-bit CQI Format

The access terminal shall set the CQI value to a 4-bit CQI index, ranging from 0x0 to 0xe. The CQI index 0 is also known as the null-rate CQI. Each CQI index is associated with a Rate Metric, a Span, a list of Single User transmission formats and a list of Multi-User transmission formats, as shown in Table 1.8.6.1-2. Among the Single User transmission formats associated with a CQI index, the transmission format with the largest Physical Layer Packet Size is defined to be the canonical transmission format of the CQI index. In Table 1.8.6.1-2, the canonical transmission format of each CQI index is typed in **bold italics**. The Rate Metric and Span of a non-zero CQI index are equal to the Data Rate (in
kbps) and Transmit Duration (in slots) respectively, of the canonical transmission format of the CQI index.
### Table 1.8.6.1-2 Rate Metric, Span and Lists of Associated Transmission Formats

<table>
<thead>
<tr>
<th>CQI Index</th>
<th>Rate Metric (kbps)</th>
<th>Span (slots)</th>
<th>List of Associated Single User Transmission Formats</th>
<th>List of Associated Multi-User Transmission Formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>0</td>
<td>16</td>
<td>(128, 16, 1024), (256, 16, 1024), (512, 16, 1024), <em>(1024, 16, 1024)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x1</td>
<td>38.4</td>
<td>16</td>
<td>(128, 16, 1024), (256, 16, 1024), (512, 16, 1024), <em>(1024, 16, 1024)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x2</td>
<td>76.8</td>
<td>8</td>
<td>(128, 8, 512), (256, 8, 512), (512, 8, 512), <em>(1024, 8, 512)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x3</td>
<td>153.6</td>
<td>4</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), <em>(1024, 4, 256)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x4</td>
<td>307.2</td>
<td>2</td>
<td>(128, 2, 128), (256, 2, 128), (512, 2, 128), <em>(1024, 2, 128)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x5</td>
<td>307.2</td>
<td>4</td>
<td>(512, 4, 128), (1024, 4, 128), <em>(2048, 4, 128)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128)</td>
</tr>
<tr>
<td>0x6</td>
<td>614.4</td>
<td>1</td>
<td>(128, 1, 64), (256, 1, 64), (512, 1, 64), <em>(1024, 1, 64)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256)</td>
</tr>
<tr>
<td>0x7</td>
<td>614.4</td>
<td>2</td>
<td>(512, 2, 64), (1024, 2, 64), <em>(2048, 2, 64)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128)</td>
</tr>
<tr>
<td>0x8</td>
<td>921.6</td>
<td>2</td>
<td>(1024, 2, 64), <em>(3072, 2, 64)</em></td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64)</td>
</tr>
<tr>
<td>0x9</td>
<td>1228.8</td>
<td>1</td>
<td>(512, 1, 64),</td>
<td>(128, 4, 256), (256, 4, 256),</td>
</tr>
<tr>
<td>CQI Index</td>
<td>Rate Metric (kbps)</td>
<td>Span (slots)</td>
<td>List of Associated Single User Transmission Formats</td>
<td>List of Associated Multi-User Transmission Formats</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------</td>
<td>-------------</td>
<td>---------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1024, 1, 64), (2048, 1, 64)</td>
<td>(512, 4, 256), (1024, 4, 256), (2048, 4, 128)</td>
</tr>
<tr>
<td>0xa</td>
<td>1228.8</td>
<td>2</td>
<td>(4096, 2, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64)</td>
</tr>
<tr>
<td>0xb</td>
<td>1843.2</td>
<td>1</td>
<td>(1024, 1, 64), (3072, 1, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64)</td>
</tr>
<tr>
<td>0xc</td>
<td>2457.6</td>
<td>1</td>
<td>(4096, 1, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64)</td>
</tr>
<tr>
<td>0xd</td>
<td>1536</td>
<td>2</td>
<td>(5120, 2, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64), (5120, 2, 64)</td>
</tr>
<tr>
<td>0xe</td>
<td>3072</td>
<td>1</td>
<td>(5120, 1, 64)</td>
<td>(128, 4, 256), (256, 4, 256), (512, 4, 256), (1024, 4, 256), (2048, 4, 128), (3072, 2, 64), (4096, 2, 64), (5120, 2, 64)</td>
</tr>
</tbody>
</table>

2-bit CQI Format

The access terminal shall set the CQI value to a 2-bit CQI index, ranging from 0x0 to 0x3. Each CQI index is associated with a Rate Metric, a Span, a list of Single User transmission formats and a list of Multi-User transmission formats, as shown in Table 1.8.6.1-2 where the CQI values 0x0 to 0x3 in 2-bit format map to CQI values 0x1 to 0x4 in 4-bit format.

The canonical packet size of a CQI index is defined to be the Physical Layer Packet Size of the canonical transmission format of that CQI index. A Single User Transmission Format associated with a CQI index shown in Table 1.8.6.1-2 is defined to be compatible with the CQI index, if at least one of the following conditions is met:

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

A Multi-User transmission format associated with a CQI index is defined to be compatible with the CQI index, if the value of the MultiUserPacketsEnabled attribute is 0x01.
The access terminal shall obey the following rules when transmitting the CQI Channel:

- Access terminal shall use CQIPeriod number of 20-ms reverse link frames to send a single CQI value. The CQI value is defined to take effect after CQIDelay number of frames from the frame boundary that the access terminal sends this new CQI value at, and stay in effect for CQIPeriod frames (see [7]).
- For an access terminal, the CQI value it transmits shall not change in slots other than T such that:
  \[(T_{AT} - \text{FrameOffset} - \text{CQIDelay in slots}) \mod (\text{CQIPeriod} \times 12 \text{ slots/frame}) = 0,\]
  where \(T_{AT}\) is the CDMA system time in slots observed at the access terminal.
- The forward link serving data rate to this access terminal shall not change in slots other than T such that
  \[(T - \text{FrameOffset}) \mod (\text{CQIPeriod} \times 12 \text{ slots/frame}) = 0\]
  where T the local CDMA system time observed either at access network or access terminal,
- When transmitting the CQI Channel, the access terminal shall set the CQI value according to the following rule:
  - The access terminal shall set the CQI value to a CQI index that corresponds to a sustainable forward link data rate to the terminal.

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

A slot \(t\) is defined to be a continuation of an earlier slot \(s\), if the following conditions are met:
- The access terminal is a potential target of a packet for which the reception began in slot \(s\).
- The slot \(t\) is in the same forward link interlace as the slot \(s\); i.e., \((t - s) \mod 4 = 0\).
- \(s < t < s + 4 \times \min(N_1, N_2, \text{MinimumContinuationSpan})\), where \(N_1\) denotes the Transmit Duration of the packet whose reception began in slot \(s\) and \(N_2\) denotes the Span of the CQI index corresponding to the CQI value that is in effect during slot \(s\) (according to Table 1.8.6.1-2).

If the access terminal is a potential target of a packet transmitted by a sector starting in slot \(s\), the access network shall not transmit a new packet from the same Forward Link Data Source to the access terminal in any slot \(t\) that is a continuation of slot \(s\).
1.8.6.1.6 Command Processing

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

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

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

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

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

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

1.8.6.1.8 Variable Rate State
In the Variable Rate State, the access network transmits the Forward Traffic Channel using transmission format determined by the CQI Channel transmitted by the access terminal.
The access terminal shall perform the supervision procedures described in 1.8.6.1.9.1 in the Variable Rate State.

1.8.6.1.8.1 Packet Transmission and CQI Requirements
1.8.6.1.8.1.1 Access Terminal Requirements
In the Variable Rate State, a slot t is defined to be open at the access terminal, if slot t is not the continuation of any previous slot. In any open slot T, the access terminal shall attempt to receive a MAC Layer packet from the serving sector, whose transmission begins in slot T and whose packet type and transmission format are compatible with the CQI value in effect at slot T.

1.8.6.1.8.1.2 Access Network Requirements
The access network shall obey the following rule when processing the CQI and sending a packet to the access terminal:
• 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.

1.8.6.1.9 Supervision Procedures

1.8.6.1.9.1 CQI Supervision

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

• The access terminal shall set the CQI supervision timer for $(CQI\text{Supervision}\text{Timer} \times 10) + 240$ 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 $T_{\text{FTCMPRestartTx}}$.

• If the access terminal generates consecutive CQI values that correspond to non-null rates for more than $N_{\text{FTCMPRestartTx}}$ 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 $\text{SupervisionFailed}$ indication and transition to the Inactive State.

1.8.6.1.9.2 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 $\text{SupervisionFailed}$ indication and transition to the Inactive State.

1.8.6.2 Message Formats

1.8.6.2.1 AttributeUpdateRequest

The sender sends an AttributeUpdateRequest message to offer an attribute-value for a given attribute.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 AttributeUpdateRequest message sent.

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

4. 1.8.6.2.2 AttributeUpdateAccept
The sender sends an AttributeUpdateAccept message in response to an AttributeUpdateRequest message to accept the offered attribute values.

5. Field
<table>
<thead>
<tr>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
</tr>
<tr>
<td>TransactionID</td>
</tr>
</tbody>
</table>

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

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

8. Channels
<table>
<thead>
<tr>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td></td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

9. 1.8.6.2.3 AttributeUpdateReject
The access network sends an AttributeUpdateReject message in response to an AttributeUpdateRequest message to reject the offered attribute values.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 corresponding AttributeUpdateRequest message.

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3. **1.8.6.3 Interface to Other Protocols**

4. **1.8.6.3.1 Commands Sent**

5. This protocol does not issue any commands.

6. **1.8.6.3.2 Indications**

7. This protocol does not register to receive any indications.

8. **1.8.7 Configuration Attributes**

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

   - MultiUserPacketsEnabled
   - ShortPacketsEnabledThresh
   - CQISupervisionTimer

10. **1.8.7.1 Simple Attributes**

11. The negotiable simple attributes for this protocol are listed in Table 1.8.7.1-1. The access terminal shall use as defaults the values in Table 1.8.7.1-1 that are typed in **bold italics**.
<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xFD</td>
<td>MultiUserPacketsEnabled</td>
<td>0x00</td>
<td>Use of Multi-User MAC packets is disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Use of Multi-User MAC packets is enabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xFA</td>
<td>ShortPacketsEnabledThresh</td>
<td>0x01</td>
<td>ShortPacketsEnabledThresh is 2048 bits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x00</td>
<td>ShortPacketsEnabledThresh is 1024 bits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x02</td>
<td>ShortPacketsEnabledThresh is 3072 bits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x03</td>
<td>ShortPacketsEnabledThresh is 4096 bits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xF8</td>
<td>CQISupervisionTimer</td>
<td>0x00</td>
<td>CQI Supervision Timer is 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01-0xff</td>
<td>Value of CQI Supervision Timer</td>
</tr>
<tr>
<td>0xF7</td>
<td>MinimumContinuationSpan</td>
<td>0x04</td>
<td>Minimum continuation span is 4 sub-packets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01-0x03 and 0x05-0x10</td>
<td>Value of Minimum continuation span in sub-packets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
</tbody>
</table>
1.8.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFTCMPType</td>
<td>Type field for this protocol</td>
<td>[5]</td>
</tr>
<tr>
<td>NFTCMPHRPDS2</td>
<td>Subtype field for this protocol</td>
<td>0x0002</td>
</tr>
<tr>
<td>NFTCMPRestartTx</td>
<td>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.</td>
<td>16</td>
</tr>
<tr>
<td>TFTCMPRestartTx</td>
<td>Reverse Channel Restart Timer</td>
<td>12 Control Channel cycles</td>
</tr>
</tbody>
</table>

1.8.9 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.

1.9 xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol

1.9.1 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.
• Open State: In this state, the access terminal obeys the power control commands that it receives from the access network. In this state, the access terminal may negotiate different xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol parameters and attributes per MAC flow and transmit data on the Reverse Traffic Channel.

The protocol states and the indications and events causing the transition between the states are shown in Figure 1.9.1-1.

![xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol State Diagram](image)

Figure 1.9.1-1. xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol State Diagram

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

1.9.2 Primitives and Public Data

1.9.2.1 Commands

This protocol defines the following commands:

• Activate

• Deactivate

1.9.2.2 Return Indications

This protocol returns the following indications:

• LinkAcquired

• SupervisionFailed

1.9.2.3 Public Data

This protocol shall make the following data public:
• Subtype for this protocol

1.9.3 Protocol Data Unit
The transmission unit of this protocol is a Reverse Traffic Channel MAC Layer packet. Each Reverse Traffic Channel MAC Layer packet contains one Security Layer packet.

1.9.4 Protocol Initialization

1.9.4.1 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.

• The value of the public data for the InConfiguration protocol instance shall be set to the value of the public data for the InUse protocol instance.

1.9.5 Procedures and Messages for the InConfiguration Instance of the Protocol

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

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

1.9.5.2 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 protocol shall be set to the corresponding attribute value of the InConfiguration protocol instance:
  
  – RPCStep

• 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 network and the access terminal shall perform the following in the order specified:

- The access terminal and the access network shall set the initial state for the InConfiguration instance of this protocol to the Inactive State.
- The InConfiguration protocol instance shall become the InUse protocol instance for the Reverse Traffic Channel MAC Protocol.

All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

### 1.9.5.3 Message Formats

#### 1.9.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

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

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

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

### 1.9.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>Unicast</td>
<td></td>
<td></td>
<td>Priority</td>
</tr>
</tbody>
</table>
### Field Length (bits)

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord | Attribute dependent |

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

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
<th>Priority</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>Unicast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

#### 1.9.6.1 Procedures

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

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

#### 1.9.6.1.1 MAC Layer Packet

The MAC Layer packet is the basic unit of data provided by the Reverse Traffic Channel MAC protocol to the Physical Layer Protocol. The structure of a MAC Layer packet is shown in Figure 1.9.6.1.1-1 and Figure 1.9.6.1.1-2. The MAC Layer packet consists of a Security Layer packet followed by the MAC Layer trailer for the data packet flow and only the Security Layer packet for the voice packet 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].

1.9.6.1.2 Command Processing

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

- Set $\text{ATI}_{\text{LCM}}$ to TransmitATI.ATI
- Transition to the Setup State

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

1.9.6.1.2.2 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.

1.9.6.1.3 Reverse Traffic Channel Long Code Mask
The access terminal shall set the long code masks for the reverse traffic channel ($\text{MI}_{\text{RTCMAC}}$ and $\text{MQ}_{\text{RTCMAC}}$) as follows. The 42-bit mask $\text{MI}_{\text{RTCMAC}}$ shall be specified as shown in Table 1.9.6.1.3-1.
Permutated (ATILCM) is defined as follows:
\[
ATILCM = (A_{31}, A_{30}, A_{29}, \ldots, A_0)
\]
Permutated (ATILCM) =
\[
(A_0, A_{31}, A_{22}, A_{13}, A_4, A_{26}, A_{17}, A_8, A_{30}, A_{21}, A_{12}, A_3, A_{25}, A_{16}, A_7, A_{29}, A_{20}, A_{11}, A_2, A_{24}, A_{15}, A_6, A_{28}, A_{19}, A_{10}, A_1, A_{23}, A_{14}, A_5, A_{27}, A_{18}, A_9).
\]
The 42-bit mask MQ_{RTCMAC} shall be derived from the mask MI_{RTCMAC} as follows:
\[
MQ_{RTCMAC}[k] = MI_{RTCMAC}[k-1], \quad \text{for } k = 1, \ldots, 41
\]
\[
MQ_{RTCMAC}[0] = MI_{RTCMAC}[0] \oplus MI_{RTCMAC}[1] \oplus MI_{RTCMAC}[2] \oplus MI_{RTCMAC}[4] \oplus MI_{RTCMAC}[5] \oplus MI_{RTCMAC}[6] \oplus MI_{RTCMAC}[9] \oplus MI_{RTCMAC}[15] \oplus MI_{RTCMAC}[16] \oplus MI_{RTCMAC}[17] \oplus MI_{RTCMAC}[18] \oplus MI_{RTCMAC}[20] \oplus MI_{RTCMAC}[21] \oplus MI_{RTCMAC}[24] \oplus MI_{RTCMAC}[25] \oplus MI_{RTCMAC}[26] \oplus MI_{RTCMAC}[30] \oplus MI_{RTCMAC}[32] \oplus MI_{RTCMAC}[34] \oplus MI_{RTCMAC}[41]
\]
where the $\oplus$ denotes the Exclusive OR operation, and $MQ_{RTCMAC}[i]$ and $MI_{RTCMAC}[i]$ denote the $i^{th}$ least significant bit of $MQ_{RTCMAC}$ and $MI_{RTCMAC}$, respectively.

1.9.6.1.4 Inactive State

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

1.9.6.1.5 Setup State

1.9.6.1.5.1 Access Terminal Requirements

The access terminal shall set a timer for $T_{RTCPATSetup}$ 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.
1.9.6.1.5.2 Access Network Requirements
The access network shall set a timer for $T_{\text{RTCMPANSetup}}$ seconds when it enters this state. If the protocol is still in the Setup State when the timer expires, the access network shall return a $\text{SupervisionFailed}$ indication.

The access network shall attempt to acquire the Reverse Traffic Channel in this state. If the access network acquires the Reverse Traffic Channel, it shall send an RTCAck message to the access terminal, return a $\text{LinkAcquired}$ indication, and shall transition to the Open State.

1.9.6.1.6 Open State

1.9.6.1.6.1 Access Terminal Requirements
In this state, the access terminal may negotiate different xHRPD Subtype 0 Reverse Traffic Channel MAC Protocol parameters and attributes per MAC flow and transmit data on the Reverse Traffic Channel.

1.9.6.2 Trailer and Message Formats

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConnectionLayerFormat</td>
<td>1</td>
</tr>
<tr>
<td>TransmissionMode</td>
<td>1</td>
</tr>
</tbody>
</table>

ConnectionLayerFormat
If the Security Layer packet contains a Format B Connection Layer packet, then the access terminal shall set this field to ‘1’. Otherwise, the access terminal shall set this field to ‘0’.

TransmissionMode
If the MAC flow is associated to link flow 2, then the access terminal shall set this field to ‘1’. Otherwise, the access terminal shall set this field to ‘0’.

1.9.6.2.2 RTCAck
The access network sends the RTCAck message to notify the access terminal that it has acquired the Reverse Traffic Channel. The access network shall send this message using the access terminal’s current ATI.
### 1.9.6.2.3 AttributeUpdateRequest

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

One or more instances of the following record

- **AttributeRecord**
  - `Attribute dependent`

### 1.9.6.2.4 AttributeUpdateAccept

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

### Table

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

### Channels

<table>
<thead>
<tr>
<th>FT C</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Addressing

<table>
<thead>
<tr>
<th>Unicast</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

### AttributeRecord

The format of this record is specified in [1].
1.9.6.2.5 AttributeUpdateReject
The access network sends an AttributeUpdateReject message in response to an AttributeUpdateRequest message to reject the offered attribute values.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

MessageID The access network shall set this field to 0x54.
TransactionID The access network shall set this value to the TransactionID field of the corresponding AttributeUpdateRequest message.

1.9.6.3 Interface to Other Protocols

1.9.6.3.1 Commands Sent
This protocol does not issue any commands.

1.9.6.3.2 Indications
This protocol does not register to receive any indications.

1.9.7 Configuration Attributes
The following attributes and default values are defined (see [1] for attribute record definition).

1.9.7.1 Simple Attributes
The negotiable simple attribute for this protocol is listed in Table 1.9.7.1-1. The access network and the access terminal shall use the default value that is typed in **bold italics**.
### Table 1.9.7.1-1. Configurable Simple Attributes

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xffNN</td>
<td>FlowPriority</td>
<td>0x00-0x07</td>
<td>Priority of MAC flow&lt;br&gt;0x00: MAC Flow is not active&lt;br&gt;0x01 – 0x07: Lower the number, higher the priority</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x08</td>
<td>Priority of MAC flow&lt;br&gt;0x08 – Lowest priority</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

#### 1.9.7.2 Complex Attributes

The following configurable complex attributes are defined:

1.9.7.2.1 AssociatedFlowsNN 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.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length(bits)</th>
<th>Default for NN between 0x02 and (MaxNumMACFlows –1), inclusive</th>
<th>Default for NN = 0x01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

One or more occurrences of the following attribute value record:

```plaintext
{
  ValueID         8 | N/A   | N/A   | N/A |
  FlowCount       8 | 0     | 1     |
}
```

FlowCount occurrences of the following two fields:

```plaintext
{
  Stream         9 | N/A   | 511   |
  SubStream      8 | N/A   | 0     |
}
```

Reserved 0 – 7 (as N/A | 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 0x01NN, where NN is the two-digit hexadecimal number that identifies the MAC Flow in the range 0x01 through MaxNumMACFlows – 1, inclusive.

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

FlowCount
The sender shall set this field to the number of higher layer flows associated with this MAC Flow.

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 ‘111111111’.

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\textsuperscript{14}. Otherwise, the sender shall set this field to ‘00000000’. If Stream is ‘111111111’, then the sender shall set this field to ‘00000000’.

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.

\textit{1.9.7.2.2 MaxMACFlows Attribute}

\textsuperscript{14} 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.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>16</td>
<td>N/A</td>
</tr>
</tbody>
</table>

One or more occurrences of the following record:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>MaxNumMACFlows</td>
<td>8</td>
<td>0x08</td>
</tr>
<tr>
<td>MaxNumActiveMACFlows</td>
<td>8</td>
<td>0x08</td>
</tr>
</tbody>
</table>

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. AttributeID: The sender shall set this field to 0x02.
3. ValueID: The sender shall set this field to an identifier assigned to this complex value.
4. MaxNumMACFlows: The sender shall set this field to indicate the maximum total number of activated and deactivated MAC flows supported. The value shall be in the range of 0x04 to 0x10, inclusive.
5. MaxNumActiveMACFlows: The sender shall set this field to indicate the maximum number of active MAC flows supported. The value shall be in the range of 0x04 to MaxNumMACFlows, inclusive.

1.9.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$N_{RTCMPType}$</td>
<td>Type field for this protocol</td>
<td>[5]</td>
</tr>
<tr>
<td>$N_{xHRPDS0RTCMP}$</td>
<td>Subtype field for this protocol</td>
<td>0x0000</td>
</tr>
<tr>
<td>$T_{RTCMPATSetup}$</td>
<td>Maximum time for the access terminal to transmit the Reverse Traffic Channel in the Setup State</td>
<td>2.5 sec</td>
</tr>
<tr>
<td>$T_{RTCMPANSetup}$</td>
<td>Maximum time for the access network to acquire the Reverse Traffic Channel and send a notification to the access terminal.</td>
<td>2 sec</td>
</tr>
</tbody>
</table>

1.9.9 Session State Information

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

This protocol defines the following parameter record in addition to the configuration attributes for this protocol.
1.9.9.1 LongCodeMask 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.

### Table 1.9.9.1-1. The Format of the Parameter Record for the LongCodeMask Parameter

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ParameterType</td>
<td>8</td>
</tr>
<tr>
<td>Length</td>
<td>8</td>
</tr>
<tr>
<td>MIRTCMAC</td>
<td>42</td>
</tr>
<tr>
<td>MQRTCMAC</td>
<td>42</td>
</tr>
<tr>
<td>Reserved</td>
<td>4</td>
</tr>
</tbody>
</table>

- **ParameterType**: This field shall be set to 0x01 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.
- **MIRTCMAC**: This field shall be set to the value of the reverse traffic channel in-phase long code mask associated with the access terminal’s session.
- **MQRTCMAC**: This field shall be set to the value of the reverse traffic channel quadrature-phase long code mask associated with the access terminal’s session.
- **Reserved**: This field shall be set to zero.
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2 SECURITY LAYER

Same as defined in Error! Reference source not found..
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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-capaculates data received from the Security Layer and forwards it to the Session Layer.

The Connection Layer performs these functions through the following protocols:
Air Link Management Protocol: This protocol maintains the overall connection state in
the access terminal and the access network. The protocol can be in one of three states,
corresponding to whether the access terminal has yet to acquire the network
(Initialization State), has acquired the network but the connection is closed (Idle State),
or has an open connection with the access network (Connected State). This protocol
activates one of the following three protocols as a function of its current state.

Initialization State Protocol: This protocol performs the actions associated with
acquiring an access network.

Idle State Protocol: This protocol performs the actions associated with an access
terminal that has acquired the network, but does not have an open connection. Mainly,
these are keeping track of the access terminal’s approximate location in support of
efficient Paging (using the Route Update Protocol), the procedures leading to the
opening of a connection, and support of access terminal power conservation.

Connected State Protocol: This protocol performs the actions associated with an access
terminal that has an open connection. Mainly, these are managing the radio link
between the access terminal and the access network (handoffs, handled via the Route
Update Protocol), and the procedures leading to the close of the connection.

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

Route Update Protocol: This protocol performs the actions associated with keeping track
of an access terminal’s location and maintaining the radio link between the access
terminal and the access network. This protocol performs supervision on the pilots.

Overhead Messages Protocol: This protocol broadcasts essential parameters over the
Control Channel. These parameters are shared by protocols in the Connection Layer as
well as protocols in other layers. This protocol also performs supervision on the
messages necessary to keep the Connection Layer functioning.

Packet Consolidation Protocol: This protocol consolidates and prioritizes packets for
transmission as a function of their assigned priority and the target transmission
channel.

Figure 3.1.1-1 illustrates the relationship between all the Connection Layer protocols. An
arrow between two protocols implies that the source sends commands to the target.
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.
3.2 Default Air-Link Management Protocol

The Default Air-Link Management Protocol is same as defined in Error! Reference source not found..

3.3 Default Initialization State Protocol

The Default Initialization State Protocol is same as defined in Error! Reference source not found..

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.
• 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 messages 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 3.4.1-1 and Figure 3.4.1-2.

**Figure 3.4.1-1. xHRPD Subtype 0 Idle State Protocol State Diagram (Access Terminal)**
This protocol supports periodic network monitoring by the access terminal, allowing for significant power savings. The following access terminal operation modes are supported:

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

This protocol supports two types of connection set-ups:

- **Normal setup**: this procedure is always performed at the initiative of the access terminal. It consists of the access terminal sending a ConnectionRequest message which in turn causes the lower layers to open the connection. The Connection Setup State contains the requirements for normal setup.

---

15 The access network may transmit a Page message to the access terminal directing it to initiate the procedure.
• Fast Connect: this procedure is always performed at the initiative of the access network
and consists of the access network opening the connection directly via a
RouteUpdate.Open command.\textsuperscript{16} Fast Connect eliminates the need for the Page / ConnectionRequest exchange when the access network has pending data to transmit to
an access terminal, and is especially useful when the access terminal is in suspended
mode. Support for Fast Connect at the access network is optional. Support for Fast
Connect at the access terminal is mandatory. The Monitor State contains the
requirements for Fast Connect.

3.4.2 Primitives and Public Data

3.4.2.1 Commands

This protocol defines the following commands:

• Activate
• Deactivate
• OpenConnection
• Close

3.4.2.2 Return Indications

This protocol returns the following indications:

• ConnectionOpened
• ConnectionFailed

3.4.2.3 Public Data

This protocol shall make the following data public:

• Subtype for this protocol

3.4.3 Protocol Data Unit

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

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

3.4.4 Protocol Initialization

3.4.4.1 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:

\textsuperscript{16} This command triggers a transmission of a TrafficChannelAssignment message based on the last
RouteUpdate message received from the access terminal.
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.

3.4.4.2 Protocol Initialization for the InUse Protocol Instance

Upon creation, the InUse instance of this protocol in the access terminal and 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 shall enter the Inactive State.

3.4.5 Procedures and Messages for the InConfiguration Instance of the Protocol

3.4.5.1 Procedures

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

3.4.5.2 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 any of the Connection Layer protocols does not have the same subtype as the corresponding InConfiguration protocol instance, then
  - the access terminal shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Inactive State.
  - the access network shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Sleep State.
- 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, and
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 and the access network shall perform the following:
  - The InConfiguration protocol instance shall become the InUse protocol instance for the Idle State Protocol at the access terminal and the access network.
- All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

### 3.4.5.3 Message Formats

#### 3.4.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord | Attribute dependent |

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addressing</strong></td>
<td>unicast</td>
<td></td>
<td><strong>Priority</strong></td>
<td>40</td>
</tr>
</tbody>
</table>

#### 3.4.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 corresponding ConfigurationRequest message.

3. **AttributeRecord**
   An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [6]. The sender shall not include more than one attribute record with the same attribute identifier.

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.4.6 Procedures and Messages for the InUse Instance of the Protocol

3.4.6.1 Procedures

3.4.6.1.1 Command Processing

3.4.6.1.1.1 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.\(^{17}\)

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

3.4.6.1.1.2 Deactivate

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

When the protocol receives this command in any other state:

- The access terminal shall transition to the Inactive State.

\(^{17}\) 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.
• The access network shall transition to the Inactive State.

3.4.6.1.1.3 OpenConnection

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

When the protocol receives this command in the Sleep State:

• The access terminal shall transition to the Monitor state and perform the procedures in 3.4.6.1.2 for sending a ConnectionRequest message.

• The access network shall queue the command and execute it when it is in the Monitor State.

When the protocol receives this command in the Monitor State:

• The access terminal shall perform the procedures in 3.4.6.1.2 for sending a ConnectionRequest message.

• The access network shall send a Page message to the access terminal and transition to the Connection Setup State.

3.4.6.1.1.4 Close

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

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

• The access terminal shall transition to the Monitor State.

• The access network shall transition to the Sleep State.

3.4.6.1.2 Access Terminal Procedures for Sending a ConnectionRequest Message

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

• Send a ConnectionRequest message,

• If an AccessChannelMAC.TransmissionSuccessful indication is received, it shall transition to the Connection Setup State,

• If an AccessChannelMAC.TransmissionFailed indication is received, it shall return a ConnectionFailed indication.

3.4.6.1.3 Inactive State

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

If the access terminal receives an OverheadMessages.Updated indication in this state, then the access terminal shall queue the latest OverheadMessages.Updated indication for 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

\[
(C + R) \mod N_\text{IDPSleep} = 0
\]

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_\text{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 3.11).
- 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.\(^\text{18}\)
- 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:

- Access terminal has received a Control Channel synchronous Sleep State capsule in the current Control Channel Cycle and has determined that the SectorParameters message is up to date. The current Control Channel Cycle is defined to be the Control Channel Cycle that started at slot \(\lceil T/256 \rceil\), where \(T\) is the current CDMA System Time in slots.

\(^{18}\) This requirement provides Fast Connect on the access terminal side.
• Access terminal received an AccessChannelMAC.TxEnded indication for every AccessChannelMAC.TxStarted indication it received since entering the Monitor State.\(^{19}\)

• Access terminal has not advertised a suspend period that is current (see 3.8). The suspend period is current if the time advertised in the associated ConnectionClose message is greater than the current CDMA System Time.\(^{20}\)

3.4.6.1.5.2 Access Network Requirements

3.4.6.1.5.2.1 General Requirements

• Access network shall select the CDMA Channel following the same specifications as the access terminal, see 3.4.6.1.5.1.1.

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

• If the access network requires opening a connection with the access terminal and does not use an accelerated procedure to set-up a connection, the access network shall send a Page message to the access terminal over the Control Channel.

• The access network may use an accelerated procedure to set-up a connection with the access terminal by bypassing the paging process. The access network should only use this procedure if it has a reasonable estimate of the access terminal’s current location. To set-up a connection in an accelerated fashion (Fast Connect) the access network shall:
  – Issue a RouteUpdate.Open command.
  – Transition to the Connection Setup State, when the protocol receives a RouteUpdate.ConnectionInitiated indication.

• The access network shall transition to the Sleep State if the access terminal did not advertise a suspend period that is current.

3.4.6.1.6 Connection Setup State

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

Figure 3.4.6.1.6-1 illustrates the process of opening a connection between the access terminal and the access network when this protocol is used along with the default Route Update and the default Reverse Traffic Channel MAC protocols.\(^{21}\)

---

\(^{19}\) This pairing ensures that the access terminal does not have any outstanding messages waiting for an answer.

\(^{20}\) 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.

\(^{21}\) The Fast Connect message exchange is identical except for not having the Idle State Protocol ConnectionRequest message and the Route Update Protocol RouteUpdate message.
Upon entering the Connection Setup State the access terminal shall:

- Issue an `OverheadMessages.Activate` command,
- Issue a `ControlChannelMAC.Activate` command,
- Set a state timer for $T_{IDPATS}$ seconds,

If the access terminal receives a `ConnectionDeny` message, the access terminal shall return a `ConnectionFailed` indication,

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

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

3.4.6.1.6.2 Access Network Requirements

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

- Set state timer for $T_{IDPANS}$ seconds.
• If the protocol receives a `RouteUpdate.ConnectionOpened` indication, the access network shall return a `ConnectionOpened` indication and transition to the Inactive State.

• If the state timer expires, the access network shall return a `ConnectionFailed` indication and shall transition to the Sleep State.

Otherwise, the access network shall perform the following:

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

• If the access network denies the connection request, it should send the access terminal a ConnectionDeny message, shall return a `ConnectionFailed` indication, and shall transition to the Sleep State.

• Otherwise, the access network shall perform the following:
  - Set state timer for $T_{IDPANSetup}$ seconds.
  - Issue a `RouteUpdate.Open` command.
  - If the protocol receives a `RouteUpdate.ConnectionOpened` indication, the access network shall return a `ConnectionOpened` indication and transition to the Inactive State.
  - If the state timer expires, the access network shall return a `ConnectionFailed` indication and shall transition to the Sleep State.

• If the access network did not enter this state as a result of receiving a ConnectionRequest message, and if the access network does not receive a ConnectionRequest message within an implementation dependent time interval, then the access network shall return a `ConnectionFailed` indication, and shall transition to the Sleep State.

3.4.6.2 Message Formats

3.4.6.2.1 Page

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
<tr>
<td>RequestReason</td>
<td>4</td>
</tr>
<tr>
<td>PreferredChannelCount</td>
<td>5</td>
</tr>
</tbody>
</table>

PreferredChannelCount occurrences of the following field:

```
{
  PreferredChannel
  ...
}
```

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreferTwoRevNBChannel</td>
<td>1</td>
</tr>
<tr>
<td>LowRateType</td>
<td>2</td>
</tr>
<tr>
<td>Reserved</td>
<td>0-7 (as needed)</td>
</tr>
</tbody>
</table>

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

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

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

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

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>Access Terminal Initiated</td>
</tr>
<tr>
<td>0x1</td>
<td>Access Network Initiated</td>
</tr>
</tbody>
</table>

All other values are invalid

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

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

PreferTwoRevNBChannel

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

LowRateType

The access terminal shall set this field to one of the low data rates (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’.

Reserved

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>AC</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.4.6.2.3 ConnectionDeny

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
<tr>
<td>DenyReason</td>
<td>4</td>
</tr>
<tr>
<td>Reserved</td>
<td>4</td>
</tr>
</tbody>
</table>

MessageID

The access network shall set this field to 0x02.

TransactionID

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

DenyReason

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

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>General</td>
</tr>
<tr>
<td>0x1</td>
<td>Network Busy</td>
</tr>
<tr>
<td>0x2</td>
<td>Authentication or billing failure</td>
</tr>
<tr>
<td></td>
<td>All other values are reserved</td>
</tr>
</tbody>
</table>

Reserved

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>CC</th>
<th>Addressing</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SLP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Best Effort</td>
<td>unicast</td>
<td>40</td>
</tr>
</tbody>
</table>

#### 3.4.6.3 Interface to Other Protocols

#### 3.4.6.3.1 Commands Sent

This protocol issues the following commands:

- `RouteUpdate.Open` (access network only)
- `OverheadMessages.Activate`
- `OverheadMessages.Deactivate`
- `ControlChannelMAC.Activate`
- `ControlChannelMAC.Deactivate`

#### 3.4.6.3.2 Indications

This protocol registers to receive the following indications:

- `RouteUpdate.ConnectionOpened`
- `RouteUpdate.ConnectionInitiated`
- `AccessChannelMAC.TxStarted`
- `AccessChannelMAC.TxEnded`
- `AccessChannelMAC.TransmissionSuccessful`
- `AccessChannelMAC.TransmissionFailed`
- `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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
<td>Length of the complex attribute in octets. The sender shall set this field to the length of the complex attribute excluding the Length field.</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
<td>The sender shall set this field to 0x00.</td>
</tr>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
<td>The sender shall set this field to an identifier assigned to this complex value.</td>
</tr>
<tr>
<td>PreferredControlChannelCycleEnabled</td>
<td>1</td>
<td>‘0’</td>
<td>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’.</td>
</tr>
<tr>
<td>PreferredControlChannelCycle</td>
<td>0 or 15</td>
<td>N/A</td>
<td>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’.</td>
</tr>
<tr>
<td>Reserved</td>
<td>7 or 0</td>
<td>N/A</td>
<td>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.</td>
</tr>
</tbody>
</table>

Length

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

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>N_IDPType</td>
<td>Type field for this protocol</td>
<td></td>
<td>See [5]</td>
</tr>
<tr>
<td>N_IDPxHRPDS0</td>
<td>Subtype field for this protocol</td>
<td>0x0000</td>
<td></td>
</tr>
<tr>
<td>N_IDPSleep</td>
<td>Number of control channel cycles constituting a sleep period</td>
<td>0x0c</td>
<td>5.12 seconds</td>
</tr>
<tr>
<td>T_IDPATSetup</td>
<td>Maximum access terminal time in the Connection Setup State</td>
<td>2.5 seconds</td>
<td></td>
</tr>
<tr>
<td>T_IDPANSetup</td>
<td>Maximum access network time in the Connection Setup State</td>
<td>1 second</td>
<td></td>
</tr>
</tbody>
</table>

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

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

---

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

**Figure 3.5.1-2. xHRPD Subtype 1 Idle State Protocol State Diagram (Access Network)**
• Suspended mode operation, in which the access terminal monitors the Control Channel continuously for a period of time and then proceeds to operate in the slotted mode. Suspended mode follows operation in the Air-Link Management Protocol Connected State and allows for quick network-initiated reconnection.

• Slotted mode operation, in which the access terminal monitors only selected slots.

This protocol supports two types of connection set-ups:

• Normal setup: this procedure is always performed at the initiative of the access terminal. It consists of the access terminal sending a ConnectionRequest message which in turn causes the lower layers to open the connection. The Connection Setup State contains the requirements for normal setup.

• Fast Connect: this procedure is always performed at the initiative of the access network and consists of the access network opening the connection directly via a RouteUpdate.Open command. Fast Connect eliminates the need for the Page / ConnectionRequest exchange when the access network has pending data to transmit to an access terminal, and is especially useful when the access terminal is in suspended mode. Support for Fast Connect at the access network is optional. Support for Fast Connect at the access terminal is mandatory. The Monitor State contains the requirements for Fast Connect.

3.5.2 Primitives and Public Data

3.5.2.1 Commands

This protocol defines the following commands:

• Activate
• Deactivate
• OpenConnection
• Close

3.5.2.2 Return Indications

This protocol returns the following indications:

• ConnectionOpened
• ConnectionFailed

3.5.2.3 Public Data

This protocol shall make the following data public:

22 The access network may transmit a Page message to the access terminal directing it to initiate the procedure.

23 This command triggers a transmission of a TrafficChannelAssignment message based on the last RouteUpdate message received from the access terminal.
- Subtype for this protocol
- PageResponseAPersistence

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

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

3.5.4 Protocol Initialization

3.5.4.1 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.

3.5.4.2 Protocol Initialization for the InUse Protocol Instance
Upon creation, the InUse instance of this protocol in the access terminal and 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 shall enter the Inactive State.

3.5.5 Procedures and Messages for the InConfiguration Instance of the Protocol

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

3.5.5.2 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:

- 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 any of the Connection Layer protocols does not have the same subtype as the corresponding InConfiguration protocol instance, then
  - the access terminal shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Inactive State.
  - the access network shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Sleep State.

• 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, and
  - 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 and the access network shall perform the following:
  - The InConfiguration protocol instance shall become the InUse protocol instance for the Idle State Protocol at the access terminal and the access network.

• All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

3.5.5.3 Message Formats

3.5.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord    | Attribute dependent |

MessageID
The sender shall set this field to 0x50.

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

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

The ConfigurationResponse message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

MessageID
The sender shall set this field to 0x51.

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

AttributeRecord
An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [6]. The sender shall not include more than one attribute record with the same attribute identifier.

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.

---

24 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.
If the protocol receives this command in any other state it shall be ignored.

3.5.6.1.1.2 Deactivate

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

When the protocol receives this command in any other state:

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

3.5.6.1.1.3 OpenConnection

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

When the protocol receives this command in the Sleep State:

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

When the protocol receives this command in the Monitor State:

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

3.5.6.1.1.4 Close

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

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

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

3.5.6.1.2 Access Terminal Procedures for Sending a ConnectionRequest Message

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

- If the access terminal received a ConnectionDeny message with the DenyReason set to 'Traffic Channel Assignment Pending', then the access terminal shall not send the ConnectionRequest message on the sector where the access terminal received the ConnectionDeny message until the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.
• If the access terminal invokes these procedures in response to an access terminal-initiated event and the ConnectionDenyBackoff attribute is set to a value in the range 0x00 to 0x78, then the access terminal should perform the following:
  
  - If the access terminal determines that the number of control channel cycles that have passed since receiving a ConnectionDeny message with DenyReason set to 0x01 is less than the value of the ConnectionDenyBackoff attribute, then the access terminal shall postpone sending the ConnectionRequest message until the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the ConnectionDenyBackoff attribute.

• Send a ConnectionRequest message,

• If an AccessChannelMAC.TransmissionSuccessful indication is received, it shall transition to the Connection Setup State,

• If an AccessChannelMAC.TransmissionFailed indication is received, it shall return a ConnectionFailed indication.

3.5.6.1.3 T₁₂ and T₂₃ Computation

The access terminal shall compute T₁₂ and T₂₃ when an AccessChannelMAC.TransmissionSuccessful indication or a ConnectedState.ConnectionClosed indication is received. The access network shall compute T₁₂ and T₂₃ when an AccessChannelMAC.MACLayerCapsuleReceived indication, a ConnectedState.ConnectionClosed, or a RouteUpdate.ConnectionLost indication is received.

The access terminal and the access network shall compute T₁₂ and T₂₃ as follows:

\[
T_{12} = T_c + \text{PagePeriod} \times \left(1 - \frac{(T_c + 256 \times R)}{\text{mod PagePeriod}}\right) + \text{PagePeriod} \times \left[\frac{\text{WCU} \times (\text{WakeCount1} + 1)}{\text{mod PagePeriod}} - 1\right]
\]

\[
T_{23} = T_{12} + \text{PagePeriod} \times \left(1 - \frac{(T_{12} + 256 \times R)}{\text{mod PagePeriod}}\right) + \text{PagePeriod} \times \left[\frac{\text{WCU} \times (\text{WakeCount2} + 1)}{\text{mod PagePeriod}} - 1\right]
\]

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

3.5.6.1.4 Inactive State

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

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

3.5.6.1.5 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 3.5.6.1.2 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 sub-synchronous capsule or the synchronous capsule sent at time T satisfying the following condition:

\[ (T + 256 \times R) \mod \text{Period} = \text{Offset}, \]

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

R shall be 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:
  - \( \text{Key} = \text{SessionSeed} \)
  - \( \text{Decorrelate} = 6 \times \text{SessionSeed}[11:0] \)
  - \( \text{N} = \text{Max}(\text{Period3}/256, 1) \)
  - where SessionSeed is given as public data of the Address Management Protocol.

- If PreferredControlChannelCycleEnabled is equal to ‘1’, then R is set to PreferredControlChannelCycle.

Period shall be computed as follows:

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

The access network and the access terminal shall compute Periodi according to Table 3.5.6.1.5-1.
Table 3.5.6.1.5-1. Computation of Period\textsubscript{i} from SlotCycle\textsubscript{i}

<table>
<thead>
<tr>
<th>SlotCycle\textsubscript{i}</th>
<th>Period\textsubscript{i}</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00 to 0x06</td>
<td>2^{SlotCycle\textsubscript{i}} \times 4 slots</td>
</tr>
<tr>
<td>0x07 to 0x1c</td>
<td>2^{(SlotCycle\textsubscript{i} - 0x7)} \times 768 slots</td>
</tr>
</tbody>
</table>

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:

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

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

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:

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

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

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:

- \textit{OverheadMessages.Activate}
- \textit{ControlChannelMAC.Activate}

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

- If the access terminal has queued an \textit{OverheadMessages.Updated} indication or upon receiving an \textit{OverheadMessages.Updated} indication, the access terminal shall tune to the CDMA Channel selected as specified in §.
• If the access terminal entered Monitor State to receive the synchronous capsule, it shall monitor the overhead messages as specified in the Overhead Messages.

• If the access terminal receives a Page message, it shall perform the procedures in 3.5.6.1.2 for sending a ConnectionRequest message.

• If the access terminal requires opening a connection, it shall perform the procedures in 3.5.6.1.2 for sending a ConnectionRequest message.

• If the access terminal receives a RouteUpdate.ConnectionInitiated indication it shall:
  – If the access terminal had previously received a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, then the access terminal shall reset TCAPendingDuration to zero, and
  – transition to the Connection Setup State.\(^{25}\)

• Access terminal may transition to the Sleep State if the requirements specified in 3.5.6.1.6.1.2 are satisfied.

• If the access terminal had previously received a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and if the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration, then the access terminal shall return a ConnectionFailed indication.

3.5.6.1.6.1.1 CDMA Channel Selection

The access terminal shall select a CDMA Channel from the list of channels or extended channels in the SectorParameters message. If no channels or extended 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 a hash function (see [6]) to compute an index into the subset of a subset of advertised CDMA Channels according to the following procedures.

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

• If the extended channel list is included in the SectorParameters message, the access terminal shall create a combined channel list by appending each CDMA Channel in the extended channel list (in order) to the set of CDMA Channels in the channel list (in order). Otherwise, the access terminal shall set the combined channel list to the set of CDMA Channels in the channel list.

• If the SupportedCDMAChannels public data of the Route Update Protocol lists any channels, then the access terminal shall remove from the combined channel list the following CDMA Channels:
  – All forward CDMA Channels that are not supported by the access terminal as indicated by the SupportedCDMAChannels public data of the Route Update Protocol.

---

\(^{25}\) This requirement provides Fast Connect on the access terminal side.
All the forward CDMA Channels whose associated reverse CDMA Channel is not supported by the access terminal as indicated by the SupportedCDMAChannels public data of the Route Update Protocol.

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

- If the AccessHashingChannelMaskIncluded field in the SectorParameters message is not included or is included and set to '0', the access terminal shall set $S$ to the subset of CDMA Channels in the combined channel list.
- If the AccessHashingChannelMaskIncluded field in the SectorParameters message is included and is set to ‘1’, the access terminal shall set $S$ to the subset of CDMA Channels in the combined channel list for which:
  - $N_i$ is equal to $N_{\text{max}}$, where $i$ is the index of the CDMA Channel in the combined channel list,
  
  \[ N_j = \text{bitcount}(\text{AccessHashingClassMask}[\text{AccessHashingMaskLength:0}] \otimes M_j, \text{ where } M_j \text{ is the AccessHashingChannelMask field in the SectorParameters message corresponding to the } j^{th} \text{ CDMA Channel in the combined channel list; } \]
  
  $N_{\text{max}}$ is the maximum value of $N_k$ for all $k$, where $k$ is the index of the CDMA Channel in the combined channel list; and
  
  \[ \text{bitcount}(x) \text{ is the number of ‘1’ bits in the binary representation of } x. \]

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

- Key = SessionSeed
- Decorrelate = 0
- N = Number of CDMA Channels in set $S$

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

3.5.6.1.6.1.2 Transition to Sleep State

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

- One of the following requirements is met:
  - The access terminal entered the Monitor State to receive the synchronous capsule and has received a Control Channel synchronous Sleep State capsule in the current Control Channel Cycle and has determined that the SectorParameters message is up to date. The current Control Channel Cycle is defined to be the Control Channel Cycle that started at slot $\lfloor T/256 \rfloor$, where $T$ is the current CDMA System Time in slots.
The access terminal entered the Monitor State to receive a sub-synchronous capsule, and has received the sub-synchronous capsule, or did not receive the sub-synchronous capsule in the expected slots.

The access terminal entered the Monitor State as a result of receiving a ConnectionDeny message with the DenyReason set to 'Traffic Channel Assignment Pending', and the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.

- Access terminal received an AccessChannelMAC.TxEnded indication for every AccessChannelMAC.TxStarted indication it received since entering the Monitor State.\(^{26}\)
- Access terminal has not advertised a suspend period that is current (see 3.8). The suspend period is current if the time advertised in the associated ConnectionClose message is greater than the current CDMA System Time.\(^{27}\)

### 3.5.6.1.6.2 Access Network Requirements

#### 3.5.6.1.6.2.1 General Requirements

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

---

\(^{26}\)This pairing ensures that the access terminal does not have any outstanding messages waiting for an answer.

\(^{27}\)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.
− Transition to the Connection Setup State, when the protocol receives a
  RouteUpdate.ConnectionInitiated indication.

− Access network shall transition to the Sleep State if all of the following conditions are
  met:
  − the access terminal did not advertise a suspend period that is current.
  − The access network entered the Monitor State as a result of sending a
    ConnectionDeny message with the DenyReason set to ‘Traffic Channel
    Assignment Pending’, and the number of control channel cycles since sending
    the ConnectionDeny message is greater than or equal to the value specified by
    the TCAPendingDuration.

− If the access network had previously sent a ConnectionDeny message with the
  DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control
  channel cycles since sending the ConnectionDeny message is greater than or equal to
  the value specified by the TCAPendingDuration, then the access network shall return a
  ConnectionFailed indication.

3.5.6.1.7 Connection Setup State

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

Figure 3.5.6.1.7-1 illustrates the process of opening a connection between the access
terminal and the access network when this protocol is used along with the default Route
Update and the default Reverse Traffic Channel MAC protocols.\textsuperscript{28}

\textsuperscript{28} The Fast Connect message exchange is identical except for not having the Idle State Protocol
ConnectionRequest message and the Route Update Protocol RouteUpdate message.
the ConnectionRequest and the RouteUpdate are bundled in the same Access Channel MAC Layer packet.

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

### 3.5.6.1.7.1 Access Terminal Requirements

The access terminal shall comply with the following requirements.

- Upon entering the Connection Setup State the access terminal shall:
  - Issue an `OverheadMessages.Activate` command,
  - Issue a `ControlChannelMAC.Activate` command,
  - Set a state timer for $T_{IDPATSetup}$ seconds,
- If the access terminal receives a ConnectionDeny message with the DenyReason not included, or included and is not set to 'Traffic Channel Assignment Pending', the access terminal shall return a `ConnectionFailed` indication,
- If the access terminal receives a ConnectionDeny message with the DenyReason set to 'Traffic Channel Assignment Pending', then the access terminal shall transition to the Monitor state,
- If the state timer expires, the access terminal shall return a `ConnectionFailed` indication,
- If the access terminal receives a `RouteUpdate.ConnectionOpened` indication, it shall return a `ConnectionOpened` indication and transition to the Inactive State.
3.5.6.1.7.2 Access Network Requirements

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

If all of the following conditions are met:

- The traffic channel resource is not available,
- The ConnectionQueuingSupported attribute is set to ‘0x01’, and
- One of the following conditions is met:
  - The received ConnectionRequest message has the ConnectionQueuingReq field set to ‘1’, or
  - The access network determines that queuing should be applied

then the access network should:

- Send ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’,
- Queue the ConnectionRequest for TCAPendingDuration in units of number of control channel cycles after sending the ConnectionDeny message, and
- Transition to the Monitor state

The access network shall not send ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’ if the ConnectionQueuingSupported attribute is set to ‘0x00’.

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

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

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

- Set state timer for T_{DPANSetup} seconds.
- If the protocol receives a RouteUpdate.ConnectionOpened indication, the access network shall return a ConnectionOpened indication and transition to the Inactive State.
- If the state timer expires, the access network shall return a ConnectionFailed indication and shall transition to the Sleep State.

---

29 The ConnectionRequest Queuing function is enabled when the priority treatment is required by the application service such as the priority service.
Otherwise, the access network shall perform the following:

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

- If the access network denies the connection request, it should send the access terminal a ConnectionDeny message, shall return a ConnectionFailed indication, and shall transition to the Sleep State.

- Otherwise, the access network shall perform the following:
  - Set state timer for $T_{IDPANSetup}$ seconds.
  - Issue a RouteUpdate.Open command.
  - If the protocol receives a RouteUpdate.ConnectionOpened indication, the access network shall return a ConnectionOpened indication and transition to the Inactive State.
  - If the state timer expires, the access network shall return a ConnectionFailed indication and shall transition to the Sleep State.

- If the access network did not enter this state as a result of receiving a ConnectionRequest message, and if the access network does not receive a ConnectionRequest message within an implementation dependent time interval, then the access network shall return a ConnectionFailed indication, and shall transition to the Sleep State.

3.5.6.2 Message Formats

3.5.6.2.1 Page

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>PageResponseAPersistenceIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>PageResponseAPersistence</td>
<td>0 or 6</td>
</tr>
<tr>
<td>Reserved</td>
<td>0 – 7 (as needed)</td>
</tr>
</tbody>
</table>

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

PageResponseAPersistenceIncluded

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

The access network shall set this field to ‘0’ if the PageResponseAPersistenceSupported attribute is set to 0x00.
Otherwise, the access network shall set this field as follows:
The access network shall set this field to ‘1’ if the
PageResponseAPersistence field is included in this message.
Otherwise, the access network shall set this field to ‘0’.

PageResponseAPersistence
The access network shall omit this field if the
PageResponseAPersistenceIncluded field is not included, or if the
PageResponseAPersistenceIncluded field is included and set to ‘0’.
Otherwise, the access network shall include this field and set it as
follows:
The access network shall set this field \( n \) such that \( 2^{n/4} \) is the access
persistence probability that the access terminal is to use when
responding to this Page message. The access network shall not set
this field to 0x3f.

Reserved
The access network shall include Reserved bits to make the length of
the entire message equal to an integer number of octets. The access
network shall set these bits to ‘0’.

<table>
<thead>
<tr>
<th>Channels</th>
<th>CCsynSS</th>
<th>CCsubsyn</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td></td>
<td></td>
<td>Priority</td>
<td>20</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
<tr>
<td>RequestReason</td>
<td>4</td>
</tr>
<tr>
<td>PreferredChannelCount</td>
<td>5</td>
</tr>
</tbody>
</table>

PreferredChannelCount occurrences of the following field:

```
{
  PreferredChannel
  
  }
```

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreferTwoRevNBChannel</td>
<td>1</td>
</tr>
<tr>
<td>LowRateType</td>
<td>2</td>
</tr>
<tr>
<td>Reserved</td>
<td>0-7 (as needed)</td>
</tr>
</tbody>
</table>

MessageID
The access terminal shall set this field to 0x01.
TransactionID  The access terminal shall increment this value for each new ConnectionRequest message sent.

RequestReason  The access terminal shall set this field to one of the request reasons as shown in Table 3.5.6.2-1.

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

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>Access Terminal Initiated</td>
</tr>
<tr>
<td>0x1</td>
<td>Access Network Initiated</td>
</tr>
<tr>
<td></td>
<td>All other values are invalid</td>
</tr>
</tbody>
</table>

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

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

PreferredTwoRevNBChannel  The access terminal shall set this field to ‘0’ to request one (6.4 kHz) reverse link narrowband channel and to ‘1’ to request two (12.8 kHz) reverse link narrowband channels.

LowRateType  The access terminal shall set this field to one of the low data rates (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’.

Reserved  The access terminal shall add reserved bits to make the length of the entire message an integer number of octets. The access terminal shall set these bits to ‘0’. The access network shall ignore this field.

<table>
<thead>
<tr>
<th>Channels</th>
<th>AC</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.5.6.2.3 ConnectionDeny  The access network sends the ConnectionDeny message to deny a connection.
### Table 3.5.6.2-2. Encoding of the DenyReason Field

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>General</td>
</tr>
<tr>
<td>0x1</td>
<td>Network Busy</td>
</tr>
<tr>
<td>0x2</td>
<td>Authentication or billing failure</td>
</tr>
<tr>
<td>0x3</td>
<td>Preferred channel not available</td>
</tr>
<tr>
<td>0x4</td>
<td>Traffic Channel Assignment Pending</td>
</tr>
<tr>
<td></td>
<td>All other values are reserved</td>
</tr>
</tbody>
</table>

The access network shall set this field to 0x02.

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

The access network shall set this field to indicate the reason it is denying the connection, as shown in Table 3.5.6.2-2.

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

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

#### 3.5.6.2.4 AttributeUpdateRequest

The sender sends an AttributeUpdateRequest message to offer a set of attribute values for a given attribute.
**Field** | **Length (bits)**
---|---
MessageID | Protocol dependent
TransactionID | 8

One or more instances of the following record

**Field** | **Length (bits)**
---|---
AttributeRecord | Attribute dependent

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

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

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

| Channels | FTC | RTC | SLP | Reliable | Addressing | unicast | Priority | 40 |
---|---|---|---|---|---|---|---|---|

3.5.6.2.5 AttributeUpdateAccept

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

| Field | **Length (bits)**
---|---
MessageID | Protocol dependent
TransactionID | 8

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

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

| Channels | FTC | RTC | SLP | Reliable | Addressing | unicast | Priority | 40 |
---|---|---|---|---|---|---|---|---|

3.5.6.2.6 AttributeUpdateReject

The access network sends an AttributeUpdateReject message in response to an AttributeUpdateRequest message to reject the offered attribute values.
**Field** | **Length (bits)**
---|---
MessageID | Protocol dependent
TransactionID | 8

1. **MessageID**: The access network shall set this field to 0x54.
2. **TransactionID**: The access network shall set this value to the TransactionID field of the corresponding AttributeUpdateRequest message.

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td></td>
<td>unicast</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

3.5.6.3 Interface to Other Protocols

3.5.6.3.1 Commands Sent

This protocol issues the following commands:

- `RouteUpdate.Open` (access network only)
- `OverheadMessages.Activate`
- `OverheadMessages.Deactivate`
- `ControlChannelMAC.Activate`
- `ControlChannelMAC.Deactivate`

3.5.6.3.2 Indications

This protocol registers to receive the following indications:

- `RouteUpdate.ConnectionOpened`
- `RouteUpdate.ConnectionInitiated`
- `AccessChannelMAC.TxStarted`
- `AccessChannelMAC.TxEnded`
- `AccessChannelMAC.TransmissionSuccessful`
- `AccessChannelMAC.MACLayerCapsuleReceived`
- `AccessChannelMAC.TransmissionFailed`
- `OverheadMessages.Updated`
- `ConnectedState.ConnectionClosed`
- `RouteUpdate.ConnectionLost`
3.5.7 Configuration Attributes

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

- PreferredControlChannelCycle
- SlottedMode
- PagingMask
- AccessHashingClassMask
- PagingMask
- WakeCountUnitsSupported
- WakeCountUnits
- ConnectionQueuingSupported

The access terminal shall not include the AccessHashingClassMask in an AttributeUpdateRequest message. The access network shall not send an AttributeUpdateRequest message containing the PreferredControlChannelCycle, the PagingMask, WakeCountUnitsSupported, or the ConnectionQueuingSupported attribute.

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

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

3.5.7.1 Simple Attributes

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

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xff</td>
<td>SmallSlotCycleAllowed</td>
<td>0x00</td>
<td>Access terminal and access network will not propose a value of SlotCycle1 that is less than 0x06.</td>
</tr>
<tr>
<td>0x01</td>
<td></td>
<td></td>
<td>Access terminal and access network can propose a value of SlotCycle1 that is less than 0x06.</td>
</tr>
<tr>
<td>Attribute ID</td>
<td>Attribute</td>
<td>Values</td>
<td>Meaning</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>0xfe</td>
<td>AccessHashingClassMask</td>
<td>0x0000</td>
<td>Access terminal and access network will hash to channels with any access hashing class.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x0001 to 0xffff</td>
<td>Access terminal and access network will hash to channels with designated access hashing classes (see 3.5.6.1.6.1.1).</td>
</tr>
<tr>
<td>0xfd</td>
<td>ConnectionDenyBackoff</td>
<td>0x00-0x78</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x79-0xfe</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xfc</td>
<td>PageResponseAPersistenceSupported</td>
<td>0x00</td>
<td>Access terminal does not support PageResponseAPersistence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports PageResponseAPersistence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xfa</td>
<td>WakeCountUnitsSupported</td>
<td>0x00</td>
<td>Access terminal does not support negotiation of WakeCountUnits attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports negotiation of WakeCountUnits attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xf9</td>
<td>WakeCountUnits</td>
<td>0x18</td>
<td>Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01-0x17</td>
<td>Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
</tbody>
</table>
### Attribute ID

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xf3</td>
<td>ConnectionQueueingSupported</td>
<td>0x00</td>
<td>Access terminal does not support ConnectionRequest queuing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports ConnectionRequest queuing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

### 3.5.7.2 Complex Attributes

#### 3.5.7.2.1 PreferredControlChannelCycle Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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.

3.5.7.2.2 SlottedMode Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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
}
```

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 0x01.

ValueID

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

SlotCycle1

The sender shall set this field to SlotCycle1. The sender shall not set this field to more than 0x1c.

SlotCycle2

The sender shall set this field to SlotCycle2. SlotCycle2 shall be greater than or equal to SlotCycle1. The sender shall not set this field to more than 0x1c.

SlotCycle3

The sender shall set this field to SlotCycle3. SlotCycle3 shall be greater than or equal to SlotCycle2. The sender shall not set this field to more than 0x1c.

WakeCount1

The sender shall set this field to WakeCount1.

WakeCount2

The sender shall set this field to WakeCount2. WakeCount2 shall be greater or equal to than WakeCount1.
Reserved

The sender shall set this field to ‘0’. The receiver shall ignore this field.

3.5.7.3 PagingMask Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

One or more of the following record:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>MaskCount</td>
<td>8</td>
<td>0x00</td>
</tr>
</tbody>
</table>

MaskCount occurrences of the following four fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>MaskPurpose</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>PreMaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
<tr>
<td>MaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
<tr>
<td>PostMaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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 0x02.

ValueID

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

MaskCount

The sender shall set this field to the number of paging masks specified in this complex attribute.

MaskPurpose

The sender shall set this field to indicate the purpose of the mask according to Table 3.5.7.3-1.

<table>
<thead>
<tr>
<th>MaskPurpose Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>Unspecified purpose.</td>
</tr>
<tr>
<td>0x01</td>
<td>The paging mask is associated with monitoring the cdma2000 1x system (see [11]).</td>
</tr>
<tr>
<td>0x02-0xff</td>
<td>Specified by [18].</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>N_IDPType</td>
<td>Type field for this protocol</td>
<td>See [5]</td>
<td></td>
</tr>
<tr>
<td>N_IDPdHRPDS1</td>
<td>Subtype field for this protocol</td>
<td>0x0001</td>
<td></td>
</tr>
<tr>
<td>T_IDPATSetup</td>
<td>Maximum access terminal time in the Connection Setup State</td>
<td>2.5 seconds</td>
<td></td>
</tr>
<tr>
<td>T_IDPANSetup</td>
<td>Maximum access network time in the Connection Setup State</td>
<td>1 second</td>
<td></td>
</tr>
</tbody>
</table>

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 xHRPD Subtype 2 Idle State Protocol

3.6.1 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 3.6.1-1 and Figure 3.6.1-2.
This protocol supports periodic network monitoring by the access terminal, allowing for significant power savings. The following access terminal operation modes are supported:

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

\[Figure 3.6.1-1. \text{xHRPD Subtype 2 Idle State Protocol State Diagram (Access Terminal)}\]

\[Figure 3.6.1-2. \text{xHRPD Subtype 2 Idle State Protocol State Diagram (Access Network)}\]
Suspended mode operation, in which the access terminal monitors the Control Channel continuously for a period of time and then proceeds to operate in the slotted mode. Suspended mode follows operation in the Air-Link Management Protocol Connected State and allows for quick network-initiated reconnection.

Slotted mode operation, in which the access terminal monitors only selected slots. This protocol supports two types of connection set-ups:

- Normal setup: this procedure is always performed at the initiative of the access terminal. It consists of the access terminal sending a ConnectionRequest message which in turn causes the lower layers to open the connection. The Connection Setup State contains the requirements for normal setup.

- Fast Connect: this procedure is always performed at the initiative of the access network and consists of the access network opening the connection directly via a RouteUpdate.Open command. Fast Connect eliminates the need for the Page / ConnectionRequest exchange when the access network has pending data to transmit to an access terminal, and is especially useful when the access terminal is in suspended mode. Support for Fast Connect at the access network is optional. Support for Fast Connect at the access terminal is mandatory. The Monitor State contains the requirements for Fast Connect.

3.6.2 Primitives and Public Data

3.6.2.1 Commands
This protocol defines the following commands:

- Activate
- Deactivate
- OpenConnection
- Close

3.6.2.2 Return Indications
This protocol returns the following indications:

- ConnectionOpened
- ConnectionFailed

3.6.2.3 Public Data
This protocol shall make the following data public:

30 The access network may transmit a Page message to the access terminal directing it to initiate the procedure.

31 This command triggers a transmission of a TrafficChannelAssignment message based on the last RouteUpdate message received from the access terminal.
• Subtype for this protocol
• PageResponseAPersistence

3.6.3 Protocol Data Unit
The transmission unit of this protocol is a message. This is a control protocol; and, therefore, it does not carry payload on behalf of other layers or protocols.
This protocol uses the Signaling Application to transmit and receive messages.

3.6.4 Protocol Initialization

3.6.4.1 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:
• 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.

3.6.4.2 Protocol Initialization for the InUse Protocol Instance
Upon creation, the InUse instance of this protocol in the access terminal and 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 shall enter the Inactive State.

3.6.5 Procedures and Messages for the InConfiguration Instance of the Protocol

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

3.6.5.2 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 any of the Connection Layer protocols does not have the same subtype as the corresponding InConfiguration protocol instance, then
  - the access terminal shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Inactive State.
  - the access network shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Sleep State.
• 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, and
  - 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 and the access network shall perform the following:
  - The InConfiguration protocol instance shall become the InUse protocol instance for the Idle State Protocol at the access terminal and the access network.

All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

3.6.5.3 Message Formats

3.6.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

MessageID
The sender shall set this field to 0x50.

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

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

The ConfigurationResponse message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord | Attribute dependent |

MessageID
The sender shall set this field to 0x51.

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

AttributeRecord
An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [6]. The sender shall not include more than one attribute record with the same attribute identifier.

3.6.6 Procedures and Messages for the InUse Instance of the Protocol

3.6.6.1 Procedures

3.6.6.1.1 Command Processing

3.6.6.1.1.1 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.\(^{32}\)

---

\(^{32}\) 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.
If the protocol receives this command in any other state it shall be ignored.

3.6.6.1.2 Deactivate

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

When the protocol receives this command in any other state:

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

3.6.6.1.3 OpenConnection

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

When the protocol receives this command in the Sleep State:

- The access terminal shall transition to the Monitor state and perform the procedures in 3.6.6.1.2 for sending a ConnectionRequest message.
- The access network shall queue the command and execute it when it is in the Monitor State.

When the protocol receives this command in the Monitor State:

- The access terminal shall perform the procedures in 3.6.6.1.2 for sending a ConnectionRequest message.
- The access network shall send a Page using Page message or MultiATPage message to the access terminal and transition to the Connection Setup State.

3.6.6.1.4 Close

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

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

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

3.6.6.1.2 Access Terminal Procedures for Sending a ConnectionRequest Message

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

- If the access terminal received a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, then the access terminal shall not send the ConnectionRequest message on the sector where the access terminal received the ConnectionDeny message until the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.
• If the access terminal invokes these procedures in response to an access terminal-initiated event and the ConnectionDenyBackoff attribute is set to a value in the range 0x00 to 0x78, then the access terminal should perform the following:
  
  - If the access terminal determines that the number of control channel cycles that have passed since receiving a ConnectionDeny message with DenyReason set to 0x01 is less than the value of the ConnectionDenyBackoff attribute, then the access terminal shall postpone sending the ConnectionRequest message until the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the ConnectionDenyBackoff attribute.

• Send a ConnectionRequest message,

• If an AccessChannelMAC.TransmissionSuccessful indication is received, it shall transition to the Connection Setup State,

• If an AccessChannelMAC.TransmissionFailed indication is received, it shall return a ConnectionFailed indication.

• If an AccessChannelMAC.SBACTransmissionFailed indication is received, it shall return a ConnectionFailed indication.

3.6.6.1.3 T_{12} and T_{23} Computation

The access terminal shall compute T_{12} and T_{23} when an AccessChannelMAC.TransmissionSuccessful indication or a ConnectedState.ConnectionClosed indication is received. The access network shall compute T_{12} and T_{23} when an AccessChannelMAC.MACLayerCapsuleReceived indication, a ConnectedState.ConnectionClosed, or a RouteUpdate.ConnectionLost indication is received.

The access terminal and the access network shall compute T_{12} and T_{23} as follows:

\[
T_{12} = T_c + \text{PagePeriod} 1 - \left[ \left( T_c + 256 \times R \right) \mod \text{PagePeriod} 1 \right] + \text{PagePeriod} 1 \times \left[ \text{WCU} \times (\text{WakeCount1} + 1) - 1 \right]
\]

\[
T_{23} = T_{12} + \text{PagePeriod} 2 - \left[ \left( T_{12} + 256 \times R \right) \mod \text{PagePeriod} 2 \right] + \text{PagePeriod} 2 \times \left[ \text{WCU} \times (\text{WakeCount2} + 1) - 1 \right]
\]

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

3.6.6.1.4 Inactive State

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

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

3.6.6.1.5 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 3.6.6.1.2 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 sub-synchronous capsule or the synchronous capsule sent at time $T$ satisfying the following condition:

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

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

  $R$ shall be 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:
    - $\text{Key} = \text{SessionSeed}$
    - $\text{Decorrelate} = 6 \times \text{SessionSeed}[11:0]$
    - $N = \text{Max}(\text{Period3}/256, 1)$
    - where SessionSeed is given as public data of the Address Management Protocol.
  - If PreferredControlChannelCycleEnabled is equal to '1', then $R$ is set to PreferredControlChannelCycle.

  Period shall be computed as follows:

  $$\text{Period} = \begin{cases} 
  \text{Period1,} & \text{CDMASystemTime in slots} < T_{12} \\
  \text{Period2,} & T_{12} \leq \text{CDMASystemTime in slots} < T_{23} \\
  \text{Period3,} & \text{Otherwise}
  \end{cases}$$

  The access network and the access terminal shall compute Periodi according to Table 3.6.6.1.5-1.
### Table 3.6.6.1.5-1. Computation of Period from SlotCycle

<table>
<thead>
<tr>
<th>SlotCyclei</th>
<th>Periodi</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00 to 0x06</td>
<td>(2^{\text{SlotCyclei}} \times 4) slots</td>
</tr>
<tr>
<td>0x07 to 0x1c</td>
<td>(2^{(\text{SlotCyclei} - 0x7)} \times 768) slots</td>
</tr>
</tbody>
</table>

### 3.6.6.1.6 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 3.6.7.3).

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:

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

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

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:

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

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

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

### 3.6.6.1.6.1 Access Terminal Requirements

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

- \textit{OverheadMessages.Activate}
- \textit{ControlChannelMAC.Activate}

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

- If the access terminal has queued an \textit{OverheadMessages.Updated} indication or upon receiving an \textit{OverheadMessages.Updated} indication, the access terminal shall tune to the CDMA Channel selected as specified in \[\Box\].
• If the access terminal entered Monitor State to receive the synchronous capsule, it shall
  monitor the overhead messages as specified in the Overhead Messages.
• If the access terminal receives a Page message, it shall perform the procedures in
  3.6.6.1.2 for sending a ConnectionRequest message.
• If the access terminal receives a MultiATPage message, it shall perform the procedures
  in 3.6.6.1.2 for sending a ConnectionRequest message if all of the following conditions
  are met:
    – The MultiATPageMessageSupported attribute is set to 0x01, and
    – One of the UATI in the MultiATPage message (included using UATImsb and
      UATIlsb fields) matches any member of the Address Management Protocol’s
      ReceiveATIList with ATIType set to ‘10’ (i.e., UATI).
• If the access terminal requires opening a connection, it shall perform the procedures in
  3.6.6.1.2 for sending a ConnectionRequest message.
• If the access terminal receives a RouteUpdate.ConnectionInitiated indication it shall:
    – If the access terminal had previously received a ConnectionDeny message with
      the DenyReason set to ‘Traffic Channel Assignment Pending’, then the access
      terminal shall reset TCAPendingDuration to zero, and
    – transition to the Connection Setup State.\(^{33}\)
• Access terminal may transition to the Sleep State if the requirements specified in
  3.6.6.1.6.1.2 are satisfied.
• If the access terminal had previously received a ConnectionDeny message with the
  DenyReason set to ‘Traffic Channel Assignment Pending’, and if the number of control
  channel cycles since receiving the ConnectionDeny message is greater than or equal to
  the value specified by the TCAPendingDuration, then the access terminal shall return a
  ConnectionFailed indication.

3.6.6.1.6.1.1 CDMA Channel Selection

The access terminal shall select a CDMA Channel from the list of channels or extended
channels in the SectorParameters message. If no channels or extended 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 a hash function (see [6]) to compute
an index into the subset of a subset of advertised CDMA Channels according to the
following procedures.
The access terminal shall create a combined channel list as follows:

\(^{33}\) This requirement provides Fast Connect on the access terminal side.
If the extended channel list is included in the SectorParameters message, the access terminal shall create a combined channel list by appending each CDMA Channel in the extended channel list (in order) to the set of CDMA Channels in the channel list (in order). Otherwise, the access terminal shall set the combined channel list to the set of CDMA Channels in the channel list.

If the SupportedCDMAChannels public data of the Route Update Protocol lists any channels, then the access terminal shall remove from the combined channel list the following CDMA Channels:

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

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

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

  - $N_i$ is equal to $N_{\text{max}}$, where $i$ is the index of the CDMA Channel in the combined channel list,
    
    $$N_j = \text{bitcount}(\text{AccessHashingClassMask}[\text{AccessHashingMaskLength}:0] \otimes M_j),$$
    
    where $M_j$ is the AccessHashingChannelMask field in the SectorParameters message corresponding to the $j^{th}$ CDMA Channel in the combined channel list;
    
    $N_{\text{max}}$ is the maximum value of $N_k$ for all $k$, where $k$ is the index of the CDMA Channel in the combined channel list; and
    
    bitcount$(x)$ is the number of ‘1’ bits in the binary representation of $x$.

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

- $\text{Key} = \text{SessionSeed}$
- $\text{Decorrelate} = 0$
- $N = \text{Number of CDMA Channels in set } S$

where SessionSeed is provided as public data by the Address Management Protocol.
3.6.6.1.6.1.2 Transition to Sleep State

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

- One of the following requirements is met:
  - The access terminal entered the Monitor State to receive the synchronous capsule and has received a Control Channel synchronous Sleep State capsule in the current Control Channel Cycle and has determined that the SectorParameters message is up to date. The current Control Channel Cycle is defined to be the Control Channel Cycle that started at slot $T/256$, where $T$ is the current CDMA System Time in slots.
  - The access terminal entered the Monitor State to receive a sub-synchronous capsule, and has received the sub-synchronous capsule, or did not receive the sub-synchronous capsule in the expected slots.
  - The access terminal entered the Monitor State as a result of receiving a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.
  - Access terminal received an AccessChannelMAC.TxEnded indication for every AccessChannelMAC.TxStarted indication it received since entering the Monitor State.\(^\text{34}\)
  - Access terminal has not advertised a suspend period that is current (see 3.8). The suspend period is current if the time advertised in the associated ConnectionClose message is greater than the current CDMA System Time.\(^\text{35}\)

3.6.6.1.6.2 Access Network Requirements

3.6.6.1.6.2.1 General Requirements

- Access network shall select the CDMA Channel following the same specifications as the access terminal, see 3.6.6.1.6.1.1.
- If the access network receives a ConnectionRequest message, it shall transition to the Connection Setup State.
- If the MultiATPageMessageSupported attribute is set to 0x00, then the access network shall not send MultiATPage message to page this access terminal.

---

\(^{34}\)This pairing ensures that the access terminal does not have any outstanding messages waiting for an answer.

\(^{35}\)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.
- If the access network requires opening a connection with the access terminal and does not use an accelerated procedure to set-up a connection, the access network shall send a Page message or a MultiATPage to the access terminal over the Control Channel.

- Access network may use an accelerated procedure to set-up a connection with the access terminal by bypassing the paging process. The access network should only use this procedure if it has a reasonable estimate of the access terminal's current location. To set-up a connection in an accelerated fashion (Fast Connect) the access network shall:
  - If the access network had previously sent a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control channel cycles since sending the ConnectionDeny message is less the value specified by the TCAPendingDuration, then the access network shall reset TCAPendingDuration to zero.
  - Issue a RouteUpdate.Open command.
  - Transition to the Connection Setup State, when the protocol receives a RouteUpdate.ConnectionInitiated indication.

- Access network shall transition to the Sleep State if all of the following conditions are met:
  - the access terminal did not advertise a suspend period that is current.
  - The access network entered the Monitor State as a result of sending a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control channel cycles since sending the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.

- If the access network had previously sent a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control channel cycles since sending the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration, then the access network shall return a ConnectionFailed indication.

3.6.6.1.7 Connection Setup State

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

Figure 3.5.6.1.7-1 illustrates the process of opening a connection between the access terminal and the access network when this protocol is used along with the default Route Update and the default Reverse Traffic Channel MAC protocols.\(^\text{36}\)

\(^{36}\) The Fast Connect message exchange is identical except for not having the Idle State Protocol ConnectionRequest message and the Route Update Protocol RouteUpdate message.
Upon entering the Connection Setup State the access terminal shall:

- Issue an `OverheadMessages.Activate` command,
- Issue a `ControlChannelMAC.Activate` command,
- Set a state timer for $T_{IDPATSetup}$ seconds,
- If the access terminal receives a ConnectionDeny message with the DenyReason not included, or included and is not set to 'Traffic Channel Assignment Pending', the access terminal shall return a `ConnectionFailed` indication,
- If the access terminal receives a ConnectionDeny message with the DenyReason set to 'Traffic Channel Assignment Pending', then the access terminal shall transition to the Monitor state,
- If the state timer expires, the access terminal shall return a `ConnectionFailed` indication,
- If the access terminal receives a `RouteUpdate.ConnectionOpened` indication, it shall return a `ConnectionOpened` indication and transition to the Inactive State.
3.6.6.1.7.2 Access Network Requirements

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

If all of the following conditions are met:

- The traffic channel resource is not available,
- The ConnectionQueuingSupported attribute is set to ‘0x01’, and
- One of the following conditions is met:
  - The received ConnectionRequest message has the ConnectionQueuingReq field set to ‘1’, or
  - The access network determines that queuing should be applied\(^{37}\),

then the access network should:

- Send ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’,
- Queue the ConnectionRequest for TCAPendingDuration in units of number of control channel cycles after sending the ConnectionDeny message, and
- Transition to the Monitor state

The access network shall not send ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’ if the ConnectionQueuingSupported attribute is set to ‘0x00’.

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

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

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

- Set state timer for \( T_{IDPANSetup} \) seconds.
- If the protocol receives a *RouteUpdate.ConnectionOpened* indication, the access network shall return a *ConnectionOpened* indication and transition to the Inactive State.
- If the state timer expires, the access network shall return a *ConnectionFailed* indication and shall transition to the Sleep State.

\(^{37}\) The ConnectionRequest Queuing function is enabled when the priority treatment is required by the application service such as the priority service
Otherwise, the access network shall perform the following:

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

- If the access network denies the connection request, it should send the access terminal a ConnectionDeny message, shall return a ConnectionFailed indication, and shall transition to the Sleep State.

- Otherwise, the access network shall perform the following:
  - Set state timer for $T_{IDPAN\text{Setup}}$ seconds.
  - Issue a $\text{RouteUpdate.Open}$ command.
  - If the protocol receives a $\text{RouteUpdate.ConnectionOpened}$ indication, the access network shall return a $\text{ConnectionOpened}$ indication and transition to the Inactive State.
  - If the state timer expires, the access network shall return a ConnectionFailed indication and shall transition to the Sleep State.

- If the access network did not enter this state as a result of receiving a ConnectionRequest message, and if the access network does not receive a ConnectionRequest message within an implementation dependent time interval, then the access network shall return a ConnectionFailed indication, and shall transition to the Sleep State.

3.6.6.2 Message Formats

3.6.6.2.1 Page

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>PageResponseAPersistenceIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>PageResponseAPersistence</td>
<td>0 or 6</td>
</tr>
<tr>
<td>Reserved</td>
<td>0 – 7 (as needed)</td>
</tr>
</tbody>
</table>

MessageID

The access network shall set this field to 0x00.

PageResponseAPersistenceIncluded

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

The access network shall set this field to ‘0’ if the PageResponseAPersistenceSupported attribute is set to 0x00.
Otherwise, the access network shall set this field as follows:
The access network shall set this field to ‘1’ if the PageResponseAPersistence field is included in this message. Otherwise, the access network shall set this field to ‘0’.

PageResponseAPersistence
The access network shall omit this field if the PageResponseAPersistenceIncluded is not included, or if the PageResponseAPersistenceIncluded field is included and set to ‘0’. Otherwise, the access network shall include this field and set it as follows:
The access network shall set this field \( n \) such that \( 2^{n/4} \) is the access persistence probability that the access terminal is to use when responding to this Page message. The access network shall not set this field to 0x3f.

Reserved
The access network shall include Reserved bits to make the length of the entire message equal to an integer number of octets. The access network shall set these bits to ‘0’.

<table>
<thead>
<tr>
<th>Channels</th>
<th>Addressing</th>
<th>SLP</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCsynSS</td>
<td>unicast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCsubsyn</td>
<td></td>
<td>SLP</td>
<td>Priority</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Best Effort</td>
<td>20</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
<tr>
<td>RequestReason</td>
<td>4</td>
</tr>
<tr>
<td>PreferredChannelCount</td>
<td>5</td>
</tr>
</tbody>
</table>

PreferredChannelCount occurrences of the following field:
{
  PreferredChannel
  24
}

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

MessageID
The access terminal shall set this field to 0x01.
TransactionID          The access terminal shall increment this value for each new ConnectionRequest message sent.

RequestReason         The access terminal shall set this field to one of the request reasons as shown in Table 3.6.6.2-1.

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>Access Terminal Initiated</td>
</tr>
<tr>
<td>0x1</td>
<td>Access Network Initiated</td>
</tr>
<tr>
<td>All other values are invalid</td>
<td></td>
</tr>
</tbody>
</table>

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

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

PreferTwoRevNBChannel The access terminal shall set this field to ‘0’ to request one (6.4 kHz) reverse link narrowband channel and to ‘1’ to request two (12.8 kHz) reverse link narrowband channels.

LowRateType          The access terminal shall set this field to one of the low data rates (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’.

Reserved             The access terminal shall add reserved bits to make the length of the entire message an integer number of octets. The access terminal shall set these bits to ‘0’. The access network shall ignore this field.

<table>
<thead>
<tr>
<th>Channels</th>
<th>AC</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.6.6.2.3 ConnectionDeny The access network sends the ConnectionDeny message to deny a connection.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
<tr>
<td>DenyReason</td>
<td>4</td>
</tr>
<tr>
<td>TCAPendingDuration</td>
<td>0 or 6</td>
</tr>
<tr>
<td>Reserved</td>
<td>0-7 (as needed)</td>
</tr>
</tbody>
</table>

1. **MessageID** The access network shall set this field to 0x02.

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

3. **DenyReason** The access network shall set this field to indicate the reason it is denying the connection, as shown in Table 3.6.6.2-2.

4. **Table 3.6.6.2-2. Encoding of the DenyReason Field**

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>General</td>
</tr>
<tr>
<td>0x1</td>
<td>Network Busy</td>
</tr>
<tr>
<td>0x2</td>
<td>Authentication or billing failure</td>
</tr>
<tr>
<td>0x3</td>
<td>Preferred channel not available</td>
</tr>
<tr>
<td>0x4</td>
<td>Traffic Channel Assignment Pending</td>
</tr>
<tr>
<td>All other values are reserved</td>
<td></td>
</tr>
</tbody>
</table>

5. **TCAPendingDuration** The access network shall include this field if DenyReason field is included and is set to 0x04 (Traffic Channel Assignment Pending). If this field is included, the access network shall set this field to the pending duration in units of control channel cycles.

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

7. **Channels**

<table>
<thead>
<tr>
<th>Addressing</th>
<th>CC</th>
<th>SLP</th>
<th>Priority</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>unicast</td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

8. **3.6.6.2.4 AttributeUpdateRequest**

The sender sends an AttributeUpdateRequest message to offer a set of attribute values for a given attribute.
### Field Length (bits)

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>Protocol dependent</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

One or more instances of the following record

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AttributeRecord</td>
<td>Attribute dependent</td>
</tr>
</tbody>
</table>

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

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
<th>Addressing</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>unicast</td>
<td>40</td>
</tr>
</tbody>
</table>

#### 3.6.6.2.5 MultiATPage

The access network sends the MultiATPage message to direct multiple access terminals to request a connection.
### Field Table

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>NumUATImsb</td>
<td>5</td>
</tr>
</tbody>
</table>

(NumUATImsb + 1) occurrences of the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UATImsbLength</td>
<td>5</td>
</tr>
<tr>
<td>UATImsb</td>
<td>(UATImsbLength + 1)</td>
</tr>
<tr>
<td>NumPagesWithUATImsb</td>
<td>6</td>
</tr>
</tbody>
</table>

(NumPagesWithUATImsb + 1) occurrences of the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UATIlsb</td>
<td>32- (UATImsbLength + 1)</td>
</tr>
<tr>
<td>PageResponseAPersistenceIncluded</td>
<td>1</td>
</tr>
<tr>
<td>PageResponseAPersistence</td>
<td>0 or 6</td>
</tr>
</tbody>
</table>

Reserved: 0 – 7 (as needed)

1. **MessageID**: The access network shall set this field to 0x04.
2. **NumUATImsb**: The access network shall set this field to one less than the number of UATI MSBs included in this message.
3. **UATImsbLength**: The access network shall set this field to one less than the length of the UATImsb field in bits.
4. **UATImsb**: The access network shall set this field to the MSBs of the UATIs that are paged using this message.
5. **NumPagesWithUATImsb**: The access network shall set this field to one less than the number of the UATIlsb fields included for the corresponding UATImsb field.
6. **UATIlsb**: The access network shall set this field to the LSBs of the UATI that is paged using this message.
7. **PageResponseAPersistenceIncluded**: The access network shall set this field as follows:
   - The access network shall set this field to ‘0’ if the PageResponseAPersistenceSupported attribute is set to 0x00.
   - Otherwise, the access network shall set this field as follows:
   - The access network shall set this field to ‘1’ if the
PageResponseAPersistence field is included in this message. Otherwise, the access network shall set this field to ‘0’.

PageResponseAPersistence
The access network shall omit this field if the PageResponseAPersistenceIncluded field is set to ‘0’. Otherwise, the access network shall include this field and set it as follows:
The access network shall set this field $n$ such that $2^{n/4}$ is the access persistence probability that the access terminal is to use when responding to this Page message. The access network shall not set this field to 0x3f.

Reserved
The access network shall include Reserved bits to make the length of the entire message equal to an integer number of octets. The access network shall set these bits to ‘0’.

<table>
<thead>
<tr>
<th>Channels</th>
<th>CCsynSS</th>
<th>CCsubsyn</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>broadcast</td>
<td>Priority</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>Protocol dependent</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

MessageID
The sender shall set this field to 0x53.

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td>Priority</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

3.6.6.2.7 AttributeUpdateReject
The access network sends an AttributeUpdateReject message in response to an AttributeUpdateRequest message to reject the offered attribute values.
### 3.6.6.3 Interface to Other Protocols

#### 3.6.6.3.1 Commands Sent

This protocol issues the following commands:

- `RouteUpdate.Open` (access network only)
- `OverheadMessages.Activate`
- `OverheadMessages.Deactivate`
- `ControlChannelMAC.Activate`
- `ControlChannelMAC.Deactivate`

#### 3.6.6.3.2 Indications

This protocol registers to receive the following indications:

- `RouteUpdate.ConnectionOpened`
- `RouteUpdate.ConnectionInitiated`
- `AccessChannelMAC.TxStarted`
- `AccessChannelMAC.TxEnded`
- `AccessChannelMAC.TransmissionSuccessful`
- `AccessChannelMAC.MACLayerCapsuleReceived`
- `AccessChannelMAC.TransmissionFailed`
- `AccessChannelMAC.SBACTransmissionFailed`
- `OverheadMessages.Updated`
- `ConnectedState.ConnectionClosed`
- `RouteUpdate.ConnectionLost`

---

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>Protocol dependent</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>SLP</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td>Reliable</td>
<td>40</td>
</tr>
</tbody>
</table>
3.6.7 Configuration Attributes

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

- PreferredControlChannelCycle
- SlottedMode
- PagingMask
- AccessHashingClassMask
- WakeCountUnitsSupported
- WakeCountUnits
- ConnectionQueuingSupported
- MultiATPageMessageSupported

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

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

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

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

3.6.7.1 Simple Attributes

The simple configurable attributes are listed in Table 3.6.7.1-1. The access network and the access terminal shall use the default values that are typed in **bold italics**.

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xff</td>
<td>SmallSlotCycleAllowed</td>
<td>0x00</td>
<td>Access terminal and access network will not propose a value of SlotCycle1 that is less than 0x06.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>0x01</strong></td>
<td>Access terminal and access network can propose a value of SlotCycle1 that is less than 0x06.</td>
</tr>
<tr>
<td>Attribute ID</td>
<td>Attribute</td>
<td>Values</td>
<td>Meaning</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>0xfe</td>
<td>AccessHashingClassMask</td>
<td>0x0000</td>
<td>Access terminal and access network will hash to channels with any access hashing class.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x0001 to 0xffff</td>
<td>Access terminal and access network will hash to channels with designated access hashing classes (see 3.5.6.1.6.1.1).</td>
</tr>
<tr>
<td>0xfd</td>
<td>ConnectionDenyBackoff</td>
<td>0x00-0x78</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x79-0xff</td>
<td>Reserved</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0xff</td>
<td>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.</td>
</tr>
<tr>
<td>0xfc</td>
<td>PageResponseAPersistenceSupported</td>
<td>0x00</td>
<td>Access terminal does not support PageResponseAPersistence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports PageResponseAPersistence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xfb</td>
<td>MultiATPageMessageSupported</td>
<td>0x00</td>
<td>Access terminal does not support MultiATPage message.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports MultiATPage message.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xfa</td>
<td>WakeCountUnitsSupported</td>
<td>0x00</td>
<td>Access terminal does not support negotiation of WakeCountUnits attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports negotiation of WakeCountUnits attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>Attribute ID</td>
<td>Attribute</td>
<td>Values</td>
<td>Meaning</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------</td>
<td>--------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>0xf9</td>
<td>WakeCountUnits</td>
<td>0x18</td>
<td>Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01-0x17</td>
<td>Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xf3</td>
<td>ConnectionQueuingSupported</td>
<td>0x00</td>
<td>Access terminal does not support ConnectionRequest queuing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports ConnectionRequest queuing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

3.6.7.2 Complex Attributes

3.6.7.2.1 PreferredControlChannelCycle Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

One or more of the following attribute value record:

`{`

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>PreferredControlChannelCycleEnabled</td>
<td>1</td>
<td>‘0’</td>
</tr>
<tr>
<td>PreferredControlChannelCycle</td>
<td>0 or 15</td>
<td>N/A</td>
</tr>
<tr>
<td>Reserved</td>
<td>7 or 0</td>
<td>N/A</td>
</tr>
</tbody>
</table>

`}`

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.

### 3.6.7.2.2 SlottedMode Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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
}
```

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 0x01.

ValueID

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

SlotCycle1

The sender shall set this field to SlotCycle1. The sender shall not set this field to more than 0x1c.

SlotCycle2

The sender shall set this field to SlotCycle2. SlotCycle2 shall be greater than or equal to SlotCycle1. The sender shall not set this field to more than 0x1c.
SlotCycle3  The sender shall set this field to SlotCycle3. SlotCycle3 shall be greater than or equal to SlotCycle2. The sender shall not set this field to more than 0x1c.

WakeCount1  The sender shall set this field to WakeCount1.

WakeCount2  The sender shall set this field to WakeCount2. WakeCount2 shall be greater or equal to than WakeCount1.

Reserved  The sender shall set this field to ‘0’. The receiver shall ignore this field.

### 3.6.7.3 PagingMask Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

One or more of the following record:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>MaskCount</td>
<td>8</td>
<td>0x00</td>
</tr>
</tbody>
</table>

MaskCount occurrences of the following four fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>MaskPurpose</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>PreMaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
<tr>
<td>MaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
<tr>
<td>PostMaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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 0x02.

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

MaskCount  The sender shall set this field to the number of paging masks specified in this complex attribute.

MaskPurpose  The sender shall set this field to indicate the purpose of the mask according to Table 3.6.7.3-1.
### Table 3.6.7.3-1. Definition of MaskPurpose Field of a Paging Mask

<table>
<thead>
<tr>
<th>MaskPurpose Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>Unspecified purpose.</td>
</tr>
<tr>
<td>0x01</td>
<td>The paging mask is associated with monitoring the cdma2000 1x system (see [11]).</td>
</tr>
<tr>
<td>0x02-0xff</td>
<td>Specified by [18].</td>
</tr>
</tbody>
</table>

- **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.

### 3.6.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>N_IDPType</td>
<td>Type field for this protocol</td>
<td>See [5]</td>
<td></td>
</tr>
<tr>
<td>N_IDPwHRPDS1</td>
<td>Subtype field for this protocol</td>
<td>0x0001</td>
<td></td>
</tr>
<tr>
<td>T_IDPATSsetup</td>
<td>Maximum access terminal time in the</td>
<td>2.5 seconds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection Setup State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T_IDPANsetup</td>
<td>Maximum access network time in the</td>
<td>1 second</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection Setup State</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.6.9 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.

### 3.7 xHRPD Subtype 3 Idle State Protocol

#### 3.7.1 Overview

The xHRPD Subtype 3 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 3.7.1-1 and Figure 3.7.1-2.

**Figure 3.7.1-1. xHRPD Subtype 3 Idle State Protocol State Diagram (Access Terminal)**
Figure 3.7.1-2. xHRPD Subtype 3 Idle State Protocol State Diagram (Access Network)

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

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

- Suspended mode operation, in which the access terminal monitors the Control Channel continuously for a period of time and then proceeds to operate in the slotted mode. Suspended mode follows operation in the Air-Link Management Protocol Connected State and allows for quick network-initiated reconnection.

- Slotted mode operation, in which the access terminal monitors only selected slots.

This protocol supports two types of connection set-ups:

- Normal setup: this procedure is always performed at the initiative of the access terminal.\(^{38}\) It consists of the access terminal sending a ConnectionRequest message which in turn causes the lower layers to open the connection. The Connection Setup State contains the requirements for normal setup.

---

\(^{38}\) The access network may transmit a Page message to the access terminal directing it to initiate the procedure.
Fast Connect: this procedure is always performed at the initiative of the access network and consists of the access network opening the connection directly via a \textit{RouteUpdate.Open} command. Fast Connect eliminates the need for the Page / ConnectionRequest exchange when the access network has pending data to transmit to an access terminal, and is especially useful when the access terminal is in suspended mode. Support for Fast Connect at the access network is optional. Support for Fast Connect at the access terminal is mandatory. The Monitor State contains the requirements for Fast Connect.

3.7.2 Primitives and Public Data

3.7.2.1 Commands

This protocol defines the following commands:

- \textit{Activate}
- \textit{Deactivate}
- \textit{OpenConnection}
- \textit{Close}

3.7.2.2 Return Indications

This protocol returns the following indications:

- \textit{ConnectionOpened}
- \textit{ConnectionFailed}

3.7.2.3 Public Data

This protocol shall make the following data public:

- Subtype for this protocol
- PageResponseAPersistence

3.7.3 Protocol Data Unit

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

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

\[39\] This command triggers a transmission of a TrafficChannelAssignment message based on the last RouteUpdate message received from the access terminal.
3.7.4 Protocol Initialization

3.7.4.1 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.

3.7.4.2 Protocol Initialization for the InUse Protocol Instance

Upon creation, the InUse instance of this protocol in the access terminal and 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 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 [1]) to define the processing of the configuration messages.

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.
- If the InUse instance of any of the Connection Layer protocols does not have the same subtype as the corresponding InConfiguration protocol instance, then
  - the access terminal shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Inactive State.
  - the access network shall set the initial state of the InConfiguration and InUse protocol instances of the Idle State protocol to the Sleep State.
- 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, and

- 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 and the access network shall perform the following:
  - The InConfiguration protocol instance shall become the InUse protocol instance for the Idle State Protocol at the access terminal and the access network.

- All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

3.7.5.3 Message Formats

3.7.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

MessageID
The sender shall set this field to 0x50.

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.7.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:
Connection Layer

### Field Length (bits)

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

<table>
<thead>
<tr>
<th>AttributeRecord</th>
<th>Attribute dependent</th>
</tr>
</thead>
</table>

**MessageID**

The sender shall set this field to 0x51.

**TransactionID**

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

**AttributeRecord**

An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [6]. The sender shall not include more than one attribute record with the same attribute identifier.

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.7.6 Procedures and Messages for the InUse Instance of the Protocol

3.7.6.1 Procedures

3.7.6.1.1 Command Processing

**3.7.6.1.1 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.

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

**3.7.6.1.2 Deactivate**

When the protocol receives a *Deactivate* command in the Inactive State it shall be ignored. When the protocol receives this command in any other state:

- The access terminal shall transition to the Inactive State.

---

40 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.
3.7.6.1.3 OpenConnection

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

When the protocol receives this command in the Sleep State:

- The access terminal shall transition to the Monitor state and perform the procedures in 3.7.6.1.2 for sending a ConnectionRequest message.
- The access network shall queue the command and execute it when it is in the Monitor State.

When the protocol receives this command in the Monitor State:

- The access terminal shall perform the following:
  - If the AT class based access control is supported and enabled, and the corresponding bit in the ACBitmap field is set to '0', the access terminal shall block the request to open a connection.
  - Otherwise, the access terminal shall invoke the procedures in 3.7.6.1.2 for sending a ConnectionRequest message.
- The access network shall send a Page using Page message or MultiATPage message to the access terminal and transition to the Connection Setup State.

3.7.6.1.4 Close

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

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

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

3.7.6.1.2 Access Terminal Procedures for Sending a ConnectionRequest Message

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

- If the access terminal received a ConnectionDeny message with the DenyReason set to 'Traffic Channel Assignment Pending', then the access terminal shall not send the ConnectionRequest message on the sector where the access terminal received the ConnectionDeny message until the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.
- If the access terminal invokes these procedures in response to an access terminal-initiated event and the ConnectionDenyBackoff attribute is set to a value in the range 0x00 to 0x78, then the access terminal should perform the following:
- If the access terminal determines that the number of control channel cycles that have passed since receiving a ConnectionDeny message with DenyReason set to 0x01 is less than the value of the ConnectionDenyBackoff attribute, then the access terminal shall postpone sending the ConnectionRequest message until the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the ConnectionDenyBackoff attribute.

- Send a ConnectionRequest message,
- If an AccessChannelMAC.TransmissionSuccessful indication is received, it shall transition to the Connection Setup State,
- If an AccessChannelMAC.TransmissionFailed indication is received, it shall return a ConnectionFailed indication.
- If an AccessChannelMAC.SBACTransmissionFailed indication is received, it shall return a ConnectionFailed indication.

3.7.6.1.3 T\textsubscript{12} and T\textsubscript{23} Computation

The access terminal shall compute T\textsubscript{12} and T\textsubscript{23} when an AccessChannelMAC.TransmissionSuccessful indication or a ConnectedState.ConnectionClosed indication is received. The access network shall compute T\textsubscript{12} and T\textsubscript{23} when an AccessChannelMAC.MACLayerCapsuleReceived indication, a ConnectedState.ConnectionClosed, or a RouteUpdate.ConnectionLost indication is received. The access terminal and the access network shall compute T\textsubscript{12} and T\textsubscript{23} as follows:

\[ T_{12} = T_c + \text{PagePeriod1} - \left( \left[ T_c + 256 \times R \right] \text{mod PagePeriod1} \right) + \text{PagePeriod1} \times \left[ \text{WCU} \times (\text{WakeCount1} + 1) - 1 \right] \]
\[ T_{23} = T_{12} + \text{PagePeriod2} - \left( \left[ T_{12} + 256 \times R \right] \text{mod PagePeriod2} \right) + \text{PagePeriod2} \times \left[ \text{WCU} \times (\text{WakeCount2} + 1) - 1 \right] \]

where Period1 and Period2 are specified in units of slots, T\textsubscript{c} is the current CDMA system time, WCU is value of the WakeCountUnits attribute.

3.7.6.1.4 Inactive State

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

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

3.7.6.1.5 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 3.7.6.1.2 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 sub-synchronous capsule or the synchronous capsule sent at time T satisfying the following condition:

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

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

R shall be 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]
  - \text{N} = \text{Max}(\text{Period3}/256, 1)
  - where SessionSeed is given as public data of the Address Management Protocol.

- If PreferredControlChannelCycleEnabled is equal to '1', then R is set to PreferredControlChannelCycle.

Period shall be computed as follows:

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

The access network and the access terminal shall compute Periodi according to Table 3.7.6.1.5-1.
### Table 3.7.6.1.5-1. Computation of Periodi from SlotCyclei

<table>
<thead>
<tr>
<th>SlotCyclei</th>
<th>Periodi</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00 to 0x06</td>
<td>(2^{\text{SlotCyclei}} \times 4) slots</td>
</tr>
<tr>
<td>0x07 to 0x1c</td>
<td>(2^{(\text{SlotCyclei} - 0x7)} \times 768) slots</td>
</tr>
</tbody>
</table>

#### 3.7.6.1.6 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 3.7.7.3).

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:

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

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

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:

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

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

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

#### 3.7.6.1.6.1 Access Terminal Requirements

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

- **OverheadMessagesActivate**
- **ControlChannelMAC.Activate**

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

- If the access terminal has queued an **OverheadMessagesUpdated** indication or upon receiving an **OverheadMessagesUpdated** indication, the access terminal shall tune to the CDMA Channel selected as specified in □.
• If the access terminal entered Monitor State to receive the synchronous capsule, it shall monitor the overhead messages as specified in the Overhead Messages.

• If the access terminal receives a Page message, it shall perform the procedures in 3.7.6.1.2 for sending a ConnectionRequest message.

• If the access terminal receives a MultiATPage message, it shall perform the procedures in 3.7.6.1.2 for sending a ConnectionRequest message if all of the following conditions are met:
  - The MultiATPageMessageSupported attribute is set to 0x01, and
  - One of the UATI in the MultiATPage message (included using UATImsb and UATIlsb fields) matches any member of the Address Management Protocol’s ReceiveATIList with ATIType set to ‘10’ (i.e., UATI).

• If the access terminal requires opening a connection, it shall perform the procedures in 3.7.6.1.2 for sending a ConnectionRequest message.

• If the access terminal receives a RouteUpdate.ConnectionInitiated indication it shall:
  - If the access terminal had previously received a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, then the access terminal shall reset TCAPendingDuration to zero, and
  - transition to the Connection Setup State.  

• Access terminal may transition to the Sleep State if the requirements specified in 3.7.6.1.6.1.2 are satisfied.

• If the access terminal had previously received a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and if the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration, then the access terminal shall return a ConnectionFailed indication.

3.7.6.1.6.1.1 CDMA Channel Selection

The access terminal shall select a CDMA Channel from the list of channels or extended channels in the SectorParameters message. If no channels or extended 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 a hash function (see [6]) to compute an index into the subset of a subset of advertised CDMA Channels according to the following procedures.

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

---

41 This requirement provides Fast Connect on the access terminal side.
If the extended channel list is included in the SectorParameters message, the access terminal shall create a combined channel list by appending each CDMA Channel in the extended channel list (in order) to the set of CDMA Channels in the channel list (in order). Otherwise, the access terminal shall set the combined channel list to the set of CDMA Channels in the channel list.

If the SupportedCDMAChannels public data of the Route Update Protocol lists any channels, then the access terminal shall remove from the combined channel list the following CDMA Channels:

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

The set, \( S \), of CDMA Channels is determined as follows:

- If the AccessHashingChannelMaskIncluded field in the SectorParameters message is not included or is included and set to '0', the access terminal shall set \( S \) to the subset of CDMA Channels in the combined channel list.
- If the AccessHashingChannelMaskIncluded field in the SectorParameters message is included and is set to '1', the access terminal shall set \( S \) to the subset of CDMA Channels in the combined channel list for which:
  - \( N_i \) is equal to \( N_{\text{max}} \), where \( i \) is the index of the CDMA Channel in the combined channel list,
  
  \[
  N_j = \text{bitcount}(\text{AccessHashingClassMask}_{[\text{AccessHashingMaskLength:0}] \otimes M_j}, \text{where } M_j \text{ is the AccessHashingChannelMask field in the SectorParameters message corresponding to the } j^{th} \text{ CDMA Channel in the combined channel list};
  \]
  
  \( N_{\text{max}} \) is the maximum value of \( N_k \) for all \( k \), where \( k \) is the index of the CDMA Channel in the combined channel list; and
  
  \( \text{bitcount}(x) \) is the number of ‘1’ bits in the binary representation of \( x \).

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

- Key = SessionSeed
- Decorrelate = 0
- \( N = \text{Number of CDMA Channels in set } S \)

where SessionSeed is provided as public data by the Address Management Protocol.
3.7.6.1.6.1.2 Transition to Sleep State

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

- One of the following requirements is met:
  - The access terminal entered the Monitor State to receive the synchronous capsule and has received a Control Channel synchronous Sleep State capsule in the current Control Channel Cycle and has determined that the SectorParameters message is up to date. The current Control Channel Cycle is defined to be the Control Channel Cycle that started at slot $[T/256]$, where $T$ is the current CDMA System Time in slots.
  - The access terminal entered the Monitor State to receive a sub-synchronous capsule, and has received the sub-synchronous capsule, or did not receive the sub-synchronous capsule in the expected slots.
  - The access terminal entered the Monitor State as a result of receiving a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control channel cycles since receiving the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.
  - Access terminal received an $\text{AccessChannelMAC.TxEnded}$ indication for every $\text{AccessChannelMAC.TxStarted}$ indication it received since entering the Monitor State.\(^{42}\)
  - Access terminal has not advertised a suspend period that is current (see 3.8). The suspend period is current if the time advertised in the associated ConnectionClose message is greater than or equal to the current CDMA System Time.\(^{43}\)

3.7.6.1.6.2 Access Network Requirements

3.7.6.1.6.2.1 General Requirements

- Access network shall select the CDMA Channel following the same specifications as the access terminal, see 3.7.6.1.6.1.1.
- If the access network receives a ConnectionRequest message, it shall transition to the Connection Setup State.
- If the MultiATPageMessageSupported attribute is set to 0x00, then the access network shall not send MultiATPage message to page this access terminal.

\(^{42}\)This pairing ensures that the access terminal does not have any outstanding messages waiting for an answer.

\(^{43}\)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.
• If the access network requires opening a connection with the access terminal and does not use an accelerated procedure to set-up a connection, the access network shall send a Page message or a MultiATPage to the access terminal over the Control Channel.

• Access network may use an accelerated procedure to set-up a connection with the access terminal by bypassing the paging process. The access network should only use this procedure if it has a reasonable estimate of the access terminal's current location. To set-up a connection in an accelerated fashion (Fast Connect) the access network shall:
  - If the access network had previously sent a ConnectionDeny message with the DenyReason set to 'Traffic Channel Assignment Pending', and the number of control channel cycles since sending the ConnectionDeny message is less than the value specified by the TCAPendingDuration, then the access network shall reset TCAPendingDuration to zero.
  - Issue a RouteUpdate.Open command.
  - Transition to the Connection Setup State, when the protocol receives a RouteUpdate.ConnectionInitiated indication.

• Access network shall transition to the Sleep State if all of the following conditions are met:
  - the access terminal did not advertise a suspend period that is current.
  - The access network entered the Monitor State as a result of sending a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control channel cycles since sending the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration.

• If the access network had previously sent a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, and the number of control channel cycles since sending the ConnectionDeny message is greater than or equal to the value specified by the TCAPendingDuration, then the access network shall return a ConnectionFailed indication.

3.7.6.1.7 Connection Setup State

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

Figure 3.7.6.1.7-1 illustrates the process of opening a connection between the access terminal and the access network when this protocol is used along with the default Route Update and the default Reverse Traffic Channel MAC protocols.\(^{44}\)

\(^{44}\) The Fast Connect message exchange is identical except for not having the Idle State Protocol ConnectionRequest message and the Route Update Protocol RouteUpdate message.
the ConnectionRequest and the RouteUpdate are bundled in the same Access Channel MAC Layer packet

Figure 3.7.6.1.7-1. Connection Setup Exchange

3.7.6.1.7.1 Access Terminal Requirements

The access terminal shall comply with the following requirements.

- Upon entering the Connection Setup State the access terminal shall:
  - Issue an OverheadMessages.Activate command,
  - Issue a ControlChannelMAC.Activate command,
  - Set a state timer for $T_{IDPAT\text{Setup}}$ seconds,
- If the access terminal receives a ConnectionDeny message with the DenyReason not included, or included and is not set to ‘Traffic Channel Assignment Pending’, the access terminal shall return a ConnectionFailed indication,
- If the access terminal receives a ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’, then the access terminal shall transition to the Monitor state,
- If the state timer expires, the access terminal shall return a ConnectionFailed indication,
- If the access terminal receives a RouteUpdate.ConnectionOpened indication, it shall return a ConnectionOpened indication and transition to the Inactive State.
3.7.6.1.7.2 Access Network Requirements

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

If all of the following conditions are met:

- The traffic channel resource is not available,
- The ConnectionQueuingSupported attribute is set to ‘0x01’, and
- One of the following conditions is met:
  - The received ConnectionRequest message has the ConnectionQueuingReq field set to ‘1’, or
  - The access network determines that queuing should be applied,

then the access network should:

- Send ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’,
- Queue the ConnectionRequest for TCAPendingDuration in units of number of control channel cycles after sending the ConnectionDeny message, and
- Transition to the Monitor state

The access network shall not send ConnectionDeny message with the DenyReason set to ‘Traffic Channel Assignment Pending’ if the ConnectionQueuingSupported attribute is set to ‘0x00’.

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

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

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

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

---

45 The ConnectionRequest Queuing function is enabled when the priority treatment is required by the application service such as the priority service
Otherwise, the access network shall perform the following:

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

- If the access network denies the connection request, it should send the access terminal a ConnectionDeny message, shall return a ConnectionFailed indication, and shall transition to the Sleep State.

- Otherwise, the access network shall perform the following:
  - Set state timer for $T_{\text{IDPANSetup}}$ seconds.
  - Issue a RouteUpdate.Open command.
  - If the protocol receives a RouteUpdate.ConnectionOpened indication, the access network shall return a ConnectionOpened indication and transition to the Inactive State.
  - If the state timer expires, the access network shall return a ConnectionFailed indication and shall transition to the Sleep State.

- If the access network did not enter this state as a result of receiving a ConnectionRequest message, and if the access network does not receive a ConnectionRequest message within an implementation dependent time interval, then the access network shall return a ConnectionFailed indication, and shall transition to the Sleep State.

### 3.7.6.2 Message Formats

#### 3.7.6.2.1 Page

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>PageResponseAPersistenceIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>PageResponseAPersistence</td>
<td>0 or 6</td>
</tr>
<tr>
<td>Reserved</td>
<td>$0 – 7$ (as needed)</td>
</tr>
</tbody>
</table>

**MessageID**

The access network shall set this field to 0x00.

**PageResponseAPersistenceIncluded**

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

The access network shall set this field to ‘0’ if the PageResponseAPersistenceSupported attribute is set to 0x00.
Otherwise, the access network shall set this field as follows: The access network shall set this field to ‘1’ if the PageResponseAPersistence field is included in this message. Otherwise, the access network shall set this field to ‘0’.

PageResponseAPersistence

The access network shall omit this field if the PageResponseAPersistenceIncluded is not included, or if the PageResponseAPersistenceIncluded field is included and set to ‘0’. Otherwise, the access network shall include this field and set it as follows:
The access network shall set this field $n$ such that $2^{n/4}$ is the access persistence probability that the access terminal is to use when responding to this Page message. The access network shall not set this field to 0x3f.

Reserved

The access network shall include Reserved bits to make the length of the entire message equal to an integer number of octets. The access network shall set these bits to ‘0’.

<table>
<thead>
<tr>
<th>Channels</th>
<th>CCsynSS</th>
<th>CCsubsyn</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td>Priority</td>
<td>20</td>
</tr>
</tbody>
</table>

3.7.6.2.2 ConnectionRequest

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
<tr>
<td>RequestReason</td>
<td>4</td>
</tr>
<tr>
<td>PreferredChannelCount</td>
<td>5</td>
</tr>
</tbody>
</table>

PreferredChannelCount occurrences of the following field:

```
{
  PreferredChannel | 24
}
```

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

MessageID The access terminal shall set this field to 0x01.
TransactionID  The access terminal shall increment this value for each new
ConnectionRequest message sent.

RequestReason  The access terminal shall set this field to one of the request reasons
as shown in Table 3.7.6.2-1.

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>Access Terminal Initiated</td>
</tr>
<tr>
<td>0x1</td>
<td>Access Network Initiated</td>
</tr>
<tr>
<td>All other values are invalid</td>
<td></td>
</tr>
</tbody>
</table>

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

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

PreferTwoRevNBChannel  The access terminal shall set this field to ‘0’ to request one (6.4 kHz)
reverse link narrowband channel and to ‘1’ to request two (12.8 kHz)
reverse link narrowband channels.

LowRateType  The access terminal shall set this field to one of the low data rates
(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’.

Reserved  The access terminal shall add reserved bits to make the length of the
entire message an integer number of octets. The access terminal shall
set these bits to ‘0’. The access network shall ignore this field.

<table>
<thead>
<tr>
<th>Channels</th>
<th>AC</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.7.6.2.3 ConnectionDeny  The access network sends the ConnectionDeny message to deny a connection.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
<tr>
<td>DenyReason</td>
<td>4</td>
</tr>
<tr>
<td>TCAPendingDuration</td>
<td>0 or 6</td>
</tr>
<tr>
<td>Reserved</td>
<td>0-7 (as needed)</td>
</tr>
</tbody>
</table>

1. **MessageID**: The access network shall set this field to 0x02.
2. **TransactionID**: The access network shall set this value to the TransactionID field of the corresponding ConnectionRequest message.
3. **DenyReason**: The access network shall set this field to indicate the reason it is denying the connection, as shown in Table 3.7.6.2-2.

**Table 3.7.6.2-2. Encoding of the DenyReason Field**

<table>
<thead>
<tr>
<th>Field value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0</td>
<td>General</td>
</tr>
<tr>
<td>0x1</td>
<td>Network Busy</td>
</tr>
<tr>
<td>0x2</td>
<td>Authentication or billing failure</td>
</tr>
<tr>
<td>0x3</td>
<td>Preferred channel not available</td>
</tr>
<tr>
<td>0x4</td>
<td>Traffic Channel Assignment Pending</td>
</tr>
<tr>
<td></td>
<td>All other values are reserved</td>
</tr>
</tbody>
</table>

4. **TCAPendingDuration**: The access network shall include this field if DenyReason field is included and is set to 0x04 (Traffic Channel Assignment Pending). If this field is included, the access network shall set this field to the pending duration in units of control channel cycles.
5. **Reserved**: The access network shall add reserved bits to make the length of the entire message an integer number of octets. The access network shall set these bits to ‘0’. The access terminal shall ignore this field.

### Channels

<table>
<thead>
<tr>
<th>Addressing</th>
<th>CC</th>
<th>SLP</th>
<th>Priority</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unicast</td>
<td></td>
<td></td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

6. **3.7.6.2.4 AttributeUpdateRequest**: The sender sends an AttributeUpdateRequest message to offer a set of attribute values for a given attribute.
### Field Length (bits)

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>Protocol dependent</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

One or more instances of the following record

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AttributeRecord</td>
<td>Attribute dependent</td>
</tr>
</tbody>
</table>

**MessageID**

The sender shall set this field to 0x52.

**TransactionID**

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

**AttributeRecord**

The format of this record is specified in [6].

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

**3.7.6.2.5 MultiATPage**

The access network sends the MultiATPage message to direct multiple access terminals to request a connection.
### Field Length (bits)

<table>
<thead>
<tr>
<th>Field</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>NumUATIMsb</td>
<td>5</td>
</tr>
</tbody>
</table>

(NumUATIMsb + 1) occurrences of the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>UATIMsbLength</td>
<td>5</td>
<td>(UATIMsbLength + 1)</td>
</tr>
<tr>
<td>UATIMsb</td>
<td>(UATIMsbLength + 1)</td>
<td></td>
</tr>
<tr>
<td>NumPagesWithUATIMsb</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

(NumPagesWithUATIMsb + 1) occurrences of the following fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>UATILsb</td>
<td>32</td>
<td>32 - (UATIMsbLength + 1)</td>
</tr>
<tr>
<td>PageResponseAPersistenceIncluded</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PageResponseAPersistence</td>
<td>0 or 6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserved</td>
<td>0 – 7</td>
</tr>
</tbody>
</table>

1. **MessageID**
   The access network shall set this field to 0x04.

2. **NumUATIMsb**
   The access network shall set this field to one less than the number of UATI MSBs included in this message.

3. **UATIMsbLength**
   The access network shall set this field to one less than the length of the UATIMsb field in bits.

4. **UATIMsb**
   The access network shall set this field to the MSBs of the UATIs that are paged using this message.

5. **NumPagesWithUATIMsb**
   The access network shall set this field to one less than the number of the UATILsb fields included for the corresponding UATIMsb field.

6. **UATILsb**
   The access network shall set this field to the LSBs of the UATI that is paged using this message.

7. **PageResponseAPersistenceIncluded**
   The access network shall set this field as follows:
   - The access network shall set this field to ‘0’ if the PageResponseAPersistenceSupported attribute is set to 0x00.
   - Otherwise, the access network shall set this field as follows:
     - The access network shall set this field to ‘1’ if the
The PageResponseAPersistence field is included in this message. Otherwise, the access network shall set this field to ‘0’.

**PageResponseAPersistence**

The access network shall omit this field if the PageResponseAPersistenceIncluded field is set to ‘0’. Otherwise, the access network shall include this field and set it as follows: The access network shall set this field $n$ such that $2^{n/4}$ is the access persistence probability that the access terminal is to use when responding to this Page message. The access network shall not set this field to 0x3f.

**Reserved**

The access network shall include Reserved bits to make the length of the entire message equal to an integer number of octets. The access network shall set these bits to ‘0’.

<table>
<thead>
<tr>
<th>Channels</th>
<th>CCsynSS</th>
<th>CCsubsyn</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>broadcast</td>
<td></td>
<td>Priority</td>
<td>20</td>
</tr>
</tbody>
</table>

### 3.7.6.2.6 AttributeUpdateAccept

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>Protocol dependent</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

**MessageID**

The sender shall set this field to 0x53.

**TransactionID**

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

### 3.7.6.2.7 AttributeUpdateReject

The access network sends an AttributeUpdateReject message in response to an AttributeUpdateRequest message to reject the offered attribute values.
### MessageID
The access network shall set this field to 0x54.

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>SLP</th>
<th>Addressing</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>unicast</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reliable</td>
<td>40</td>
</tr>
</tbody>
</table>

#### 3.7.6.3 Interface to Other Protocols

#### 3.7.6.3.1 Commands Sent
This protocol issues the following commands:
- RouteUpdate.Open (access network only)
- OverheadMessages.Activate
- OverheadMessages.Deactivate
- ControlChannelMAC.Activate
- ControlChannelMAC.Deactivate

#### 3.7.6.3.2 Indications
This protocol registers to receive the following indications:
- RouteUpdate.ConnectionOpened
- RouteUpdate.ConnectionInitiated
- AccessChannelMAC.TxStarted
- AccessChannelMAC.TxEnded
- AccessChannelMAC.TransmissionSuccessful
- AccessChannelMAC.MACLayerCapsuleReceived
- AccessChannelMAC.TransmissionFailed
- AccessChannelMAC.SBACTransmissionFailed
- OverheadMessages.Updated
- ConnectedState.ConnectionClosed
- RouteUpdate.ConnectionLost
3.7.7 Configuration Attributes

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

- PreferredControlChannelCycle
- SlottedMode
- PagingMask
- AccessHashingClassMask
- WakeCountUnitsSupported
- WakeCountUnits
- ConnectionQueuingSupported
- MultiATPageMessageSupported

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

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

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

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

3.7.7.1 Simple Attributes

The simple configurable attributes are listed in Table 3.7.7.1-1. The access network and the access terminal shall use the default values that are typed in **bold italics**.

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xff</td>
<td>SmallSlotCycleAllowed</td>
<td>0x00</td>
<td>Access terminal and access network will not propose a value of SlotCycle1 that is less than 0x06.</td>
</tr>
<tr>
<td></td>
<td><strong>0x01</strong></td>
<td></td>
<td>Access terminal and access network can propose a value of SlotCycle1 that is less than 0x06.</td>
</tr>
<tr>
<td>Attribute ID</td>
<td>Attribute</td>
<td>Values</td>
<td>Meaning</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>0xfe</td>
<td>AccessHashingClassMask</td>
<td>0x0000</td>
<td>Access terminal and access network will hash to channels with any access hashing class.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x0001 to 0xffff</td>
<td>Access terminal and access network will hash to channels with designated access hashing classes (see 3.5.6.1.6.1.1).</td>
</tr>
<tr>
<td>0xfd</td>
<td>ConnectionDenyBackoff</td>
<td>0x00-0x78</td>
<td>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</td>
</tr>
<tr>
<td>0xfc</td>
<td>PageResponseAPersistenceSupported</td>
<td>0x00</td>
<td>Access terminal does not support PageResponseAPersistence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports PageResponseAPersistence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xfb</td>
<td>MultiATPageMessageSupported</td>
<td>0x00</td>
<td>Access terminal does not support MultiATPage message.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports MultiATPage message.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xfa</td>
<td>WakeCountUnitsSupported</td>
<td>0x00</td>
<td>Access terminal does not support negotiation of WakeCountUnits attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Access terminal supports negotiation of WakeCountUnits attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
</tbody>
</table>
### Attribute ID 0xf9

**Attribute**: "WakeCountUnits"

- **Values**
  - **0x18**: Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.
  - **0x01-0x17**: Units of WakeCount1 and WakeCount2 fields in SlottedMode attribute.
  - **All other values**: Reserved

### Attribute ID 0xf3

**Attribute**: "ConnectionQueuingSupported"

- **Values**
  - **0x00**: Access terminal does not support ConnectionRequest queuing.
  - **0x01**: Access terminal supports ConnectionRequest queuing.
  - **All other values**: Reserved

### Attribute ID 0xf2

**Attribute**: "ATAccessClass"

- **Values**
  - **0xff**: Access class not assigned
  - **0x00-0x06**: Assigned access class
  - **All other values**: Reserved

#### 3.7.7.2 Complex Attributes

#### 3.7.7.2.1 PreferredControlChannelCycle Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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.

3.7.7.2.2 SlottedMode Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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
}
```

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 0x01.

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

SlotCycle1
The sender shall set this field to SlotCycle1. The sender shall not set this field to more than 0x1c.
SlotCycle2  The sender shall set this field to SlotCycle2. SlotCycle2 shall be
greater than or equal to SlotCycle1. The sender shall not set this field
to more than 0x1c.

SlotCycle3  The sender shall set this field to SlotCycle3. SlotCycle3 shall be
greater than or equal to SlotCycle2. The sender shall not set this field
to more than 0x1c.

WakeCount1  The sender shall set this field to WakeCount1.

WakeCount2  The sender shall set this field to WakeCount2. WakeCount2 shall be
greater or equal to than WakeCount1.

Reserved  The sender shall set this field to ‘0’. The receiver shall ignore this field.

3.7.7.3 PagingMask Attribute

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

One or more of the following record:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>MaskCount</td>
<td>8</td>
<td>0x00</td>
</tr>
</tbody>
</table>

MaskCount occurrences of the following four fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>MaskPurpose</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>PreMaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
<tr>
<td>MaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
<tr>
<td>PostMaskDuration</td>
<td>16</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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 0x02.

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

MaskCount  The sender shall set this field to the number of paging masks
specified in this complex attribute.

MaskPurpose  The sender shall set this field to indicate the purpose of the mask
according to Table 3.7.7.3-1.
Table 3.7.7.3-1. Definition of MaskPurpose Field of a Paging Mask

<table>
<thead>
<tr>
<th>MaskPurpose Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>Unspecified purpose.</td>
</tr>
<tr>
<td>0x01</td>
<td>The paging mask is associated with monitoring the cdma2000 1x system (see [11]).</td>
</tr>
<tr>
<td>0x02-0xff</td>
<td>Specified by [18].</td>
</tr>
</tbody>
</table>

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.

3.7.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>N_IDPType</td>
<td>Type field for this protocol</td>
<td>See [5]</td>
<td></td>
</tr>
<tr>
<td>N_IDPdHRPDS1</td>
<td>Subtype field for this protocol</td>
<td>0x0001</td>
<td></td>
</tr>
<tr>
<td>T_IDPATSetup</td>
<td>Maximum access terminal time in the Connection Setup State</td>
<td>2.5 seconds</td>
<td></td>
</tr>
<tr>
<td>T_IDPANSetup</td>
<td>Maximum access network time in the Connection Setup State</td>
<td>1 second</td>
<td></td>
</tr>
</tbody>
</table>

3.7.9 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.

3.8 Default Connected State Protocol

The Default Connected State Protocol is same as defined in Error! Reference source not found.

3.9 xHRPD Subtype 0 Route Update Protocol

3.9.1 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.

- **Idle State:** This state corresponds to the Air-Link Management Protocol Idle State. In this state, the access terminal autonomously maintains the Active Set. Route update messages from the access terminal to the access network are based on the distance between the access terminal’s current serving sector and the serving sector at the time the access terminal last sent an update.

- **Connected State:** In this state the access network dictates the access terminal’s Active Set. Route update messages from the access terminal to the access network are based on changing radio link conditions.

Transitions between states are driven by commands received from Connection Layer protocols and the transmission and reception of the *TrafficChannelAssignment* message.

The protocol states, messages and commands causing the transition between the states are shown in Figure 3.9.1-1.

![Figure 3.9.1-1. xHRPD Subtype 0 Route Update Protocol State Diagram](image)

This protocol uses parameters that are provided, as public data by the Overhead Messages Protocol, configured attributes, or protocol constants.

Table 3.9.1-1 lists all of the protocol parameters obtained from the public data of the Overhead Messages Protocol.
### Table 3.9.1-1. Route Update Protocol Parameters that are Public Data of the Overhead Messages Protocol

<table>
<thead>
<tr>
<th>RU Parameter</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude</td>
<td>Latitude of sector in units of 0.25 second</td>
</tr>
<tr>
<td>Longitude</td>
<td>Longitude of sector in units of 0.25 second</td>
</tr>
<tr>
<td>RouteUpdateRadiusOverhead</td>
<td>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</td>
</tr>
<tr>
<td>NumNeighbors</td>
<td>Number of neighbors specified in the message</td>
</tr>
<tr>
<td>NeighborPN</td>
<td>PN Offset of each neighbor in units of 64 PN chips</td>
</tr>
<tr>
<td>NeighborChannelIncluded</td>
<td>Set to ‘1’ if a Channel Record is included for the neighbor</td>
</tr>
<tr>
<td>NeighborChannel</td>
<td>Neighbor Channel Record specifying network type and frequency</td>
</tr>
</tbody>
</table>

3.9.2 Primitives and Public Data

3.9.2.1 Commands

This protocol defines the following commands:

- *Activate*
- *Deactivate*
- *Open*
- *Close*
- *SendRouteUpdate*

3.9.2.2 Return Indications

This protocol returns the following indications:

- *ConnectionLost* (access network only)
- *NetworkLost*
- *IdleHO*
- *ActiveSetUpdated*
- *AssignmentRejected*
- *ConnectionInitiated*
- *ConnectionOpened*
3.9.2.3 Public Data

This protocol shall make the following data public:

- Subtype for this protocol
- Active Set
- Pilot PN for every pilot in the Active Set
- MACIndex for every pilot in the Active Set
- Channel record specified in the TrafficChannelAssignment message
- FrameOffset specified in the TrafficChannelAssignment message
- Current RouteUpdate message
- Information listed in SupportedCDMACChannels attribute
- Pilot strength of all pilots in the Active Set

3.9.3 Protocol Data Unit

The transmission unit of this protocol is a message. This is a control protocol and, therefore, it does not carry payload on behalf of other layers or protocols. This protocol uses the Signaling Application to transmit and receive messages.

3.9.4 Protocol Initialization

3.9.4.1 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.

3.9.4.2 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 shall enter the Inactive State.
3.9.5 Procedures and Messages for the InConfiguration Instance of the Protocol

3.9.5.1 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.

3.9.5.2 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 3.9.6.1.2.1.
- The access terminal and the access network shall purge the InConfiguration instance of the protocol.

- If the InUse instance of the Route Update Protocol does not have the same subtype as this protocol instance, then the access terminal and the access network shall perform the following:
  - 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 InConfiguration protocol instance shall become the InUse protocol instance for the Route Update Protocol at the access terminal and the access network.

- All the public data that are not defined by this protocol shall be removed from the list of public data for the InUse protocol instance.

### 3.9.5.3 Message Formats

#### 3.9.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

**AttributeRecord**

- **MessageID**
  - The sender shall set this field to 0x50.

- **TransactionID**
  - The sender shall increment this value for each new ConfigurationRequest message sent.

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

#### Channels

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

#### 3.9.5.3.2 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 |
--- | ---

MessageID  
The sender shall set this field to 0x51.

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

AttributeRecord  
An attribute record containing a single attribute value. If this message selects a complex attribute, only the ValueID field of the complex attribute shall be included in the message. The format of the AttributeRecord is given in [6]. The sender shall not include more than one attribute record with the same attribute identifier.

| Channels | FTC | RTC | SLP | Reliable |
--- | --- | --- | --- | ---
Addressing | unicast | | | Priority | 40 |

3.9.6 Procedures and Messages for the InUse Instance of the Protocol

3.9.6.1 Procedures

3.9.6.1.1 Command Processing

3.9.6.1.1.1 Activate

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

- Issue an AccessChannelMAC.Activate command,
- Transition to the Idle State.

If this command is received in any other state, it shall be ignored.

3.9.6.1.1.2 Deactivate

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

If the protocol receives this command in any other state, the access terminal and the access network shall:

- Issue a ReverseTrafficChannelMAC.Deactivate command,
- Issue a ForwardTrafficChannelMAC.Deactivate command,
- Issue an AccessChannelMAC.Deactivate command,
3.9.6.1.1.3 Open

If the protocol receives an *Open* command in the Idle State,

- The access terminal shall ignore it.
- The access network shall:
  - Transmit a *TrafficChannelAssignment* message as follows:
    - The access network should base the *TrafficChannelAssignment* message on the last *RouteUpdate* message it received from the access terminal.
    - If the *SupportedCDMAChannels* attribute contains one or more band classes, then the access network shall assign a Traffic Channel on a CDMA Channel supported by the access terminal as indicated by the value of the *SupportedCDMAChannels* attribute.
  - Return a *ConnectionInitiated* indication,
  - Issue a *ReverseTrafficChannelMAC.Activate* command,
  - Issue a *ForwardTrafficChannelMAC.Activate* command,
  - Issue an *AccessChannelMAC.Deactivate* command,
  - Transition to the Connected State.

If this command is received in any other state it shall be ignored.

3.9.6.1.1.4 Close

If the protocol receives a *Close* command in the Connected State the access terminal and the access network shall:

- Issue a *ReverseTrafficChannelMAC.Deactivate* command,
- Issue a *ForwardTrafficChannelMAC.Deactivate* command,
- Issue an *AccessChannelMAC.Activate* command,
- Transition to the Idle State.

If this command is received in any other state it shall be ignored.

3.9.6.1.2 Pilots and Pilot Sets

The access terminal estimates the strength of the Forward Channel transmitted by each sector in its neighborhood. This estimate is based on measuring the strength of the Forward Pilot Channel (specified by the pilot’s PN offset and the pilot’s CDMA Channel), henceforth referred to as the pilot.

When this protocol is in the Connected State, the access terminal may use pilot strengths to decide when to generate *RouteUpdate* messages. When this protocol is in the Idle State, the access terminal uses pilot strengths to decide which sector’s Control Channel it monitors.
The following pilot sets are defined to support the Route Update process:\(^{46}\)

- **Active Set**: The set of pilots (specified by the pilot’s PN offset and the pilot’s CDMA Channel) associated with the sectors currently serving the access terminal. When a connection is open, a sector is considered to be serving an access terminal when there is a Forward Traffic Channel, Reverse Traffic Channel and Reverse Power Control Channel assigned to the access terminal. When a connection is not open, a sector is considered to be serving the access terminal when the access terminal is monitoring that sector’s control channel.

- **Candidate Set**: The pilots (specified by the pilot’s PN offset and the pilot’s CDMA Channel) that are not in the Active Set, but are received by the access terminal with sufficient strength to indicate that the sectors transmitting them are good candidates for inclusion in the Active Set.

- **Neighbor Set**: The set of pilots (specified by the pilot’s PN offset and the pilot’s CDMA Channel) that are not in either one of the two previous sets, but are likely candidates for inclusion in the Active Set.

- **Remaining Set**: The set of all possible pilots (specified by the pilot’s PN offset and the pilot’s CDMA Channel) on the current channel assignment, excluding the pilots that are in any of the three previous sets.

At any given instant a pilot in the current CDMA Channel is a member of exactly one set. The access terminal maintains all four sets. The access network maintains only the Active Set.

The access terminal complies with the following rules when searching for pilots, estimating the strength of a given pilot, and moving pilots between sets.

### 3.9.6.1.2.1 Neighbor Set Search Window Parameters Update

The access terminal shall maintain `RouteUpdateNeighborList` which is a list of structures of type `Neighbor` (defined below). For each pilot (specified by the pilot’s PN offset and the pilot’s CDMA Channel) in the Neighbor Set, the access terminal shall maintain a structure in the `RouteUpdateNeighborList`.

A Neighbor structure consists of four fields: `PilotPN`, `Channel`, `SearchWindowSize`, and `SearchWindowOffset`.

The `RouteUpdateNeighborList` is used by the access terminal to perform pilot search on a pilot in the Neighbor Set.

When this set of procedures is invoked, the access terminal shall perform the following steps in the order specified:

- For each pilot (specified by its pilot PN and its channel) in the Neighbor Set, the access terminal shall first initialize the corresponding Neighbor structure in `RouteUpdateNeighborList` as follows:

---

\(^{46}\) In this context, a pilot identifies a sector.
- Set the structure’s PilotPN field to the neighbor pilot’s PN.
- Set the structure’s Channel field to the neighbor pilot’s channel record.
- Set the structure’s SearchWindowSize field to the configurable attribute SearchWindowNeighbor.
- Set the structure’s SearchWindowOffset to zero.

- For each pilot (specified by the pilot’s PN offset and the pilot’s CDMA Channel) listed in the OverheadMessagesNeighborList, the access terminal shall set the non-NULL fields of the corresponding Neighbor structure in the RouteUpdateNeighborList to the fields of the Neighbor structure in the OverheadMessagesNeighborList for this pilot.
- For each pilot (specified by the pilot’s PN offset and the pilot’s CDMA Channel) listed in the NeighborListMessageNeighborList, the access terminal shall set the non-NULL fields of the corresponding Neighbor structure in the RouteUpdateNeighborList to the fields of the Neighbor structure in the NeighborListMessageNeighborList for this pilot.

3.9.6.1.2.2 Pilot Search

The access terminal shall continually search for pilots in the Connected State and whenever it is monitoring the Control Channel in the Idle State. The access terminal shall search for pilots in all pilot sets. This search shall be governed by the following rules:

Search Priority: The access terminal should use the same search priority for pilots in the Active Set and Candidate Set. In descending order of search rate, the access terminal shall search, most often, the pilots in the Active Set and Candidate Set, then shall search the pilots in the Neighbor Set, and lastly shall search the pilots in the Remaining Set.

Search Window Size: The access terminal shall use the search window size specified by the configurable attribute SearchWindowActive for pilots in the Active Set and Candidate Set. For each pilot in the Neighbor Set, the access terminal shall use the search window size specified by Table 3.9.6.2.8-1Table and SearchWindowSize field of the corresponding Neighbor structure in the RouteUpdateNeighborList. The access terminal shall use search window size specified by configurable attribute SearchWindowRemaining for pilots in the Remaining Set.

Search Window Center: The access terminal should center the search window around the earliest usable multipath component for pilots in the Active Set. The access terminal should center the search window for each pilot in the Neighbor Set around the pilot’s PN sequence offset plus the search window offset specified by Table 3.9.6.2.8-2Table and SearchWindowOffset field of the corresponding Neighbor structure in the RouteUpdateNeighborList using timing defined by the access terminal’s time reference (see Error! Reference source not found.). The access terminal should center the search window around the pilot’s PN sequence offset using timing defined by the access terminal’s time reference (see Error! Reference source not found.) for the Remaining Set.
3.9.6.1.2.3 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.

3.9.6.1.2.4 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., $\text{PS}_1 < \text{PS}_2 < \text{PS}_3 < \ldots < \text{PS}_{N_A}$, 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 $\text{PS}_i$ in the Active Set whenever the strength $\text{PS}_i$ satisfies the following inequality:

$$10 \times \log_{10} \text{PS}_i < \max \left( \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{j=1}^{N_A} \text{PS}_j + \frac{\text{DropIntercept}}{2}, -\frac{\text{PilotDrop}}{2} \right)$$

$$i = 1, 2, \ldots, N_A - 1$$

The access terminal shall reset and disable the timer whenever the above inequality is not satisfied for the corresponding pilot.

Sections 3.9.6.1.2.6 and 3.9.6.1.6.5 specify the actions the access terminal takes when the pilot drop timer expires.

3.9.6.1.2.5 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 3.9.6.1.5.1 and 3.9.6.1.6.1).
3.9.6.1.2.6 Candidate Set Management

The access terminal shall support a maximum Candidate Set size of $N_{\text{RUPCandidate}}$ pilots.

The access terminal shall add a pilot to the Candidate Set if one of the following conditions is met:

- Pilot is not already in the Active Set or Candidate Set and the strength of the pilot exceeds the value specified by PilotAdd.
- Pilot is deleted from the Active Set, its pilot drop timer has expired, DynamicThresholds is equal to ‘1’, and the pilot strength is above the threshold specified by PilotDrop.
- Pilot is deleted from the Active Set but its pilot drop timer has not expired.

The access terminal shall delete a pilot from the Candidate Set if one of the following conditions is met:

- Pilot is added to the Active Set.
- Pilot’s drop timer has expired.
- Pilot is added to the Candidate Set; and, as a consequence, the size of the Candidate Set exceeds $N_{\text{RUPCandidate}}$. In this case, the access terminal shall delete the weakest pilot in the set. Pilot A is considered weaker than pilot B:
  - If pilot A has an active drop timer but pilot B does not,
  - If both pilots have an active drop timer and pilot A’s drop timer is closer to expiration than pilot B’s, or
  - If neither of the pilots has an active drop timer and pilot A’s strength is less than pilot B’s.

3.9.6.1.2.7 Neighbor Set Management

The access terminal shall support a minimum Neighbor Set size of $N_{\text{RUPNeighbor}}$ pilots.

- The access terminal shall maintain a counter, AGE, for each pilot in the Neighbor Set as follows.

The access terminal shall perform the following in the order specified:

- If a pilot is added to the Active Set or Candidate Set, it shall be deleted from the Neighbor Set.
- If a pilot is deleted from the Active Set, but not added to the Candidate Set, then it shall be added to the Neighbor Set with the AGE of 0.
- If a pilot is deleted from the Candidate Set, but not added to the Active Set, then it shall be added to the Neighbor Set with the AGE of 0.
• If the size of the Neighbor Set is greater than the maximum Neighbor Set supported by the access terminal, the access terminal shall delete enough pilots from the Neighbor Set such that the size of the Neighbor Set is the maximum size supported by the access terminal and pilots with higher AGE are deleted first.

• If the access terminal receives an *OverheadMessages.Updated* indication, then:
  - The access terminal shall increment the AGE for every pilot in the Neighbor Set.
  - For each pilot in the neighbor list given as public data by the Overhead Messages Protocol that is a member of the Neighbor Set, the access terminal shall perform the following:
    + The access terminal shall set the AGE of this neighbor list pilot to the minimum of its current AGE and NeighborMaxAge.
    + For each pilot in the neighbor list given as public data by the Overhead Messages Protocol (in the order specified in the neighbor list) that is a member of the Remaining Set, the access terminal shall perform the following:
      + If the addition of this neighbor list pilot to the Neighbor Set would not cause the size of the Neighbor Set size to increase beyond the maximum Neighbor Set size supported by the access terminal, then the access terminal shall add this neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge.
      + If the addition of this neighbor list pilot would cause the size of the Neighbor Set to increase beyond the maximum Neighbor Set size supported by the access terminal and the Neighbor Set contains at least one pilot with AGE greater than NeighborMaxAge associated with the pilot’s channel, then the access terminal shall delete the pilot in the Neighbor Set for which the difference between its AGE and the NeighborMaxAge associated with that pilot’s channel (i.e., AGE - NeighborMaxAge) is the greatest and shall add this neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge associated with the pilot’s channel.

• If the access terminal receives a NeighborList message, then:
  - The access terminal shall increment the AGE for every pilot in the Neighbor Set.
  - For each pilot in the neighbor list given in the NeighborList message that is a member of the Neighbor Set, the access terminal shall perform the following:
    + The access terminal shall set the AGE of this neighbor list pilot to the minimum of its current AGE and NeighborMaxAge.

47 The order in which pilots of the same AGE are deleted does not matter in this case.
For each pilot in the neighbor list given in the NeighborList message (in the order specified in the message) that is a member of the Remaining Set, the access terminal shall perform the following:

- If the addition of this neighbor list pilot to the Neighbor Set would not cause the size of the Neighbor Set size to increase beyond the maximum Neighbor Set size supported by the access terminal, then the access terminal shall add this neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge.

- If the addition of this neighbor list pilot would cause the size of the Neighbor Set to increase beyond the maximum Neighbor Set size supported by the access terminal and the Neighbor Set contains at least one pilot with AGE greater than NeighborMaxAge associated with the pilot’s channel, then the access terminal shall delete the pilot in the Neighbor Set for which the difference between its AGE and the NeighborMaxAge associated with that pilot’s channel (i.e., AGE - NeighborMaxAge) is the greatest and shall add this neighbor list pilot to the Neighbor Set with its AGE set to NeighborMaxAge associated with the pilot’s channel.

- If the addition of this neighbor list pilot would cause the size of the Neighbor Set to increase beyond the maximum Neighbor Set size supported by the access terminal and the Neighbor Set does not contain a pilot with AGE greater than NeighborMaxAge associated with the pilot’s channel, the access terminal shall not add this neighbor list pilot to the Neighbor Set.

The access terminal shall perform the procedures specified in 3.9.6.1.2.1 if a pilot (specified by the pilot’s PN offset and the pilot’s CDMA Channel) is added to or deleted from the Neighbor Set.

### 3.9.6.1.2.8 Remaining Set Management

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 add a pilot to the Remaining Set if it deletes the pilot from the Neighbor Set and if the pilot was not added to the Active Set or Candidate Set.

The access terminal shall delete the pilot from the Remaining Set if it adds it to another set.

### 3.9.6.1.2.9 Pilot PN Phase Measurement

The access terminal shall measure the arrival time, PILOT_ARRIVAL, for each pilot reported to the access network. The pilot arrival time shall be the time of occurrence, as measured at the access terminal antenna connector, of the earliest arriving usable multipath component of the pilot. The arrival time shall be measured relative to the access terminal’s time reference in units of PN chips. The access terminal shall compute the reported pilot PN phase, PILOT_PN_PHASE, as:

\[
\text{PILOT_PN_PHASE} = (\text{PILOT_ARRIVAL} + (64 \times \text{PILOT_PN})) \mod 2^{15},
\]

where PILOT_PN is the PN sequence offset index of the pilot.
3.9.6.1.3 Message Sequence Numbers

The access network shall validate all received RouteUpdate messages as specified in 3.9.6.1.3.1.

The access terminal shall validate all received TrafficChannelAssignment messages as specified in 3.9.6.1.3.2.

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.

3.9.6.1.3.1 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.

3.9.6.1.3.2 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.\(^{48}\)

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.

3.9.6.1.3.3 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.

---

\(^{48}\) The access network may send a message multiple times to increase its delivery probability.
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.\(^{49}\)

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.

3.9.6.1.4 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 3.9.6.1.2.1.
- 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).

3.9.6.1.5 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 3.9.6.1.2.1.
- Stop using the parameters specified in the AttributeOverride message in the set
  management procedures and start using values specified by the
  SetManagementSameChannelParameters and the
  SetManagementDifferentChannelParameters attributes whichever applicable, in the set
  management procedures.

\(^{49}\) The access network may send a message multiple times to increase its delivery probability.
3.9.6.1.5.1 Active Set Maintenance

The access network shall not initially maintain an Active Set for the access terminal in this state.

If the access network receives an Open command, prior to send a TrafficChannelAssignment message, the access network shall initialize the Active Set to the set of pilots in the TrafficChannelAssignment message that it sends in response to command (see 3.9.6.1.1.3).

The access terminal shall initially keep an Active Set of size one when it is in the Idle State. The Active Set pilot shall be the pilot associated with the Control Channel the access terminal is currently monitoring. The access terminal shall return an IdleHO indication when the Active Set changes in the Idle State.

The access terminal shall not change its Active Set pilot at a time that causes it to miss a synchronous Control Channel capsule. Other rules governing when to replace this Active Set pilot are beyond the scope of this specification.

If the access terminal receives a TrafficChannelAssignment message, it shall set its Active Set to the list of pilots specified in the message 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.

3.9.6.1.5.2 Pilot Channel Supervision in the Idle State

The access terminal shall perform pilot channel supervision in the Idle State as follows:

- Access terminal shall monitor the pilot strength of the pilot in its active set, all the pilots in the candidate set and all the pilots in the neighbor set that are on the same frequency.
- If the strength of all the pilots that the access terminal is monitoring goes below the value specified by PilotDrop, the access terminal shall start a pilot supervision timer. The access terminal shall consider the timer to be expired after the time specified by PilotDropTimer.
- If the strength of at least one of the pilots goes above the value specified by PilotDrop while the pilot supervision timer is counting down, the access terminal shall reset and disable the timer.
- If the pilot supervision timer expires, the access terminal shall return a NetworkLost indication.

3.9.6.1.5.3 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 3.9.6.1.5.1.
• 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.

3.9.6.1.5.4 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:
  – the RouteUpdateRadiusOverhead field of the SectorParameters message is not set to zero, and
  – the value of the RouteUpdateRadiusMultiply attribute is not 0x00, and
the computed value $r$ is greater than $\max (0, rm \times ro + ra)$, where $ro$ is the value provided in the RouteUpdateRadiusOverhead field of the SectorParameters message transmitted by the sector in which the access terminal last sent a RouteUpdate message, $rm$ is the value of the RouteUpdateRadiusMultiply attribute, and $ra$ is the value of the RouteUpdateRadiusAdd attribute.

If $(x_L, y_L)$ are the longitude and latitude of the sector to which the access terminal last sent a RouteUpdate, and $(x_C, y_C)$ are the longitude and latitude of the sector currently providing coverage to the access terminal, then $r$ is given by

$$r = \sqrt{\left(\frac{\pi}{180} \times \frac{y_L}{14400}\right)^2 + \left[y_C - y_L\right]^2}$$

The access terminal shall compute $r$ with an error of no more than $\pm 5\%$ of its true value when $|y_L/14400|$ is less than 60 and with an error of no more than $\pm 7\%$ of its true value when $|y_L/14400|$ is between 60 and 70.

If the value of the SupportRouteUpdateEnhancements attribute is 0x00, then the access network shall not send a RouteUpdateRequest message. If the value of the SupportRouteUpdateEnhancements attribute is not 0x00, then the access network may send a RouteUpdateRequest message.

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50 The $x$’s denote longitude and the $y$’s denote latitude.

51 This equation applies if the access terminal does not cross longitude = 180. Modified equation that is applicable in all cases is:

$$r = \sqrt{D_{\text{longitude}} \times \cos \left(\frac{\pi}{180} \times \frac{y_L}{14400}\right)^2 + \left[y_C - y_L\right]^2}$$

$$D_{\text{longitude}} = x_C - x_L \text{ if } \left|x_C - x_L\right| < 180$$

$$D_{\text{longitude}} = 360 \times 14400 - \left|x_C - x_L\right| \text{ if } \left|x_C - x_L\right| \geq 180$$

52 $x_L$ and $y_L$ are given in units of 1/4 seconds. $x_L/14400$ and $y_L/14400$ are in units of degrees.
3.9.6.1.6 Connected State

In this state, RouteUpdate messages from the access terminal are based on changes in the radio link between the access terminal and the access network, obtained through pilot strength measurements at the access terminal.

The access network determines the contents of the Active Set through TrafficChannelAssignment messages.

3.9.6.1.6.1 Access Terminal Requirements

In the Connected State, the access terminal shall perform the following:

- If the protocol receives a ReverseTrafficChannelMAC.LinkAcquired indication the access terminal shall:
  - Send a TrafficChannelComplete message with the MessageSequence field of the message set to the MessageSequence field of the TrafficChannelAssignment message,
  - Return a ConnectionOpened indication.

3.9.6.1.6.2 Access Network Requirements

In the Connected State, the access network shall perform the following:

- If the protocol receives a ReverseTrafficChannelMAC.LinkAcquired indication the access network shall return a ConnectionOpened indication.

3.9.6.1.6.3 Active Set Maintenance

3.9.6.1.6.3.1 Access Network

Whenever the access network sends a TrafficChannelAssignment message to the access terminal, it shall add to the Active Set any pilots listed in the message that are not currently in the Active Set.

The access network shall delete a pilot from the Active Set if the pilot was not listed in a TrafficChannelAssignment message and if the access network received the TrafficChannelComplete message, acknowledging that TrafficChannelAssignment message.

The access network should send a TrafficChannelAssignment message to the access terminal in response to changing radio link conditions, as reported in the access terminal’s RouteUpdate messages.

The access network should only specify a pilot in the TrafficChannelAssignment message if it has allocated the required resources in the associated sector. This means that the sector specified by the pilot is ready to receive data from the access terminal and is ready to transmit queued data to the access terminal.

If the SupportedCDMAChannels attribute contains one or more band classes, then the access network shall assign a Traffic Channel on a CDMA Channel supported by the access terminal as indicated by the value of the SupportedCDMAChannels attribute.
If the access network adds or deletes a pilot in the Active Set, it shall send an
ActiveSetUpdated indication.

If the access network adds a pilot specified in a RouteUpdate message to the Active Set, the
access network may use the PilotPNPhase field provided in the message to obtain a round
trip delay estimate from the access terminal to the sector associated with this pilot. The
access network may use this estimate to accelerate the acquisition of the access terminal’s
Reverse Traffic Channel in that sector.

3.9.6.1.6.3.2 Access Terminal

If the access terminal receives a valid TrafficChannelAssignment message (see 3.9.6.1.3.2),
it shall replace the contents of its current Active Set with the pilots specified in the message.
The access terminal shall process the message as defined in 3.9.6.1.6.6.

3.9.6.1.6.4 ResetReport Message

The access network may send a ResetReport message to reset the conditions under which
RouteUpdate messages are sent from the access terminal. Access terminal usage of the
ResetReport message is specified in the following section.

3.9.6.1.6.5 Route Update Report Rules

The access terminal sends a RouteUpdate message to the access network in this state to
request addition or deletion of pilots from its Active Set. If the access terminal is sending
the RouteUpdate message in response to a RouteUpdateRequest message that contains a
Channel record, the access terminal shall include in a RouteUpdate message the pilot PN
phase, pilot strength, and drop status for pilots whose strength is above the value specified
by PilotAdd and subject to the following conditions:

- If the RouteUpdateRequest message contains one or more SectorPilotPN fields, the
  access terminal shall include pilots in the CDMA channel indicated by the Channel
  record and that are indicated by the SectorPilotPN fields. Otherwise, the access terminal
  shall include pilots which are in the CDMA channel indicated by the Channel record.

If the access terminal is not sending the RouteUpdate message in response to a
RouteUpdateRequest message that contains a Channel record, the access terminal shall
determine which pilots to include in the RouteUpdate message as follows:

- If DynamicThresholds is equal to ‘0’, 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. If DynamicThresholds is equal to ‘1’, then 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, for each pilot in the
  Candidate Set whose strength is above the values specified by PilotAdd, and for each
  pilot in the Candidate Set whose strength, PS, satisfies the following inequality:

\[
10 \times \log_{10} PS > \frac{\text{SoftSlope} \times \log_{10} \sum_{i} PS_i + \text{AddIntercept}}{2},
\]

where the summation is performed over all pilots currently in the Active Set.
It is optional for the access terminal to send RouteUpdate message. In case the access
terminal chooses to do so, it shall send a RouteUpdate message if any one of the following
occurs:

- The value of the SupportRouteUpdateEnhancements attribute is not 0x00 and the
  access terminal receives a RouteUpdateRequest message.
- The xHRPD Subtype 0 Route Update Protocol receives a SendRouteUpdate command.
- If DynamicThresholds is equal to ‘0’ and the strength of a Neighbor Set or Remaining
  Set pilot is greater than the value specified by PilotAdd.
- If DynamicThresholds is equal to ‘1’ and the strength of a Neighbor Set or Remaining
  Set pilot, PS, satisfies the following inequality:

\[
10 \times \log_{10} PS > \max \left( \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{i \in A} PS_i + \frac{\text{AddIntercept}}{2}, \frac{\text{PilotAdd}}{2} \right)
\]

where the summation is performed over all pilots currently in the Active Set.
- If DynamicThresholds is equal to ‘0’ and the strength of a Candidate Set pilot is greater
  than the value specified by PilotCompare above an Active Set pilot, and a RouteUpdate
  message carrying this information has not been sent since the last ResetReport
  message was received.
- If DynamicThresholds is equal to ‘0’ and the strength of a Candidate Set pilot is above
  PilotAdd, and a RouteUpdate message carrying this information has not been sent since
  the last ResetReport message was received.
- If DynamicThresholds is equal to ‘1’ and
  - the strength of a Candidate Set pilot, PS, satisfies the following inequality:

\[
10 \times \log_{10} PS > \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{i \in A} PS_i + \frac{\text{AddIntercept}}{2}
\]

where the summation is performed over all pilots currently in the Active Set, and
  - a RouteUpdate message carrying this information has not been sent since the
    last ResetReport message was received.
- If DynamicThresholds is equal to ‘1’ and
  - the strength of a Candidate Set pilot is greater than the value specified by
    PilotCompare above an Active Set pilot, and
  - the strength of a Candidate Set pilot, PS, satisfies the following inequality:

\[
10 \times \log_{10} PS > \frac{\text{SoftSlope}}{8} \times 10 \times \log_{10} \sum_{i \in A} PS_i + \frac{\text{AddIntercept}}{2}
\]

where the summation is performed over all pilots currently in the Active Set, and
  - a RouteUpdate message carrying this information has not been sent since the
    last ResetReport message was received.
• The pilot drop timer of an Active Set pilot has expired, and a RouteUpdate message carrying this information has not been sent since the last ResetReport message was received.

If the value of the SupportRouteUpdateEnhancements attribute is 0x00, then the access network shall not send a RouteUpdateRequest message. If the value of the SupportRouteUpdateEnhancements attribute is not 0x00, then the access network may send a RouteUpdateRequest message.

3.9.6.1.6.6 Processing the TrafficChannelAssignment Message in the Connected State

If valid TrafficChannelAssignment (see 3.9.6.1.3.2) message does not contain a Channel Record, or if a valid TrafficChannelAssignment message contains a Channel Record and the access terminal supports the CDMA Channel specified by the Channel Record, then the access terminal shall process the message as follows:

• If the TrafficChannelAssignment message contains a value for the FrameOffset that is different from the value of the FrameOffset received in the last TrafficChannelAssignment message that was received in the Idle state, then the access terminal shall return a RouteUpdate.AssignmentRejected indication and shall discard the message.

• The access terminal shall update its Active Set as defined in 3.9.6.1.6.3.2.

• The access terminal shall tune to the CDMA Channel defined by the Channel Record, if this record is included in the message.

• 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.

• The access terminal shall start monitoring and responding to the Power Control Channels defined by the MACIndex fields provided in the message.

• The access terminal shall send the access network a TrafficChannelComplete message specifying the MessageSequence value received in the TrafficChannelAssignment message.

3.9.6.1.6.7 Processing the TrafficChannelComplete Message

The access network should set a transaction timer when it sends a TrafficChannelAssignment message. If the access network sets a transaction timer, it shall reset the timer when it receives a TrafficChannelComplete message containing a MessageSequence field equal to the one sent in the TrafficChannelAssignment message.

If the timer expires, the access network should return a ConnectionLost indication.
3.9.6.1.6.8 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 3.9.6.1.2.1.

3.9.6.1.6.9 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 3.9.6.1.3.3) 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 3.9.6.1.3.3) AttributeOverride message, it shall send the access network an AttributeOverrideResponse message specifying the MessageSequence value received in the AttributeOverride message.
3.9.6.1.6.10 Processing of OverheadMessages.Updated Indication
Upon receiving OverheadMessages.Updated indication, the access terminal shall perform
the OverheadMessagesNeighborList Initialization procedures as specified in 3.9.6.1.6.11
and then perform the procedures specified in 3.9.6.1.2.1.

3.9.6.1.6.11 OverheadMessagesNeighborList Initialization
When the OverheadMessagesNeighborList initialization procedures are invoked by the
access terminal, it shall perform the following:
• The access terminal shall remove all Neighbor structures from the
OverheadMessagesNeighborList list.
• For each pilot (specified by its pilot PN and its channel) in the neighbor list given as
public data of Overhead Messages Protocol, the access terminal shall add a Neighbor
structure to the OverheadMessagesNeighborList list and populate it as follows:
  - Set the structure’s PilotPN field to the corresponding NeighborPilotPN field
given as public data of the Overhead Messages Protocol.
  - If the Overhead Messages Protocol’s NeighborChannelIncluded field is set to ‘1’,
set the structure’s Channel field to the Overhead Messages Protocol’s
corresponding NeighborChannel. Otherwise, set the structure’s Channel field
to the current channel.
  - If the Overhead Messages Protocol’s SearchWindowSizeIncluded field is set to
‘1’, then set the structure’s SearchWindowSize field to the Overhead Messages
Protocol’s corresponding SearchWindowSize field. Otherwise, set the
structure’s SearchWindowSize field to NULL.
  - If the Overhead Messages Protocol’s SearchWindowOffsetIncluded field is set to
‘1’, then set the structure’s SearchWindowOffset field to the Overhead
Messages Protocol’s corresponding SearchWindowOffset field. Otherwise, set
the structure’s SearchWindowOffset field to NULL.

3.9.6.2 Message Formats

3.9.6.2.1 RouteUpdate
The access terminal sends the RouteUpdate message to notify the access network of its
current location and provide it with an estimate of its surrounding radio link conditions.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>MessageSequence</td>
<td>8</td>
</tr>
<tr>
<td>ReferencePilotPN</td>
<td>9</td>
</tr>
<tr>
<td>ReferencePilotStrength</td>
<td>6</td>
</tr>
<tr>
<td>ReferenceKeep</td>
<td>1</td>
</tr>
<tr>
<td>NumPilots</td>
<td>4</td>
</tr>
</tbody>
</table>

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 this message. The sequence number of this message is 1 more than the sequence number of the last RouteUpdate message (modulo 2^8) sent by this access terminal. If this is the first RouteUpdate message sent by the access terminal, it shall set this field to 0x00.

3. **ReferencePilotPN**: The access terminal shall set this field to the access terminal’s time reference (the reference pilot), relative to the zero offset pilot PN sequence in units of 64 PN chips.

4. **ReferencePilotStrength**: The access terminal shall set this field to \(\left\lfloor -2 \times 10 \times \log_{10} PS \right\rfloor \), where PS is the strength of the reference pilot, measured as specified in 3.9.6.1.2.3. If this value is less than 0, the access terminal shall set this field to ‘000000’. If this value is greater than ‘111111’, the access terminal shall set this field to ‘111111’.

---

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ReferenceKeep
If the pilot drop timer corresponding to the reference pilot has expired, the access terminal shall set this field to ‘0’; otherwise, the access terminal shall set this field to ‘1’.

NumPilots
The access terminal shall set this field to the number of pilots that follow this field in the message.

PilotPNPhase
The PN offset in resolution of 1 chip of a pilot in the Active Set or Candidate Set of the access terminal that is not the reference pilot.

ChannelIncluded
The access terminal shall set this field to ‘1’ if the channel for this pilot offset is not the same as the current channel. Otherwise, the access terminal shall set this field to ‘0’.

FwdChannel
The access terminal shall include this field if the ChannelIncluded field is set to ‘1’. The access terminal shall set this to the channel record corresponding to this pilot (see [1]). Otherwise, the access terminal shall omit this field for this pilot offset.

PilotStrength
The access terminal shall set this field to \(-2 \times 10 \times \log_{10} \text{PS}\) where PS is the strength of the pilot in the above field, measured as specified in 3.9.6.1.2.3. If this value is less than 0, the access terminal shall set this field to ‘000000’. If this value is greater than ‘111111’, the access terminal shall set this field to ‘111111’.

Keep
If the pilot drop timer corresponding to the pilot in the above field has expired, the access terminal shall set this field to ‘0’; otherwise, the access terminal shall set this field to ‘1’.

InitialCQI
The access terminal shall set this field to the initial CQI value corresponding to the initial forward link data rate being requested by the access terminal.

CQIFormat
The access terminal shall set this field to ‘00’ if it supports 4-bit CQI format and to ‘01’ if it supports 2-bit CQI format. Other values are reserved.

xHRPDLocationPresent
The access terminal shall set this field to ‘1’ if it has GPS location. Otherwise, the access terminal shall set this field to ‘0’.

xHRPDLocation
If the xHRPDLocationPresent field is set to ‘0’, then the access terminal shall omit this field. Otherwise, the access terminal shall set this field to ‘0000000’ for USA and ‘0000001’ for Canada. Rest of the values are reserved.
Reserved

The number of bits in this field is equal to the number needed to make the message length an integer number of octets. This field shall be set to all zeros.

<table>
<thead>
<tr>
<th>Channels</th>
<th>AC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

3.9.6.2.2 TrafficChannelAssignment

The access network sends the TrafficChannelAssignment message for assigning traffic channel.

---

53 This message is sent reliably when it is sent over the Reverse Traffic Channel.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>MessageSequence</td>
<td>8</td>
</tr>
<tr>
<td>ChannelIncluded</td>
<td>1</td>
</tr>
<tr>
<td>xHRPDfwdChannel</td>
<td>0 or 24</td>
</tr>
<tr>
<td>FrameOffset</td>
<td>4</td>
</tr>
<tr>
<td>CQIFormat</td>
<td>2</td>
</tr>
<tr>
<td>CQIPeriod</td>
<td>8</td>
</tr>
<tr>
<td>xHRPDRreserved1</td>
<td>4</td>
</tr>
<tr>
<td>NumPilots</td>
<td>4</td>
</tr>
</tbody>
</table>

NumPilots occurrences of the following record:

```
{
  PilotPN            9
  xHRPDRreserved2    1
  MACIndexLSBs       6
  xHRPDRreserved3    3
  xHRPDRreserved4    2
  xHRPDRreserved5    3
}
```

xHRPDRreserved6       1

NumPilots occurrences of the following field:

```
{
  xHRPDRreserved7      2
}
```

MACIndexMSBIncluded   1

NumPilots occurrences of the following field:

```
{
  MACIndexMSB          0 or 1
}
```

xHRPDRreserved8       5

NumPilots occurrences of the following field:

```
{
  xHRPDRreserved9      3
}
```

xHRPDRreserved10      1
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xHRPDRevChannel</td>
<td>24</td>
</tr>
<tr>
<td>FrequencyPreCorrection</td>
<td>10</td>
</tr>
<tr>
<td>AccessSNR</td>
<td>6</td>
</tr>
<tr>
<td>Reserved</td>
<td>Variable</td>
</tr>
</tbody>
</table>

1. **MessageID**
   The access network shall set this field to 0x01.

2. **MessageSequence**
   The access network shall set this to 1 higher than the MessageSequence field of the last TrafficChannelAssignment message (modulo $2^8$, $S=8$) sent to this access terminal.

3. **ChannelIncluded**
   The access network shall set this field to ‘1’ if the Channel record is included for these pilots. Otherwise, the access network shall set this field to ‘0’.

4. **xHRPDFwdChannel**
   The access network shall include this field if the ChannelIncluded field is set to ‘1’. The access network shall set this to the forward channel record corresponding to this pilot (see [1]). Otherwise, the access network shall omit this field for this pilot offset. If Channel is included, the access network shall set the SystemType field of the Channel record to ‘0x03’.

5. **FrameOffset**
   The access network shall set this field to the frame offset the access terminal shall use when transmitting the Reverse Traffic Channel, in units of slots.

6. **CQIFormat**
   The access terminal shall set this field to ‘00’ if it supports 4-bit CQI format and to ‘01’ if it supports 2-bit CQI format. Other values are reserved.

7. **CQIPeriod**
   The access terminal shall set this field to a value that specifies the duration in 20 msec frames during which access terminal transmits a single CQI value.

8. **xHRPDReserved1**
   This field shall be set to all zeros.

9. **NumPilots**
   The access network shall set this field to the number of pilots included in this message.

10. **PilotPN**
    The access network shall set this field to the PN Offset associated with the sector that will transmit a Power Control Channel to the access terminal, to whom the access terminal is allowed to connect, and whose Control Channel and Forward Traffic Channel the access terminal may monitor.

11. **xHRPDReserved2**
    This field shall be set to zero.
MACIndexLSBs: Least Significant Bits of the Medium Access Control Index. The access network shall set this field to the six least significant bits of the MACIndex assigned to the access terminal by this sector.

xHRPDReserved3: This field shall be set to all zeros.

xHRPDReserved4: This field shall be set to all zeros.

xHRPDReserved5: This field shall be set to all zeros.

xHRPDReserved6: This field shall be set to ‘1’.

xHRPDReserved7: This field shall be set to all zeros.

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’.

MACIndexMSB: Most significant bit of the Medium Access Control Index. If MACIndexMSBsIncluded field is not included in this message or if MACIndexMSBsIncluded field is equal to ‘0’, then the access network shall omit this field. Otherwise, the access network shall set this field as follows:

The \(i\)th occurrence of this field corresponds to the \(i\)th occurrence of the PilotPN field in this message. The access network shall set the \(i\)th occurrence of this field to the most significant bit of the 7-bit MACIndex assigned to the access terminal by the \(i\)th PilotPN.

xHRPDReserved8: This field shall be set to all zeros.

xHRPDReserved9: This field shall be set to all zeros.

xHRPDReserved10: This field shall be set to zero.

xHRPDRevChannel: The access network shall set this field to reverse channel record (see [6]).

FrequencyPreCorrection: The access network shall set field to the frequency offset of the received access probe as measured by the access network. This field is a 10-bit signed number and the value range of -512 to 511 corresponds to -1024 to 1022 Hz frequency offset.

AccessSNR: The access network shall set field to the signal-to-noise ratio of the received access probe as measured by the access network. The value
range of -32 to 31 corresponds to SNR of -15 dB to 16 dB with 0.5 dB resolution.

Reserved

The number of bits in this field is equal to the number needed to make the message length an integer number of octets. This field shall be set to all zeros.

<table>
<thead>
<tr>
<th>Channels</th>
<th>CC</th>
<th>FTC</th>
<th>SLP</th>
<th>Reliable</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>MessageSequence</td>
<td>8</td>
</tr>
</tbody>
</table>

3.9.6.2.3 TrafficChannelComplete

The access terminal sends the TrafficChannelComplete message to provide an acknowledgment for the TrafficChannelAssignment message.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
</table>

MessageID

The access terminal shall set this field to 0x02.

MessageSequence

The access terminal shall set this field to the MessageSequence field of the TrafficChannelAssignment message whose receipt this message is acknowledging.

<table>
<thead>
<tr>
<th>Channels</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
</tbody>
</table>

3.9.6.2.4 ResetReport

The access network sends the ResetReport message to reset the RouteUpdate transmission rules at the access terminal.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
</table>

MessageID

The access network shall set this field to 0x03.

54 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.
3.9.6.2.5 NeighborList

The NeighborList message is used to convey information corresponding to the neighboring sectors to the access terminals when the access terminal is in the Connected State.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>Count</td>
<td>5</td>
</tr>
</tbody>
</table>

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        |

\( m, 0 \leq m \leq \text{Count} \). Count occurrences of the following field:

| FPDCHSupported         | 0 or 1        |

Reserved | Variable

MessageID | The access network shall set this field to 0x04.
Count
   The access network shall set this field to the number of records specifying neighboring sectors information included in this message.

PilotPN
   The access network shall set this field to the PN Offset of a neighboring sector for which the access network is providing search window information in this message.

ChannelIncluded
   The access network shall set this field to ‘1’ if a Channel record is included for this neighbor, and to ‘0’ otherwise. The access network may set this field to ‘0’ if the channel associated with this pilot is the same as the channel that is used to carry this message. If this field is set to ‘0’, the access terminal shall assume that the channel associated with this pilot is the same as the channel on which this message is received. The nth occurrence of this field corresponds to the nth occurrence of PilotPN in the record that contains the PilotPN field above.

Channel
   Channel record specification for the neighbor channel. See [1] for the Channel record format. The nth occurrence of this field corresponds to the nth occurrence of PilotPN in the record that contains the PilotPN field above.

SearchWindowSizeIncluded
   The access network shall set this field to ‘1’ if SearchWindowSize field for neighboring sectors is included in this message. Otherwise, the access network shall set this field to ‘0’.

SearchWindowSize
   The access network shall omit this field if SearchWindowSizeIncluded is set to ‘0’. If SearchWindowSizeIncluded is set to ‘1’, the access network shall set this field to the value shown in Table corresponding to the search window size to be used by the access terminal for the neighbor pilot. The nth occurrence of this field corresponds to the nth occurrence of PilotPN in the record that contains the PilotPN field above.
Table 3.9.6.2.5-1. Search Window Sizes

<table>
<thead>
<tr>
<th>SearchWindowSize Value</th>
<th>Search Window Size (PN chips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>80</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>11</td>
<td>130</td>
</tr>
<tr>
<td>12</td>
<td>160</td>
</tr>
<tr>
<td>13</td>
<td>226</td>
</tr>
<tr>
<td>14</td>
<td>320</td>
</tr>
<tr>
<td>15</td>
<td>452</td>
</tr>
</tbody>
</table>

SearchWindowOffsetIncluded

The access network shall set this field to ‘1’ if SearchWindowOffset field for neighboring sectors is included in this message. Otherwise, the access network shall set this field to ‘0’.

SearchWindowOffset

The access network shall omit this field if SearchWindowOffsetIncluded is set to ‘0’. If SearchWindowOffsetIncluded is set to ‘1’, the access network shall set this field to the value shown in Table 3.9.6.2.5-2 corresponding to the search window offset to be used by the access terminal for the neighbor pilot. The \( n \)th occurrence of this field corresponds to the \( n \)th occurrence of PilotPN in the record that contains the PilotPN field above.
Table 3.9.6.2.5-2. Search Window Offset

<table>
<thead>
<tr>
<th>SearchWindowOffset</th>
<th>Offset (PN chips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>WindowSize /2</td>
</tr>
<tr>
<td>2</td>
<td>WindowSize</td>
</tr>
<tr>
<td>3</td>
<td>3 ×WindowSize /2</td>
</tr>
<tr>
<td>4</td>
<td>-WindowSize /2</td>
</tr>
<tr>
<td>5</td>
<td>-WindowSize</td>
</tr>
<tr>
<td>6</td>
<td>-3 ×WindowSize /2</td>
</tr>
<tr>
<td>7</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

FPDCHSupportedIncluded

If this field is included, the access network shall set this field as follows:

The access network shall set this field to ‘0’ if the FPDCHSupported fields are omitted. Otherwise, the access network shall set this field to ‘1’.

FPDCHSupported

If FPDCHSupportedIncluded is not included or is included and is set to ‘0’, the access network shall omit all occurrences of this field. Otherwise, the access network shall include m occurrences of this field, where m is the number of Channel records in this message that have SystemType equal to 0x01, and the access network shall set the occurrences of this field as follows:

The access network shall set the \(i\)th occurrence of this field as follows:

If the system on the CDMA Channel corresponding to the \(i\)th Channel record (see [6]) that has SystemType equal to 0x01 supports the Forward Packet Data Channel (see [11]), the access terminal shall set the \(i\)th occurrence of this field to ‘1’. Otherwise, the access network shall set the \(i\)th occurrence of this field to ‘0’.

Reserved

The number of bits in this field is equal to the number needed to make the message length an integer number of octets. The access network shall set this field to zero. The access terminal shall ignore this field.

\[55\] WindowSize is pilot’s search window size in PN chips.
### 3.9.6.2.6 AttributeOverride

The access network may send this message in order to override the configured values for the attributes included in this message.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>MessageSequence</td>
<td>8</td>
</tr>
</tbody>
</table>

One or more instances of the following record:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AttributeRecord</td>
<td>variable</td>
</tr>
</tbody>
</table>

**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 (modular $2^8$, $S=8$) 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.

### 3.9.6.2.7 AttributeOverrideResponse

The access terminal sends the AttributeOverrideResponse message to provide an acknowledgment for the AttributeOverride message.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>MessageSequence</td>
<td>8</td>
</tr>
</tbody>
</table>

1. **MessageID**
   The access network shall set this field to 0x06.

2. **MessageSequence**
   The access terminal shall set this field to the MessageSequence field of the AttributeOverride message whose receipt this message is acknowledging.

<table>
<thead>
<tr>
<th>Channels</th>
<th>Addressing</th>
<th>RTC</th>
<th>SLP</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>unicast</td>
<td>Best Effort</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

3. **3.9.6.2.8 RouteUpdateRequest**
   The access network sends a RouteUpdateRequest message to request the access terminal to send a RouteUpdate message.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>ChannelIncluded</td>
<td>1</td>
</tr>
<tr>
<td>Channel</td>
<td>0 or 24</td>
</tr>
<tr>
<td>SectorCount</td>
<td>0 or 4</td>
</tr>
</tbody>
</table>

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 message is being sent on the Control Channel, the access network shall set this field to ‘0’. Otherwise, the access network may set this field to ‘1’ to indicate that the Channel field is included or to ‘0’ to indicate that the Channel field is not included.

3. **Channel**  
If ChannelIncluded is set to ‘0’, the access network shall omit this field. Otherwise, the access network shall set this field to a Channel record specification. See [1] for the Channel record format. The access network shall set the SystemType field of this record to 0x03 if SupportRouteUpdateEnhancements is equal to 0x02.

4. **SectorCount**  
If ChannelIncluded is set to ‘0’, the access network shall omit this field. Otherwise, the access network shall set this field to the number of records specifying neighboring sectors information included in this message.
SectorPilotPN

The access network shall set this field to the PN Offset of a neighboring sector for which the access terminal is to report pilot strength information.

SectorSearchWindowSizeIncluded

If ChannelIncluded is set to '0', the access network shall omit this field. Otherwise, the access network shall set this field to '1' if SectorSearchWindowSize field for neighboring sectors is included in this message. Otherwise, the access network shall set this field to '0'.

SectorSearchWindowSize

The access network shall omit this field if SectorSearchWindowSizeIncluded is set to '0'. If SectorSearchWindowSizeIncluded is set to '1', the access network shall set this field to the value shown in Table 3.9.6.2.8-1 corresponding to the search window size to be used by the access terminal for the neighbor pilot. The $n^{th}$ occurrence of this field corresponds to the $n^{th}$ occurrence of SectorPilotPN in the record that contains the SectorPilotPN field above.
Table 3.9.6.2.8-1. Search Window Sizes

<table>
<thead>
<tr>
<th>SearchWindowSize Value</th>
<th>Search Window Size (PN chips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>80</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>11</td>
<td>130</td>
</tr>
<tr>
<td>12</td>
<td>160</td>
</tr>
<tr>
<td>13</td>
<td>226</td>
</tr>
<tr>
<td>14</td>
<td>320</td>
</tr>
<tr>
<td>15</td>
<td>452</td>
</tr>
</tbody>
</table>

SectorWindowOffsetIncluded

If ChannelIncluded is set to ‘0’, the access network shall omit this field. Otherwise, the access network shall set this field to ‘1’ if SectorWindowOffsetIncluded field for neighboring sectors is included in this message. Otherwise, the access network shall set this field to ‘0’.

SectorWindowOffset

The access network shall omit this field if SectorWindowOffsetIncluded is set to ‘0’. If SectorWindowOffsetIncluded is set to ‘1’, the access network shall set this field to the value shown in Table 3.9.6.2.8-2 corresponding to the search window offset to be used by the access terminal for the neighbor pilot. The \( n \)th occurrence of this field corresponds to the \( n \)th occurrence of SectorPilotPN in the record that contains the SectorPilotPN field above.
### Table 3.9.6.2.8-2. Search Window Offset

<table>
<thead>
<tr>
<th>SearchWindowOffset</th>
<th>Offset (PN chips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>$\text{WindowSize}^{56}/2$</td>
</tr>
<tr>
<td>2</td>
<td>$\text{WindowSize}$</td>
</tr>
<tr>
<td>3</td>
<td>$3 \times \text{WindowSize}/2$</td>
</tr>
<tr>
<td>4</td>
<td>$-\text{WindowSize}/2$</td>
</tr>
<tr>
<td>5</td>
<td>$-\text{WindowSize}$</td>
</tr>
<tr>
<td>6</td>
<td>$-3 \times \text{WindowSize}/2$</td>
</tr>
<tr>
<td>7</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>CC</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td>Priority</td>
<td>40</td>
</tr>
</tbody>
</table>

3.9.6.2.9 AttributeUpdateRequest

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

One or more instances of the following record

| AttributeRecord     | Attribute dependent |

MessageID The sender shall set this field to 0x52.

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

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

---

56 $\text{WindowSize}$ is pilot’s search window size in PN chips.
3.9.6.2.10 AttributeUpdateAccept

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

MessageID  The sender shall set this field to 0x53.

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

3.9.6.2.11 AttributeUpdateReject

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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

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

3.9.6.3 Interface to Other Protocols

3.9.6.3.1 Commands Sent

This protocol sends the following commands:

- ReverseTrafficChannelMAC.Activate
3.9.6.3.2 Indications

This protocol registers to receive the following indications:

- `ReverseTrafficChannelMAC.LinkAcquired`
- `OverheadMessages.Updated`

3.9.7 Configuration Attributes

Unless specified otherwise, the access terminal and the access network shall not use the Generic Attribute Update Protocol to update configurable attributes belonging to the xHRPD Subtype 0 Route Update Protocol. If the value of the `SupportRouteUpdateEnhancements` attribute is not 0x00, then the access terminal and the access network shall support the use of the Generic Attribute Update Protocol to update values of the following attributes belonging to the xHRPD Subtype 0 Route Update Protocol:

- `RouteUpdateRadiusMultiply`
- `RouteUpdateRadiusAdd`

If the value of the `SupportRouteUpdateEnhancements` attribute is 0x00, then the access network shall not include the `RouteUpdateRadiusMultiply` and `RouteUpdateRadiusAdd` attributes in an `AttributeUpdateRequest` message.

3.9.7.1 Simple Attributes

The configurable simple attributes for this protocol are listed in Table 3.9.7.1-1. The access terminal shall not include these simple attributes in a `ConfigurationRequest` message or an `AttributeUpdateRequest` message.

The access terminal and access network shall use as defaults the values in Table 3.9.7.1-1 that are typed in **bold italics.**
<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Value(s)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x03</td>
<td>SetManagementOverrideAllowed</td>
<td>0x00</td>
<td>The SetManagementSameChannelParameters and SetManagementDifferentChannel Parameters attributes in the AttributeOverride message are discarded.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>The SetManagementSameChannelParameters and SetManagementDifferentChannel Parameters attributes in the AttributeOverride message are acted upon.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x02-0xff</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xff</td>
<td>RouteUpdateRadiusMultiply</td>
<td>0x00</td>
<td>Distance-based registration is disabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x0a</td>
<td>Multiplier for the Route update radius is 1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Multiplier for the Route update radius in units of 0.1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x0a</td>
<td>Multiplier for the Route update radius in units of 0.1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xFE</td>
<td>RouteUpdateRadiusAdd</td>
<td>0x00</td>
<td>Addition to the Route update radius is zero.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Addition to the Route update radius expressed as 2’s complement value.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved</td>
</tr>
<tr>
<td>0xFD</td>
<td>SupportRouteUpdateEnhancements</td>
<td>0x00</td>
<td>Use of Generic Attribute Update Protocol to update RouteUpdateRadiusMultiply and RouteUpdateRadiusAdd and processing of RouteUpdateRequest message is not supported.</td>
</tr>
</tbody>
</table>
### 3.9.7.2 Complex Attributes

The following complex attributes and default values are defined (see [6] for attribute record definition). The following complex attributes are to be used only by the access network in a ConfigurationRequest message:

- SearchParameters
- SetManagementSameChannelParameters
- SetManagementDifferentChannelParameters

The following complex attributes are to be used only by the access terminal in a ConfigurationRequest message:

- SupportedCDMAChannels

#### 3.9.7.2.1 SearchParameters Attribute

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Value(s)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x01</td>
<td>Use of Generic Attribute Update Protocol to update RouteUpdateRadiusMultiply and RouteUpdateRadiusAdd and processing of RouteUpdateRequest message without Channel Record is supported.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0x02</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other values</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field</td>
<td>Length (bits)</td>
<td>Default Value</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

One or more of the following record:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ValueID</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>PilotIncrement</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>SearchWindowActive</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>SearchWindowNeighbor</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>SearchWindowRemaining</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

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 0x00.

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.

PilotIncrement
The access network shall set this field to the pilot PN sequence increment, in units of 64 PN chips, that access terminals are to use for searching the Remaining Set. The access network should set this field to the largest increment such that the pilot PN sequence offsets of all its neighbor access networks are integer multiples of that increment. The access terminal shall support all the valid values for this field.

SearchWindowActive
Search window size for the Active Set and Candidate Set. The access network shall set this field to the value shown in Table 3.9.6.2.8-1Table corresponding to the search window size to be used by the access terminal for the Active Set and Candidate Set. The access terminal shall support all the valid values specified by this field.

SearchWindowNeighbor
Search window size for the Neighbor Set. The access network shall set this field to the value shown in Table corresponding to the search window size to be used by the access terminal for the Neighbor Set. The access terminal shall support all the valid values specified by this field.
SearchWindowRemaining

Search window size for the Remaining Set. The access network shall set this field to the value shown in Table corresponding to the search window size to be used by the access terminal for the Remaining Set. The access terminal shall support all the valid values specified by this field.

3.9.7.2.2 SetManagementSameChannelParameters Attribute

The access terminal shall use these attributes if the pilot being compared is on the same channel as the active set pilots’ channel.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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 0x01.

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 $\lfloor -2 \times 10 \times \log_{10} \frac{E_c}{I_0} \rfloor$. 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 shall set this field to the pilot drop threshold, expressed as an unsigned binary number equal to $\lfloor -2 \times 10 \times \log_{10} \frac{E_c}{I_0} \rfloor$. 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.

**PilotCompare**

Active Set versus Candidate Set comparison threshold, expressed as a 2’s complement number. The access terminal transmits a RouteUpdate message when the strength of a pilot in the Candidate Set exceeds that of a pilot in the Active Set by this margin. The access network shall set this field to the threshold Candidate Set pilot to Active Set pilot ratio, in units of 0.5 dB. The access terminal shall support all the valid values specified by this field.

**PilotDropTimer**

Timer value after which an action is taken by the access terminal for a pilot that is a member of the Active Set or Candidate Set, and whose strength has not become greater than the value specified by PilotDrop. If the pilot is a member of the Active Set, a RouteUpdate message is sent in the Connected State. If the pilot is a member of the Candidate Set, it will be moved to the Neighbor Set. The access network shall set this field to the drop timer value shown in Table 3.9.7.2.2-1 corresponding to the pilot drop timer value to be used by access terminals. The access terminal shall support all the valid values specified by this field.
## Table 3.9.7.2.2-1. Pilot Drop Timer Values

<table>
<thead>
<tr>
<th>PilotDropTimer</th>
<th>Timer Expiration (seconds)</th>
<th>PilotDropTimer</th>
<th>Timer Expiration (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>&lt; 0.1</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>9</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>10</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>11</td>
<td>79</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>12</td>
<td>112</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>13</td>
<td>159</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
<td>14</td>
<td>225</td>
</tr>
<tr>
<td>7</td>
<td>19</td>
<td>15</td>
<td>319</td>
</tr>
</tbody>
</table>

### 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’.

### 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.

### 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.

### 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.

### 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.

### 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.
### 3.9.7.2.3 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.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

One or more of the following attribute value record:

```plaintext
{
    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 \(-2 \times 10 \times \log10 \frac{E_c}{I_0}\) 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
shall set this field to the pilot drop threshold, expressed as an unsigned binary number equal to \(\lfloor -2 \times 10 \times \log_{10} \frac{E_c}{I_0} \rfloor\). 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.

PilotCompare

Active Set versus Candidate Set comparison threshold, expressed as a 2’s complement number. The access terminal transmits a RouteUpdate message when the strength of a pilot in the Candidate Set exceeds that of a pilot in the Active Set by this margin. The access network shall set this field to the threshold Candidate Set pilot to Active Set pilot ratio, in units of 0.5 dB. The access terminal shall support all the valid values specified by this field.

PilotDropTimer

Timer value after which an action is taken by the access terminal for a pilot that is a member of the Active Set or Candidate Set, and whose strength has not become greater than the value specified by PilotDrop. If the pilot is a member of the Active Set, a RouteUpdate message is sent in the Connected State. If the pilot is a member of the Candidate Set, it will be moved to the Neighbor Set. The access network shall set this field to the drop timer value shown in Table 3.9.7.2.2-1 corresponding to the pilot drop timer value to be used by access terminals. The access terminal shall support all the valid values specified by this field.

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’.

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.

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.

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.

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.

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.

### 3.9.7.2.4 SupportedCDMAChannels Attribute

The access terminal uses this attribute to convey to the access network the CDMA Channels supported by the access terminal.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>AttributeID</td>
<td>8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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
}
```

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Length of the complex attribute in octets. The access terminal shall set this field to the length of the complex attribute excluding the Length field.</td>
</tr>
<tr>
<td>AttributeID</td>
<td>The access terminal shall set this field to 0x04.</td>
</tr>
<tr>
<td>ValueID</td>
<td>This field identifies this particular set of values for the attribute. The access terminal shall set this field to an identifier assigned to this complex value.</td>
</tr>
<tr>
<td>BandClassCount</td>
<td>The access terminal shall set this field to the number of occurrences of the BandClass field in this complex value.</td>
</tr>
</tbody>
</table>
BandClass  The access terminal shall set this field to the band class supported by the access terminal.

BandSubClassCount The access terminal shall set this field to the number of band sub-classes supported by the access terminal in this band class.

BandSubClass  The access terminal shall set this field to the band sub-class supported by the access terminal.

Reserved  The access terminal shall add reserved bits to make the length of each attribute value record equal to an integer number of octets. The access terminal shall set this field to zero. The access network shall ignore this field.

### 3.9.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N_RUPType</td>
<td>Type field for this protocol</td>
<td>See [5]</td>
</tr>
<tr>
<td>N_RUPxHRPDS0</td>
<td>Subtype field for this protocol</td>
<td>0x0000</td>
</tr>
<tr>
<td>N_RUPActive</td>
<td>Maximum size of the Active Set</td>
<td>6</td>
</tr>
<tr>
<td>N_RUCandidate</td>
<td>Maximum size of the Candidate Set</td>
<td>6</td>
</tr>
<tr>
<td>N_RUPNeighbor</td>
<td>Minimum size of the Neighbor Set</td>
<td>20</td>
</tr>
</tbody>
</table>

### 3.9.9 Session State Information

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

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

### 3.9.9.1 RouteUpdate 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.
Table 3.9.9.1-1. The Format of the Parameter Record for the RouteUpdate Parameter

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ParameterType</td>
<td>8</td>
</tr>
<tr>
<td>Length</td>
<td>8</td>
</tr>
<tr>
<td>TCAMessageSequence</td>
<td>8</td>
</tr>
<tr>
<td>RUPMessageSequence</td>
<td>8</td>
</tr>
<tr>
<td>ChannelIncluded</td>
<td>1</td>
</tr>
<tr>
<td>xHRPDfwdChannel</td>
<td>0 or 24</td>
</tr>
<tr>
<td>FrameOffset</td>
<td>4</td>
</tr>
<tr>
<td>CQIFormat</td>
<td>2</td>
</tr>
<tr>
<td>CQIPeriod</td>
<td>8</td>
</tr>
<tr>
<td>xHRPDReserved1</td>
<td>4</td>
</tr>
<tr>
<td>NumPilots</td>
<td>4</td>
</tr>
</tbody>
</table>

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 fields:

- xHRPDReserved7: 2

MACIndexMSBsIncluded: 1

NumPilots occurrences of the following field:

MACIndexMSB: 0 or 1

xHRPDReserved8: 5

NumPilots occurrences of the following field:

{ }
ParameterType  This field shall be set to 0x01 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.

TCAMessageSequence
This field shall be set to the MessageSequence field of the last TrafficChannelAssignment message that was sent by the source access network.

RUPMessageSequence
This field shall be set to the MessageSequence field of the last RouteUpdate message that was received by the source access network.

ChannelIncluded
This field shall be set to ‘1’ if the Channel field is included. Otherwise, this field shall be set to ‘0’.

xHRPDFwdChannel
This field shall be included only if the ChannelIncluded field is set to ‘1’. If included, this field shall be set to the last xHRPDFwdChannel field of the last TrafficChannelAssignment message that included the Channel field and was sent by the source access network, or the xHRPDFwdChannel field shall be set by another access network if the RouteUpdate parameter is from the other access network.

FrameOffset
This field shall be set to the FrameOffset field in the last TrafficChannelAssignment message that was sent by the source access network, or the FrameOffset field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.

CQIFormat
This field shall be set to the CQIFormat field in the last TrafficChannelAssignment message that was sent by the source access network, or the CQIFormat field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.
TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.

CQIPeriod

This field shall be set to the CQIPeriod field in the last TrafficChannelAssignment message that was sent by the source access network, or the CQIPeriod field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.

xHRPDReserved1

This field shall be set to all zeros.

NumPilots

This field shall be set to the NumPilots field in the last TrafficChannelAssignment message that was sent by the source access network, or the NumPilots field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.

PilotPN

This field shall be set to the corresponding PilotPN field in the last TrafficChannelAssignment message that was sent by the source access network, or the corresponding PilotPN field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.

SectorID

This field shall be set to the SectorID corresponding to the sector associated with the PilotPN specified above.

xHRPDReserved2

This field shall be set to zero.

MACIndexLSBs

This field shall be set to the corresponding MACIndexLSBs field in the last TrafficChannelAssignment message that was sent by the source access network, or the corresponding MACIndexLSBs field in the next TrafficChannelAssignment message to be sent by the source access network if the RouteUpdate parameter is from another access network.

xHRPDReserved3

This field shall be set to all zeros.

xHRPDReserved4

This field shall be set to all zeros.

xHRPDReserved5

This field shall be set to all zeros.

xHRPDReserved6

This field shall be set to '1'.
xHRPDReserved7 This field shall be set to all zeros.

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’.

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.

xHRPDReserved8 This field shall be set to all zeros.

xHRPDReserved9 This field shall be set to all zeros.

xHRPDReserved10 This field shall be set to zero.

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.

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.

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.

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.
3.9.9.2 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 3.9.9.2-1. The Format of the Parameter Record for the AttributeOverrideMessageSequence Parameter

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ParameterType</td>
<td>8</td>
</tr>
<tr>
<td>Length</td>
<td>8</td>
</tr>
<tr>
<td>AttributeOverrideMessageSequence</td>
<td>8</td>
</tr>
</tbody>
</table>

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.

3.10 Default Packet Consolidation Protocol

The Default Packet Consolidation Protocol is same as defined in Error! Reference source not found..

3.11 Overhead Messages Protocol

3.11.1 Overview

The QuickConfig message and the SectorParameters message are collectively termed the overhead messages. These messages are broadcast by the access network over the Control Channel. These messages are unique, in that they pertain to multiple protocols and are, therefore, specified separately. The Overhead Messages Protocol provides procedures related to transmission, reception and supervision of these messages.

This protocol can be in one of two states:

- **Inactive State**: In this state, the protocol waits for an Activate command. This state corresponds only to the access terminal and occurs when the access terminal has not acquired an access network or is not required to receive overhead messages.
- **Active State**: In this state the access network transmits and the access terminal receives overhead messages.

![Overhead Messages Protocol State Diagram](image)

*Figure 3.11.1-1. Overhead Messages Protocol State Diagram*

3.11.2 Primitives and Public Data

3.11.2.1 Commands

This protocol defines the following commands:

- **Activate**
- **Deactivate**

3.11.2.2 Return Indications

This protocol returns the following indications:

- **ANRedirected**
- **SupervisionFailed**
- **Updated**

3.11.2.3 Public Data

This protocol shall make the following data public:

- Subtype for this protocol
- All data in the overhead messages
- OverheadParametersUpToDate

3.11.3 Protocol Data Unit

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

This protocol uses the Signaling Application to transmit and receive messages.
3.11.4 Protocol Initialization

3.11.4.1 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.

3.11.4.2 Protocol Initialization for the InUse Protocol Instance

Upon creation, the InUse instance of this protocol in the access terminal and 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 shall enter the Inactive State.
- The protocol at the access network shall enter the Active State.

3.11.5 Procedures and Messages for the InConfiguration Instance of the Protocol

3.11.5.1 Procedures

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

3.11.5.2 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:

- If the InUse instance of any of the Connection Layer protocols does not have the same subtype as the corresponding InConfiguration protocol instance, then
  - The access terminal shall set the initial state of the InConfiguration and InUse protocol instances of the Overhead Messages protocol to the Inactive State.
  - The access network shall set the initial state of the InConfiguration and InUse protocol instances of the Overhead Messages protocol to the Active State.
- 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, and
  – 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 and the access network shall perform the following:
  – The InConfiguration protocol instance shall become the InUse protocol instance for the Overhead Messages Protocol at the access terminal and the access network.

• All the public data not defined by this protocol shall be removed from the public data of the InUse protocol.

3.11.5.3 Message Formats

3.11.5.3.1 ConfigurationRequest

The ConfigurationRequest message format is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

Zero or more instances of the following record

| AttributeRecord   | Attribute dependent |

MessageID
The sender shall set this field to 0x50.

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

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>unicast</td>
<td></td>
<td></td>
<td>Priority</td>
</tr>
</tbody>
</table>

3.11.5.3.2 ConfigurationResponse

The ConfigurationResponse message format is as follows:
### Field Length (bits)

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>TransactionID</td>
<td>8</td>
</tr>
</tbody>
</table>

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 corresponding ConfigurationRequest message.

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

<table>
<thead>
<tr>
<th>Channels</th>
<th>FTC</th>
<th>RTC</th>
<th>SLP</th>
<th>Reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addressing</strong></td>
<td>unicast</td>
<td></td>
<td><strong>Priority</strong></td>
<td>40</td>
</tr>
</tbody>
</table>

3.11.6 Procedures and Messages for the InUse Instance of the Protocol

3.11.6.1 Procedures

3.11.6.1.1 Extensibility Requirements

Further revisions of the access network may add new overhead messages.

- The access terminal shall discard overhead messages with a MessageID field it does not recognize.

Further revisions of the access network may add new fields to existing overhead messages. These fields shall be added to the end of the message, prior to the Reserved field if such a field is defined.

- The access terminal shall ignore fields it does not recognize.

3.11.6.1.2 Command Processing

The access network shall ignore all commands.

3.11.6.1.2.1 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.
If this protocol receives the command in the Active State, it shall be ignored.

3.11.6.1.2.2 Deactivate

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

If this protocol receives the command in the Active State:

- Access terminal shall transition to the Inactive State.
- Access network shall ignore it.

3.11.6.1.3 Inactive State

This state corresponds only to the access terminal and occurs when the access terminal has not acquired an access network or is not required to receive overhead messages. In this state, the protocol waits for an Activate command.

3.11.6.1.4 Active State

3.11.6.1.5 Access Network Requirements

The access network shall include a QuickConfig message in every Control Channel synchronous Sleep State capsule. The access network should include a SectorParameters message in the synchronous capsule at least once every NoMPSectorParameters Control Channel cycles. The access network shall set the SectorSignature field of the QuickConfig message to the SectorSignature field of the next SectorParameters message. The access network shall set the AccessSignature field of the QuickConfig message to the public data AccessSignature (see Access Channel MAC Protocol).

3.11.6.1.6 Access Terminal Requirements

When in the Active State, the access terminal shall perform supervision on the QuickConfig and the SectorParameters messages as specified in 3.11.6.1.6.1.1 and 3.11.6.1.6.1.2, respectively.

If the access terminal does not have any stored value for the overhead parameters or if it receives a RouteUpdate.IdleHO indication, or if it receives a ConnectedState.ConnectionClosed indication, the access terminal shall set OverheadParametersUpToDate to 0.

When the access terminal receives the QuickConfig message, it shall perform the following:

- If any of the following conditions are true:
  - OverheadParametersUpToDate is equal to 0,
  - the value of the SectorSignature field of the new QuickConfig message is different from the last received value for SectorSignature corresponding to the same sector\(^{57}\) from which the QuickConfig message is received, or

---

\(^{57}\) A sector is specified by its SectorID and the CDMA channel associated with it (see the definition of Sector).
the sector from which this QuickConfig message is received is different from
the sector from which the last QuickConfig message was received,
then the access terminal shall perform the following:
- The access terminal shall set OverheadParametersUpToDate to 0.
- The access terminal shall monitor every subsequent Control Channel
  synchronous capsule until it receives the updated SectorParameters message.
  When the access terminal receives the updated SectorParameters message, it
  shall return an *Updated* indication and set OverheadParametersUpToDate to 1.

Once the access terminal receives an updated overhead message, it should store the
signature associated with the message for future comparisons. The access terminal may
cache overhead message parameters and signatures to speed up acquisition of parameters
from a sector that was previously monitored.

If the Redirect field of the QuickConfig message is set to ‘1’, the access terminal shall return
an *ANRedirected* indication.\(^{58}\)

The access terminal shall store a list of RouteUpdateTriggerCodes associated with subnets
visited by the access terminal for future comparisons and for future use. This list is called
the RouteUpdateTriggerCodeList. Each entry in the RouteUpdateTriggerCodeList shall
include the subnet and the RouteUpdateTriggerCode. Other protocols may cache
information keyed by (Subnet, RouteUpdateTriggerCode) pairs. If other protocols cache
information keyed by (Subnet, RouteUpdateTriggerCode) pairs, then these protocols shall
delete such information when the (Subnet, RouteUpdateTriggerCode) pair is deleted from
the RouteUpdateTriggerCodeList.

If RouteUpdateTriggerCodeListSize is set to 0x00, the access terminal shall delete all entries
in the RouteUpdateTriggerCodeList. Otherwise, the access terminal shall perform the
following:
- The access terminal shall delete any entries in the RouteUpdateTriggerCodeList other
  than the current (Subnet, RouteUpdateTriggerCode) received in the most recent
  SectorParameters message if the entries have an expiration timer that has been running
  for at least \(2^\text{RouteUpdateTriggerMaxAge} + 3\) \times 1.28 seconds.
- If the expiration timer for the RouteUpdateTriggerCodeList entry corresponding to the
  current (Subnet, RouteUpdateTriggerCode) received in the most recent
  SectorParameters message has been running for at least \(2^\text{RouteUpdateTriggerMaxAge} + 3\) \times 1.28 seconds, the access terminal shall reset, initialize to zero, and restart the
  expiration timer for that entry.

---

\(^{58}\) Redirection is commonly used in networks under test.
• If the (Subnet, RouteUpdateTriggerCode) pair from the most recently received SectorParameters message is not included in the RouteUpdateTriggerCodeList, then the access terminal shall add the entry to the RouteUpdateTriggerCodeList and shall reset, initialize to zero, and start the expiration timer for that entry. The access terminal shall generate a RouteUpdate.SendRouteUpdate command when it adds an entry to the RouteUpdateTriggerCodeList. If there are more than the number of entries specified by the RouteUpdateTriggerCodeListSize attribute in the RouteUpdateTriggerCodeList, then the access terminal shall delete entries from the list until there are exactly RouteUpdateTriggerCodeListSize entries in the list according to the following rules:
  - The access terminal shall delete the oldest entries in the list first, and
  - the access terminal shall not delete the entry in the list that corresponds to the (Subnet, RouteUpdateTriggerCode) received in the most recent SectorParameters message.

3.11.6.1.6.1 Supervision Procedures

3.11.6.1.6.1.1 Supervision of QuickConfig Message

Upon entering the Active State, the access terminal shall start the following procedure to supervise the QuickConfig message:

The access terminal shall set a QuickConfig supervision timer for $T_{OMPQCSupervision}$. If a QuickConfig message is received while the timer is active, the access terminal shall reset and restart the timer.

If the timer expires, the access terminal shall return a SupervisionFailed indication and disable the timer.

3.11.6.1.6.1.2 Supervision of SectorParameters Message

Upon entering the Active State, the access terminal shall start the following procedure to supervise the SectorParameters message:

The access terminal shall set a SectorParameters supervision timer for $T_{OMPSPSupervision}$. If a SectorParameters message is received while the timer is active, the access terminal shall reset and restart the timer.

If a QuickConfig message is received while the timer is active and the SectorSignature field of the QuickConfig message matches the last received value for SectorSignature corresponding to the same sector from which the QuickConfig message is received, the access terminal shall reset and restart the timer.

59 The access terminal could choose to wait for confirmation that the RouteUpdate was delivered before updating the RouteUpdateTriggerCode list.

60 A sector is specified by its SectorID and the CDMA channel associated with it (see the definition of Sector).
If the timer expires, the access terminal shall return a `SupervisionFailed` indication and disable the timer.

### 3.11.6.2 Message Formats

#### 3.11.6.2.1 QuickConfig

The QuickConfig message is used to indicate a change in the overhead messages’ contents and to provide frequently changing information.

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>ColorCode</td>
<td>8</td>
</tr>
<tr>
<td>SectorID24</td>
<td>24</td>
</tr>
<tr>
<td>SectorSignature</td>
<td>16</td>
</tr>
<tr>
<td>AccessSignature</td>
<td>16</td>
</tr>
<tr>
<td>Redirect</td>
<td>1</td>
</tr>
<tr>
<td>RPCCount63To0</td>
<td>6</td>
</tr>
</tbody>
</table>

- **RPCCount63To0** occurrences of the following field

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ForwardTrafficValid63To0</td>
<td>1</td>
</tr>
</tbody>
</table>

- **RPCCount127To64Included** 0 or 1
- **RPCCount127To64** 0 or 6

- **RPCCount127To64** occurrences of the following field:

<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ForwardTrafficValid127To64</td>
<td>0 or 1</td>
</tr>
</tbody>
</table>

- **Reserved** 0 – 7 (as needed)

- **MessageID** The access network shall set this field to 0x00.
- **ColorCode** The access network shall set this field to the color code corresponding to this sector.
- **SectorID24** The access network shall set this field to the least significant 24 bits of the SectorID value corresponding to this sector.
- **SectorSignature** The access network shall set this field to the value of the SectorSignature field of the next SectorParameters message it will transmit.
AccessSignature

The access network shall set this field to the value of the AccessSignature parameter from the AccessParameters message that is Public Data of the Access Channel MAC Protocol.

Redirect

Access network redirect. The access network shall set this field to ‘1’ if it is redirecting all access terminals away from this access network.

RPCCount63To0

The access network shall set this field to the maximum number of RPC channels supported by the sector corresponding to Forward Traffic Channels associated with MAC indices 0 through 63, inclusive.

ForwardTrafficValid63To0

The access network shall set occurrence \( n \) of this field to ‘1’ if the Forward Traffic Channel associated with MACIndex 64-\( n \) is valid. The access terminal uses this field to perform supervision of the Forward Traffic Channel.

RPCCount127To64Included

If this field is included, the access network shall set this field to ‘1’ if the RPCCount127To64 field is included in this message. Otherwise, the access network shall set this field to ‘0’.

RPCCount127To64

If the RPCCount127To64Included field is omitted, or if RPCCount127To64Included is ‘0’, then the access network shall omit this field. Otherwise, the access network shall set this field to the maximum number of RPC channels supported by the sector corresponding to Forward Traffic Channels associated with MAC indices 64 through 127, inclusive.

ForwardTrafficValid127To64

If the RPCCount127To64Included field is omitted, or if RPCCount127To64Included is ‘0’, then the access network shall omit this field. Otherwise, the access network shall set occurrence \( n \) of this field to ‘1’ if the Forward Traffic Channel associated with MACIndex 128-\( n \) is valid. The access terminal uses this field to perform supervision of the Forward Traffic Channel.

Reserved

The number of bits in this field is equal to the number needed to make the message length an integer number of octets. The access

\[\text{Network redirect is commonly used during testing.}\]
network shall set this field to zero. The access terminal shall ignore this field.

<table>
<thead>
<tr>
<th>Channels</th>
<th>CCsynSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>broadcast</td>
</tr>
<tr>
<td>SLP</td>
<td>Best Effort</td>
</tr>
<tr>
<td>Priority</td>
<td>10</td>
</tr>
</tbody>
</table>

3.11.6.2.2 SectorParameters

The SectorParameters message is used to convey sector specific information to the access terminals.
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageID</td>
<td>8</td>
</tr>
<tr>
<td>CountryCode</td>
<td>12</td>
</tr>
<tr>
<td>SectorID</td>
<td>128</td>
</tr>
<tr>
<td>SubnetMask</td>
<td>8</td>
</tr>
<tr>
<td>SectorSignature</td>
<td>16</td>
</tr>
<tr>
<td>Latitude</td>
<td>22</td>
</tr>
<tr>
<td>Longitude</td>
<td>23</td>
</tr>
<tr>
<td>RouteUpdateRadiusOverhead</td>
<td>11</td>
</tr>
<tr>
<td>LeapSeconds</td>
<td>8</td>
</tr>
<tr>
<td>LocalTimeOffset</td>
<td>11</td>
</tr>
<tr>
<td>ReverseLinkSilenceDuration</td>
<td>2</td>
</tr>
<tr>
<td>ReverseLinkSilencePeriod</td>
<td>2</td>
</tr>
<tr>
<td>ChannelCount</td>
<td>5</td>
</tr>
</tbody>
</table>

ChannelCount occurrences of the following field:

| Channel                                  | 24            |

NeighborCount                               | 5             |

NeighborCount occurrences of the following field:

| NeighborPilotPN                           | 9             |

NeighborCount occurrences of the following two fields:

| NeighborChannelIncluded                   | 1             |
| NeighborChannel                           | 0 or 24       |

NeighborSearchWindowSizeIncluded            | 1             |

NeighborCount occurrences of the following field:

| NeighborSearchWindowSize                  | 0 or 4        |

NeighborSearchWindowOffsetIncluded          | 1             |

NeighborCount occurrences of the following field:

| NeighborSearchWindowOffset                | 0 or 3        |

ExtendedChannelIncluded                    | 0 or 1        |
<table>
<thead>
<tr>
<th>Field</th>
<th>Length (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ExtendedChannelCount</td>
<td>0 or 5</td>
</tr>
<tr>
<td>AccessHashingChannelMaskIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>AccessHashingMaskLength</td>
<td>0 or 4</td>
</tr>
<tr>
<td>AccessHashingChannelMaskSameAsPrevious</td>
<td>1</td>
</tr>
<tr>
<td>AccessHashingChannelMask</td>
<td>0 or AccessHashingMaskLength + 1</td>
</tr>
<tr>
<td>RouteUpdateTriggerCodeIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>RouteUpdateTriggerCode</td>
<td>0 or 12</td>
</tr>
<tr>
<td>RouteUpdateTriggerMaxAge</td>
<td>0 or 4</td>
</tr>
<tr>
<td>PriorSessionGAUP</td>
<td>0 or 1</td>
</tr>
<tr>
<td>FPDCHSupportedIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>SecondaryColorCodeIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>SecondaryColorCodeCount</td>
<td>0 or 3</td>
</tr>
<tr>
<td>SecondaryColorCodeCount</td>
<td></td>
</tr>
<tr>
<td>ACBitmapIncluded</td>
<td>0 or 1</td>
</tr>
<tr>
<td>ACBitmap</td>
<td>0 or 7</td>
</tr>
<tr>
<td>Reserved</td>
<td>0 – 7 (as needed)</td>
</tr>
</tbody>
</table>

1 MessageID The access network shall set this field to 0x01.
CountryCode

The access network shall set this field to the three-digit BCD (binary coded decimal) encoded representation of the Mobile Country Code (as specified in [20]) associated with this sector.

SectorID

Sector Address Identifier. The Access Network shall set the value of the SectorID according to the rules specified in [1]. The Access Terminal shall not assume anything about the format of the SectorID other than the (SectorID, CDMA Channel) pair uniquely identifies a sector.

SubnetMask

Sector Subnet identifier. The access network shall set this field to the number of consecutive 1's in the subnet mask of the subnet to which this sector belongs. The value of this field should be less than or equal to 104 if SecondaryColorCodeIncluded field is included and is set to ‘1’.

SectorSignature

SectorParameters message signature. The access network shall change this field if the contents of the SectorParameters message changes.

Latitude

The latitude of the sector. The access network shall set this field to this sector’s latitude in units of 0.25 second, expressed as a two's complement signed number with positive numbers signifying North latitudes. The access network shall set this field to a value in the range \([-1296000\) to \(1296000\) inclusive (corresponding to a range of \([-90^\circ\) to \(+90^\circ\]).

Longitude

The longitude of the sector. The access network shall set this field to this sector’s longitude in units of 0.25 second, expressed as a two's complement signed number with positive numbers signifying East longitude. The access network shall set this field to a value in the range \([-2592000\) to \(2592000\) inclusive (corresponding to a range of \([-180^\circ\) to \(+180^\circ\]).

RouteUpdateRadiusOverhead

If the access terminal is to perform distance based route updates, the access network shall set this field to the non-zero “distance” beyond which the access terminal is to send a new RouteUpdate message (see Default Route Update Protocol). If access terminals are not to perform distance based route updates, the access network shall set this field to 0\(^62\).

\(^62\) The access terminal determines whether to send a distance based RouteUpdate message or not using the RouteUpdateRadiusOverhead value of the serving sector. If the serving sector allows distance based Route Updates, the access terminal uses the RouteUpdateRadiusOverhead value sent by the sector in which the access terminal last registered.
LeapSeconds The number of leap seconds that have occurred since the start of CDMA System Time.

LocalTimeOffset The access network shall set this field to the offset of the local time from CDMA System Time. This value will be in units of minutes, expressed as a two’s complement signed number.

ReverseLinkSilenceDuration The access network shall set this field to specify the duration of the Reverse Link Silence Interval in units of frames.

ReverseLinkSilencePeriod The access network shall set this field to specify the period of the Reverse Link Silence Interval. The Reverse Link Silence Interval is defined as the time interval of duration ReverseLinkSilenceDuration frames that starts at times T where T is the CDMA System Time in units of frames and it satisfies the following equation:

\[ T \mod (2048 \times 2^{\text{ReverseLinkSilencePeriod}} - 1) = 0. \]

ChannelCount The access network shall set this field to the number of cdma2000 high rate packet data channels available to the access terminal on this sector.

Channel Channel record specification for each channel. See [1] for the Channel record format. The access network shall set the SystemType field of this record to 0x00.

NeighborCount The access network shall set this field to the number of records specifying neighboring sectors information included in this message.

NeighborPilotPN The access network shall set this field to the PN Offset of a neighboring sector that the access terminal should add to its Neighbor Set.

NeighborChannelIncluded The access network shall set this field to ‘1’ if a Channel record is included for this neighbor, and to ‘0’ otherwise. The \( n \)th occurrence of this field corresponds to the \( n \)th occurrence of NeighborPilotPN in the record that contains the NeighborPilotPN field above.

NeighborChannel Channel record specification for the neighbor channel. See [1] for the Channel record format. The access network shall omit this field if the corresponding NeighborChannelIncluded field is set to ‘0’. Otherwise, if included, the \( n \)th occurrence of this field corresponds to the \( n \)th occurrence of NeighborPilotPN in the record that contains the NeighborPilotPN field above.
NeighborSearchWindowSizeIncluded
The access network shall set this field to ‘1’ if NeighborSearchWindowSize field for neighboring sectors is included in this message. Otherwise, the access network shall set this field to ‘0’.

NeighborSearchWindowSize
The access network shall omit this field if NeighborSearchWindowSizeIncluded is set to ‘0’. If NeighborSearchWindowSizeIncluded is set to ‘1’, the access network shall set this field to the value shown in Table 3.11.6.2-1 corresponding to the search window size to be used by the access terminal for the neighbor pilot. The $n^{th}$ occurrence of this field corresponds to the $n^{th}$ occurrence of NeighborPilotPN in the record that contains the NeighborPilotPN field above.

<table>
<thead>
<tr>
<th>SearchWindowSize Value</th>
<th>Search Window Size (PN chips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>80</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>11</td>
<td>130</td>
</tr>
<tr>
<td>12</td>
<td>160</td>
</tr>
<tr>
<td>13</td>
<td>226</td>
</tr>
<tr>
<td>14</td>
<td>320</td>
</tr>
<tr>
<td>15</td>
<td>452</td>
</tr>
</tbody>
</table>

NeighborSearchWindowOffsetIncluded
The access network shall set this field to ‘1’ if NeighborSearchWindowOffset field for neighboring sectors is included.
in this message. Otherwise, the access network shall set this field to ‘0’.

NeighborSearchWindowOffset
The access network shall omit this field if NeighborSearchWindowOffsetIncluded is set to ‘0’. If NeighborSearchWindowOffsetIncluded is set to ‘1’, the access network shall set this field to the value shown in Table 3.11.6.2-2 corresponding to the search window offset to be used by the access terminal for the neighbor pilot. The \( n \)th occurrence of this field corresponds to the \( n \)th occurrence of NeighborPilotPN in the record that contains the NeighborPilotPN field above.

<table>
<thead>
<tr>
<th>SearchWindowOffset</th>
<th>Offset (PN chips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>WindowSize(^{63} /2)</td>
</tr>
<tr>
<td>2</td>
<td>WindowSize</td>
</tr>
<tr>
<td>3</td>
<td>( 3 \times ) WindowSize /2</td>
</tr>
<tr>
<td>4</td>
<td>- WindowSize /2</td>
</tr>
<tr>
<td>5</td>
<td>- WindowSize</td>
</tr>
<tr>
<td>6</td>
<td>-3 \times ) WindowSize /2</td>
</tr>
<tr>
<td>7</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

ExtendedChannelIncluded
If any of the fields after this field except for Reserved are included, the access network shall include this field. Otherwise, the access network shall omit this field. If included, the access network shall set this field as follows:

The access network shall set this field to ‘0’ if the ExtendedChannel fields are omitted. Otherwise, the access network shall set this field to ‘1’.

ExtendedChannelCount
If the ExtendedChannelIncluded field is omitted or is included and set to ‘0’, the access network shall omit this field. Otherwise, the access network shall include this field and shall set this field to the number of cdma2000 high rate packet data extended channels available to the access terminal on this sector. If this field is not

\(^{63}\)WindowSize is pilot’s search window size in PN chips.
included, the access terminal shall assume that the value of this field is ‘00000’.

ExtendedChannel Channel record specification for each extended channel. If ExtendedChannelCount is not included, the access network shall omit this field. See [1] for the Channel record format. The access network shall set the SystemType field of this record to 0x00.

AccessHashingChannelMaskIncluded
If any of the fields after this field except for Reserved are included, the access network shall include this field. Otherwise, the access network shall omit this field. If included, the access network shall set this field as follows:
The access network shall set this field to ‘0’ if the AccessHashingChannelMask fields are omitted. Otherwise, the access network shall set this field to ‘1’.

AccessHashingMaskLength
If the AccessHashingChannelMaskIncluded field is omitted or is included and set to ‘0’, the access network shall omit this field. Otherwise, the access network shall set this field one less than the number of bits in the AccessHashingChannelMask field(s).

If the AccessHashingChannelMaskIncluded field is omitted or is included and set to ‘0’, the access network shall omit the following two-field record. Otherwise, the access network shall include m occurrences of the following two field record, where m is the total number of Channel and ExtendedChannel records in this message that have SystemType equal to 0x00

AccessHashingChannelMaskSameAsPrevious
The access network shall set this field in the i\textsuperscript{th} occurrence of this record as follows:
If i is greater than 1 and the AccessHashingChannelMask for the i\textsuperscript{th} Channel or ExtendedChannel record with SystemType equal to 0x00 in this message is the same as the AccessHashingChannelMask for the (i-1)\textsuperscript{th} Channel or ExtendedChannel record with SystemType equal to 0x00 in this message, the access network may set this field to ‘1’. Otherwise, the access network shall set this field to ‘0’.

AccessHashingChannelMask
The access network shall set this field in the i\textsuperscript{th} occurrence of this record as follows:
If the AccessHashingChannelMaskSameAsPrevious field in this record is set to ‘1’, the access network shall omit this field. Otherwise, the access network shall set this field to the \((\text{AccessHashingMaskLength} + 1)\) bit access hashing class of the i\textsuperscript{th} combined channel list entry in this message that has SystemType
equal to 0x00, where the combined channel list is defined to be the ordered set of all Channel records in order (if any) with all Extended Channel records appended in order (if any). If this field is not included, the access terminal shall assume that the value of this field is the same as the value for this field in the previous occurrence of this record.

RouteUpdateTriggerCodeIncluded
The access network shall include this field if any of the fields other than the Reserved field that follow this field are to be included in the message. If this field is included, the access network shall set it as follows: The access network shall set this field to ‘1’ if RouteUpdateTriggerCode is included in this message. Otherwise, the access network shall set this field to ‘0’.

RouteUpdateTriggerCode
If the RouteUpdateTriggerCodeIncluded field is not included in this message, or if the RouteUpdateTriggerCodeIncluded field is included and is set to ‘0’, then the access network shall omit this field. Otherwise, the access network shall set this field to a 12-bit value.

RouteUpdateTriggerMaxAge
If the RouteUpdateTriggerCodeIncluded field is not included in this message or if the RouteUpdateTriggerCodeIncluded field is included and set to ‘0’, the access network shall omit this field. Otherwise, the access network shall set this field to indicate the duration of the RouteUpdateTriggerCode timer.

PriorSessionGAUP
The access network shall include this field if any of the fields other than the Reserved field that follow this field are to be included in the message. If this field is included, then the access network shall set this field as follows: If the access terminal is not allowed to include the PriorSession attribute in an AttributeUpdateRequest message, then the access network shall set this field to ‘0’. Otherwise, the access network shall set this field to ‘1’.

FPDCHSupportedIncluded
The access network shall include this field if any of the fields other than the Reserved field that follow this field are to be included in the message. If this field is included, the access network shall set this

64 The RouteUpdateTriggerCode represents parameters associated with other protocols or applications. A RouteUpdate message is triggered when the RouteUpdateTriggerCode changes. The access network can update parameters associated with other protocols or applications when it determines that the parameters at the access terminal need to be updated.
field as follows:
The access network shall set this field to ‘0’ if the FPDCHSupported
fields are omitted. Otherwise, the access network shall set this field
to ‘1’.

FPDCHSupported
If FPDCHSupportedIncluded is not included or is included and is set
to ‘0’, then the access network shall omit all occurrences of this field.
Otherwise, the access network shall include \( m \) occurrences of this
field, where \( m \) is the number of NeighborChannel records in this
message that have SystemType equal to 0x01, and the access
network shall set the occurrences of this field as follows:
The access network shall set the \( i \)th occurrence of this field as
follows:
If the system on the CDMA Channel corresponding to the \( i \)th
NeighborChannel record that has SystemType equal to 0x01 supports
the Forward Packet Data Channel (see [11]), the access network shall
set the \( i \)th occurrence of this field to ‘1’. Otherwise, the access
network shall set the \( i \)th occurrence of this field to ‘0’.

SecondaryColorCodeIncluded
The access network shall include this field if any of the non-reserved
fields that follow this field are to be included in the message. If
included, the access network shall set this field as follows:
The access network shall set this field to ‘1’ if the SecondaryColorCodeCount
field is included. Otherwise, the access network shall set this field to ‘0’.

SecondaryColorCodeCount
If SecondaryColorCodeIncluded is omitted or set to ‘0’, then the
access network shall omit this field. Otherwise, the access network
shall set this field as follows:
If SecondaryColorCodeIncluded is included and set to ‘1’, then the
access network shall set this field to indicate the number of
secondary color codes covering this sector. If the access terminal is
to consider all possible values of SecondaryColorCode to be included
in this message, then the access network shall set this field to ‘000’.

SecondaryColorCode
If SecondaryColorCodeCount is omitted or included and set to ‘000’,
then the access network shall omit this field. Otherwise, the access
network shall set this field as follows:
The access network shall set this field to a color code that is to be
considered to be a member of the set of the SecondaryColorCode
values.
ACBitmapIncluded

If any of the fields after this field except for Reserved are included, the access network shall include this field. Otherwise, the access network shall omit this field. If included, the access network shall set this field as follows:

The access network shall set this field to ‘0’ if the ACBitmap field is omitted. Otherwise, the access network shall set this field to ‘1’.

ACBitmap

If the ACBitmapIncluded field is omitted or is included and set to ‘0’, the access network shall omit this field. Otherwise the access network shall include this field to indicate whether access is allowed or not for certain access class. Each bit in the 7 bit fields represents a access class. The MSB bit corresponds to Access Class 0, and in that order the LSB bit corresponds to Access Class 6. If the bit corresponding to an Access Class is set to ‘0’, it means that the access for this Access Class should be blocked; otherwise, the access is allowed.

Reserved

The number of bits in this field is equal to the number needed to make the message length an integer number of octets. The access network shall set this field to zero. The access terminal shall ignore this field.

<table>
<thead>
<tr>
<th>Channels</th>
<th>CCsyn</th>
<th>SLP</th>
<th>Best Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing</td>
<td>broadcast</td>
<td>Priority</td>
<td>30</td>
</tr>
</tbody>
</table>

3.11.6.3 Interface to Other Protocols

3.11.6.3.1 Commands Sent

This protocol sends the following command:

- RouteUpdate.SendRouteUpdate

3.11.6.3.2 Indications

This protocol registers to receive the following indications:

- RouteUpdate.IdleHO
- ConnectedState.ConnectionClosed

3.11.7 Configuration Attributes

The simple configurable attributes are listed in Table 3.11.7-1. The access network and the access terminal shall use the default values that are typed in **bold italics**.
Table 3.11.7-1 Configurable Simple Attributes

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xff</td>
<td>OverheadCachePeriod</td>
<td>0x00</td>
<td>Value of overhead cache period is zero.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01</td>
<td>Value of overhead cache period in units of 5.12 seconds.</td>
</tr>
<tr>
<td>0xfe</td>
<td>RouteUpdateTriggerCodeListSize</td>
<td>0x00</td>
<td>Sending of RouteUpdate messages based on the RouteUpdateTriggerCodeList is disabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x01–0x05</td>
<td>Size of the RouteUpdateTriggerCodeList</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other values</td>
<td>Reserved.</td>
</tr>
</tbody>
</table>

3.11.8 Protocol Numeric Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Meaning</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOMPType</td>
<td>Type field for this protocol</td>
<td>[5]</td>
</tr>
<tr>
<td>NOMPDefault</td>
<td>Subtype field for this protocol</td>
<td>0x0000</td>
</tr>
<tr>
<td>TOMPQCSupervision</td>
<td>QuickConfig supervision timer</td>
<td>12 Control Channel cycles</td>
</tr>
<tr>
<td>TOMPSPSupervision</td>
<td>SectorParameters supervision timer</td>
<td>12 Control Channel cycles</td>
</tr>
<tr>
<td>NOMPSectorParameters</td>
<td>The recommended maximum number of Control Channel cycles between two consecutive SectorParameters message transmissions</td>
<td>4</td>
</tr>
</tbody>
</table>

3.11.9 Session State Information

This protocol does not define any parameter record to be included in a Session State Information record (see [1]).
4 SESSION LAYER

4.1 Introduction

4.1.1 General Overview

The Session Layer contains protocols used to negotiate a session between the access terminal and the access network.

A session is a shared state maintained between the access terminal and the access network, including information such as:

- A unicast address (UATI) assigned to the access terminal,
- the set of protocols used by the access terminal and the access network to communicate over the air-link,
- configuration settings for these protocols (e.g., authentication keys, parameters for Connection Layer and MAC Layer protocols, etc.), and
- an estimate of the current access terminal location.

During a single session the access terminal and the access network can open and close a connection multiple times; therefore, sessions will be closed rarely, and only on occasions such as the access terminal leaving the coverage area or such as prolonged periods in which the access terminal is unavailable.

The Session Layer contains the following protocols:

- Session Management Protocol: This protocol provides the means to control the activation of other Session Layer protocols. In addition, this protocol ensures the session is still valid and manages closing of the session.
- Address Management Protocol: This protocol specifies procedures for the initial UATI assignment and maintains the access terminal addresses.
- Session Configuration Protocol: This protocol provides the means to negotiate and provision the protocols used during the session, and negotiates the configuration parameters for these protocols. This protocol uses the procedures and attribute value formats defined by the Generic Configuration Protocol (see [6]) for protocol negotiation.
- Multimode Capability Discovery Protocol: This protocol allows the access network to discover the multimode capabilities of the access terminal.

The relationship between the Session Layer protocols is illustrated in Figure 4.1.1-1.
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.

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.
### Table 4.4-1. Simple Configurable Attributes

<table>
<thead>
<tr>
<th>Attribute ID</th>
<th>Attribute</th>
<th>Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00NN</td>
<td>Protocol Type, where NN is the hexadecimal Protocol Type value excluding values 0x03, 0x0c, 0x14, 0x15, 0x16, and 0x17.(^{65})</td>
<td>0x0000</td>
<td>Default Protocol Subtype</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0xfffe</td>
<td>HardLink Protocol Subtype</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x0001 – 0xffff, 0xffffffff</td>
<td>Protocol Subtype</td>
</tr>
<tr>
<td>NN is 0x03 or 0x0c</td>
<td>0x0001</td>
<td>xHRPD Protocol Subtype 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0xfffe</td>
<td>HardLink Protocol Subtype</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x0000, 0x0002 – 0xffffffff</td>
<td>Protocol Subtype</td>
</tr>
</tbody>
</table>

65 Protocol subtypes for protocol types 0x14 – 0x17 are configured by the Stream Layer Protocol.

### 4.5 Generic Multimode Capability Discovery Protocol

The Generic Multimode Capability Discovery Protocol is same as defined in [5].

### 4.6 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 for this protocol.
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

<table>
<thead>
<tr>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0001</td>
<td>Default Packet Application bound to the radio network.</td>
</tr>
<tr>
<td>0x0002</td>
<td>Default Packet Application bound to the service network.</td>
</tr>
<tr>
<td>0x0008</td>
<td>Enhanced Multi-Flow Packet Application bound to the radio network.</td>
</tr>
<tr>
<td>0x0009</td>
<td>Enhanced Multi-Flow Packet Application bound to the service network.</td>
</tr>
</tbody>
</table>

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
5.2 Default Stream Protocol
The Default Stream Protocol is same as defined in [5].

5.3 Generic Virtual Stream Protocol
The Generic Virtual Stream Protocol is same as defined in [5].
6 DEFAULT SIGNALING APPLICATION

The Default Signaling Application Protocol is same as defined in [5] with the exception of $T_{\text{SLPWaitAck}} = 1000$ ms.
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7 DEFAULT PACKET APPLICATION

The Default Packet Application Protocol is same as defined in[5].
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8 ENHANCED MULTI-FLOW PACKET APPLICATION

The Enhanced Multi-flow Packet Application Protocol is same as defined in [28].
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