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Route Control Plane for Ultra Mobile Broadband (UMB) Air Interface Specification

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No text.

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FOREWORD**(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 the Route Control Plane part of the Ultra Mobile Broadband™ (UMB™)¹ air interface. Other parts of this Standard are:

- Overview for Ultra Mobile Broadband (UMB) Air Interface Specification
- Physical Layer for Ultra Mobile Broadband (UMB) Air Interface Specification
- MAC Layer for Ultra Mobile Broadband (UMB) Air Interface Specification
- Radio Link Layer for Ultra Mobile Broadband (UMB) Air Interface Specification
- Application Layer for Ultra Mobile Broadband (UMB) Air Interface Specification
- Security Functions for Ultra Mobile Broadband (UMB) Air Interface Specification
- Connection Control Plane for Ultra Mobile Broadband (UMB) Air Interface Specification
- Session Control Plane for Ultra Mobile Broadband (UMB) Air Interface Specification
- Broadcast-Multicast Upper Layers for Ultra Mobile Broadband (UMB) Air Interface Specification

Other Standards may be required to implement this system and are listed in the References section of each part.

This standard provides a specification for land mobile wireless systems based upon cellular principles. This Standard is one part of the IMT-2000 CDMA Multi-Carrier, IMT-2000 CDMA MC, also known as cdma2000®².

¹ Ultra Mobile Broadband™ and (UMB™) are trade and service marks owned by the CDMA Development Group (CDG).

² cdma2000® is the trademark for the technical nomenclature for certain specifications and standards of the Organizational Partners (OPs) of 3GPP2. Geographically (and as of the date of publication), cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United States.

FOREWORD

- 1 No text.

REFERENCES

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

- 7
- 8 [1] C.S0084-000-0, Overview for Ultra Mobile Broadband (UMB) Air Interface
9 Specification.
 - 10 [2] C.S0084-001-0, Physical Layer for Ultra Mobile Broadband (UMB) Air Interface
11 Specification.
 - 12 [3] C.S0084-002-0, MAC Layer for Ultra Mobile Broadband (UMB) Air Interface
13 Specification.
 - 14 [4] C.S0084-003-0, Radio Link Layer for Ultra Mobile Broadband (UMB) Air Interface
15 Specification.
 - 16 [5] C.S0084-004-0, Application Layer for Ultra Mobile Broadband (UMB) Air Interface
17 Specification.
 - 18 [6] C.S0084-005-0, Security Functions for Ultra Mobile Broadband (UMB) Air
19 Interface Specification.
 - 20 [7] C.S0084-006-0, Connection Control Plane for Ultra Mobile Broadband (UMB) Air
21 Interface Specification.
 - 22 [8] C.S0084-007-0, Session Control Plane for Ultra Mobile Broadband (UMB) Air
23 Interface Specification.
 - 24 [9] Reserved.
 - 25 [10] C.S0084-009-0, Broadcast-Multicast Upper Layer for Ultra Mobile Broadband
26 (UMB) Air Interface Specification.
 - 27 [11] C.R1001, Administration of Parameter Value Assignments for cdma2000 Spread
28 Spectrum Standards. (Informative)

REFERENCES

- 1 No text.

1 **1 INTRODUCTION**

2 Route Control Plane consists of following protocols:

- 3 • Route Control Protocol

- 1 No text.

2 BASIC ROUTE CONTROL PROTOCOL

2.1 Overview

The Route Control Protocol resides in the Control Plane. The Route Control Protocol performs the following functions:

- Controls the creation and deletion of Routes.
- Maintains mapping between Route identifier (RouteID) and Access Network identifier (ANID).
- Maintains identity of the DataAttachmentPoint (DAP) Route and SessionAnchor Route.
- UATI and PagingID assignment.

A Route consists of an InUse protocol stack associated with an access network.

This protocol can be in one of three states:

- **WaitingToOpen State:** In this state, a Route to the access network is not configured yet. In this state, the access terminal sends a RouteOpenRequest message to the access network (unless the access terminal entered this state to perform registration) and waits for the response.
- **Open State:** In this state, a Route to the access network is configured (i.e., access network has access terminal's session).
- **WaitingToClose State:** This state applies only to the access network. In this state the access network waits for the Route close procedure to complete.

Figure 2-1 provides an overview of the access terminal states and state transitions.

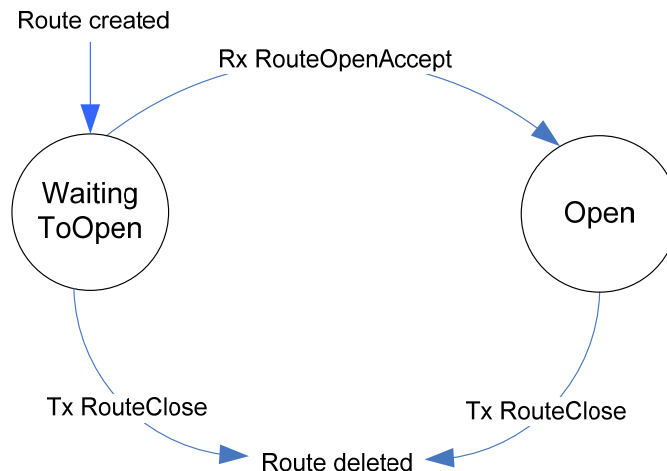
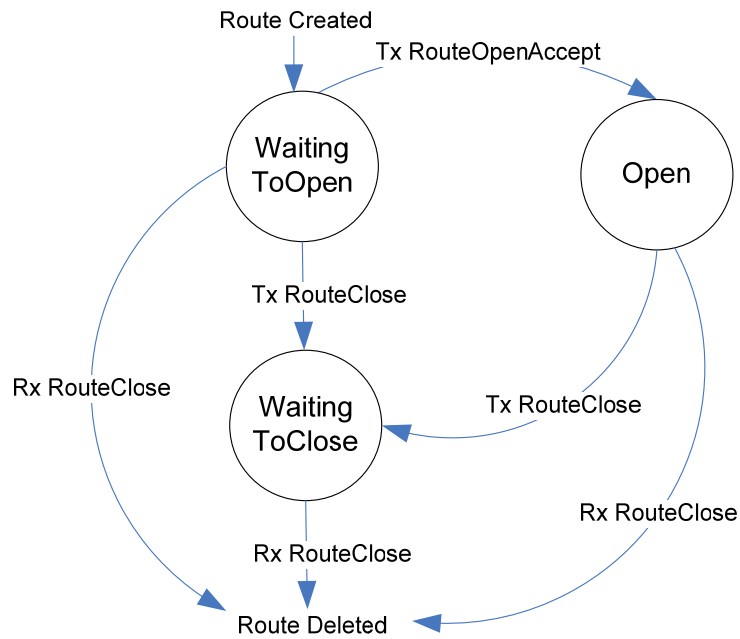


Figure 2-1. Route Control Protocol State Diagram (Access Terminal)

1 Figure 2-2 provides an overview of the access network states and state transitions.



2
3 **Figure 2-2. Route Control Protocol State Diagram (Access Network)**

4 2.2 Primitives, Local Common Data, and Public Data

5 2.2.1 Commands

6 This protocol defines the following commands:

- 7 • *CreateNewStack(PilotID)*
- 8 • *CloseRoute*
- 9 • *DeleteOldRoutes*
- 10 • *QueryRouteMap*

11 2.2.2 Return Indications

12 This protocol returns the following indications:

- 13 • *RouteOpened*
- 14 • *RouteClosed*
- 15 • *UATIAssigned(RouteID)*
- 16 • *DAPAssigned(RouteID)*
- 17 • *RouteCreated(RouteCounter)*
- 18 • *LinkInitialized*

1 2.2.3 Procedure Calls

- 2 • CREATE_ID_TAG
- 3 – Inputs: SequenceNumber
- 4 – Outputs: IDTagSize, IDTag

5 2.2.4 Local Common Data

6 This protocol defines the following Local Common Data (i.e., AT only):

- 7 • PagingIDList
- 8 • RouteCounterGlobal
- 9 • RouteMap (RouteID and ANID of all Routes in Open State)
- 10 • DAPRefreshTime
- 11 • RetryDelay[ANID]
- 12 • CurrentATI (see [1])
- 13 • SessionSignature
- 14 • DAPLinkID[]
- 15 • SessionAnchorRouteID – Set to RouteID of SessionAnchorRoute

16 2.2.5 Public Data

17 This protocol shall make the following data public:

- 18 • Subtype for this protocol
- 19 • State of this protocol
- 20 • RouteCounterLocal
- 21 • RouteID
- 22 • LinkID[]
- 23 • Whether this protocol belongs to the DataAttachmentPoint Route
- 24 • Whether this protocol belongs to the SessionAnchor Route
- 25 • DAPMoveAllowed
- 26 • All data defined as Static Attribute, Static Non-Attribute Data, and Local Common Data

27 **2.3 Protocol Data Unit**

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

30 This protocol uses the Signaling Protocol to transmit and receive messages.

2.4 Procedures and Messages for the InConfiguration Instance of the Protocol

2.4.1 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 procedures specified in [1].

2.4.2 Procedures

This protocol uses the services of the Session Control Protocol to perform negotiation of attribute values.

2.4.3 Message Formats

This protocol does not define any messages.

2.5 Procedures and Messages for the InUse Instance of the Protocol

2.5.1 Procedures

The access terminal shall support at least six Routes ³.

2.5.1.1 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 access terminal and access network shall perform the procedures specified in [1].
- The access terminal shall set all entries in LinkID[] to NULL.
- If this Route is being opened with the access network that served as the SessionAnchor Route, the access terminal shall mark this Route as the SessionAnchor Route.
- If no other Route currently exists and this is not the SessionAnchor Route, the access terminal shall perform the following:

~~– Set OldUATI to NULL.~~

– Set SessionSeed to a 128-bit pseudo-random (see [1]) or random number.

– Clear the PagingIDList

– Set CurrentATI to
<ATIType = '11', ATI = SessionSeed >.

– Set UATI to NULL.

– Set SessionSignature to 0x0000

– Set all entries in DAPLinkID[] to NULL.

³ Six routes are required due to the following: three Routes in Airlink Management Protocol Connected State, one Route to perform session negotiation, one Route to the SessionAnchor access network, and one Route to add a pilot that may belong to a new access network.

1 – Set RouteCounterGlobal to 0

2 – Set RouteCounterLocal to 0

3 – Set RouteID to ‘0000000’

4 Otherwise, the access terminal shall perform the following, where RouteCounterLocal and
5 RouteCounterGlobal arithmetic is done using modulo 2^{15} :

6 – Set RouteCounterLocal to next available value starting from RouteCounterGlobal,
7 where the next available value is the value whose 7 least significant bits are not
8 equal to the RouteID of an existing Route.

9 – Set RouteID to the seven least significant bits of RouteCounterLocal

10 – Set RouteCounterGlobal to (RouteCounterLocal + 1)

11 • The protocol at the access terminal and access network shall enter the WaitingToOpen
12 State.

13 2.5.1.2 Hard Commit Procedures

14 The access terminal and the access network shall perform the procedures specified in [1]
15 when directed by the InUse instance of the Session Control Protocol to execute the Hard
16 Commit procedures.

17 2.5.1.3 Soft Commit Procedures

18 The access terminal and the access network shall perform the procedures specified in [1],
19 in the order specified, when directed by the InUse instance of the Session Control Protocol
20 to execute the Soft Commit procedures.

21 2.5.1.4 UATI Assignment Processing

22 Whenever the access terminal receives a UATI assignment via a UATIAssignment message,
23 RouteOpenAccept message, or DAPAssignment message, the access terminal shall perform
24 the following:

25 • Add the following entry to the PagingIDList:

26 <ATIType=‘10’, PagingID > where PagingID is determined as follows:

27 – If the PagingIDInd field is set to ‘00’, then PagingID shall be set to the value of
28 PagingID received in the message.

29 – If the PagingIDInd field is set to ‘01’, then PagingID shall be set to 32 LSB of the
30 UATI being assigned to the access terminal, as derived below.

31 – If the PagingIDInd field is set to ‘10’, then PagingID shall be set to the value of
32 PagingID corresponding to the CurrentATI public data.

33 • The access terminal shall set CurrentATI to

34 <ATIType = ‘10’, ATI > where ATI is set as follows:

- 1 – If the `UATIlsbSameAsPrev` field in the received message equals '1', then `ATI =`
 2 `[ANIDmsb | 64 LSB of CurrentATI]` where `ANIDmsb` is the 64 MSB of the identifier of
 3 the access network that transmitted the message.
- 4 – If the `UATIlsbSameAsPrev` field in the received message equals '0', then `ATI =`
 5 `[ANIDmsb | UATIlsb received in the message]` where `ANIDmsb` is the 64 MSB of the
 6 identifier of the access network that transmitted the message.
- 7 • Return a *UATIAssigned(RouteID)* indication, with `RouteID` set to the `RouteID` of this
 8 Route
- 9 • Mark this Route as the `SessionAnchor` Route.
- 10 • The access terminal shall send a `UATIComplete` message to the access network.
- 11 • The access terminal shall delete the `PagingID` corresponding to the previous `UATI` from
 12 the `PagingIDList` if any of the following conditions are true:
- 13 – The `UATIComplete` message containing the new `UATI` was acknowledged
- 14 – The access terminal has received a `RouteOpenAccept` on a route on which access
 15 was made with the new `UATI`.
- 16 – The access terminal has performed a successful explicit registration with the new
 17 `UATI`.

18 2.5.1.5 LinkID Procedures

- 19 • If the access terminal receives a `LinkID` (via the `RouteOpenAccept` message or the
 20 `LinkIDAssignment` message), the access terminal shall perform the following:
- 21 – If all the current `LinkID`s of this Route is `NULL`, then the Route Control Protocol
 22 shall return a *LinkInitialized* indication.
- 23 – If this `LinkID` is different than all of the `LinkID`s of the other Routes, the access
 24 terminal shall open a new interface to the layers above the air interface.
- 25 • The access terminal shall delete an interface to layers above the air interface
 26 corresponding to a `LinkID` if all of the following conditions are true:
- 27 – No Route with the `LinkID` exists, and
- 28 – The `LinkID` is not same as any entry in `DAPLinkID[]`
- 29 • The access network shall not change `LinkID` assigned to a Route.

30 2.5.1.6 DataAttachmentPoint Procedures

31 2.5.1.6.1 Access Terminal Procedures

32 The access terminal shall perform the following `DataAttachmentPoint` Route related
 33 procedures in Open State:

- 34 • If the access terminal receives a `DAPMoveRequestRequest` message from the access
 35 network, the access terminal shall send a `DAPMoveRequest` message to the access
 36 network.

- 1 • The access terminal shall not send an unsolicited DAPMoveRequest message if
2 ATassistedDAPMove field of the ATassistedDAPMoveMode attribute is set to 0.
- 3 • If ATassistedDAPMove field of the ATassistedDAPMoveMode attribute is set to 1⁴, the
4 access terminal shall comply with the following requirements in determining when to
5 send a DAPMoveRequest message to request the access network to assign this Route as
6 the DataAttachmentPoint Route:
- 7 – The access terminal should send a DAPMoveRequest message if all of the following
8 conditions are satisfied, subject to other constraints of DAPMoveRequestTimer:
- 9 + A period of L2HotoDAPMoveRequestTimer has elapsed since the Route Control
10 Protocol has received the last *ReverseControlChannelMAC.FLSSChanged*
11 indication and the FLSS public data of the Reverse Control Channel MAC
12 Protocol correspond to this Route,
- 13 + DFLSS and FLSS public data of the Reverse Control Channel MAC Protocol are
14 the same, and
- 15 + This Route is not the DataAttachmentPoint Route.
- 16 – The access terminal shall not send an unsolicited DAPMoveRequest message ~~prior~~
17 ~~to receiving~~ if all the LinkIDs associated with this Route are NULL.
- 18 – The access terminal shall not send an unsolicited DAPMoveRequest message if
19 DAPMoveAllowed is set to NO.
- 20 – Upon exiting the Idle State of the AirLink Management Protocol, the access terminal
21 shall send a DAPMoveRequest message if all of the following conditions are true:
- 22 + The access terminal has received ~~the~~ at least one LinkID associated with this
23 Route,
- 24 ~~+This Route is not marked as the DataAttachmentPoint Route, and~~
- 25 + The FLSS public data of the Reverse Control Channel MAC Protocol correspond
26 to this Route, and
- 27 + One of the following conditions is true:
- 28 ▪ This Route is not marked as the DataAttachmentPoint Route, or
- 29 ▪ The access terminal has not received a DAPAssignment message in response
30 to the last DAPMoveRequest message sent on any route.
- 31 – The access terminal shall send a DAPMoveRequest message prior to the expiration
32 of the DataAttachmentPoint refresh timer. If DataAttachmentPoint refresh timer
33 expires, AT shall send a DAPMoveRequest message when the access terminal
34 acquires an access network (i.e. when Air Link Management Protocol is not in
35 Initialization State).

⁴ ATassistedDAPMoveMode is supported since the access terminal knows channel conditions.

- 1 – Unless specified otherwise, the access terminal shall not send an unsolicited
2 DAPMoveRequest message if a DAPMoveRequest message was sent on any route
3 within the period equal to the value of the DAPMoveRequestTimer field of the
4 ATassistedDAPMoveMode attribute.
- 5 • If the access terminal receives a DAPAssignment message from the access network ~~with~~
6 ~~the RequestStatus field set to '1'~~, the access terminal shall perform the following: if the
7 Timestamp field of the message is set to a value lower than the Timestamp field of the
8 previous DAPAssignment message (if any) processed by the access terminal, the access
9 terminal shall discard this message; otherwise, the access terminal shall perform the
10 following:
- 11 – The access terminal shall mark this Route as the DataAttachmentPoint Route.
- 12 – The access terminal shall set DAPLinkID[] local common data to LinkID[] of this
13 Route.
- 14 – The Route Control Protocol shall return a *DAPAssigned(RouteID)* indication with
15 argument set to the RouteID of this Route
- 16 – The access terminal shall set DAPRefreshTime local common data to the
17 corresponding value received in the message and shall start the
18 DataAttachmentPoint refresh timer with a value set to DAPRefreshTime.
- 19 – If this message includes a UATI assignment, the access terminal shall process the
20 UATI assignment as specified in 2.5.1.4.
- 21 ~~• If the access terminal receives a RestartNetworkInterface message from the access~~
22 ~~network the RestartNetworkInterface field is set to '1'⁵, the access terminal shall~~
23 ~~perform the following: restart the interface between the Radio Link Protocol and the~~
24 ~~higher layer. The access terminal may also restart higher layer protocols.~~
- 25 – Delete all interfaces to layers above the air interface corresponding to all LinkIDs
- 26 – Delete all LinkIDs
- 27 – Issue an AirLinkManagement.CloseConnection command
- 28 – Delete SessionAnchor Route
- 29 • If the Route Control Protocol receives a *RouteControl.DAPAssigned(RouteID)* indication
30 from any Route, the Route Control Protocol shall perform the following: if the RouteID
31 received with this indication is not equal to the RouteID of this Route, the Route
32 Control Protocol shall mark this Route as not being the DataAttachmentPoint Route.

33 2.5.1.6.2 Access Network Procedures

34 The access network shall perform the following DataAttachmentPoint Route related
35 procedures:

⁵ Restarting interface does not affect the session.

- 1 • If ATassistedDAPMove field of the ATassistedDAPMoveMode attribute is set to 1, the
2 access network shall not send a DAPAssignment message unless in response to
3 receiving a DAPMoveRequest message from the access terminal.
- 4 • If ATassistedDAPMove field of the ATassistedDAPMoveMode attribute is set to 0, the
5 access network shall send a DAPAssignment message when any of the following
6 conditions is true:
 - 7 – DataAttachmentPoint is changed, and at least one LinkID associated with the old
8 DataAttachmentPoint and the new DataAttachmentPoint is different.
 - 9 – When DataAttachmentPoint is assigned, and there was no previous
10 DataAttachmentPoint.
- 11 • The access network may send a DAPMoveRequestRequest message to request the
12 access terminal to send a DAPMoveRequest message.

13 2.5.1.7 SessionAnchor Procedures

14 2.5.1.7.1 Access Terminal Procedures

15 The access terminal shall perform the following SessionAnchor Route related procedures:

- 16 • If the access terminal receives a UATIAssignment message, the access terminal shall
17 process the UATI assignment as specified in 2.5.1.4.
- 18 • If the Route Control Protocol receives a *RouteControl.UATIAssigned(RouteID)* indication,
19 the Route Control Protocol shall perform the following:
 - 20 – If the RouteID received with this indication is not equal to the RouteID of this
21 Route, the Route Control Protocol shall mark this Route as not being the
22 SessionAnchor Route.

23 2.5.1.7.2 Access Network Procedures

24 The access network shall perform the following SessionAnchor Route related procedures:

- 25 • When the access network receives a *Route.ATIReceived* indication and if the *ATType* is
26 equal to '11', the access network shall set *SessionSeed* to the *ATI*.
- 27 • When the access network sends a UATI assignment via UATIAssignment message,
28 RouteOpenAccept message, or DAPAssignment message, it shall perform the following:
 - 29 – Access network shall assign a Unicast Access Terminal Identifier (UATI) and Paging
30 Identifier (PagingID) to the access terminal for the session.
- 31 • When the access network receives a UATIComplete message, the access network shall
32 return a *UATIAssigned* indication
- 33 • The access network shall not send a UATI assignment via UATIAssignment message, or
34 DAPAssignment message before confirming that the access terminal has received
35 RouteOpenAccept message (e.g. the access network can confirm that the access
36 terminal has received RouteOpenRequest message when the access network receives
37 RouteMap with ANIDmsb corresponding to this Route included).

2.5.1.8 WaitingToOpen State

2.5.1.8.1 Access Terminal Requirements

The access terminal may send a RouteOpenRequest message to the access network. If this is the SessionAnchor Route, then the access terminal shall send a RouteOpenRequest message upon entering this state.

The access terminal shall send a RouteOpenRequest message, if at least one of the following conditions is false:

- The access terminal entered this state for performing explicit registration
- RegistrationFailed public data of AirLink Management Protocol is set to '0'

If the *AirLinkManagement.RouteOpenRequired* indication is received, then the access terminal shall send a RouteOpenRequest message.

While in this state, the access terminal shall perform the following:

- If the access terminal receives a RouteOpenRequestRequest message, the access terminal shall send a RouteOpenRequest message to this access network.
- If the access terminal sends a RouteOpenRequest message, it shall perform the following:
 - The Route Control Protocol shall return a *RouteCreated(RouteCounter)* indication, with RouteCounter set to the value transmitted in the corresponding RouteOpenRequest message.
 - The access terminal shall start the ATWaitingToOpen timer with a value of $T_{RCPATWaitOpen}$.
- If the access terminal receives a RouteOpenAccept message, the access terminal shall perform the following:
 - The access terminal shall add the RouteID and ANID corresponding to this Route to RouteMap.
 - The access terminal shall return a *RouteOpened* indication.
 - If RouteOpenAccept message includes a UATI assignment, the access terminal shall process the UATI assignment as specified in 2.5.1.4.
 - If DAPMoveRequestNotAllowed field of the RouteOpenAccept message is set to '1', then the access terminal shall set DAPMoveAllowed to NO. Otherwise, the access terminal shall set DAPMoveAllowed to YES.
 - The access terminal shall stop the ATWaitingToOpen timer.
 - The access terminal shall transition to the Open State.
- If the access terminal receives a RouteOpenReject message, the access terminal shall perform the following:
 - If the RejectReason field is set to 0x00, the access terminal shall start a Retry Delay timer for this access network for time specified by RetryDelay field in the message.

- 1 – The access terminal shall delete this Route.
- 2 • The access terminal may send a RouteMap message to the access network.
- 3 • While the Retry Delay timer is running for an access network, the access terminal
- 4 should not send a RouteOpenRequest message to a pilot if the access terminal
- 5 determines that the pilot belongs to that access network.
- 6 • If the access terminal receives a RouteClose message, the access terminal shall send a
- 7 RouteClose message to the access network and shall delete this Route.
- 8 • If the ATWaitingToOpen timer expires, *AirLinkManagement.AirLinkInitialized* indication
- 9 is received, *AirLinkManagement.IdleInitiated* indication is received,
- 10 ~~*AirLinkManagement.ConnectionClosed* indication is received,~~ *Route.PersonalityFailure*
- 11 indication is received, *Route.UATIFailed* indication is received, ~~*Route.RouteExists*~~
- 12 indication is received, the access terminal shall delete this Route.
- 13 • If *Signaling.ReliableSignalingStreamReset* indication is received, or
- 14 *Signaling.ReliableMessageDeliveryFailed* indication is received, the access terminal shall
- 15 perform the following:
- 16 – If Air Link Management Protocol is in Suspended State, then the access terminal
- 17 shall delete this Route. Otherwise, the access terminal shall issue an
- 18 *AirLinkManagement.CloseConnection* command.
- 19 – If this is the SessionAnchor Route, the access terminal shall delete this Route.
- 20 • If *Route.RouteDoesNotExist* indication is received, the access terminal should create a
- 21 new Route.
- 22 • If the Route Control Protocol receives a *CreateNewStack(PilotID)* command, the Route
- 23 Control Protocol shall perform the following: if the CurrentATI public data is set to
- 24 RATI, the Route Control Protocol shall ignore this command; otherwise, the Route
- 25 Control Protocol shall perform the following:
- 26 – The Route Control Protocol shall select an *InitialProtocolSetIdentifier* or
- 27 *PersonalityIndex* to describe the personality of the new protocol stack. If the
- 28 overhead information corresponding to this pilot is available, the
- 29 *InitialProtocolSetIdentifier* corresponding to the selected personality shall be equal
- 30 to one of the *InitialProtocolSetIdentifier* values advertised by the access network
- 31 corresponding to this pilot; otherwise, the access terminal may choose a
- 32 *InitialProtocolSetIdentifier* or *PersonalityIndex* based on an implementation-defined
- 33 decision.
- 34 – The Route Control Protocol shall create a new Route (protocol stack) with the
- 35 selected *InitialProtocolSetIdentifier* or *PersonalityIndex*.
- 36 • If the access terminal receives a RouteCreate message, the access terminal shall
- 37 perform the following:
- 38 – The Route Control Protocol shall select most preferred *ProtocolSetIdentifier* or
- 39 *PersonalityIndex* from the list included in the message that the access terminal can
- 40 support.

1 – The Route Control Protocol shall create a new Route (protocol stack) with the
2 selected ProtocolSetIdentifier or PersonalityIndex.

3 – If the new Route Open operation is not successful, then the access terminal shall
4 send RouteCreateFailure message.

5 The access terminal shall perform the SessionAnchor Route related procedures specified in
6 2.5.1.7.1.

7 2.5.1.8.2 Access Network Requirements

8 The access network shall perform the following:

- 9 • If the access network receives a RouteOpenRequest message, the access network shall
10 send a RouteOpenAccept message or a RouteOpenReject message to the access
11 terminal:

12 – If the access network sends a RouteOpenAccept message, the Route Control
13 Protocol shall transition to the Open State and return a RouteCreated(RouteCounter)
14 indication with RouteCounter set to the value received in the corresponding
15 RouteOpenRequest message.

16 – If the access network sends a RouteOpenReject message, the access network shall
17 delete this Route.

18 ~~The Route Control Protocol shall return a RouteCreated(RouteCounter) indication, with~~
19 ~~RouteCounter set to the value received in the corresponding RouteOpenRequest~~
20 ~~message.~~

- 21 • If the access network sends a RouteClose message to the access terminal, the access
22 network shall transition to the WaitingToClose State.

- 23 • If the access network receives a RouteClose message in this state and if this is not
24 SessionAnchor Route, the access network shall delete this Route.

- 25 • If the Route Control Protocol receives *DeleteOldRoutes* command from a Route other
26 than this Route, the access network ~~shall~~ should delete this Route after Route sending
27 this command transitions to Open state.

28 2.5.1.9 Open State

29 2.5.1.9.1 Access Terminal Requirements

30 Upon entering this state if this is not the only Route in RouteMap, the access terminal shall
31 perform the following in order specified:

- 32 • If the key exchange procedure is initiated on this Route, wait for the
33 KeyExchange.KeyExchangeCompleted(Result) indication from the Key Exchange Protocol
34 of this Route.

- 35 • ~~If this is not the only Route in RouteMap, t~~The access terminal shall send a RouteMap
36 message to the access network conveying the information in RouteMap.

1 If *Route.RouteDoesNotExist* indication is received, the access terminal should create a new
2 Route.

3 If the Route Control Protocol receives a *CreateNewStack(PilotID)* command, the Route
4 Control Protocol shall perform the following: if the CurrentATI public data is set to RATI,
5 the Route Control Protocol shall ignore this command; otherwise, the Route Control
6 Protocol shall perform the following:

- 7 • The Route Control Protocol shall select a *InitialProtocolSetIdentifier* or *PersonalityIndex*
8 to describe the personality of the new protocol stack. If the overhead information
9 corresponding to this pilot is available, the *InitialProtocolSetIdentifier* corresponding to
10 the selected personality shall be equal to one of the *InitialProtocolSetIdentifier* values
11 advertised by the access network corresponding to this pilot; otherwise, the access
12 terminal may choose a *InitialProtocolSetIdentifier* or *PersonalityIndex* based on an
13 implementation-defined decision.
- 14 • The Route Control Protocol shall create a new Route (protocol stack) with the selected
15 *InitialProtocolSetIdentifier* or *PersonalityIndex*.

16 If the access terminal receives a *RouteCreate* message, the access terminal shall perform
17 the following:

- 18 • The Route Control Protocol shall select ~~most preferred~~ *ProtocolSetIdentifier* or
19 *PersonalityIndex* from the list included in the message that the access terminal can
20 support to describe the personality of the Route.
- 21 • The Route Control Protocol shall create a new Route (protocol stack) with the selected
22 *ProtocolSetIdentifier* or *PersonalityIndex* personality.
- 23 • If the new Route Open operation is not successful, then the access terminal shall send
24 *RouteCreateFailure* message.

25 If the Route Control Protocol receives a *RouteControl.RouteOpened* indication or a
26 *RouteControl.RouteClosed* indication from another route, the access terminal shall send
27 *RouteMap* message to the access network conveying the information in *RouteMap* unless
28 the State public data of the AirLink Management Protocol is set to Idle.

29 If the Route Control Protocol receives a *Signaling.ReliableSignalingStreamReset* indication or
30 a *Signaling.ReliableMessageDeliveryFailed* indication, then the access terminal shall
31 perform the following in order specified:

- 32 • Issue an *AirLinkManagement.CloseConnection* command.
- 33 • and If this is the *SessionAnchor* Route, the access terminal shall delete this Route.

34 If the access terminal receives a *RouteMapRequest* message, the access terminal shall send
35 a *RouteMap* message to the access network conveying the information in *RouteMap*.

36 If a *AirLinkManagement.AirLinkInitialized* indication is received or a
37 *AirLinkManagement.IdleInitiated* indication is received, and this is not the *SessionAnchor*
38 Route, the access terminal shall perform the following:

- 39 • The access terminal shall remove the *RouteID* and *ANID* corresponding to this Route
40 from *RouteMap*.

- 1 • The access terminal shall delete this Route.
- 2 The access terminal shall perform the DataAttachmentPoint Route related procedures
3 specified in 2.5.1.6.1.
- 4 The access terminal shall perform the LinkID related procedures specified in 2.5.1.5. The
5 access terminal shall perform the SessionAnchor Route related procedures specified in
6 2.5.1.7.1.
- 7 If the access terminal receives a RouteClose message or a *CloseRoute* command, the access
8 terminal shall perform the following:
- 9 • The access terminal shall send a RouteClose message to the access network.
- 10 If all of the following conditions are true, the access terminal shall start the ATRouteClose
11 timer with a value of ATRouteCloseTimer:
- 12 • State public data of the AirLink Management Protocol is not set to Connected
13 • This is not the SessionAnchor Route
- 14 The ATRouteClose timer shall be disabled if any of the above conditions is no longer true.
- 15 Unless the access terminal receives a RouteClose message or a *CloseRoute* command, the
16 access terminal shall comply with the following requirements for sending a RouteClose
17 message:
- 18 • The access terminal shall not send a RouteClose message if any of the following
19 conditions are true:
- 20 – This is the SessionAnchor Route.
21 – This is the DataAttachmentPoint Route and the value of the ATAssistedDAPMove
22 field of the ~~ATAssistedDAPMoveMode~~ attribute is equal to
23 1.
24 – State public data of the AirLink Management Protocol is set to “Connected”
25 – The ATRouteClose timer is active.
- 26 • The access terminal should not send a RouteClose message if the Busy public data of
27 any protocol of this Route is not zero.
- 28 If the access terminal sends a RouteClose message, the access terminal shall perform the
29 following:
- 30 • The access terminal shall remove the RouteID and ANID corresponding to this Route
31 from the RouteMap.
- 32 • If this is the SessionAnchor Route, the access terminal shall issue an
33 *AirLinkManagement.CloseConnection* command.
- 34 • The access terminal shall return a *RouteClosed* indication and shall delete this Route.

2.5.1.9.2 Access Network Requirements

If the access network receives a *CloseRoute* command in this state, the access network shall perform the following:

- The access network shall send a *RouteClose* message to the access terminal and transition to the *Waiting To Close* state.

If the access network receives a *RouteMap* message in this state, the access network shall send a *RouteMapAck* message to the access terminal.

If the access network receives a *RouteClose* message in this state and if this is not *SessionAnchor Route*, the access network shall delete this *Route*.

~~If the access network receives a *RouteOpenRequest* message, the access network shall send a *RouteOpenAccept* message.~~

The access network shall perform the *DataAttachmentPoint Route* related procedures specified in 2.5.1.6.2.

The access network shall perform the *SessionAnchor Route* related procedures specified in 2.5.1.7.2.

The access network should send a *RouteClose* message if all of the following conditions are true:

- The State public data of the *AirLink Management Protocol* is not set to “*Connected*”,
- If the *Busy* public data of all protocols of this *Route* is zero.
- This is not the *SessionAnchor Route*

If the access network sends a *RouteClose* message, it shall enter the *WaitingToClose* state.

If the *Route Control Protocol* receives *DeleteOldRoutes* command from a *Route* other than this *Route*, the access network ~~shall~~ should delete this *Route* after *Route* sending this command transitions to *Open* state.

If the *Route Control Protocol* receives *QueryRouteMap* command, the access network shall send a *RouteMapRequest* message to the access terminal.

2.5.1.10 *WaitingToClose* State

This state applies only to the access network. In this state the access network waits for the *Route* close procedures to complete.

If this *Route* is not *SessionAnchor Route* or has not assigned a *UATI*, then the access network shall perform the following:

- Upon entering this state, the access network shall start the *ANRouteClose* timer with a value of $T_{RCPANRouteClose}$.
- If the access network receives a *RouteClose* message from the access terminal or the *ANRouteClose* timer expires, the access network shall return a *RouteClosed* indication and shall delete this *Route*.

1 • If the access network receives a *Route.RouteReopen* indication, the Route Control
2 Protocol shall terminate this Route and open a new one.

3 • If the Route Control Protocol receives *DeleteOldRoutes* command from a Route other
4 than this Route, the access network ~~shall~~ should delete this Route after Route sending
5 this command transitions to Open state.

6 If this Route is SessionAnchor Route or has assigned a UATI, then the access network shall
7 perform the following:

8 • If the access network receives any message from the access terminal, the access
9 network shall send a RouteClose message.

10 • If the access network receives a *Route.RouteReopen* indication, the Route Control
11 Protocol shall terminate this Route after the new one transitions to Open state.

12 • If the Route Control Protocol receives *DeleteOldRoutes* command from a Route other
13 than this Route, the access network should delete this Route after Route sending this
14 command transitions to Open state.

15 • If the access network determines that this Route is no longer SessionAnchor Route,
16 then the access network shall follow procedures specified in this section for non
17 SessionAnchor Route.

18 2.5.2 Message Formats

19 2.5.2.1 RouteOpenRequest

20 The access terminal sends the RouteOpenRequest message to request opening a Route.
21

Field	Length (bits)
MessageID	8
RouteCounter	15
Reserved1	1
SessionSignature	16
RouteOpenRequestReason	4
EmergencyIndication	1
AuthenticationTagIncluded	1
Reserved2	0 or 2
AuthenticationTagBlobLength	0 or 8
AuthenticationTagBlob	0 or 8 x AuthenticationT agBlobLength
SessionAnchorRouteID	0 or 7
Reserved3	0-7 (as needed)

- 1 MessageID The access terminal shall set this field to 0x00.
- 2 RouteCounter The access terminal shall ~~increment~~set this field to
3 ~~RouteCounterLocal~~the next available value each time a
4 ~~RouteOpenRequest message is sent, where the next available value is~~
5 ~~the value whose 7 least significant bits are not equal to the RouteID~~
6 ~~of an existing Route. The seven least significant bits of this field shall~~
7 ~~be used as the RouteID for this Route.~~
- 8 Reserved1 The access terminal shall set this field to '0'. The access network
9 shall ignore this field.
- 10 SessionSignature The access terminal shall set this field to the signature of the current
11 session.
- 12 RouteOpenRequestReason
13 The access terminal shall set this field to the reason for Route open
14 request as specified in Table 2-1.

Table 2-1. RouteOpenRequestReason encoding

RejectReasonRouteOpenRequestReason	Meaning
0x0	AT-initiated
0x1	Page Response
0x2	Registration Failed
0x3	Response to RouteCreate message
0x4	Response to RouteOpenRequestRequest message
<u>0x5</u>	<u>Response to RegistrationResponse message with "Registration Successful with RouteOpenRequired" indication</u>
All other values	Reserved

- 16 EmergencyIndication The access terminal shall set this field to '1' if this is an emergency
17 RouteOpenRequest; Otherwise, the access terminal shall set this field
18 to '0'.
- 19 AuthenticationTagIncluded
20 The access terminal shall set this field to '0' if the CurrentATI public
21 data is set to RATI ~~or this is the SessionAnchor Route~~; otherwise, the
22 access terminal shall set this field to '1'.
- 23 Reserved2 The access terminal shall omit this field if the
24 AuthenticationTagIncluded field is set to '0'; otherwise, the access

1 terminal shall set this field to '00'. The access network shall ignore
 2 this field.

3 **AuthenticationTagBlobLength**

4 The access terminal shall omit this field if the
 5 AuthenticationTagIncluded field is set to '0'; otherwise, the access
 6 terminal shall include this field and set it as follows:

7 The access terminal shall set this field to the length of the
 8 AuthenticationTagBlob field in units of octets which is equal to value
 9 of IDTagSize returned by the CREATE_ID_TAG(SequenceNumber)
 10 procedure call to the Message Integrity Protocol of the SessionAnchor
 11 Route, where SequenceNumber is set to the 32-bit value (17-bit of
 12 '0's | RouteCounter). The access terminal shall not set this field to
 13 0x00.

14 **AuthenticationTagBlob**

15 The access terminal shall omit this field if the
 16 AuthenticationTagIncluded field is set to '0'; otherwise, the access
 17 terminal shall include this field and set it as follows:

18 The access terminal shall set this field to the value of IDTag returned
 19 by the CREATE_ID_TAG(SequenceNumber) procedure call to the
 20 Message Integrity Protocol of the SessionAnchor Route, where
 21 SequenceNumber is set to the 32-bit value (17-bit of '0's |
 22 RouteCounter).

23 ~~**SessionAnchorRouteID**~~

24 ~~The access terminal shall omit this field if the~~
 25 ~~AuthenticationTagIncluded field is set to '0'; otherwise, the access~~
 26 ~~terminal shall include this field and set it to the Route Identifier of~~
 27 ~~the SessionAnchor Route.~~

28 **Reserved3**

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

Channels	RTC	RLP	Reliable
Addressing	unicast	AuthTag	Required when key available

33 2.5.2.2 RouteOpenAccept

34 The access network sends the RouteOpenAccept message to accept the access terminal
 35 request for opening a new Route.
 36

Field	Length (bits)
MessageID	8
ANIDmsb	64
LinkIDIncluded	1
<u>NumLinkIDs</u>	<u>3</u>

NumLinkIDs occurrences of the following record:

LinkID	0 or 64
MTU	0 or 8

UATIAssignIncluded	1
UATIlsbSameAsPrev	0 or 1
UATIlsb	0 or 64
PagingIDInd	0 or 2
PagingID	0 or 32
<u>DAPMoveRequestNotAllowed</u>	<u>1</u>
Reserved	0-7 (as needed)

- 1 MessageID The access network shall set this field to 0x01.
- 2 ANIDmsb The access network shall set this field to the 64 MSB of its access
3 network identifier.
- 4 ~~LinkIDIncluded~~ ~~The access network shall set this field to '1' if the LinkID field is~~
5 ~~included in this message.~~
- 6 NumLinkIDs The access network shall set this field to the number of the LinkID
7 fields included in this message.
- 8 LinkID ~~The access network shall omit this field if the LinkIDIncluded field is~~
9 ~~set to '0'; otherwise, t~~The access network shall include this field and
10 set it to ~~its~~ link identifier.
- 11 MTU ~~The access network shall omit this field if the LinkIDIncluded field is~~
12 ~~set to '0'; otherwise, t~~The access network shall include this field and
13 set it such that the maximum transmission unit of IP datagrams over
14 this ~~Route-LinkID~~ (in octets) equals 1280+MTU.
- 15 UATIAssignIncluded The access network shall set this field to '1' if UATI and PagingID
16 assignment is included in this message; otherwise, the access
17 network shall set this field to '0'.

1 UATIlsbSameAsPrev The access network shall omit this field if UATIAssignIncluded field is
 2 set to '0', otherwise, the access network shall include this field and
 3 set it as follows:

4 The access network shall set this field to '1' if the 64 LSB of the UATI
 5 being assigned is the same as the 64 LSB of the UATI currently
 6 assigned to the access terminal; otherwise, the access network shall
 7 set this field to '0'.

8 UATIlsb If the UATIlsbSameAsPrev field is not included or is included and is
 9 set to '1', the access network shall omit this field; otherwise, the
 10 access network shall include this field and set it to the 64 LSB of the
 11 UATI being assigned to the access terminal.

12 PagingIDInd The access network shall omit this field if UATIAssignIncluded field is
 13 set to '0'; otherwise, the access network shall include this field and
 14 set it as follows:

15 The access network shall set this field to '00' if the PagingID field is
 16 included in this message. The access network shall set this field to
 17 '01' if PagingID corresponds to the 32 LSB of the UATI assigned to
 18 the access terminal. The access network shall set this field to '10' if
 19 the PagingID is the same as the current value of PagingID.

20 PagingID The access network shall omit this field if the PagingIDInd field is not
 21 included or is included and is not set to '00'; otherwise, the access
 22 network shall include this field and set it to the unicast paging
 23 identifier being assigned to the access terminal.

24 DAPMoveRequestNotAllowed
 25 If the access terminal is not allowed to send unsolicited
 26 DAPMoveRequest message on this Route, then the access network
 27 shall set this field to '1'; otherwise, the access network shall set this
 28 field to '0'.

29 Reserved The access network shall add reserved bits to make the length of the
 30 entire message equal to an integer number of octets. The access
 31 network shall set these bits to '0'. The access terminal shall ignore
 32 this field.
 33

Channels	FTC	RLP	Reliable
Addressing	unicast	AuthTag	Required when key available

34 2.5.2.3 RouteClose

35 The sender sends the RouteClose message to close the current Route.

1

Field	Length (bits)
MessageID	8
<u>CloseReason</u>	<u>8</u>
<u>RetryDelay</u>	<u>0 or 8</u>

2

MessageID The sender shall set this field to 0x02.

3

CloseReason The sender shall set this field to the reason for close as specified in Table 2-2.

4

5

Table 2-2. CloseReason encoding

<u>CloseReason</u>	<u>Meaning</u>
<u>0x00</u>	<u>Normal Close</u>
<u>0x01</u>	<u>General authentication/billing failure</u>
<u>0x02</u>	<u>No network connectivity</u>
<u>0x03</u>	<u>System overloaded</u>
<u>0x04</u>	<u>Reliable Signaling Stream Reset</u>
<u>0x05</u>	<u>Reliable Message Delivery Failed</u>
<u>0x06</u>	<u>Close Reply</u>
<u>All other values</u>	<u>Reserved</u>

6

RetryDelay The access network shall omit this field if the CloseReason field is not set to 0x03; otherwise, the access network shall include this field and set it to the retry delay in units of seconds as follows: Let a=RetryDelay[4:0] and b=RetryDelay[7:5], the effective retry delay is $2^b \times a$ in units of seconds.

7

8

9

10

11

Channels		RTC	FTC

RLP	Reliable (FTC only)	Best Effort (FTC ⁶ and RTC)

⁶ Access network sends RouteClose message in Best Effort mode if Signaling,ReliableSignalingStreamReset indication is received on this route.

Addressing	unicast
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AuthTag	Required when key available
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1 2.5.2.4 DAPMoveRequest

2 The access terminal sends the DAPMoveRequest message to request changing the
 3 DataAttachmentPoint access network to the access network corresponding to the Route
 4 that generated this message.

Field	Length (bits)
MessageID	8

6 MessageID The access terminal shall set this field to 0x03.

Channels	RTC
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RLP	Reliable
------------	----------

Addressing	unicast
-------------------	---------

AuthTag	Required when key is available
----------------	--------------------------------

8 2.5.2.5 DAPAssignment

9 The access network sends the DAPAssignment message to assign a new
 10 DataAttachmentPoint access network to the access terminal.

Field	Length (bits)
MessageID	8
RestartNetworkInterface	1
RequestStatus	1
Reserved1	6
TimeStamp	0 or 1648
DAPRefreshTime	0 or 16
UATIAssignIncluded	0 or 1
UATIlsbSameAsPrev	0 or 1
UATIlsb	0 or 64
PagingIDInd	0 or 2
PagingID	0 or 32
Reserved2	0-7 (as needed)

12 MessageID The access network shall set this field to 0x04.

13 ~~RestartNetworkInterface~~
 14 ~~If the access network wants to request the access terminal to restart~~

1		the network interface, the access network shall set this field to '1';
2		otherwise, the access network shall set this field to '0'.
3	RequestStatus	If this message is being sent in response to a DAPMoveRequest
4		message from the access terminal and the access network does not
5		accept the DataAttachmentPoint move request, the access network
6		shall set this field to '0'; Otherwise, the access network shall set this
7		field to '1'.
8	Reserved1	The access network shall set this field to '000000'. The access
9		terminal shall ignore this field.
10	Timestamp	The access network shall omit this field if the RequestStatus field is
11		set to '0'; otherwise, the access network shall include this field and
12		set it as follows:
13		The access network shall set this field to <u>indicate</u> the system -time at
14		which this message was generated the DAP move succeeded.; <u>This</u>
15		<u>field shall be set to 48 LSBs of time</u> specified in the NTP timestamp
16		format [RFC1305].
17	DAPRefreshTime	The access network shall omit this field if the RequestStatus field is
18		set to '0'; otherwise, the access network shall include this field and
19		set it as follows:
20		The access network shall set this field to the refresh time, in seconds,
21		associated with this DataAttachmentPoint assignment. The access
22		network shall set this field to 0xffff to indicate a timer value of
23		infinity.
24	UATIAssignIncluded	The access network shall omit this field if the RequestStatus field is
25		set to '0'; otherwise, t The access network shall <u>include this field and</u>
26		<u>set it this field</u> to '1' if UATI and PagingID assignment is included in
27		this message; otherwise, the access network shall set this field to '0'.
28	UATIlsbSameAsPrev	The access network shall omit this field if UATIAssignIncluded field is
29		not included or is included and is set to '0', otherwise, the access
30		network shall include this field and set it as follows:
31		The access network shall set this field to '1' if the 64 LSB of the UATI
32		being assigned is the same as the 64 LSB of the UATI currently
33		assigned to the access terminal; otherwise, the access network shall
34		set this field to '0'.
35	UATIlsb	If the UATIlsbSameAsPrev field is not included or is included and is
36		set to '1', the access network shall omit this field; otherwise, the

1 access network shall include this field and set it to the 64 LSB of the
2 UATI being assigned to the access terminal.

3 **PagingIDInd** The access network shall omit this field if UATIAssignIncluded field is
4 ~~not included or is included and is~~ set to '0'; otherwise, the access
5 network shall include this field and set it as follows:

6 The access network shall set this field to '00' if the PagingID field is
7 included in this message. The access network shall set this field to
8 '01' if PagingID corresponds to the 32 LSB of the UATI assigned to
9 the access terminal. The access network shall set this field to '10' if
10 the PagingID is the same as the current value of PagingID.

11 **PagingID** The access network shall omit this field if the PagingIDInd field is not
12 included or is included and is not set to '00'; otherwise, the access
13 network shall include this field and set it to the unicast paging
14 identifier being assigned to the access terminal.

15 **Reserved2** The access network shall add reserved bits to make the length of the
16 entire message equal to an integer number of octets. The access
17 network shall set these bits to '0'. The access terminal shall ignore
18 this field.

Channels	FTC	RLP	Reliable
Addressing	unicast	AuthTag	Required when key is available

20 2.5.2.6 RouteMap

21 The access terminal sends the RouteMap message to provide the mapping of Route
22 identifier (RouteID) to Access Network identifier (ANID) of all existing Routes in RouteMap.

23

Field	Length (bits)
MessageID	8
TransactionID	8
Reserved1	4
NumRoutes	4

NumRoutes occurrences of the following record:

Reserved2	1
RouteID	7
ANIDmsb	64

24 **MessageID** The access terminal shall set this field to 0x05.

- 1 TransactionID The access terminal shall increment this value for each new
2 RouteMap message sent.

- 3 Reserved1 The access terminal shall set this field to '0000'. The access network
4 shall ignore this field.

- 5 NumRoutes The access terminal shall set this field to the number of Routes in
6 RouteMap.

- 7 Reserved2 The access terminal shall set this field to '0'. The access network
8 shall ignore this field.

- 9 RouteID The access terminal shall set this field to the RouteID assigned to the
10 Route. The access terminal shall not change the RouteID assigned to
11 this Route.

- 12 ANIDmsb The access terminal shall set this field to the 64 MSB of the access
13 network identifier corresponding to this Route.

14

Channels	RTC	RLP	Reliable
Addressing	Unicast	AuthTag	Required when key is available

15 2.5.2.7 RouteMapAck

16 The access network sends the RouteMapAck message to acknowledge the reception of a
17 RouteMap message from the access terminal.

18

Field	Length (bits)
MessageID	8
TransactionID	8

19 MessageID The access network shall set this field to 0x06.

20 TransactionID The access network shall set this field to the value of the
21 TransactionID field in the RouteMap message to which this message
22 is the acknowledgement.

23

Channels	FTC	RLP	Reliable
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Addressing	unicast	AuthTag	Required when key is available
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2.5.2.8 RouteMapRequest

The access network sends the RouteMapRequest message to query the access terminal for the current RouteMap.

Field	Length (bits)
MessageID	8

MessageID The access network shall set this field to 0x07.

Channels	FTC	RLP	Reliable
Addressing	unicast	AuthTag	Required when key is available

2.5.2.9 UATIAssignment

The access network sends the UATIAssignment message to assign a UATI to the access terminal.

Field	Length (bits)
MessageID	8
UATIlsbSameAsPrev	1
UATIlsb	0 or 64
PagingIDInd	2
PagingID	0 or 32
Reserved	0-7 (as needed)

MessageID The access network shall set this field to 0x08.

UATIlsbSameAsPrev The access network shall set this field to '1' if the 64 LSB of the UATI being assigned is the same as the 64 LSB of the UATI currently assigned to the access terminal; otherwise, the access network shall set this field to '0'.

UATIlsb If the UATIlsbSameAsPrev field is set to '1', the access network shall omit this field; otherwise, the access network shall include this field and set it to the 64 LSB of the UATI being assigned to the access terminal.

PagingIDInd The access network shall set this field to '00' if the PagingID field is included in this message. The access network shall set this field to

1 '01' if PagingID corresponds to the 32 LSB of the UATI assigned to
 2 the access terminal. The access network shall set this field to '10' if
 3 the PagingID is the same as the current value of PagingID.

4 **PagingID** The access network shall omit this field if the PagingIDInd field is not
 5 set to '00'; otherwise, the access network shall include this field and
 6 set it to the unicast paging identifier being assigned to the access
 7 terminal.

8 **Reserved** This field shall be set to reserved bits to make the length of the entire
 9 message equal to an integer number of octets. These bits shall be set
 10 to '0'.

Channels	FTC	RLP	Reliable
Addressing	unicast	AuthTag	Required when key available

12 2.5.2.10 UATIComplete

13 The access terminal sends this message to notify the access network that it has received
 14 the UATI assignment.

15

Field	Length (bits)
MessageID	8
RouteID	7
UATIlsbSameAsPrev	1
UATIlsb	0 or 64
PagingIDInd	2
PagingID	0 or 32
Reserved	0-7 (as needed)

16 **MessageID** The access terminal shall set this field to 0x09.

17 **RouteID** The access terminal shall set this field to the RouteID of the Route
 18 that performed the UATI assignment.

19 **UATIlsbSameAsPrev** The access terminal shall set this field to '1' if the 64 LSB of the UATI
 20 that was assigned is the same as the 64 LSB of the UATI previously
 21 assigned to the access terminal; otherwise, the access terminal shall
 22 set this field to '0'.

23 **UATIlsb** If the UATIlsbSameAsPrev field is set to '1', the access terminal shall
 24 omit this field; otherwise, the access terminal shall include this field

1 and set it to the 64 LSB of the UATI that was assigned to the access
 2 terminal.

3 **PagingIDInd** The access terminal shall set this field to '00' if the PagingID field is
 4 included in this message. The access terminal shall set this field to
 5 '01' if PagingID corresponds to the 32 LSB of the UATI conveyed in
 6 this message. The access terminal shall set this field to '10' if the
 7 PagingID is the same as the previous value of PagingID.

8 **PagingID** The access terminal shall omit this field if the PagingIDInd field is not
 9 set to '00'; otherwise, the access terminal shall include this field and
 10 set it to the unicast paging identifier assigned to the access terminal.

11 **Reserved** This field shall be set to reserved bits to make the length of the entire
 12 message equal to an integer number of octets. These bits shall be set
 13 to '0'.
 14

Channels	RTC	RLP	Reliable
Addressing	Unicast	AuthTag	Required when key available

15 2.5.2.11 RouteCreate

16 The access network sends the RouteCreate message to request the access terminal to open
 17 a Route to the indicated access network⁷.
 18

⁷ For example, this can be used by an access network that intends to become the SessionAnchor.

Field	Length (bits)
MessageID	8
ANIDmsb	64
Reserved1	45
<u>NumAllowedPersonalities</u>	<u>4</u>
<u>NumProtocolSetIdentifier</u>	<u>3</u>

~~NumAllowedPersonalities NumProtocolSetIdentifier~~ occurrences of the following ~~field~~ record:

<u>AllowedPersonalityType</u>	<u>2</u>
<u>Reserved2</u>	<u>2 or 6</u>
ProtocolSetIdentifier	<u>0 or 16</u>

NumPersonalityIndex	3
Reserved2	5

~~NumPersonalityIndex~~ occurrences of the following ~~field~~:

PersonalityIndex	<u>0 or 4</u>
------------------	---------------

Reserved3	0-7 (as needed)
----------------------	----------------------------

- 1 MessageID The access network shall set this field to 0x0a.
- 2 ANIDmsb The access network shall set this field to the 64 MSB of the access
- 3 network identifier corresponding to the access network to which a
- 4 Route is to be created.
- 5 Reserved1 The access network shall set this field to '0000~~0~~'. The access terminal
- 6 shall ignore this field.
- 7 NumAllowedPersonalities
- 8 The access network shall set this field to the number of records
- 9 included in this message. The access network shall list these records
- 10 in decreasing order of preference.
- 11
- 12 NumProtocolSetIdentifier
- 13 ~~The access network shall set this field to the number of~~
- 14 ~~ProtocolSetIdentifier fields included in this message.~~

AllowedPersonalityType

The access network shall set this field to type of allowed personality as specified in Table 2-3.

Table 2-3. AllowedPersonalityType encoding

AllowedPersonalityType	Meaning
'00'	ProtocolSetIdentifier
'01'	PersonalityIndex
All other values	Reserved

~~Reserved2~~ If the AllowedPersonalityType field is set to '00', then length of this field shall be 6-bit; otherwise, the length of this field shall be 2 bits. The access network shall set all bits in this field to '0'. The access terminal shall ignore this field.

~~ProtocolSetIdentifier~~ If the AllowedPersonalityType field is not set to '00', then the access network shall omit this field; otherwise, ~~the access network shall include this field and set this field~~ to the ProtocolSetIdentifier corresponding to a personality allowed for this Route. ~~The access network shall list these field in decreasing order of preference.~~

~~NumPersonalityIndex~~ The access network shall set this field to the number of PersonalityIndex fields included in this message.

~~Reserved2~~ The access network shall set this field to '00000'. The access terminal shall ignore this field.

~~PersonalityIndex~~ If the AllowedPersonalityType field is not set to '01', then the access network shall omit this field; otherwise, ~~the access network shall include this field and set this field~~ to the PersonalityIndex corresponding to a personality allowed for this Route.

~~The access network shall list these field in decreasing order of preference.~~The access network shall not set this field to 0xf.

~~Reserved3~~ 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 these bits to '0'. The access terminal shall ignore this field.

Channels	FTC
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RLP	Reliable
------------	----------

Addressing	unicast	AuthTag	Required when key available
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2.5.2.12 RouteOpenReject

The access network sends the RouteOpenReject message to reject a RouteOpenRequest message from the access terminal.

Field	Length (bits)
MessageID	8
RejectReason	8
RetryDelay	0 or 8

MessageID The access network shall set this field to 0x0b.

RejectReason The access network shall set this field to the reason for rejection as specified in Table 2-4.

Table 2-4. RejectReason encoding

RejectReason	Meaning
0x00	Route Open Request queued
0x01	Session fetch failed due to session not found
0x02	Session fetch failed due to authentication failure
0x03	General authentication/billing failure/Other
0x04	No network connectivity
0x05	System overloaded
0x06	Pilot belongs to existing Route
<u>0x06</u>	<u>Session fetch failed due to stale RouteCounter</u>
All other values	Reserved

RetryDelay The access network shall omit this field if the RejectReason field is not set to 0x00; otherwise, the access network shall include this field and set it to the retry delay in units of seconds as follows: Let $a = \text{RetryDelay}[4:0]$ and $b = \text{RetryDelay}[7:5]$, the effective retry delay is $2^b \times a$ in units of seconds.

Channels	FTC	RLP	Reliable
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Addressing	unicast	AuthTag	Required when key available
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1 2.5.2.13 LinkIDAssignment

2 The access network sends the LinkIDAssignment message to convey its link identifier to
 3 the access terminal.

Field	Length (bits)
MessageID	8
<u>NumLinkIDs</u>	<u>3</u>

NumLinkIDs occurrences of the following record:

LinkID	64
MTU	8

5 MessageID The access network shall set this field to 0x0c.

6 NumLinkIDs The access network shall set this field to the number of the LinkID
 7 fields included in this message.

8 LinkID The access network shall set this field to ~~its~~ link identifier.

9 MTU The access network shall include this field and set it such that the
 10 maximum transmission unit of IP datagrams over this ~~route-LinkID~~
 11 (in octets) equals 1280+MTU.

Channels	FTC	RLP	Reliable
Addressing	unicast	AuthTag	Required when key is available

13 2.5.2.14 DAPMoveRequestRequest

14 The access network sends the DAPMoveRequestRequest message to request the access
 15 terminal to send a DAPMoveRequest message.

Field	Length (bits)
MessageID	8

17 MessageID The access network shall set this field to 0x0d.

Channels	FTC	RLP	Reliable
-----------------	-----	------------	----------

Addressing	unicast	AuthTag	Required when key is available
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1 2.5.2.15 RouteOpenRequestRequest

2 The access network sends the RouteOpenRequestRequest message to request the access
3 terminal to send a RouteOpenRequest message for the same Route

4

Field	Length (bits)
MessageID	8

5 MessageID The access network shall set this field to 0x0e.

6

Channels	FTC	RLP	Reliable
Addressing	unicast	AuthTag	Required when key is available

7 2.5.2.16 RouteCreateFailure

8 The access terminal sends the RouteCreateFailure message to indicate to the access
9 network that the Route Create operation failed.

10

Field	Length (bits)
<u>MessageID</u>	<u>8</u>

11 MessageID The access network shall set this field to 0x0f.

12

<u>Channels</u>	<u>RTC</u>	<u>RLP</u>	<u>Reliable</u>
<u>Addressing</u>	<u>unicast</u>	<u>AuthTag</u>	<u>Required when key is available</u>

13 2.5.2.17 RestartNetworkInterface

14 The access network sends the RestartNetworkInterface message to request the access
15 terminal to restart network interfaces.

16

Field	Length (bits)
<u>MessageID</u>	<u>8</u>

17 MessageID The access network shall set this field to 0x10.

18

Channels	<u>FTC</u>	RLP	<u>Reliable</u>
Addressing	<u>unicast</u>	AuthTag	<u>Required when key is available</u>

2.5.2.18 DAPMoveReject

The access network sends the DAPMoveReject message to reject the DAPMoveRequest message from the access terminal.

Field	Length (bits)
<u>MessageID</u>	<u>8</u>
<u>RejectReason</u>	<u>8</u>

MessageID The access network shall set this field to 0x11.

RejectReason The access network shall set this field to the reason for rejection as specified in Table 2-5.

Table 2-5. RejectReason encoding

RejectReason	Meaning
<u>0x00</u>	<u>AN not allowed</u>
<u>0x01</u>	<u>Network no response/Network busy</u>
<u>All other values</u>	<u>Reserved</u>

Channels	<u>FTC</u>	RLP	<u>Reliable</u>
Addressing	<u>unicast</u>	AuthTag	<u>Required when key is available</u>

2.5.3 Interface to Other Protocols

2.5.3.1 Commands Sent

This protocol ~~issues the following commands: does not issue any commands.~~

- AirLinkManagement.CloseConnection

2.5.3.2 Indications

This protocol registers to receive the following indications:

- AirLinkManagement.AirLinkInitialized
- AirLinkManagement.IdleInitiated

- 1 • ~~*AirLinkManagement.ConnectionClosed*~~
- 2 • *RouteControl.UATIAssigned(RouteID)* (from other Routes)
- 3 • *RouteControl.DAPAssigned(RouteID)* (from other Routes)
- 4 • *RouteControl.RouteOpened* (from other Routes)
- 5 • *RouteControl.RouteClosed* (from otherRoutes)
- 6 • *Route.PersonalityFailure*
- 7 • *Route.RouteExists*
- 8 • *Route.RouteReopen*
- 9 • *Route.UATIFailed*
- 10 • ~~*Route.ATIReceived*~~
- 11 • *Signaling.ReliableSignalingStreamReset*
- 12 • ~~*Signaling.ReliableMessageDeliveryFailed*~~
- 13 • ~~*KeyExchange.KeyExchangeCompleted(Result)*~~
- 14 • ~~*AirLinkManagement.RouteOpenRequired*~~

15 2.6 Configuration Attributes

16 2.6.1 Simple Attributes

17 The negotiable simple attributes for this protocol are listed in Table 2-6. The access
18 terminal shall use as defaults the values in Table 2-6 typed in ***bold italics***.

19 **Table 2-6. ~~Configuration Configurable~~ Attributes**

Attribute ID	Attribute	Commit / Scope	Values	Meaning
0x0000	ATRouteCloseTimer	Soft/ Static	<i>0x0005</i>	Route close timer period of 5 seconds
			0x0001-0x0004	Route close timer period in seconds
			All other values	Reserved

20 2.6.2 Complex Attributes

21 2.6.2.1 ATassistedDAPMoveMode Attribute

22 The sender shall set AttributeID field to 0x8000.
23

Field	Length (bits)	Default
ATassistedDAPMove	1	1
DAPMoveRequestTimer	15	0x0000
L2HotoDAPMoveRequestTimer	15	0x0000
<u>Reserved</u>	<u>1</u>	<u>N/A</u>

1 ATassistedDAPMove The sender shall set this field to 1 if the access terminal is allowed to
2 send a DAPMoveRequest message.

3 DAPMoveRequestTimer

4 The sender shall set this field to Recommended minimum period, in
5 units of 10ms, between unsolicited DAPMoveRequest messages. The
6 sender shall not set this field to a value greater than 0x03e8.

7 L2HotoDAPMoveRequestTimer

8 The sender shall set this field to the interval, in units of 10ms, for
9 which the access terminal must wait after detecting a L2 handoff
10 before sending a DAPMoveRequest message. The sender shall not set
11 this field to a value greater than 0x03e8.

12 Reserved The sender shall set this field to '0'. The receiver shall ignore this
13 field.

Commit	Soft
---------------	------

Scope	Static
--------------	--------

15 2.7 Non-Attribute Data

16 This protocol defines the following static Non-attribute data. This protocol does not define
17 any dynamic Non-attribute data.

18 2.7.1 PagingID

19 The sender shall set DataID field to 0x0000.
20

Field	Length (bits)
NumPagingID	3
NumPagingID occurrences of the following record	
PagingIDType	2
PagingID	32
Reserved	0-7 (as needed)

- 1 NumPagingID This field shall be set to the number of PagingID records included.
- 2 PagingIDType This field shall be set to the type of the included PagingID as follows:
3 This field shall be set to '01' for Multicast PagingID and '10' for
4 Unicast PagingID. No more than one occurrence of PagingID of each
5 PagingIDType shall be included.
- 6 PagingID This field shall be set to the current paging identifier assigned to the
7 access terminal.
- 8 Reserved This field shall be set to reserved bits to make the length of the entire
9 record equal to an integer number of octets. These bits shall be set to
10 '0'.

11 2.7.2 SessionSeed

12 The sender shall set DataID field to 0x0001.

Field	Length (bits)
SessionSeed	128

- 14 SessionSeed This field shall be set to the value of the SessionSeed associated with
15 the access terminal's session.

16 2.8 Protocol Numeric Constants

17

Constant	Meaning	Value
N _{RCPT} Type	Type field for this protocol	[1]
N _{RCPB} Basic	Subtype field for this protocol	0x00
T _{RCPAT} WaitOpen	Duration is seconds for access terminal to wait in the WaitingToOpen state for a RouteOpenAccept message from the access network	1
T _{RCPAN} RouteClose	Duration is seconds for access network to wait, after sending a RouteClose message, for a RouteClose message from the access terminal	1

1 **2.9 Session State Information**

- 2 The Session State Information record (see [1]) consists of parameter records.
- 3 All configuration attributes and Non-attribute data are Session State Information records.
- 4 This protocol does not define additional parameter records.

- 1 No text.